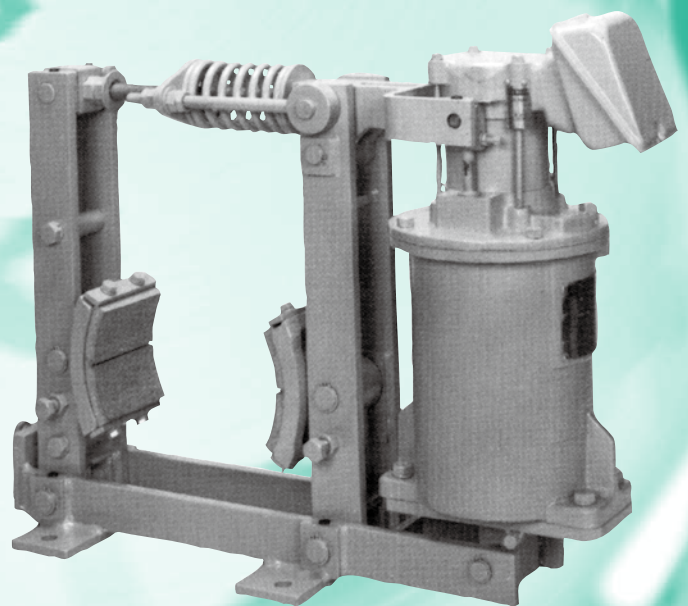
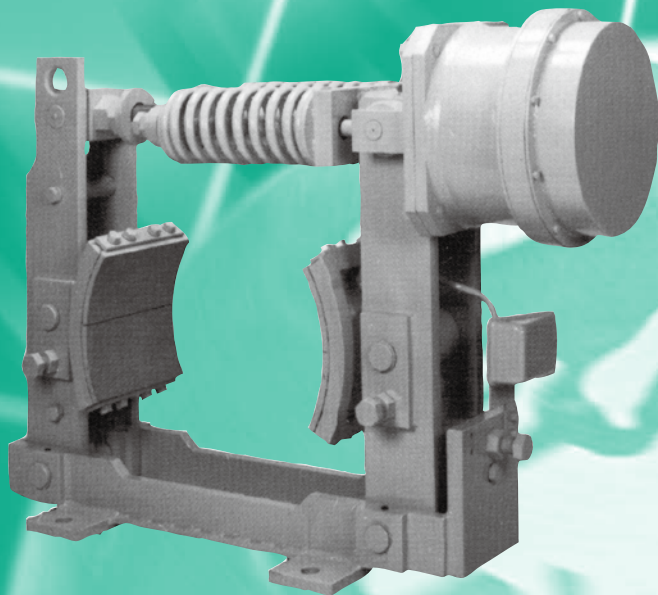




No.SC-191

Drum-type brakes

For cranes, general industrial machinery,
and auxiliary steel-rolling machines



Satuma Electric Mfg. Co., Ltd.

Drum-type brakes

For cranes, general industrial machinery,
and auxiliary steel-rolling machines

This series of brakes has been developed based on our years of manufacturing experience and a new design concept. The features of this long-life brake series include simplified maintenance, shockless operation and low noise achieved by an air damper (standard equipment on large electromagnetic brakes.)

Types and Ratings of Drum Type Brakes

Table 1 Types and ratings of Brakes

| Brake type | BRS5 type AC-operated DC electromagnetic brakes | BMS5-T type MEW Lifter brakes | BMS5-WT type MEW Lifter brakes |
|--|--|---|---|
| Applicable standard | JEM 1240 (AC. operated brakes for totally-enclosed fan-cooled low-voltage three-phase wound-rotor induction motor for crane use) | | |
| A c t u a t i o n | Off brake (Instantaneous strong-excitation type) | No-voltage operation | |
| A p p l i c a t i o n | For crane hoisting and industrial machinery | | For traversing and traveling of cranes, for conveyers |
| Ambient temperature | −10℃～+40℃ | | |
| Protective structure of operation unit | Dustproof type (Main unit: Unprotected type) | | |
| Insulation class of operation unit | Class B insulation | Class E insulation | |
| Rated voltage and frequency | 200V 50Hz、220V 60Hz、400V 50Hz、440V 60Hz | | |
| Usage rate of operation unit | 60% | | |
| A c t u a t i n g c y c l e | 400 (cycle/hour) | 400 (cycle/hour) BMS5-2840 (W) T or smaller, 250 (cycle/hour) BMS5-3145 (W) T or larger | |
| C o a t i n g c o l o r | Munsell 5B5/0.5 | | |

Note 1: See the page of each brake for shared voltage and frequency.

Application of Drum Type Brakes to motors

Table 2 Application of Brakes to motors (JEM1202 Totally-enclosed fan-cooled low-voltage three-phase wound-rotor induction motor for cranes)

| Motor | | AC-operated DC electromagnetic brakes and MEW Lifter brakes | | | | | | | |
|-----------|-----------------|---|--------------------------|---------------------------------------|----------------------------|-------------------|----------------------------|-------------------|----------------------------|
| Frame No. | Number of poles | Type of AC-operated DC electromagnetic brake | Type of MEW Lifter brake | Motor output and rated braking torque | | | | | |
| | | | | 25%ED | | 40%ED | | 60%ED | |
| | | | | Motor output (kW) | Rated braking torque (N·m) | Motor output (kW) | Rated braking torque (N·m) | Motor output (kW) | Rated braking torque (N·m) |
| 132M | 6 | BRS5-1316 | BMS5-1316T | 2.5 | 49 | 2.2 | 49 | 1.8 | 49 |
| | | | | 4 | 66 | 3.7 | 66 | 3 | 49 |
| 160M | 6 | BRS5-1620 | BMS5-1620T-1 | 6.3 | 98 | 5.5 | 98 | 4.5/6.3 | 98 |
| | | | BMS5-1620T-2 | 8.5 | 137 | 7.5 | 137 | --- | --- |
| 160 L | 6 | BRS5-1620 | BMS5-1620T-2 | 13 | 208 | 11 | 208 | 9 | 137 |
| 180 L | 6 | BRS5-1825 | BMS5-1825T | 17 | 294 | 15 | 294 | 13 | 208 |
| 200 L | 6 | BRS5-2025 | BMS5-2025T | 25 | 392 | 22 | 392 | 18.5 | 294 |
| 225M | 6 | BRS5-2231 | BMS5-2231T | 33 | 519 | 30 | 519 | 25 | 392 |
| 250M | 6 | BRS5-2535 | BMS5-2535T | 40 | 617 | 37 | 617 | 30 | 519 |
| | | | | 50 | 784 | 45 | 784 | 37 | 617 |
| 280M | 8 | BRS5-2840 | BMS5-2840T | 63 | 1290 | 55 | 1290 | 45 | 980 |
| 315M | 8 | BRS5-3145 | BMS5-3145T | 85 | 1760 | 75 | 1760 | 63 | 1290 |
| | | | | 100 | 2080 | 90 | 1760 | 75 | 1760 |
| 355 L | 10 | BRS5-3550L-1 | BMS5-3550T | 125 | 3280 | 110 | 3280 | 90 | 2600 |
| | | BRS5-3550L-2 | | 150 | 3920 | --- | --- | --- | --- |
| 400 L | 10 | BRS5-4056L-1 | BMS5-4056T | 185 | 4660 | 160 | 3920 | 132 | 3920 |
| | | BRS5-4056L-2 | | 220 | 5490 | 200 | 5490 | 160 | 3920 |

Note 2: The rated braking torque of brakes has been selected as 150% or more of the rated motor torque (JEM 1202) at 50 Hz and 25% ED or more.

Note 3: When the motor is to be used at an output of 15% ED, select a brake to be used on a case-by-case basis.

Note 4: For motors with a frame No. of 315 M or more, use the brake alongside another braking system such as electric braking.

Features of Drum Type Brakes

1. A brake lining with a contact angle of 60° is adopted.
 - Excellent initial braking torque characteristics and easy replacement
2. Automatic vertical gap adjustment of brake lining
 - Simple maintenance and inspection
3. Can be manually opened
 - This no-voltage actuation brake can be manually opened using a special auxiliary nut (bolt.)
4. Large electromagnetic brakes come with an air damper (which can be optionally mounted to other electromagnetic brakes. Please refer to the note column of each specification/external dimension table for the standard equipment scope.)
 - Mounting the air damper helps ensure shockless and low-noise operation.

| BFS5-T type AL brakes | BDS5 type DC electromagnetic brakes | | | Brake type |
|--|--|---|-----------------------------|--|
| | Operating power source : AC | | Operating power source : DC | |
| ----- | ----- | JEM 1120 (DC electromagnetic brakes for DC motors of auxiliary rolling mill and cranes) | | Applicable standard |
| AL control | Off brake (Instantaneous strong-excitation type) | | | A c t u a t i o n |
| For speed control | For crane hoisting and industrial machinery | | | A p p l i c a t i o n |
| -10℃～+40℃ | | | | Ambient temperature |
| Dustproof type (Main unit: Unprotected type) | | | | Protective structure of operation unit |
| Class E insulation | Class B insulation | | | Insulation class of operation unit |
| 200V 50Hz、220V 60Hz、400V 50Hz、440V 60Hz | | DC220V (110V) | | Rated voltage and frequency |
| 15% ED (150 sec. cycle) | 60% | Time rating | Continuous | Usage rate of operation unit |
| ----- | 400 (cycle/hour) | 600 (cycle/hour) | | A c t u a t i n g c y c l e |
| Munsell 5B5/0.5 | | | | C o a t i n g c o l o r |

| AL brake | DC electromagnetic brake | | | | | | | Motor | |
|------------------|--------------------------------------|--|-------------------------------|----------------------|-------------------------------|----------------------|-------------------------------|-----------|-----------------|
| Type of AL brake | Type of the DC electromagnetic brake | Motor output and rated braking torque of brake | | | | | | Frame No. | Number of poles |
| | | 40%ED | | 60%ED | | Continuous rating | | | |
| | | Motor output (kW) | Rated braking torque (N·m) | Motor output (kW) | Rated braking torque (N·m) | Motor output (kW) | Rated braking torque (N·m) | | |
| ----- | BDS5-1720 | 2.2 | 98 | 1.8 | 98 | 1.5 | 98 | 132M | 6 |
| | | 3.7 | 98 | 3 | 98 | 2.8 | 98 | | |
| BFS5-1620T-1 | | 5.5 | 98 | 4.5 | 98 | 4 | 98 | 160M | 6 |
| | | 7.5 | 127 | 6.3 | 98 | 5.5 | 98 | | |
| BFS5-1620T-2 | BDS5-2125 | 11 | 196 | 9 | 196 | 7.5 | 196 | 160 L | 6 |
| BFS5-1825T | | 15 | 255 | 13 | 196 | 11 | 196 | 180 L | 6 |
| BFS5-2025T | | 22 | 333 | 18.5 | 333 | 15 | 255 | 200 L | 6 |
| BFS5-2231T | | 30 | 539 | 25 | 539 | 22 | 539 | 225M | 6 |
| BFS5-2535T | BDS5-2533 | 37 | 706 | 30 | 539 | 25 | 539 | 250M | 6 |
| | | 45 | 706 | 37 | 706 | 33 | 539 | | |
| BFS5-2840T | BDS5-3040 | 55 | 1270 | 45 | 980 | 37 | 980 | 280M | 8 |
| BFS5-3145T | BDS5-3348L | 75 | 1960 | 63 | 1960 | 50 | 1960 | 315M | 8 |
| ----- | | 90 | 1960 | 75 | 1960 | 63 | 1960 | | |
| | | 110 | 3430 | 90 | 2550 | 75 | 1960 | 355 L | 10 |
| ----- | | 132 | 3430 | 110 | 3430 | 90 | 2550 | | |
| | | --- | ---- | --- | ---- | --- | ---- | | |
| ----- | BDS5-4058L | 160 | 3920 | 132 | 3920 | 110 | 3920 | 400 L | 10 |
| | | --- | ---- | 160 | 3920 | --- | ---- | | |
| | | 200 | 5100 | --- | ---- | 132 | 3920 | | |

Note 5: The AL brake is applicable when the intermittent service rating of the motor is 40% ED or lower.

BRS5 Type AC-operated DC electromagnetic brakes

The AC-operated DC electromagnetic brake is actuated by applying AC power to a DC instantaneous strong-excitation circuit using an exclusive control box. This is an off brake, which is disengaged when the power is set to on and engaged when it is set to off.

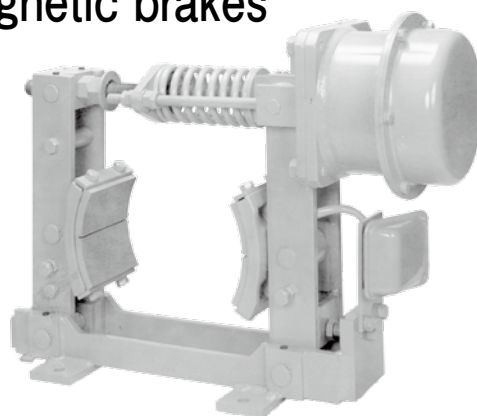


Fig. 1
BRS5-1316
}
BRS5-2231

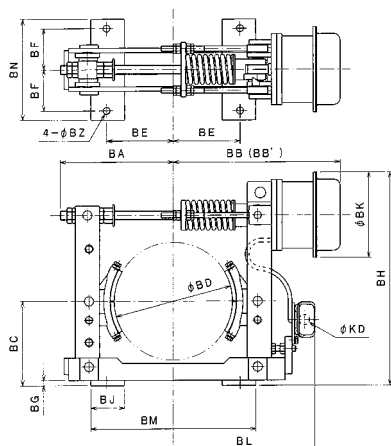


Fig. 2
BRS5-2535
}
BRS5-3145

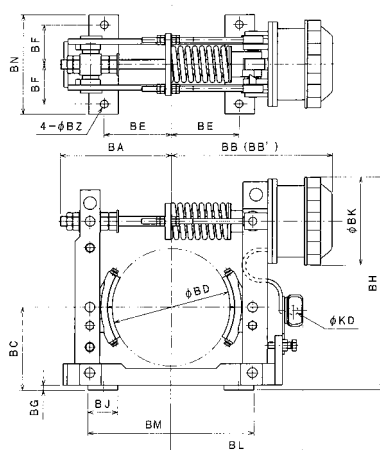


Fig. 3
BRS5-3550L
}
BRS5-4056L

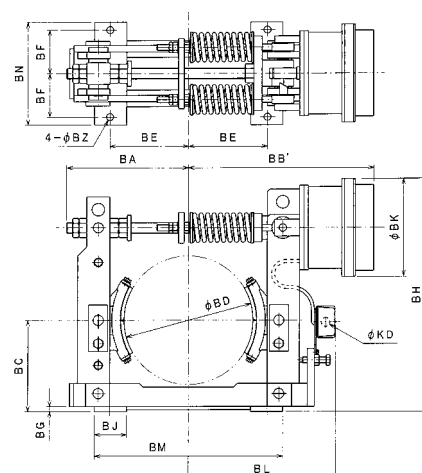


Fig. 4
Brake drum

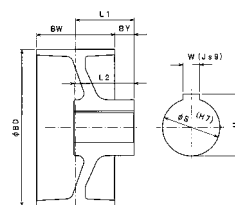


Table 3 Specifications and external dimensions of BRS5 Type AC-operated DC electromagnetic brakes

| Brake type | Frame No. | Rated braking torque (N·m) | | Frame No. of motor | Electro-magnet type | Control box (outline drawing) | Mass (kg) | | Moment of inertia of drum (kg · m ²) | Permissible braking workload (kJ / min) | | Permissible braking rotational speed (min ⁻¹) |
|--------------|-----------|----------------------------|------|--------------------|---------------------|-------------------------------|-----------|------|--|---|------|---|
| | | | | | | | Main body | Drum | | 50Hz | 60Hz | |
| BRS5-1316 | B132 | 66 | 49 | 132M | MD13D | BRD-SC (Fig. 5) | 28 | 4.5 | 0.02 | 20 | 22 | 3600 |
| BRS5-1620 | B160 | 208 | 137 | 98 | 160M | BRD-SC (Fig. 5) | 45 | 8 | 0.05 | 33 | 35 | 2900 |
| BRS5-1825 | B180 | 294 | 208 | | 180 L | BRD-SC (Fig. 5) | 66 | 15 | 0.15 | 57 | 60 | 2300 |
| BRS5-2025 | B200 | 392 | 294 | | 200 L | BRD-SC (Fig. 5) | 70 | 15 | 0.15 | 57 | 60 | 2300 |
| BRS5-2231 | B225 | 519 | 392 | | 225M | BRD-SC (Fig. 5) | 78 | 25 | 0.48 | 97 | 104 | 1800 |
| BRS5-2535 | B250 | 784 | 617 | 519 | 250M | BRD-SC (Fig. 5) | 126 | 35 | 0.80 | 126 | 129 | 1600 |
| BRS5-2840 | B280 | 1290 | 980 | | 280M | BRD-SC (Fig. 5) | 180 | 50 | 1.50 | 143 | 153 | 1400 |
| BRS5-3145 | B315 | 2080 | 1760 | 1290 | 315M | BRD-SC (Fig. 5) | 241 | 78 | 2.80 | 176 | 188 | 1300 |
| BRS5-3550L-1 | B355 | 3280 | 2600 | | 355 L | BRD-LC (Fig. 6) | 410 | 108 | 4.80 | 196 | 209 | 1150 |
| BRS5-3550L-2 | B355 | 3920 | | | 355 L | BRD-LC (Fig. 6) | 410 | 108 | 4.80 | 196 | 209 | 1150 |
| BRS5-4056L-1 | B400 | 4660 | 3920 | | 400 L | BRD-LC (Fig. 6) | 630 | 145 | 9.90 | 224 | 239 | 1000 |
| BRS5-4056L-2 | B400 | 5490 | | | 400 L | BRD-LC (Fig. 6) | 630 | 145 | 9.90 | 224 | 239 | 1000 |

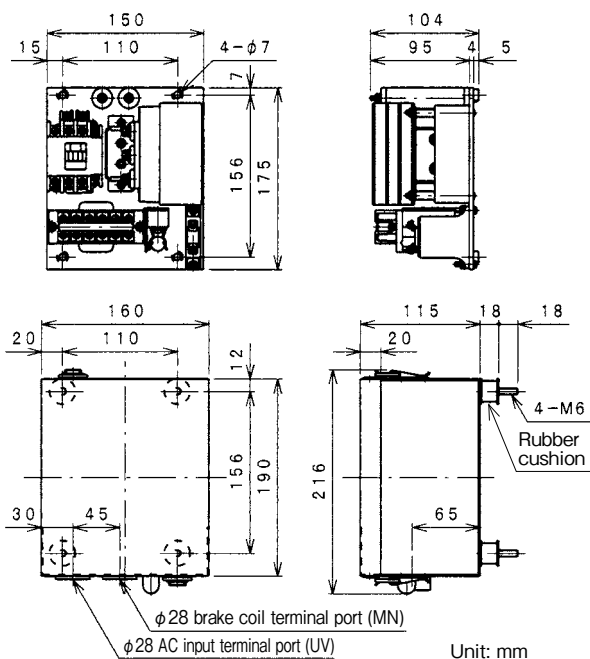
Note 6: See Table 1 (P. 1 and 2) for major ratings.

Note 7: The control box is to be separately installed and placed in the operation panel.

Note 8: The control box BRD-SC (Fig. 5) cannot be used for both 200- and 400 V-class brakes. (Control boxes of voltages and frequencies other than those listed in Table 1 are special items.)

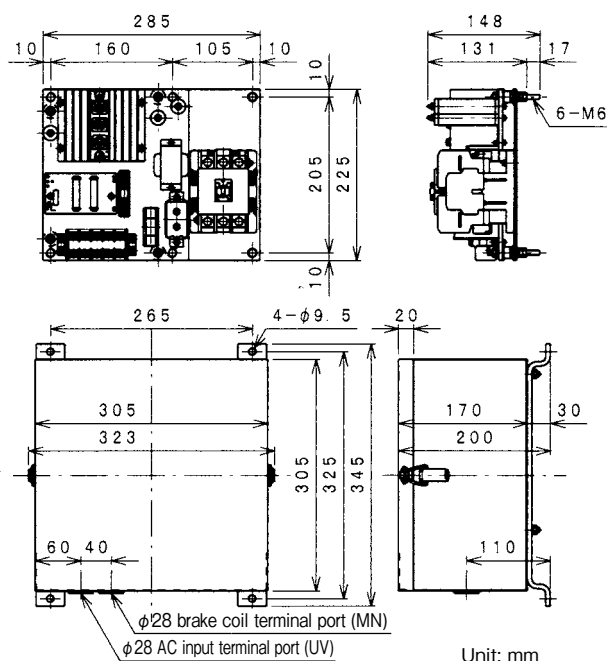
Note 9: The control box BRD-LC (Fig. 6) is exclusive for each voltage and frequency.

Note 10: Brakes BRS5-3550L or larger come with an air damper, which is also optionally available for brakes BRS5-3145 or smaller. (Sub-symbol L is attached to the symbol of electromagnetic brakes with an air damper.)



Top: Main body (Mass: 2.4 kg) Bottom: With case (Mass: 3.9 kg)

Fig. 5 External dimensions of control box (BRD-SC)



Top: Main body (Mass: 5.2 kg) Bottom: With case (Mass: 10.5 kg)

Fig. 6 External dimensions of control box (BRD-LC)

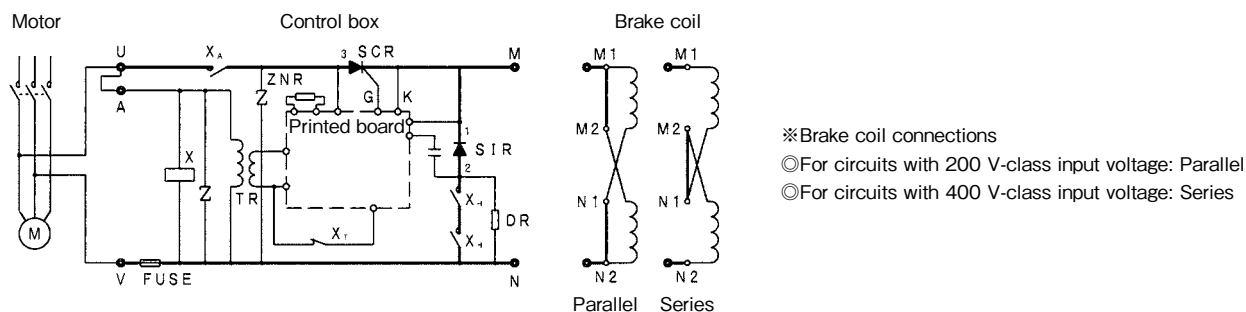


Fig. 7 Control box circuit diagram

| Brake main body (mm) | | | | | | | | | | | | | | | Brake drum (mm) (Fig. 4) | | | | | | | | Outline drawing | Brake type |
|----------------------|-----|-----|-----|----|------|-----|-----|-------|-----|-----|-----|-----|----|----|--------------------------|-----|----|----------------|----------------|-----|----|-------|--------------------|--------------|
| BA | BB | BB' | BC | BG | BH | BK | BL | BE | BF | BM | BN | BJ | BZ | KD | BD | BW | BY | L ₁ | L ₂ | S | W | H | | |
| 173 | 287 | 312 | 132 | 11 | 372 | 180 | 249 | 108 | 75 | 256 | 180 | 50 | 12 | 28 | 160 | 80 | 40 | 80 | 82 | 32 | 10 | 35.3 | Fig. 1 | BRS5-1316 |
| 210 | 344 | 369 | 160 | 11 | 425 | 209 | 282 | 127 | 85 | 310 | 210 | 65 | 15 | 28 | 200 | 100 | 37 | 87 | 112 | 42 | 12 | 45.3 | Fig. 1 | BRS5-1620 |
| 256 | 402 | 437 | 180 | 11 | 489 | 228 | 335 | 139.5 | 90 | 350 | 220 | 65 | 15 | 28 | 250 | 125 | 22 | 84.5 | 112 | 48 | 14 | 51.8 | Fig. 1 | BRS5-1825 |
| 256 | 402 | 437 | 200 | 14 | 509 | 228 | 335 | 159 | 95 | 400 | 250 | 75 | 19 | 28 | 250 | 125 | 32 | 94.5 | 112 | 55 | 16 | 59.3 | Fig. 1 | BRS5-2025 |
| 303 | 445 | 480 | 225 | 14 | 569 | 228 | 378 | 178 | 110 | 440 | 270 | 90 | 19 | 28 | 315 | 160 | 35 | 115 | 112 | 55 | 16 | 59.3 | Fig. 1 | BRS5-2231 |
| 335 | 484 | 519 | 250 | 15 | 643 | 266 | 396 | 203 | 120 | 500 | 300 | 90 | 24 | 28 | 355 | 180 | 40 | 130 | 142 | 60 | 18 | 64.4 | Fig. 2 | BRS5-2535 |
| 405 | 546 | 581 | 280 | 17 | 733 | 306 | 451 | 228.5 | 130 | 560 | 320 | 100 | 24 | 28 | 400 | 200 | 40 | 140 | 142 | 70 | 20 | 74.9 | Fig. 2 | BRS5-2840 |
| 415 | 600 | 635 | 315 | 20 | 826 | 362 | 491 | 254 | 150 | 630 | 360 | 125 | 28 | 28 | 450 | 225 | 55 | 167.5 | 172 | 85 | 22 | 90.4 | Fig. 2 | BRS5-3145 |
| 473 | 719 | | 355 | 20 | 906 | 382 | 571 | 305 | 170 | 730 | 400 | 125 | 28 | 34 | 500 | 250 | 60 | 185 | 212 | 100 | 28 | 106.4 | Fig. 3 | BRS5-3550L-1 |
| 473 | 719 | | 355 | 20 | 906 | 382 | 571 | 305 | 170 | 730 | 400 | 125 | 28 | 34 | 500 | 250 | 60 | 185 | 212 | 100 | 28 | 106.4 | Fig. 3 | BRS5-3550L-2 |
| 563 | 814 | | 400 | 25 | 1020 | 419 | 635 | 343 | 180 | 820 | 440 | 140 | 35 | 34 | 560 | 280 | 65 | 205 | 212 | 110 | 28 | 116.4 | Fig. 3 | BRS5-4056L-1 |
| 563 | 814 | | 400 | 25 | 1020 | 419 | 635 | 343 | 180 | 820 | 440 | 140 | 35 | 34 | 560 | 280 | 65 | 205 | 212 | 110 | 28 | 116.4 | Fig. 3 | BRS5-4056L-2 |

Note 11: BB' is the dimension of the brake equipped with an air damper (option.)

Note 12: The brake drum (Fig. 4) is made of gray cast iron (FC250.)

BMS5-T Type MEW Lifter brakes

BMS5-WT Type MEW Lifter brakes

The MEW Lifter brake uses a MEW Lifter (trade name of an electro-hydraulic lifter) instead of the electromagnet used by an electromagnetic brake. The MEW Lifter characteristics mean a slower operation with less impact than electromagnetic brakes.

To further decrease the operational speed, type BMS5-WT decreases the braking torque, and uses a MEW Lifter equipped with a lowering time-adjustment mechanism, which is ideal for traversing and traveling of cranes and stopping of conveyers.

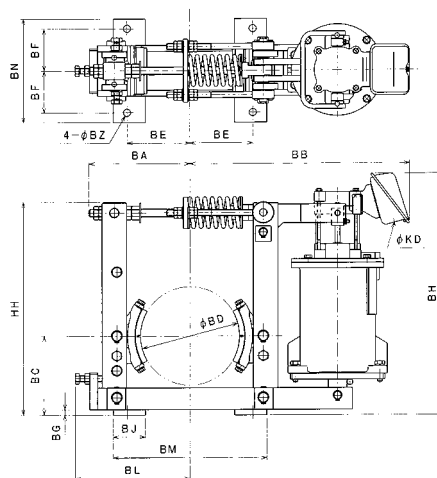


Fig. 8

BMS5-1316 (W) T, 1620 (W) T

Table 4 Specifications and external dimensions of BMS5-T Type MEW Lifter brakes

| Brake type | Frame No. | Rated braking torque (N·m) | | | Frame No. of motor | MEW Lifter type | Mass (kg) | | Moment of inertia of drum (kg · m ²) | Permissible braking workload (kJ / min) | | Permissible braking rotational speed (min ⁻¹) |
|--------------|-----------|----------------------------|------|------|--------------------|-----------------|-----------|------|--|---|-------|---|
| | | | | | | | Main body | Drum | | 50Hz | 60Hz | |
| BMS5-1316T | B132 | 66 | 49 | | 132M | MLD-15HS | 31 | 4.5 | 0.02 | 20 | 22 | 3600 |
| BMS5-1620T-1 | B160 | 98 | | | 160M 160 L | MLD-25HS | 51 | 8 | 0.05 | 33 | 35 | 2900 |
| BMS5-1620T-2 | B160 | 208 | 137 | | 160 L | MLD-25HS | 52 | 8 | 0.05 | 33 | 35 | 2900 |
| BMS5-1825T | B180 | 294 | 208 | | 180 L | MLD-40HS | 71 | 15 | 0.15 | 57 | 60 | 2300 |
| BMS5-2025T | B200 | 392 | 294 | | 200 L | MLD-40HS | 75 | 15 | 0.15 | 57 | 60 | 2300 |
| BMS5-2231T | B225 | 519 | 392 | | 225M | MLD-40HS | 84 | 25 | 0.48 | 97 | 104 | 1800 |
| BMS5-2535T | B250 | 784 | 617 | 519 | 250M | MLD-60HS | 135 | 35 | 0.80 | 126 | 129 | 1600 |
| BMS5-2840T | B280 | 1290 | | 980 | 280M | MLD-60HS | 178 | 50 | 1.50 | 143 | 153 | 1400 |
| BMS5-3145T | B315 | 2080 | 1760 | 1290 | 315M | MLD-120HS | 221 | 78 | 2.80 | 176 | 188 | 1300 |
| BMS5-3550T | B355 | 3920 | 3280 | 2600 | 355 L | MLD-120HS | 371 | 108 | 4.80 | 196 | 209 | 1150 |
| BMS5-4056T | B400 | 5490 | 4660 | 3920 | 400 L | MLD-120HS | 511 | 145 | 9.90 | 224 | 239 | 1000 |
| BMS5-5276T | --- | 11800 | | 8820 | --- | MLD-200HS | 1035 | --- | (36.0) | (298) | (310) | 750 |

Table 5 Specifications and external dimensions of BMS5-WT Type MEW Lifter brakes

| Brake type | Frame No. | Rated braking torque (N·m) | | | Frame No. of motor | MEW Lifter type | Mass (kg) | | Moment of inertia of drum (kg · m ²) | Permissible braking workload (kJ / min) | | Permissible maximum braking workload (kJ) | Permissible braking rotational speed (min ⁻¹) |
|-------------|-----------|----------------------------|------|------|--------------------|-----------------|-----------|------|--|---|-------|---|---|
| | | | | | | | Main body | Drum | | 50Hz | 60Hz | | |
| BMS5-1316WT | B132 | 39 | 29 | 20 | 132M | MLD-25HN | 41 | 4.5 | 0.02 | 20 | 22 | 137 | 3600 |
| BMS5-1620WT | B160 | 98 | 66 | 39 | 160M 160 L | MLD-25HN | 52 | 8 | 0.05 | 33 | 35 | 216 | 2900 |
| BMS5-1825WT | B180 | 176 | 137 | 98 | 180 L | MLD-25HN | 67 | 15 | 0.15 | 57 | 60 | 314 | 2300 |
| BMS5-2025WT | B200 | 265 | 206 | 147 | 200 L | MLD-25HN | 72 | 15 | 0.15 | 57 | 60 | 314 | 2300 |
| BMS5-2231WT | B225 | 382 | 294 | 206 | 225M | MLD-40HN | 85 | 25 | 0.48 | 97 | 104 | 549 | 1800 |
| BMS5-2535WT | B250 | 510 | 392 | 274 | 250M | MLD-40HN | 120 | 35 | 0.80 | 126 | 129 | 686 | 1600 |
| BMS5-2840WT | B280 | 804 | 617 | 431 | 280M | MLD-40HN | 163 | 50 | 1.50 | 143 | 153 | 882 | 1400 |
| BMS5-3145WT | B315 | 1270 | 980 | 686 | 315M | MLD-60HN | 200 | 78 | 2.80 | 176 | 188 | 1180 | 1300 |
| BMS5-3550WT | B355 | 2250 | 1760 | 1230 | 355 L | MLD-120HN | 369 | 108 | 4.80 | 196 | 209 | 1370 | 1150 |
| BMS5-4056WT | B400 | 3330 | 2600 | 1810 | 400 L | MLD-120HN | 506 | 145 | 9.90 | 224 | 239 | 1670 | 1000 |
| BMS5-5276WT | --- | 7840 | 6860 | 5880 | --- | MLD-200HN | 1033 | --- | (36.0) | (298) | (310) | (2940) | 750 |

Note 13: See Table 1 (P.1 and 2) for major ratings.

Note 14: Shared use for 200 V and 400 V is possible by changing the connection of the MEW Lifter, but shared use for 50- and 60-Hz frequencies is not allowed.

Note 15: MLD-15HS (used for BMS5-1316T) is exclusive for each voltage and frequency.

Note 16: The moment of inertia and each braking workload of the brake drum for BMS5-5276 (W)T are for your reference.

Note 17: Contact us when using the brake for crane hoisting. Some brakes are not appropriate for this purpose.

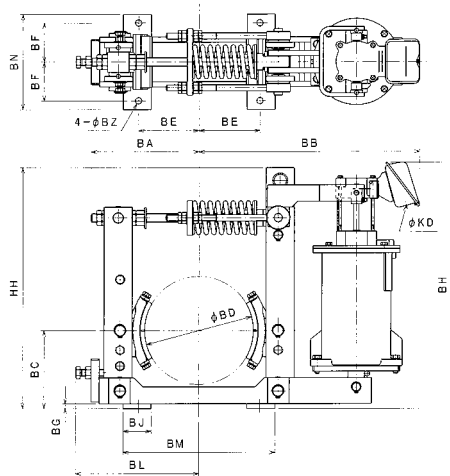


Fig. 9

BMS5-1825(W)T~3145(W)T

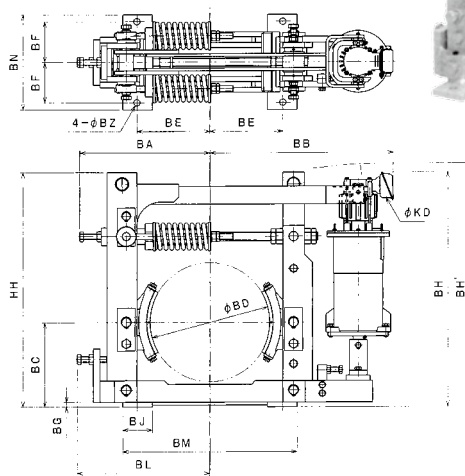


Fig. 10

BMS5-3550(W)T~5276(W)T

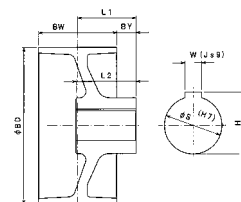
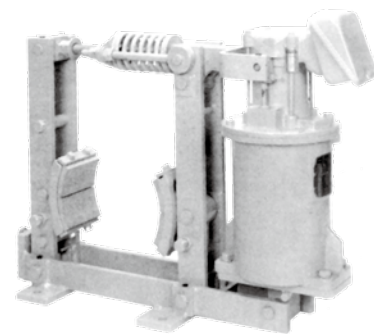


Fig. 11

Brake drum

| Brake main body (mm) | | | | | | | | | | | | | | Brake drum (mm) (Fig. 11) | | | | | | | | | | Outline drawing | Brake type |
|----------------------|------|-----|----|------|------|------|-----|-------|-----|-----|-----|-----|----|---------------------------|-----|-----|-----|----------------|----------------|-----|-----|-------|---------|--------------------|------------|
| BA | BB | BC | BG | BH | HH | BH' | BL | BE | BF | BM | BN | BJ | BZ | KD | BD | BW | BY | L ₁ | L ₂ | S | W | H | | | |
| 172 | 395 | 132 | 11 | 384 | 302 | --- | 200 | 108 | 75 | 256 | 180 | 50 | 12 | 27 | 160 | 80 | 40 | 80 | 82 | 32 | 10 | 35.3 | Fig. 8 | BMS5-1316T | |
| 204 | 443 | 160 | 11 | 489 | 432 | --- | 232 | 127 | 85 | 310 | 210 | 65 | 15 | 27 | 200 | 100 | 37 | 87 | 112 | 42 | 12 | 45.3 | Fig. 8 | BMS5-1620T-1 | |
| 204 | 443 | 160 | 11 | 489 | 432 | --- | 232 | 127 | 85 | 310 | 210 | 65 | 15 | 27 | 200 | 100 | 37 | 87 | 112 | 42 | 12 | 45.3 | Fig. 8 | BMS5-1620T-2 | |
| 249 | 507 | 180 | 11 | 568 | 556 | --- | 284 | 139.5 | 90 | 350 | 220 | 65 | 15 | 27 | 250 | 125 | 22 | 84.5 | 112 | 48 | 14 | 51.8 | Fig. 9 | BMS5-1825T | |
| 249 | 507 | 200 | 14 | 571 | 584 | --- | 284 | 159 | 95 | 400 | 250 | 75 | 19 | 27 | 250 | 125 | 32 | 94.5 | 112 | 55 | 16 | 59.3 | Fig. 9 | BMS5-2025T | |
| 296 | 580 | 225 | 14 | 571 | 586 | --- | 327 | 178 | 110 | 440 | 270 | 90 | 19 | 27 | 315 | 160 | 35 | 115 | 112 | 55 | 16 | 59.3 | Fig. 9 | BMS5-2231T | |
| 322 | 621 | 250 | 15 | 717 | 673 | --- | 378 | 203 | 120 | 500 | 300 | 90 | 24 | 27 | 355 | 180 | 40 | 130 | 142 | 60 | 18 | 64.4 | Fig. 9 | BMS5-2535T | |
| 373 | 728 | 280 | 17 | 718 | 744 | --- | 440 | 228.5 | 130 | 560 | 320 | 100 | 24 | 27 | 400 | 200 | 40 | 140 | 142 | 70 | 20 | 74.9 | Fig. 9 | BMS5-2840T | |
| 400 | 756 | 315 | 20 | 796 | 820 | --- | 455 | 254 | 150 | 630 | 360 | 125 | 28 | 27 | 450 | 225 | 55 | 167.5 | 172 | 85 | 22 | 90.4 | Fig. 9 | BMS5-3145T | |
| 545 | 766 | 355 | 20 | 983 | 985 | 1020 | 555 | 305 | 170 | 730 | 400 | 125 | 28 | 27 | 500 | 250 | 60 | 185 | 212 | 100 | 28 | 106.4 | Fig. 10 | BMS5-3550T | |
| 625 | 846 | 400 | 25 | 1088 | 1080 | 1125 | 639 | 343 | 180 | 820 | 440 | 140 | 35 | 27 | 560 | 280 | 65 | 205 | 212 | 110 | 28 | 116.4 | Fig. 10 | BMS5-4056T | |
| 784 | 1026 | 527 | 30 | 1310 | 1357 | 1425 | 818 | 381 | 241 | 944 | 580 | 180 | 42 | 27 | 762 | 362 | --- | --- | --- | --- | --- | --- | Fig. 10 | BMS5-5276T | |

| Brake main body (mm) | | | | | | | | | | | | | | | Brake drum (mm) (Fig. 11) | | | | | | | | | | Outline drawing | Brake type |
|----------------------|------|-----|----|------|------|------|-----|-------|-----|-----|-----|-----|----|----|---------------------------|-----|-----|----------------|----------------|-----|-----|-------|---------|-------------|--------------------|------------|
| BA | BB | BC | BG | BH | HH | BH' | BL | BE | BF | BM | BN | BJ | BZ | KD | BD | BW | BY | L ₁ | L ₂ | S | W | H | | | | |
| 172 | 415 | 132 | 11 | 483 | 352 | --- | 200 | 108 | 75 | 256 | 180 | 50 | 12 | 27 | 160 | 80 | 40 | 80 | 82 | 32 | 10 | 35.3 | Fig. 8 | BMS5-1316WT | | |
| 204 | 443 | 160 | 11 | 489 | 432 | --- | 232 | 127 | 85 | 310 | 210 | 65 | 15 | 27 | 200 | 100 | 37 | 87 | 112 | 42 | 12 | 45.3 | Fig. 8 | BMS5-1620WT | | |
| 249 | 507 | 180 | 11 | 505 | 556 | --- | 284 | 139.5 | 90 | 350 | 220 | 65 | 15 | 27 | 250 | 125 | 22 | 84.5 | 112 | 48 | 14 | 51.8 | Fig. 9 | BMS5-1825WT | | |
| 249 | 507 | 200 | 14 | 507 | 584 | --- | 284 | 159 | 95 | 400 | 250 | 75 | 19 | 27 | 250 | 125 | 32 | 94.5 | 112 | 55 | 16 | 59.3 | Fig. 9 | BMS5-2025WT | | |
| 296 | 580 | 225 | 14 | 571 | 586 | --- | 327 | 178 | 110 | 440 | 270 | 90 | 19 | 27 | 315 | 160 | 35 | 115 | 112 | 55 | 16 | 59.3 | Fig. 9 | BMS5-2231WT | | |
| 322 | 620 | 250 | 15 | 578 | 673 | --- | 378 | 203 | 120 | 500 | 300 | 90 | 24 | 27 | 355 | 180 | 40 | 130 | 142 | 60 | 18 | 64.4 | Fig. 9 | BMS5-2535WT | | |
| 373 | 727 | 280 | 17 | 579 | 744 | --- | 440 | 228.5 | 130 | 560 | 320 | 100 | 24 | 27 | 400 | 200 | 40 | 140 | 142 | 70 | 20 | 74.9 | Fig. 9 | BMS5-2840WT | | |
| 400 | 756 | 315 | 20 | 731 | 820 | --- | 455 | 254 | 150 | 630 | 360 | 125 | 28 | 27 | 450 | 225 | 55 | 167.5 | 172 | 85 | 22 | 90.4 | Fig. 9 | BMS5-3145WT | | |
| 545 | 766 | 355 | 20 | 983 | 985 | 1020 | 555 | 305 | 170 | 730 | 400 | 125 | 28 | 27 | 500 | 250 | 60 | 185 | 212 | 100 | 28 | 106.4 | Fig. 10 | BMS5-3550WT | | |
| 625 | 846 | 400 | 25 | 1088 | 1080 | 1125 | 639 | 343 | 180 | 820 | 440 | 140 | 35 | 27 | 560 | 280 | 65 | 205 | 212 | 110 | 28 | 116.4 | Fig. 10 | BMS5-4056WT | | |
| 784 | 1026 | 527 | 30 | 1310 | 1357 | 1425 | 818 | 381 | 241 | 944 | 580 | 180 | 42 | 27 | 762 | 362 | --- | --- | --- | --- | --- | --- | Fig. 10 | BMS5-5276WT | | |

Note 18: The brake drum (Fig. 11) is made of gray cast iron (FC250.)

BFS5-T Type AL brakes

The AL brake is a special MEW Lifter brake used to control speed (AL control) by connecting a MEW Lifter to the secondary side of a wound-rotor induction motor. When the AL brake is to be used, place a brake for stopping on the coupling side of the motor, and the AL brake on the anti-coupling side.

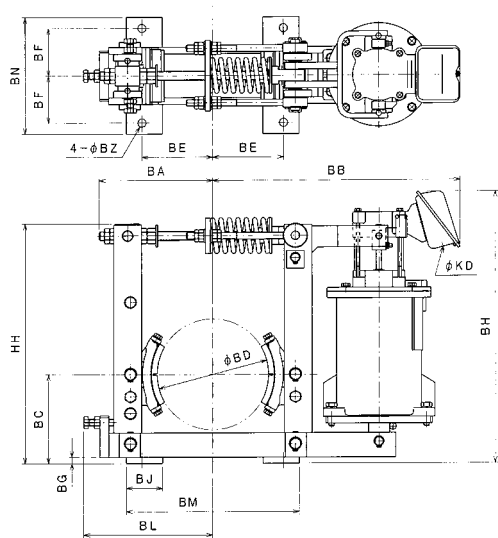
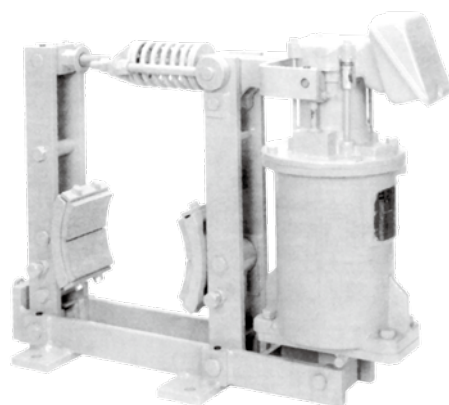


Fig. 12 BFS5-1620T-1,2

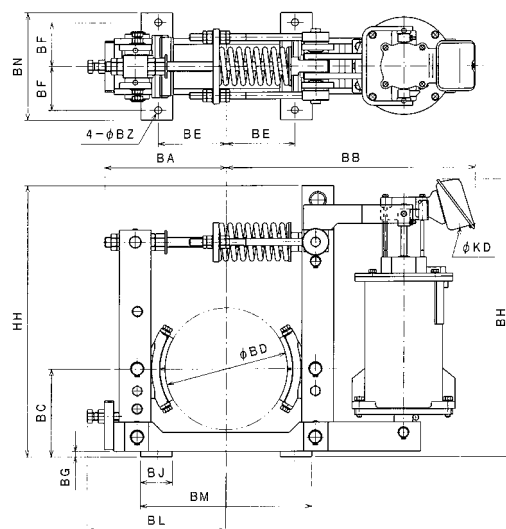


Fig. 13 BFS5-1825T~3145T

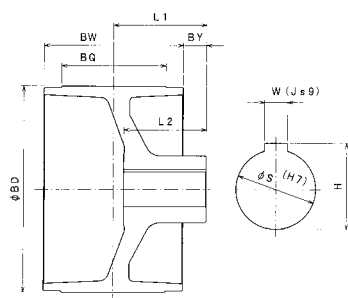
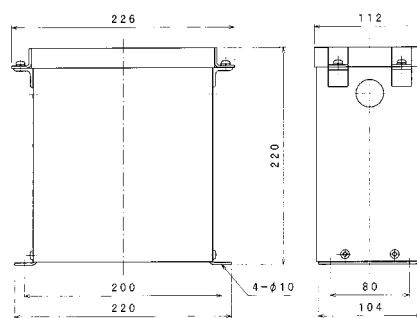


Fig. 14 Brake drum



Mass: 9 kg Unit: mm

Fig. 15 External dimensions of AL transformer

Table 6 Specifications and external dimensions of BFS5-T type AL brakes

| Brake type | Brake frame No. (reference) (Equivalent to JEM 1240) | Motor frame No. (reference) (Equivalent to JEM 1202) | MEW Lifter type | Capacity of AL transformer (kVA) (Fig. 15) | Mass (kg) | | Moment of inertia of drum (kg·m ²) |
|--------------|---|---|-----------------|--|-----------|------|---|
| | | | | | Main body | Drum | |
| BFS5-1620T-1 | B160 | 160M | MLD-25HS | 0.5 | 51 | 10 | 0.09 |
| BFS5-1620T-2 | B160 | 160 L | MLD-25HS | 0.5 | 52 | 10 | 0.09 |
| BFS5-1825T | B180 | 180 L | MLD-40HS | 0.5 | 71 | 22 | 0.25 |
| BFS5-2025T | B200 | 200 L | MLD-40HS | 0.5 | 75 | 22 | 0.25 |
| BFS5-2231T | B225 | 225M | MLD-40HS | 0.5 | 84 | 39 | 0.68 |
| BFS5-2535T | B250 | 250M | MLD-60HS | 0.5 | 135 | 59 | 1.30 |
| BFS5-2840T | B280 | 280M | MLD-60HS | 0.5 | 178 | 85 | 2.50 |
| BFS5-3145T | B315 | 315M | MLD-120HS | 0.5 | 221 | 131 | 4.80 |

Note 19: See Table 1 (P.1 and 2) for major ratings.

Note 20: Shared use for 200 V and 400 V is possible by changing the connection of the MEW Lifter, but shared use for 50- and 60-Hz frequencies is not allowed.

Speed control of crane motors using MEW Lifter

(AL-control : Adjustable lowering control)

With a MEW Lifter (electro-hydraulic lifter), the hydraulic pressure of the cylinder room changes by altering the rotation speed of the pilot motor at the top of the lifter, while the lifting force increases or decreases in proportion to the square of the rotation speed of the pilot motor. The AL-control system controls the speed of the wound-rotor motor using this property.

Figure A demonstrates the mechanism and connection. By moving the controller from the stop position to the first lowering notch, the wound-rotor motor IM and electromagnetic brake MB are connected to the power supply, the switch SW for MEW Lifter is connected to the R side respectively and the MEW Lifter of the AL brake is excited by the secondary frequency (like the power supply frequency when stopped) via a transformer TR to adjust voltage, generate lifting power and open the brake, whereupon the motor starts rotating. Since the secondary frequency declines with increasing motor-rotation speed, the lifting force of the MEW Lifter suddenly falls, as shown by curve A in Fig. B, and becomes 0 at the synchronous rotation speed.

Meanwhile, the spring strength for braking the AL brake is shown by linear line B. As shown, there is a state at a certain motor-rotation speed where the lifting force of the MEW Lifter is in equilibrium with the spring strength, allowing the brake shoe to rotate while slightly in contact with the brake drum.

If the motor-rotation speed increases slightly further from this state, the lifting force declines below the spring strength, allowing an increase in braking force and reducing the motor-rotation speed. If the motor-rotation speed declines slightly, the braking power decreases to increase the rotation speed, and the motor continues stable operation accordingly.

Specifically, assuming the synthetic torque of curves A and B to be C, the sum of the generated torque D of the motor and curve C when a resistor is inserted is shown by curve E (fedba.) When the load is 0, winding operation is performed at the speed of point d. At stable speed under a rated load, the lowering characteristics are improved as shown by point b, allowing stable low-speed lowering torque characteristics to be obtained.

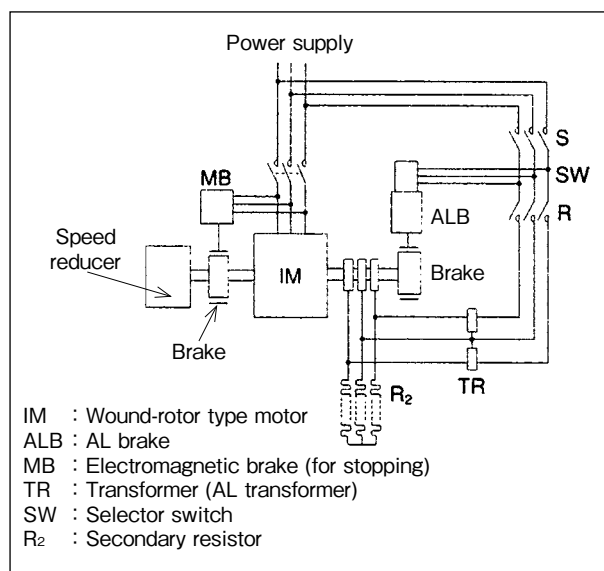


Fig. A Mechanism and connection

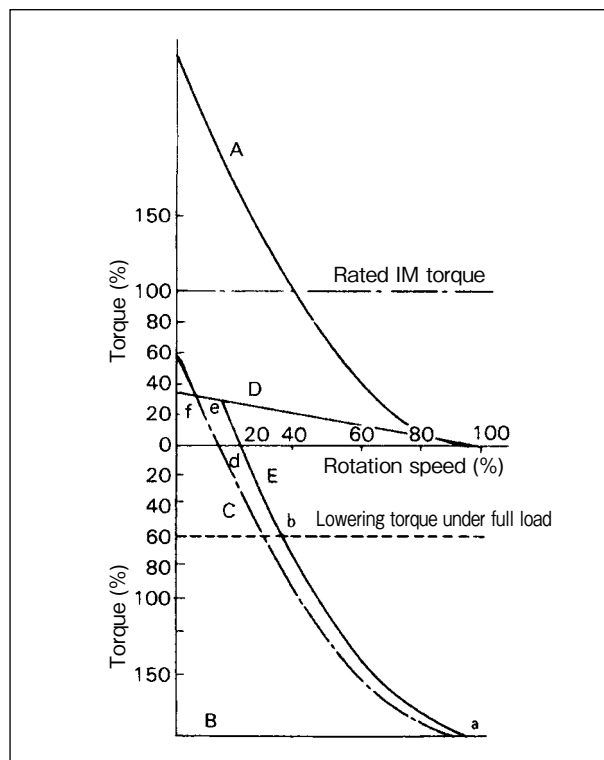


Fig. B Operation characteristics of AL brake

| Brake main body (mm) | | | | | | | | | | | | | Brake drum(mm) (Fig. 14) | | | | | | | | | | Outline | Brake type |
|----------------------|-----|-----|----|-----|-----|-----|-------|-----|-----|-----|-----|----|--------------------------|-----|-----|-----|------|----------------|----------------|----|----|------|---------|--------------|
| BA | BB | BC | BG | BH | HH | BL | BE | BF | BM | BN | BJ | BZ | KD | BD | BW | BQ | BY | L ₁ | L ₂ | S | W | H | drawing | |
| 204 | 443 | 160 | 11 | 489 | 432 | 232 | 127 | 85 | 310 | 210 | 65 | 15 | 27 | 200 | 160 | 100 | 37 | 117 | 112 | 42 | 12 | 45.3 | Fig. 12 | BFS5-1620T-1 |
| 204 | 443 | 160 | 11 | 489 | 432 | 232 | 127 | 85 | 310 | 210 | 65 | 15 | 27 | 200 | 160 | 100 | 37 | 117 | 112 | 42 | 12 | 45.3 | Fig. 12 | BFS5-1620T-2 |
| 249 | 507 | 180 | 11 | 568 | 556 | 284 | 139.5 | 90 | 350 | 220 | 65 | 15 | 27 | 250 | 180 | 125 | 22 | 112 | 112 | 48 | 14 | 51.8 | Fig. 13 | BFS5-1825T |
| 249 | 507 | 200 | 14 | 571 | 584 | 284 | 159 | 95 | 400 | 250 | 75 | 19 | 27 | 250 | 180 | 125 | 32 | 122 | 112 | 55 | 16 | 59.3 | Fig. 13 | BFS5-2025T |
| 296 | 580 | 225 | 14 | 571 | 586 | 327 | 178 | 110 | 440 | 270 | 90 | 19 | 27 | 315 | 200 | 160 | 35 | 135 | 112 | 55 | 16 | 59.3 | Fig. 13 | BFS5-2231T |
| 322 | 621 | 250 | 15 | 717 | 673 | 378 | 203 | 120 | 500 | 300 | 90 | 24 | 27 | 355 | 240 | 180 | 40 | 160 | 142 | 60 | 18 | 64.4 | Fig. 13 | BFS5-2535T |
| 373 | 728 | 280 | 17 | 718 | 744 | 440 | 228.5 | 130 | 560 | 320 | 100 | 24 | 27 | 400 | 300 | 200 | 40 | 190 | 142 | 70 | 20 | 74.9 | Fig. 13 | BFS5-2840T |
| 400 | 756 | 315 | 20 | 796 | 820 | 455 | 254 | 150 | 630 | 360 | 125 | 28 | 27 | 450 | 340 | 225 | 54.5 | 224.5 | 172 | 85 | 22 | 90.4 | Fig. 13 | BFS5-3145T |

Note 21: Use the brake drum for the AL brake as specified by Satuma (Fig. 14.) The brake drums for BFS5-1620T to 2231T are made of gray cast iron (FC250), and those for BFS5-2535T to 3145T are made of spherical graphite cast iron (FCD400.)

BDS5 Type DC electromagnetic brakes

Since the DC electromagnetic brake is of the DC instantaneous strong-excitation type, it must be strongly excited when the electromagnet is pulled, and weakly excited thereafter. Refer to Fig. 20 and Table 9 when planning an operational circuit.

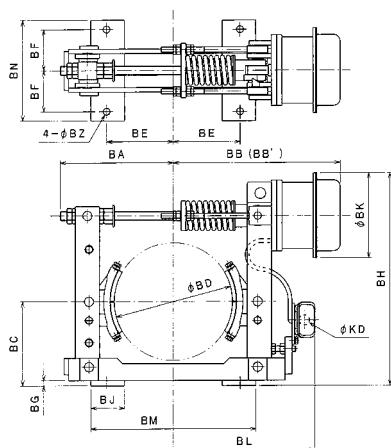


Fig. 16
BDS5-1720
BDS5-2125

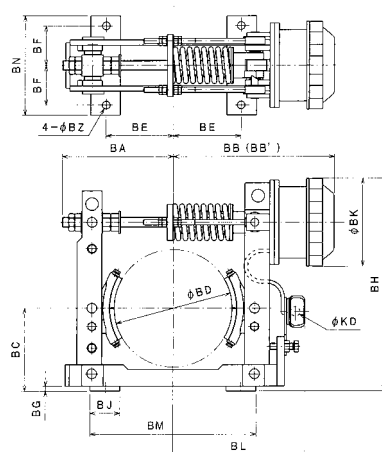


Fig. 17
BDS5-2533
BDS5-3040

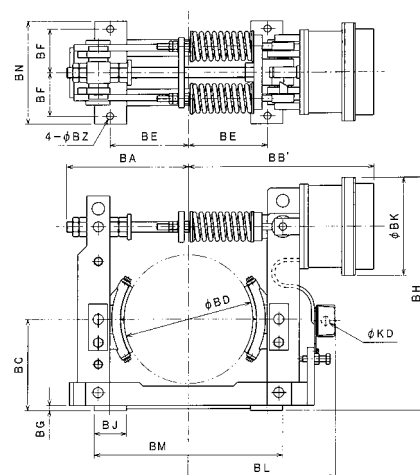
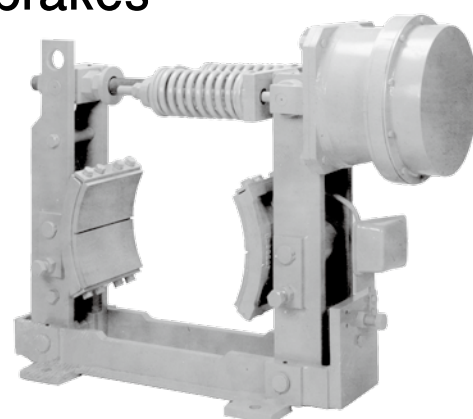


Fig. 18
BDS5-3348L
BDS5-5276L

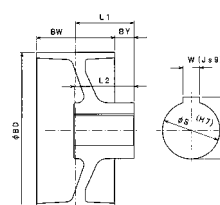


Fig. 19
Brake drum

Table 7 Specifications and external dimensions of the BDS5 Type DC electromagnetic brakes

| Brake type | Frame No. | Rated braking torque (N·m) | | | Frame No. of motor | | Electro-magnet type | Mass (kg) | | Moment of inertia of drum (kg · m ²) | Permissible braking workload (KJ/min) | Permissible braking rotational speed (min ⁻¹) |
|------------|----------------------|----------------------------|------------|------------|-------------------------|------------------------|---------------------|-----------|------|--|---------------------------------------|---|
| | | category 0 | category 1 | category 2 | DC | AC | | Main body | Drum | | | |
| BDS5-1720 | B802 | 147 | 127 | 98 | 802 A 802 B 802 C | 132M 160M | MD15D | 45 | 8.5 | 0.06 | 28 | 2800 |
| BDS5-2125 | B803 B804 | 333 | 255 | 196 | 803 804 | 160M 180 L 200 L | MD17D | 68 | 15 | 0.15 | 44 | 2300 |
| BDS5-2533 | B806 B808 | 1030 | 706 | 539 | 806 808 | 225M 250M | MD24D | 140 | 45 | 0.63 | 94 | 1800 |
| BDS5-3040 | B810 | 1520 | 1270 | 980 | 810 | 280M | MD29D | 225 | 70 | 1.60 | 139 | 1400 |
| BDS5-3348L | B812 B814 | 3430 | 2550 | 1960 | 812 814 | 315M 355 L | MD31D | 380 | 110 | 4.00 | 176 | 1200 |
| BDS5-4058L | B816 B818 | 6470 | 5100 | 3920 | 816 818 | 400 L | MD35D | 620 | 160 | 10.0 | 231 | 1000 |
| BDS5-5276L | B620 B622 B624 | --- | 11800 | 8820 | 620 622 624 | --- | MD40D | 1070 | --- | 36.0 | 298 | 750 |

Note 22: See Table 1 (P. 1 and 2) for major rating.

Note 23: Inform us of the brake type and DC voltage shown in Table 9 when ordering a resistor box. (The one for DC 110 V is also available.)

Note 24: AC operation of the BDS5 type DC electromagnetic brake is permissible using a control box. Use the control box BRD-SC (Fig. 5 on P. 4) for BDS5-1720 to BDS5-3040, and use control box BRD-LC (Fig. 6 on P. 4) for BDS-3348L to BDS5-4058L.

Note 25: Brakes BDS5-3348L or larger come with an air damper, which is also optionally available for brakes BDS5-3040 or smaller. (The sub-symbol L is attached to the symbol of electromagnetic brakes with an air damper.)

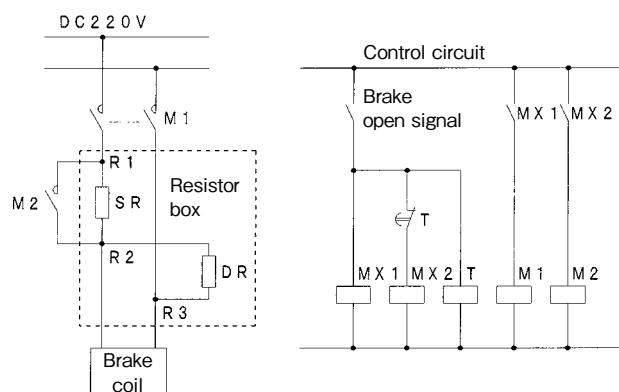


Fig. 20 Operation circuit of the DC electromagnetic brake

Description of symbols

- SR : Series resistor to be added at the time of weak excitation
- DR : Discharging resistor for brake
- M1 : Electromagnetic contactor for excitation
- M2 : Electromagnetic contactor for SR short circuit
- T : Time-limit operation timer 0.5 or 1.0 sec.
- MX1 : Auxiliary relay
- MX2 : Auxiliary relay

Table 8 External dimensions of the resistor box (mm)

| Resistor box | A | B | H | C | D | E |
|--------------|-----|-----|-----|-----|----|----|
| ED-11 | 155 | 175 | 137 | 277 | 32 | 51 |
| ED-21 | 265 | 285 | 177 | 337 | 30 | 91 |
| ED-31 | 347 | 367 | 177 | 419 | 30 | 91 |
| ED-41 | 347 | 367 | 227 | 419 | 30 | 91 |

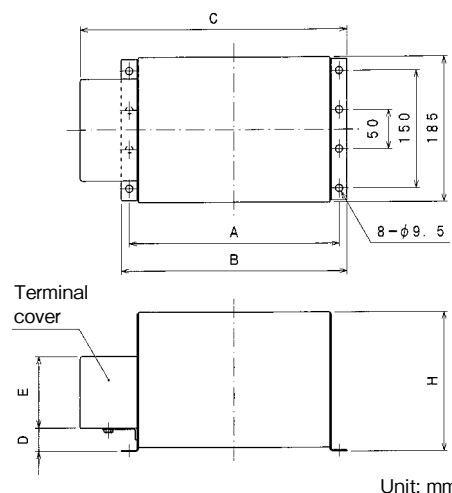


Fig. 21 Outline drawing of the resistor box

Table 9 Specifications of brakes for DC power supply

| Brake type | Electro-magnet type | Coil resistance (Ω) at 75°C | Strong excitation | | | Weak excitation | | External resistance value | | Resistor box (Fig. 21) | Mass of the resistor box (kg) |
|------------|---------------------|-----------------------------|-------------------|-------------|----------|-----------------|-------------|---------------------------|--------|------------------------|-------------------------------|
| | | | Voltage (V) | Current (A) | Time (s) | Voltage (V) | Current (A) | SR (Ω) | DR (Ω) | | |
| BDS5-1720 | MD15D | 28.0 | 220 | 7.86 | 0.5 | 29 | 1.04 | 180 | 600 | ED-11 | 3 |
| BDS5-2125 | MD17D | 21.8 | 220 | 10.1 | 0.5 | 30 | 1.38 | 137 | 440 | ED-21 | 4.5 |
| BDS5-2533 | MD24D | 19.0 | 220 | 11.6 | 0.5 | 41 | 2.16 | 80.7 | 400 | ED-21 | 5 |
| BDS5-3040 | MD29D | 14.4 | 220 | 15.3 | 0.5 | 39 | 2.71 | 64.8 | 300 | ED-21 | 6 |
| BDS5-3348L | MD31D | 12.4 | 220 | 17.7 | 1.0 | 39 | 3.15 | 55.5 | 260 | ED-21 | 6.3 |
| BDS5-4058L | MD35D | 9.15 | 220 | 24.0 | 1.0 | 40 | 4.37 | 39.4 | 200 | ED-31 | 7.5 |
| BDS5-5276L | MD40D | 5.84 | 220 | 37.7 | 1.0 | 33 | 5.65 | 32.0 | 120 | ED-41 | 10 |

| Brake main body (mm) | | | | | | | | | | | | | | | Brake drum for AC motor (mm) (Fig. 19) | | | | | | | | | | Outline | Brake type |
|----------------------|------|-----|-----|----|------|-----|-----|-----|-----|-----|-----|-----|----|----|--|-----|----------------------|----------------|-------------------|----------------|----------------|----------------------|---------|------------|---------|------------|
| BA | BB | BB' | BC | BG | BH | BK | BL | BE | BF | BM | BN | BJ | BZ | KD | BD | BW | BY | L ₁ | L ₂ | S | W | H | drawing | | | |
| 208 | 346 | 371 | 178 | 11 | 443 | 209 | 282 | 82 | 73 | 224 | 190 | 65 | 19 | 28 | 203 | 83 | 23.5 33.5 | 65 75 | 82 112 | 32 42 | 10 12 | 35.3 45.3 | Fig. 16 | BDS5-1720 | | |
| 253 | 405 | 440 | 213 | 14 | 522 | 228 | 335 | 102 | 80 | 270 | 200 | 65 | 19 | 28 | 254 | 95 | 32.5 32.5 37.5 | 80 80 85 | 112 112 112 | 42 48 55 | 12 14 16 | 45.3 51.8 59.3 | Fig. 16 | BDS5-2125 | | |
| 326 | 511 | 546 | 250 | 15 | 663 | 306 | 406 | 146 | 114 | 370 | 280 | 75 | 24 | 28 | 330 | 146 | 35 37 | 108 110 | 112 142 | 55 60 | 16 18 | 59.3 64.4 | Fig. 17 | BDS5-2533 | | |
| 386 | 579 | 614 | 308 | 20 | 789 | 362 | 461 | 190 | 136 | 490 | 340 | 110 | 28 | 28 | 406 | 171 | 34.5 | 120 | 142 | 70 | 20 | 74.9 | Fig. 17 | BDS5-3040 | | |
| 448 | 704 | | 336 | 20 | 879 | 382 | 556 | 235 | 165 | 580 | 400 | 110 | 28 | 34 | 483 | 222 | 34 49 | 145 160 | 172 212 | 85 100 | 22 28 | 90.4 106.4 | Fig. 18 | BDS5-3348L | | |
| 553 | 824 | | 403 | 25 | 1023 | 419 | 645 | 298 | 203 | 736 | 480 | 140 | 35 | 34 | 584 | 286 | 37 | 180 | 212 | 110 | 28 | 116.4 | Fig. 18 | BDS5-4058L | | |
| 685 | 1018 | | 527 | 30 | 1282 | 470 | 789 | 381 | 241 | 944 | 580 | 180 | 42 | 34 | 762 | 362 | --- | --- | --- | --- | --- | --- | Fig. 18 | BDS5-5276L | | |

Note 26: BB' is the dimension of the brake equipped with an air damper (option.)

Note 27: The brake drums (Fig. 19) for BDS5-1720 to 2125 are made of gray cast iron (FC250), and those for BDS5-2533 to 5276L are made of ductile cast iron (FCD400.)

Combination of a motor and drum-type brakes

See Table 2 on P. 1 for the standard application of drum-type brakes to totally-enclosed fan-cooled, low-voltage three-phase wound-rotor induction motor for cranes (JEM1202). See Fig. 22, Table 10, Fig. 23, and Table 11 for the mounting dimensions of motors and various brakes.

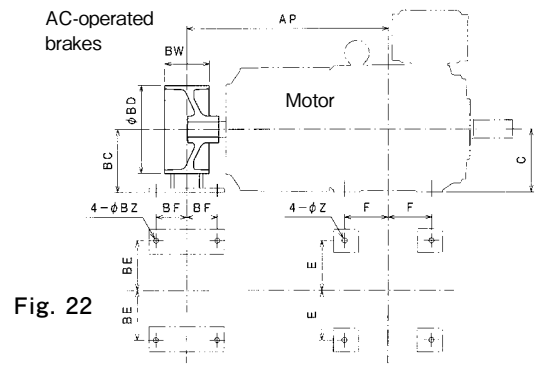


Fig. 22

1. Combination of motors and AC-operated DC electromagnetic brakes, or MEW Lifter brakes

Table 10 Dimensions for combination of motors (JEM1202) and AC-operated brakes (BRS5 type/BMS5-T type)

| Applicable model | | | | Dimension (mm) (Fig. 22) | | | | | | | | | | |
|------------------|-----------------|-------------|---------------------------|--------------------------|-------|-------|----|-------|-----|-----|-------|-----|----|--------------------|
| Motor (40%ED) | | | Type of AC-operated brake | Motor | | | | Brake | | | | | | Related dimensions |
| Frame No. | Number of poles | Output (kW) | | C | E | F | Z | BC | BD | BW | BE | BF | BZ | |
| 132M | 6 | 2.2 / 3.7 | BRS5-1316 / BMS5-1316T | 132 | 108 | 89 | 12 | 132 | 160 | 80 | 108 | 75 | 12 | 469 |
| 160M | 6 | 5.5 | BRS5-1620 / BMS5-1620T-1 | 160 | 127 | 105 | 15 | 160 | 200 | 100 | 127 | 85 | 15 | 522 |
| | | 7.5 | BRS5-1620 / BMS5-1620T-2 | | | | | | | | | | | |
| 160 L | 6 | 11 | BRS5-1620 / BMS5-1620T-2 | 160 | 127 | 127 | 15 | 160 | 200 | 100 | 127 | 85 | 15 | 544 |
| 180 L | 6 | 15 | BRS5-1825 / BMS5-1825T | 180 | 139.5 | 139.5 | 15 | 180 | 250 | 125 | 139.5 | 90 | 15 | 584 |
| 200 L | 6 | 22 | BRS5-2025 / BMS5-2025T | 200 | 159 | 152.5 | 19 | 200 | 250 | 125 | 159 | 95 | 19 | 647 |
| 225M | 6 | 30 | BRS5-2231 / BMS5-2231T | 225 | 178 | 155.5 | 19 | 225 | 315 | 160 | 178 | 110 | 19 | 720.5 |
| 250M | 6 | 37 / 45 | BRS5-2535 / BMS5-2535T | 250 | 203 | 174.5 | 24 | 250 | 355 | 180 | 203 | 120 | 24 | 844.5 |
| 280M | 8 | 55 | BRS5-2840 / BMS5-2840T | 280 | 228.5 | 209.5 | 24 | 280 | 400 | 200 | 228.5 | 130 | 24 | 889.5 |
| 315M | 8 | 75 / 90 | BRS5-3145 / BMS5-3145T | 315 | 254 | 228.5 | 28 | 315 | 450 | 225 | 254 | 150 | 28 | 996 |
| 355 L | 10 | 110 / 132 | BRS5-3550L-1 / BMS5-3550T | 355 | 305 | 315 | 28 | 355 | 500 | 250 | 305 | 170 | 28 | 1130 |
| 400 L | 10 | 160 | BRS5-4056L-1/BMS5-4056T | 400 | 343 | 355 | 35 | 400 | 560 | 280 | 343 | 180 | 35 | 1190 |
| | | 200 | BRS5-4046L-2/BMS5-4056T | | | | | | | | | | | |

2. Combination of motors and AL brakes/AC-operated DC electromagnetic brakes, or MEW Lifter brakes

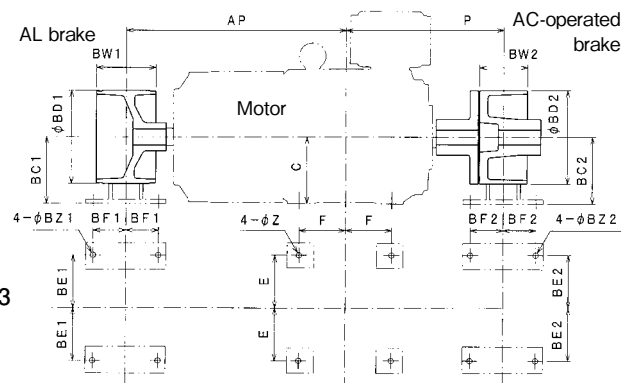


Fig. 23

Table 11 Dimensions for combination of motors (JEM 1202) and AL brakes (BFS5-T type)/AC-operated brakes (BRS5 type/BMS5-T type/)

| Applicable model | | | | Dimension (mm) (Fig. 23) | | | | | | | | | | | | | | | | | | |
|------------------|-----------------|-------------|---------------------|-------------------------------|-------|-------|-------|----|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------------------|-----------------|-----------------|-----------------|-----------------|-----------------|--------------------|-------|
| Motor (40%ED) | | | Type of AL brake | Type of AC- operated brake | Motor | | | | AL brake | | | | | | AC-operated brake | | | | | | Related dimensions | |
| Frame No. | Number of poles | Output (kW) | | | C | E | F | Z | BC ₁ | BD ₁ | BW ₁ | BE ₁ | BF ₁ | BZ ₁ | BC ₂ | BD ₂ | BW ₂ | BE ₂ | BF ₂ | BZ ₂ | AP | P |
| 160M | 6 | 5.5 | BFS5-1620T-1 | BRS5-1620 BMS5-1620T-1 | 160 | 127 | 105 | 15 | 160 | 200 | 160 | 127 | 85 | 15 | 160 | 200 | 100 | 127 | 85 | 15 | 522 | 379 |
| | | 7.5 | BFS5-1620T-1 | BRS5-1620 BMS5-1620T-2 | | | | | | | | | | | | | | | | | | |
| 160 L | 6 | 11 | BFS5-1620T-2 | BRS5-1620 BMS5-1620T-2 | 160 | 127 | 127 | 15 | 160 | 200 | 160 | 127 | 85 | 15 | 160 | 200 | 100 | 127 | 85 | 15 | 574 | 401 |
| 180 L | 6 | 15 | BFS5-1825T | BRS5-1825 BMS5-1825T | 180 | 139.5 | 139.5 | 15 | 180 | 250 | 180 | 139.5 | 90 | 15 | 180 | 250 | 125 | 139.5 | 90 | 15 | 611.5 | 439 |
| 200 L | 6 | 22 | BFS5-2025T | BRS5-2025 BMS5-2025T | 200 | 159 | 152.5 | 19 | 200 | 250 | 180 | 159 | 95 | 19 | 200 | 250 | 125 | 159 | 95 | 19 | 674.5 | 494 |
| 225M | 6 | 30 | BFS5-2231T | BRS5-2231 BMS5-2231T | 225 | 178 | 155.5 | 19 | 225 | 315 | 200 | 178 | 110 | 19 | 225 | 315 | 160 | 178 | 110 | 19 | 740.5 | 530.5 |
| 250M | 6 | 37 45 | BFS5-2535T | BRS5-2535 BMS5-2535T | 250 | 203 | 174.5 | 24 | 250 | 355 | 240 | 203 | 120 | 24 | 250 | 355 | 180 | 203 | 120 | 24 | 874.5 | 578.5 |
| 280M | 8 | 55 | BFS5-2840T | BRS5-2840 BMS5-2840T | 280 | 228.5 | 209.5 | 24 | 280 | 400 | 300 | 228.5 | 130 | 24 | 280 | 400 | 200 | 228.5 | 130 | 24 | 939.5 | 676.5 |
| 315M | 8 | 75 | BFS5-3145T | BRS5-3145 | 315 | 254 | 228.5 | 28 | 315 | 450 | 340 | 254 | 150 | 28 | 315 | 450 | 225 | 254 | 150 | 28 | 1053 | 734 |
| | | 90 | ----- | BMS5-3145T | | | | | | | | | | | | | | | | | | |

Brake-type descriptions

●Structure and arrangement of Brake type

| 1. Type symbol | 2. Size symbol | 3. Sub symbol |
|----------------|----------------|---------------|
|----------------|----------------|---------------|

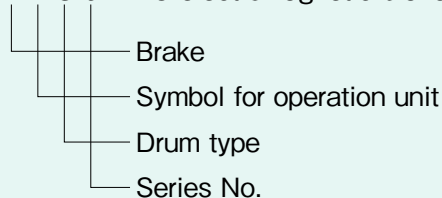
1. Type symbol

● B R S 5 ...AC-operated DC electromagnetic brake

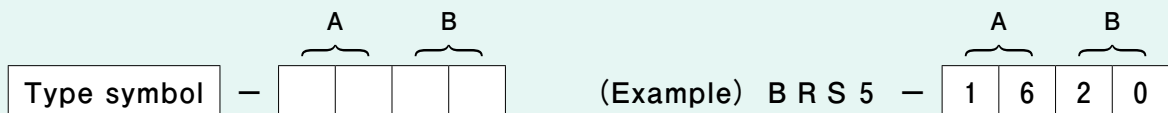
● B M S 5 ...MEW Lifter brake

● B F S 5 ...AL brake

● B D S 5 ...DC electromagnetic brake



2. Size symbol



● A ...Initial 2 digits of the brake center height

● B ...Initial 2 digits of the brake drum diameter

● Brake center height...160mm

● Brake drum diameter...200mm

3. Sub symbols

- A : Reverse operation type (braking when applying current)
- B : Unlubricated type (using bush for pin holes)
- E : With limit switch for checking brake release
- G : With limit switch for checking brake release by manual release operation
- K : Brake with mounting dimensions equivalent to those of old brakes
- L : Electromagnetic brake with air damper
- M : Electromagnetic brake with control box mounted to the brake main body
- P : With outdoor cover
- S : With handle for manual release
- T : Brake using MLD type MEW Lifter, or brake with special dimensions
- U : Brake with unitized brake drum and shaft
- W : Weak braking torque type

General expressions used for brake calculations

1. Braking torque

$$T_B = \frac{9550 \times kW}{n} \times F \text{ (N} \cdot \text{m)}$$

$$T'_B = \frac{974 \times kW}{n} \times F \text{ (kgf} \cdot \text{m)}$$

2. Braking time

$$t_B = \frac{J \times n}{9.55 \times (T_B \pm T_L)} \text{ (s)}$$

$$= \frac{GD^2 \times n}{375 \times (T_B \pm T_L)} \text{ (s)}$$

3. Rotation speed at start of braking

$$n_B = n + \Delta n$$

$$= n + \frac{9.55 \times (\pm T_L) \times \Delta t}{J} \text{ (min}^{-1}\text{)}$$

$$= n + \frac{375 \times (\pm T_L) \times \Delta t}{GD^2} \text{ (min}^{-1}\text{)}$$

4. Braking distance

To determine the braking distance, calculate the rotation volume of the motor up to stop, and perform a proportional calculation based on the motor-rotation speed and the speed of the load.

- Rotation volume of the motor up to stop

$$R = \frac{n + n_B}{60} \times \frac{1}{2} \times \Delta t + \frac{n_B}{60} \times \frac{1}{2} \times t_B \text{ (Rotation)}$$

- Braking distance

$$S = V \times \frac{R}{n} \text{ (m)}$$

5. Braking workload

- Braking workload for an operation

$$A_B = \frac{J \times n^2}{183} \times \frac{T_B}{T_B \pm T_L} \text{ (J)}$$

$$A'_B = \frac{GD^2 \times n^2}{7160} \times \frac{T'_B}{T'_B \pm T'_L} \text{ (kgf} \cdot \text{m)}$$

- Braking workload per minute

$$E_B = A_B \times Z \text{ (J/min)}$$

$$E'_B = A'_B \times Z \text{ (kgf} \cdot \text{m/min)}$$

T_B : Braking torque (N·m)

T'_B : Braking torque (kgf·m)

kW : Motor output (kW)

n : Motor-rotation speed (min⁻¹)

F : Constant related to load conditions and stopping time

(Hoisting 1.5 and over)
(Traversing, traveling 1.0~0.7)

J : Total moment of inertia converted to brake shaft (kg·m²)

$GD^2 = 4J \cdots$ Balance wheel effect (kgf·m²)

t_B : Braking time (s)

T_L : Load torque (N·m)

T'_L : Load torque (kgf·m)

Value converted into brake shaft

Code - represents the direction reverse to brake torque (lowering)

Code + represents the same direction as brake torque (hoisting)

Δn : Change in motor-rotation speed due to dead time (min⁻¹)

Δt : Dead time up to start of braking operation (s)

n_B : Rotation speed at the start of braking operation (min⁻¹)

R : Rotation volume of motor up to stop (rotation)

S : Braking distance (m)

V : Speed of load (m/min)

Z : Braking frequency (cycle/minute)

A_B : Braking workload per operation (J)

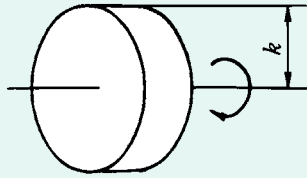
A'_B : Braking workload per operation (kgf·m)

E_B : Braking workload per minute (J/min)

E'_B : Braking workload per minute (kgf·m/min)

Calculation of the moment of inertia J

1. Right circular Cylinder

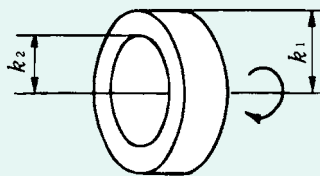


$$J = m \times \frac{k^2}{2} \text{ (kg} \cdot \text{m}^2\text{)}$$

k : Radius of rotating body [m]

m : Mass of rotating body [kg]

2. Hollow right circular cylinder



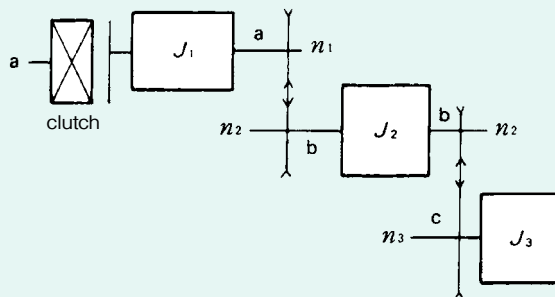
$$J = m \times \frac{k_1^2 + k_2^2}{2} \text{ (kg} \cdot \text{m}^2\text{)}$$

k_1 : Outer radius of rotating body (m)

k_2 : Inner radius of rotating body (m)

m : Mass of rotating body (kg)

To convert J of shaft a of the clutch having different rotation speed :



$$J = J_1 + \left(\frac{n_2}{n_1}\right)^2 \times J_2 + \left(\frac{n_3}{n_1}\right)^2 \times J_3 \text{ (kg} \cdot \text{m}^2\text{)}$$

n_1 Rotation speed of clutch shaft (min^{-1})

n_2 Rotation speed of shaft with second shaft J_2 (min^{-1})

n_3 Rotation speed of shaft with third shaft J_3 (min^{-1})