# Power supply for clutches and brake

For rated voltage DC 24V clutches and brakes
- ■BEH model (for ultrahigh-speed control)
- ■BEJ model (for high-speed control)
- ■BE model (for general control)
- ■BER model (for general control with control relay)
- ■BEZ model (for toothed clutch exclusive use)

For rated voltage DC 45/ 90/ 180V clutches & brakes
- ■BEW model (for general control)
- ■BEW-S type (compact・lightweight)
- ■BEW-W type (for both full/half wave・high capacity)
- ■BEW-FH type (overexcitation power supply)
- ■BEM model (compact・lead wire type)
- ■BEM-T type (ultracompact・lead wire type)

## Model list DC 24V specification

| Model | | BEH | BEJ | BE | BER | BEZ |
|---|---|---|---|---|---|---|
| Appearance | |  |  |  |  |  |
| Descriptive page | | P155～156 | P157～158 | P159～160 | | |
| Applicable clutch brake | | Electromagnetic clutch and brake<br>Clutch and brake unit<br>(Toothed clutch) | Electromagnetic clutch and brake<br>Clutch and brake unit<br>(Toothed clutch) | Electromagnetic clutch and brake<br>Clutch and brake unit<br>Non-excited brake | Electromagnetic clutch and brake<br>Clutch and brake unit | Toothed clutch |
| Characteristic | | For ultrahigh-speed control<br>Compact/High capacity<br>Defect factor display | For ultrahigh-speed control<br>Compact/Lightweight)<br>Overexcitation control | Multipurpose<br>High capacity<br>Robust | Built-in relay<br>High capacity<br>Robust | For toothed clutch only<br>High capacity<br>Robust |
| Input voltage [V] | AC100 | ● | ● | ● | ● | ● |
| | AC110 | | | | | ● |
| | AC200 | ● | ● | ● | ● | ● |
| | AC220 | | | | | ● |
| Output voltage [V] | | Overexciting: DC100<br>Steady-state: DC24<br>Reverse exciting: DC100 | Overexciting: DC100<br>Steady-state: DC24 | DC24 | DC24 | DC21.5 |
| Output capacity [W] | | 100 | 50 | 05： 25<br>10： 50<br>20：100<br>40：200 | 05： 25<br>10： 50<br>20：100 | 10：56.6<br>20：114 |
| Dimension [mm] | | 90×170×115 | 156×132×81 | 05： 90×130× 75<br>10：105×160×100<br>20：120×180×120<br>40：130×230×135 | 05：105×160×100<br>10：120×180×120<br>20：130×230×135 | 10：105×160×100<br>20：120×180×120 |
| Applicable size | 01 | | | | | |
| | 02 | | | | | |
| | 025 | | | | | |
| | 03 | | | | | |
| | 04 | | | | | |
| | 05 | | | | | |
| | 06 | 101 CS CSZ 111 BSZ 121 122 125 126 CBW CMW | 101 CS CSZ 111 BSZ 121 122 125 126 CBW CMW | 102 CYT 112 101 CS CSZ 111 BSZ 121 122 125 126 CBW CMW 180 | 102 CYT 112 101 CS CSZ 111 BSZ 121 122 125 126 CBW CMW 180 | |
| | 08 | | | | | |
| | 10 | | | | | |
| | 12 | 180 | 180 | BXW XS BXM BXL BXH BXR 457 458 | | |
| | 14 | | | | | |
| | 16 | | | | | |
| | 18 | 546 | 546 | | | 546 |
| | 20 | | | | | |
| | 25 | | | | | |
| | 32 | | | | | |

Models inside dotted square are special specification. Please contact us.

# Selection of power supplies

## 1 What is the type and size of the clutch and brake to be energized?

Electromagnetic actuated type/ spring actuated type (non-excited operation type), model, size, etc.

Depending on the type of clutch and brake to be used, applicable power supply is different. Grasp the clutch and brake model, voltage specification and size (power consumption).

## 2 What is the total power consumption for the power supply?

Depending on the specification of the machinery, several clutches and brakes are simultaneously energized. To control several clutches and brakes with one power supply, the total power consumption is necessary to understand. (Depending on the power supply, plural energization may not be supported.)

## 3 What is the clutch and brake characteristic required for the machinery?

Operation frequency, operation responsiveness, if overexciting function is necessary, if reverse exciting function is necessary, first-order control/ second-order control, torque up, etc.

By the specification of the machinery, the required operation characteristic, frequency or responsiveness is determined. For the response time of each clutch and brake model and the response time for the amount of work, refer to the section of each model and the technical data.

## 4 What is the applicable supply-voltage specification for the clutch and brake?

Power supply voltage is necessary for controlling machinery. There is equipment with AC100V and AC200V, or with DC24V as a control power. Power supply voltage is one of the very important items for selecting power supply.

## 5 What is the control method?

Sequencer, relay, SSR, etc

# Model list DC 45/90/180V Specification

| Model, type | | BEW | BEW-S | BEW-W | BEW-FH | BEM | BEM-T |
|---|---|---|---|---|---|---|---|
| Appearance | |  |  |  |  |  |  |
| Descriptive page | | P161～162 | P163～164 | P165～166 | P167～168 | P169～170 | P171～172 |
| Applicable clutch brake | | Non-excited brake | Non-excited brake | Non-excited brake | Non-excited brake | Non-excited brake | Non-excited brake |
| Characteristic | | For general control Terminal block type | Compact/lightweight Terminal block type | For full/half wave rectification Terminal block type Compact/High capacity | Overexcitation control Terminal block type | Lead wire type Compact | Lead wire type Ultracompact |
| Input voltage [V] | AC100 | ● | ● | ● | ● | ● | ● |
| | AC200 | ● | ● | ● | ● | ● | ● |
| | AC400 | ● | ● | ● | | ● | |
| Output voltage [V] | | DC45 / 90 / 180 | DC45 / 90 / 180 | DC45 / 90 / 180 | •For input volt. AC100V Overexciting: DC90V Steady-state: DC45V •For input volt. AC200V Overexciting: DC180V Steady-state: DC90V | DC45 / 90 / 180 | DC45 / 90 |
| Output capacity [W] | | 2H:90 4H:180 2HR:90 1F:360 2F:180 | 2S：90 4S：180 | 4W：1080 | 1FH：72 2FH：144 | 2H：72 4H：125 | 2T：90 |
| Dimension [mm] | | 44×51×33 | 42×19×27 | 45×33×32 | 78×31×55 | 28×18×12 | 7×17×19 |
| Voltage [V] | | DC45 / DC90 / DC180 | DC45 / DC90 / DC180 | DC45 / DC90 / DC180 | DC45 / DC90 / DC180 | DC45 / DC90 / DC180 | DC45 / DC90 |
| Applicable size | 01 | BXW XS BXM BXL BXH | BXW XS BXM BXL BXH | BXW XS BXM BXL BXH | BXW XS BXM BXL BXH | BXW XS BXM BXL BXH 458 | BXW XS BXM BXL BXH |
| | 02 | | | | | | |
| | 03 | | | | | | |
| | 04 | | | | | | |
| | 05 | | | | | | |
| | 06 | | | | | | |
| | 08 | | | | | | |
| | 10 | | | | | | |
| | 12 | BXW XS BXL BXH BMS 458 | BXW XS BXL BXH 458 | BXW XS BXL BXH BMS 458 | BXW XS BXL BXH 458 | BXW XS BXL BXH 458 | BXW XS BXL BXH 458 |
| | 14 | | | | | | |
| | 16 | | | | | | |
| | 18 | | | | | | |
| | 20 | BXW BMM 458 | BXW 458 | BXW BMM 458 | BXW 458 | BXW 458 | |
| | 25 | | | | | | |

# BEH model

## Power supply for ultrahigh-speed control


The operation speed of a clutch and brake is designed to offer high-frequency and high-accuracy operations. It is compact and lightweight, also has substantial protection features.

### Combination control of clutch and brake is easy.

High-frequency switching behavior such as inching operation can be performed by a single input signal. A fighting phenomenon caused by reverse exciting function in a large clutch and brake can be reduced.

### Optimal function can be obtained as soon as mounted.

An optimal value for operating the electromagnetic actuated type clutch and brake is set in advance that troublesome adjustment is not required.

### Substantial protection features

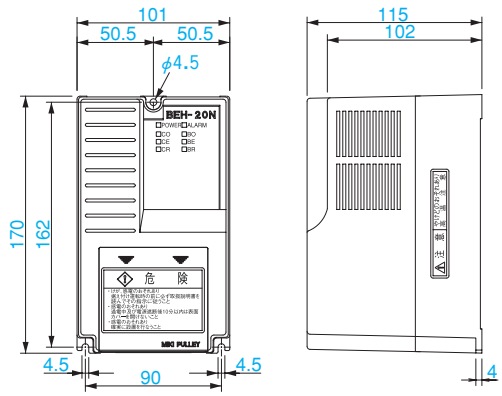
A short circuit or disconnection caused by faulty wiring or setting error during installation is informed by an alarm display. By the displayed contents, the defect factor is easy to find.

## Specification

| | | | |
|---|---|---|---|
| **Input voltage** | AC 100/115 V<br>AC 200/220 V | | ±10% 50/60Hz |
| **Output voltage** | Overexciting voltage | | DC 100 V |
| | Steady-state exciting voltage | | DC 24 V |
| | Reverse exciting voltage | | DC 100 V |
| **Size settings (SW1.2)** | Set up with the inside rotary switch.<br>06: [ 1 ] 08: [ 2 ] 10: [ 3 ] 12: [ 4 ] 16: [ 5 ]<br>20: [ 6 ] 25: [ 7 ] No over/reverse exciting [ 0 ] | | |
| **Applicable clutch and brake** | Miki pulley electromagnetic clutch and brake Rated voltage DC24V<br>※ Except the 180 model toothed clutch | | |
| **Protection features** | ・Input overvoltage/undervoltage protection<br>・Overcurrent protection<br>・Instantaneous power failure detection<br>・Breaking detection | | |
| **Operation setup (SW3)** | It is set when it is ON. | | |
| | 1 | Single acting/ interlocking mode | (Before shipment OFF: interlocking mode) |
| | 2 | Power failure detection | (Before shipment OFF) |
| | 3 | Breaking detection | (Before shipment ON) |
| | 4 | Wrong size detection | (Before shipment ON) |
| Control panel power consump. | 15 W (Unloaded condition) | | |
| **Input signal** | DC5 ～ 24V (3mA Smoothing power supply) | | |
| **Use environment** | −10 ～ +50 ℃ / 10 ～ 90 %RH | | |
| **Mass** | 1.3 kg | | |

## Dimension

CAD

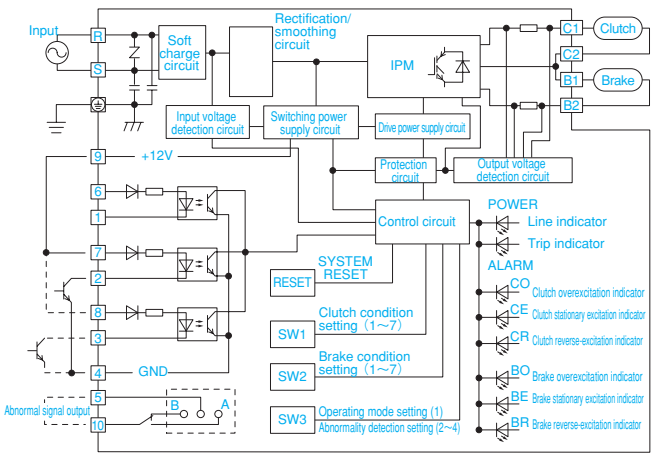



●CAD file No.BE2

## Terminal and feature

| Terminal marking | Terminal name | Function explanation |
|---|---|---|
| **R-S** | Power input terminal | Connect a commercial power AC200/220V 50/60Hz. (or AC100/115V) |
| **C1-C2** | Clutch output terminal | Connect a clutch |
| **B1-B2** | Brake output terminal | Connect a brake |
| ⏚ | Earth terminal | Ground earth terminal (third ground or above) |
| **1-6** | Manipulate signal (standby) | Do not connect anything |
| **2** | Manipulate signal 1 | Input an external signal for clutch operation |
| **3** | Manipulate signal 2 | Input an external signal for brake operation |
| **7** | Operating power input 1 | Input the power (+) for clutch operation. |
| **8** | Operating power input 2 | Input the power (+) for brake operation. |
| **9** | Manipulate signal power (+) | Manipulate signal standby power (100mA or below) |
| **4** | Manipulate signal power (-) | Manipulate signal standby power (COM) |
| **5-10** | Abnormal signal output terminal | Inside relay functions during trip |

## Structure



# Characteristics

## ●Performance responsiveness

All the circuits are contactless, and the response from the signal input to electromagnetic clutch and brake output is fast and stable. Furthermore, the clutch and brake responsiveness can be doubled by adding a reverse exciting function to the overexciting function of the power supply BEJ-10 model. (Compared with our product model BEJ-10) The BEH-20N model is the most significant power supply for electromagnetic clutch and brake that offers an ultrahigh-speed control and high accuracy.

## ●Sound during operation

The BEH-20N model has a noise-reduction structure. An excitation sound is not generated in the BEH-20 model due to the sound-absorbing design.

## ●Output control method

The "single-acting mode" that controls a stand-alone electromagnetic clutch and brake respectively or the "interlocking mode" that is suitable for controlling an electromagnetic clutch and brake in combination can be selected. In this regard, however, the two can not be output simultaneously (output the C1-C2 and B1-B2 at the same time) because of the circuit structure.

## ● Power supply voltage variation and output voltage

The BEH-20N model controls the output voltage to be stable even if the power supply voltage fluctuates in some degree. By this feature, a stable output can be obtained in a bad environment for the power supply. Response fluctuations of electromagnetic clutch and brake can be also reduced.

For the large voltage variation, however, it is detected as abnormal voltage, and the protection trip functions. To perform a normal operation, suppress the power supply voltage variation within +/-10%.

# Instruction for use

## ●Protective device

Do not enter a discharge device such as varistor on the output side (between C1-C2 and B1-B2). If it is entered, an overcurrent trip will occur, which may cause operation shutdown or damage to the discharge device or power supply.

## ● Protection feature of the power supply

This power supply has various protection features. If the protection trip works, the LED blinking pattern of the surface panel indicates the cause of the trip. When restarting the operation, eliminate the cause of the trip phenomenon and confirm if there is any abnormality.

## ● Confirmation method of output voltage value

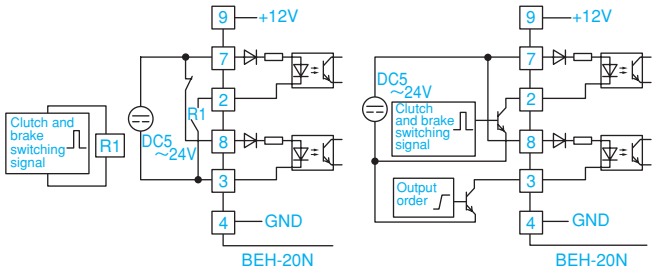
When confirming the output voltage by a voltmeter or tester, perform the confirmation under the condition that the electromagnetic clutch and brake load is connected to the output side. If there is no connection, the protection feature for breaking detection may work, or the value around DC280V (the voltage charged to the condenser) is indicated.

## ●Special correspondence product

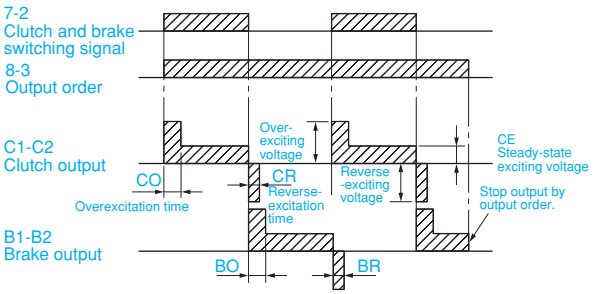
There are some machine characteristics that don't like a quick coupling or stopping by overexcitation control. The BEH-20N can be used as a simple contactless control panel without overexcitation control by changing the setting of the inside switches SW1 and SW2 to 0 (zero). Various special adjustment products are also supported. It can also be used as a power supply for electromagnetic coils. Contact us for further information.

# Wire connection method and time chart

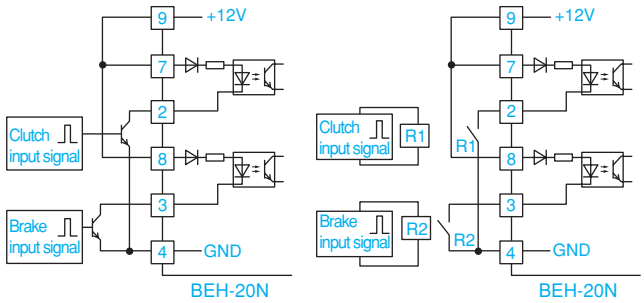
## ●Interlocking mode (SW3-1 OFF)



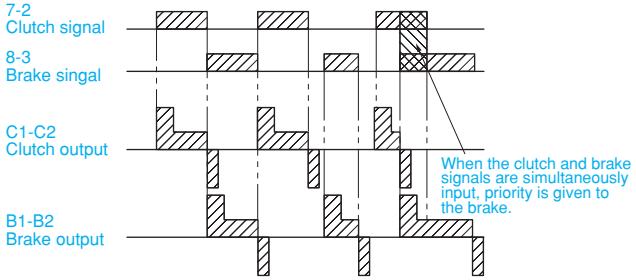

Terminal No. The clutch and brake is switched by a single input signal.




## ●Single-acting mode SW3-1 ON)




Terminal No. The clutch and brake operate by their respective input terminals. (Simultaneous output of the clutch and brake can not be performed.)




# Ordering Information

**BEH-20N-1**

Input voltage specification
AC200V : Blank
AC100V : 1

# BEJ model

## Power supply for high-speed control

This power supply improves the armature suction time or torque risetime by instantaneously applying DC100V to the clutch and brake rated excitation voltage DC24V. This will actualize high-frequency and high-accuracy operations of various mechanical devices.

### ■Combination control of clutch and brake is easy.

High-frequency switching behavior such as inching operation can be performed by a single input signal.

### ■Compact and lightweight

Since all circuits are contactless, it is compact and lightweight.

### ■Photo coupler input

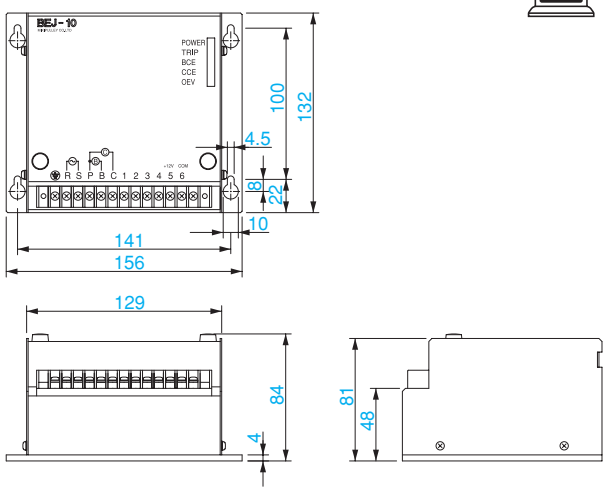
It is useful for a direct control from a sequencer, etc.

## ■ Specification

| | | | | | |
|---|---|---|---|---|---|
| **Input voltage** | AC 100/115 V | ±10% 50/60Hz | | | |
| | AC 200/220 V | | | | |
| **Output voltage** | Overexciting voltage | DC 100 V | | | |
| | Steady-state exciting voltage | DC 24 V | | | |
| **Size settings** | Coordination number | 06 | 10 | 12 | 16 |
| | Applicable clutch and brake size | 06/08 | 10 | 12 | 16 |
| | ※ Adjusted by size before shipment | | | | |
| **Applicable clutch and brake** | Miki pulley electromagnetic clutch and brake Rated voltage DC24V<br>※ Except the 180 model toothed clutch | | | | |
| **Protection features** | ・Overcurrent protection<br>When overcurrent is detected, stop all output.<br>Reset by turning OFF.<br>・Input-side 20A fast-blow fuse | | | | |
| **Operation setup** | Change by the slide switch SW1 on the substrate. | | | | |
| | ALT side | Interlocking mode (Before shipment: interlocking mode) | | | |
| | 0/0 side | Single-acting mode | | | |
| **Control panel power consump.** | 15 W (Unloaded condition) | | | | |
| **Input signal** | DC5 ～ 24V (3mA Smoothing power supply) | | | | |
| **Use environment** | 0 ～ +50 ℃ / 10 ～ 90 %RH | | | | |
| **Mass** | 1.1 kg | | | | |

## ■ Dimension

CAD

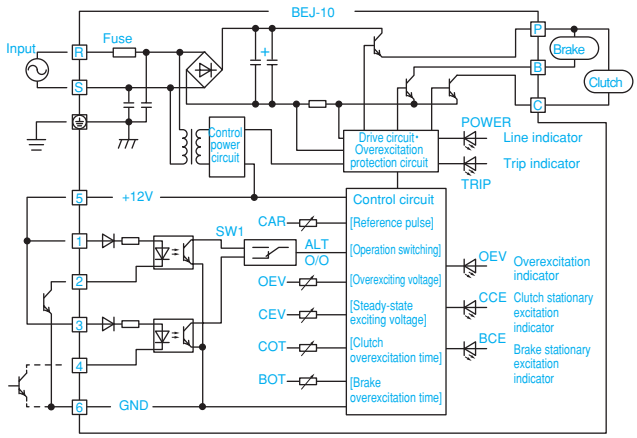



●CAD file No.BE1

## ■ Terminal and feature

| Terminal marking | Terminal name | Function explanation |
|---|---|---|
| R-S | Power input terminal | Connect a commercial power AC200/220V 50/60Hz. (or AC100/115V) |
| P-C | Clutch output terminal | Connect a clutch |
| P-B | Brake output terminal | Connect a brake |
| ⏚ | Earth terminal | Ground earth terminal (third ground or above) |
| 1 | Operating power input 1 | Input the power (+) for clutch operation. |
| 3 | Operating power input 2 | Input the power (+) for brake operation. |
| 2 | Manipulate signal 1 | Input an external signal for clutch operation |
| 4 | Manipulate signal 2 | Input an external signal for brake operation |
| 5 | Manipulate signal power (+) | Manipulate signal standby power (100mA or below) |
| 6 | Manipulate signal power (-) | Manipulate signal standby power (COM) |

## ■ Structure



# Characteristics

## ●Performance responsiveness

All the circuits are contactless, and the response from signal input to electromagnetic clutch and brake output is fast and stable. For a high-accuracy control of the electromagnetic clutch and brake, rectification, smoothing and PWM control of a commercial power are performed.

## ●Sound during operation

By comparison with the BEH-20N model with a sound-absorbing design, the BEH-20 model generates a sound of excitation during operation. This phenomenon is changed depending on the electromagnetic clutch and brake size or mounting environment. It is not an abnormal sound, however if the excitation sound bothers in the use environment, the BEH-20 model is recommended to use.

## ●Output control method

The "single-acting mode" that controls a stand-alone electromagnetic clutch and brake respectively or the "interlocking mode" that is suitable for controlling an electromagnetic clutch and brake in combination can be selected. In this regard, however, the two can not be output simultaneously (output the P-C and P-B at the same time) because of the circuit structure.

## ● Power supply voltage variation and output voltage

The BEJ-10 model is designed to function properly if the power supply voltage fluctuates in some degree. However, it has a characteristic that the output voltage changes as the power supply voltage fluctuates. To satisfy the electromagnetic clutch and brake performance, suppress the power supply voltage variation within ±10%. If response fluctuations still occur with the BEJ-10 model, the BEH-20N model is recommended to use.

# Instruction for use

## ●Protective device

Do not enter a discharge device such as varistor on the output side (between P-C and P-B). If it is entered, an overcurrent trip will occur, which may cause operation shutdown or damage to the discharge device or power supply.

## ●Protection feature of the power supply

This power supply contains the overcurrent protection feature and fuse. When the protection feature functions, there is a possibility of output-side error.

- Output-side short circuit
- Output-side earth fault
- Output-side (clutch and brake) abnormality

When restarting the operation, confirm if there is any abnormality on the output side.

## ●Confirmation method of output voltage value

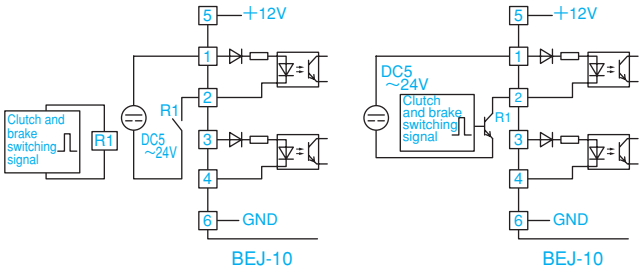
When confirming the output voltage by a voltmeter or tester, perform the confirmation under the condition that the electromagnetic clutch and brake load is connected to the output side. If there is no connection, the value around DC280V that is the voltage charged to the condenser (DC140V in the case of AC100V) is indicated.

## ●Special correspondence product

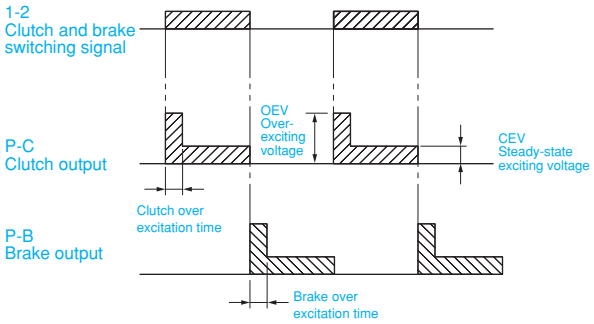
There are some machine characteristics that don't like a quick coupling or stopping by overexcitation control. In such case, a particular specification with no overexcitation control is available. Various special adjustment products are also supported. It can also be used as a power supply for electromagnetic coils. Contact us for further information.

# Wire connection method and time chart

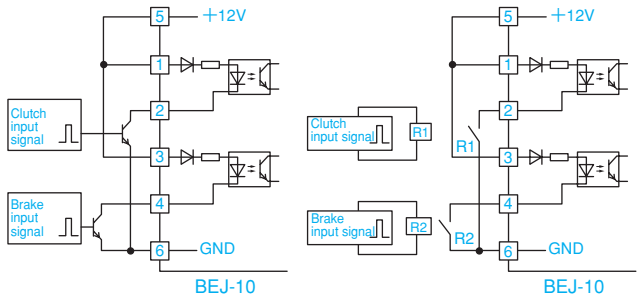
## ●Interlocking mode (SW1 ALT side)



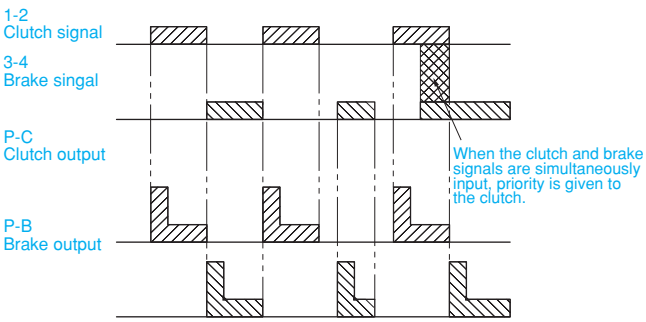

Terminal No. The clutch and brake is switched by a single input signal.




## ●Single-acting mode (SW1 O/O side)




Terminal No. The clutch and brake operate by their respective input terminals. (Simultaneous output of the clutch and brake can not be performed.)




# Ordering Information

**BEJ-10-06-1**

- 1: Input voltage
  AC200V : Blank
  AC100V : 1
- 06: Applicable clutch and brake
  Coordination number 06/10/12/16

# BE model

## Power supply for general control

This is a basic model of the rated voltage DC24V power supplies for electromagnetic clutch and brake control.

### ■ Correspond to each input voltage of AC100V and AC200V

Simply by connecting and inputting, the required DC24V for electromagnetic clutch and brake operation can be obtained for both AC100V and AC200V specifications.

### ■ Trans step-down and full-wave rectification method

Direct-current voltage (DC24V) is output after insulating, stepping down and full-wave rectifying by the transformer. It is robust, safe also highly reliable.

### ■ Easy maintenance

Due to the simple structure with built-in transformer and rectifier, the maintenance is easy.

### ■ BER for controlling the clutch brake unit

The BER model with a built-in relay is added to the product lineup for switching control of the clutch brake unit.

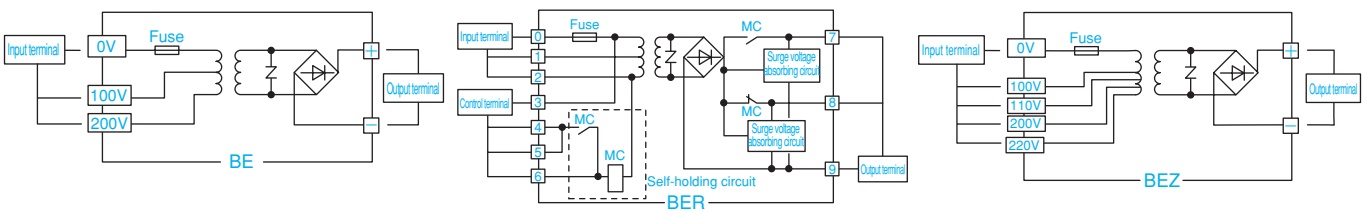
### ■ Environmental product

Conversion to the corresponding parts on the basis of the environmental regulations such as RoHS is promoting.

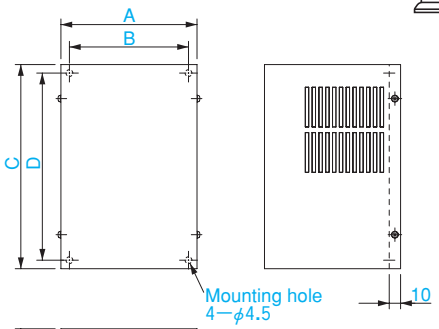
## Specification

| Type | | | BE-05 | BE-10 | BE-20 | BE-40 | BER-05 | BER-10 | BER-20 | BEZ-10 | BEZ-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dimension/Form | Refer to the dimensional list | | Form 1 | Form 2 | Form 3 | Form 4 | Form 2 | Form 3 | Form 4 | Form 2 | Form 3 |
| | AC 100 V | ±10% 50/60Hz | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | AC 110 V | | | | | | | | | ● | ● |
| | AC 200 V | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | AC 220 V | | | | | | | | | ● | ● |
| Output voltage | Trans step-down · single-phase full-wave rectification · non-smoothed | | DC 24 V | | | | DC 24 V 2-output · built-in relay | | | DC 21.5 V | |
| Rating/Capacity | Continuous rating | | 25 W | 50 W | 100 W | 200 W | 25 W | 50 W | 100 W | 56.6 W | 114 W |
| Size settings | ◎: Connectable two or more<br>●: Applicable<br>△: Applicable depending on the clutch and brake model | 02 | ◎ | ◎ | ◎ | ◎ | ● | | | ◎ | 12 ◎ |
| | | 03 | ◎ | ◎ | ◎ | ◎ | ● | | | ◎ | 13 ◎ |
| | | 04 | ◎ | ◎ | ◎ | ◎ | ● | | | ◎ | 15 ◎ |
| | | 05 | ◎ | ◎ | ◎ | ◎ | ● | | | ◎ | 21 ◎ |
| | | 06 | ● | ◎ | ◎ | ◎ | ● | | | ● | 23 ◎ |
| | | 08 | △ | ● | ◎ | ◎ | △ | ● | | ● | 25 ◎ |
| | | 10 | △ | ● | ◎ | ◎ | △ | ● | | | 31 ● |
| | | 12 | | ● | ◎ | ◎ | | ● | | | 32 ● |
| | | 14 | | △ | ● | ◎ | | △ | | | |
| | | 16 | | △ | ● | ◎ | | △ | ● | | |
| | | 18 | | | ● | ◎ | | | ● | | |
| | | 20 | | | △ | ● | | | △ | | |
| | | 25 | | | △ | ● | | | △ | | |
| | | 31 | | | △ | ● | | | △ | | |
| | | 40 | | | | ● | | | △ | | |
| Applicable clutch and brake | Miki Pulley clutch and brake Rated voltage DC 24V | | ・Electromagnetic clutch and brake<br>・Non-excited brake<br>・The others for general control | | | | Clutch brake unit for switching control | | | For toothed clutch only | |
| Protection feature | Input-side fast-blow fuse | | 1 A | 1 A | 3 A | 5 A | 1 A | 1 A | 3 A | 3 A | 5 A |
| Use environment | Non condensing | | 0 ～ +50 ℃ / 10 ～ 90 %RH | | | | | | | | |
| Mass | Per product | | 1.4 kg | 2.4 kg | 4.0 kg | 6.4 kg | 1.6 kg | 3.0 kg | 4.9 kg | 3.4 kg | 4.4 kg |

## Structure



## Dimensions




Unit: [mm]

| Dimension | Configuration No | | | |
|---|---|---|---|---|
| | Config. 1 | Config. 2 | Config. 3 | Config. 4 |
| A | 95 | 105 | 120 | 130 |
| B | 80 | 90 | 105 | 105 |
| C | 130 | 160 | 180 | 230 |
| D | 115 | 145 | 165 | 215 |
| E | 75 | 100 | 120 | 135 |
| CAD file No | BE3 | BE4 | BE5 | BE6 |

## Characteristics

### Output method

DC24V is output by stepping down and full-wave rectifying a single phase of commercial power by a transformer. Since it is not smoothed, there is a pulsation in the output voltage. It is usually not a problem for general use, however if reducing response fluctuations is necessary, use a smoothing power supply, or BEJ-10 or BEJ-20N model.

### Power supply voltage variation and output voltage

In this power supply, the output voltage varies at the same rate as the variation rate of the input voltage. To perform a normal operation, suppress the variation within ±10%.

## Instruction for use

### Protective device

There is a surge-voltage absorbing circuit built in the BER model that no discharge device is required. For the BE/BEZ model, however, a control contact will be set between the output terminal and electromagnetic clutch and brake that a discharge device must be externally set. Refer to the right-hand wire connection method for more detail.

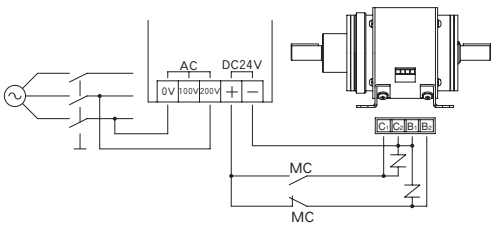
### Confirmation of the output voltage value

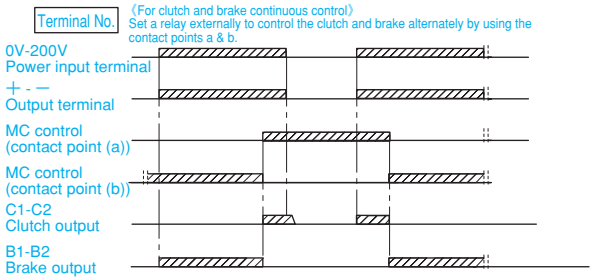
In this power supply, the output voltage value varies in no-loaded state and connected state of electromagnetic clutch and brake. Under the condition of no-load, a higher voltage is generated than the specified value.

It is designed to obtain the rated voltage (DC24V) under the condition that the load with more than half of the rated value is connected during specified input voltage. When selecting the model, apply a half of the rated value as a measure.

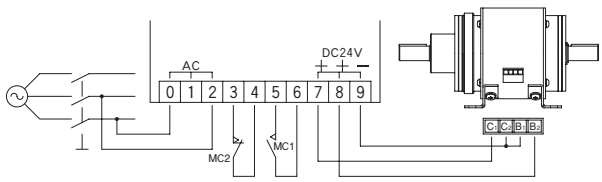
## Wire connection method and time chart

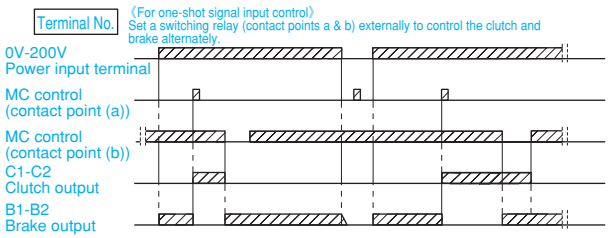
### Basic connection method for BE



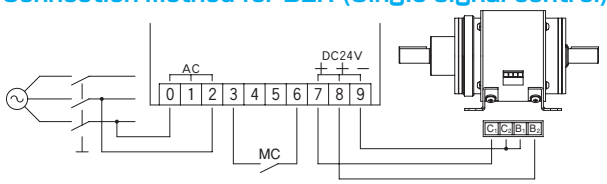



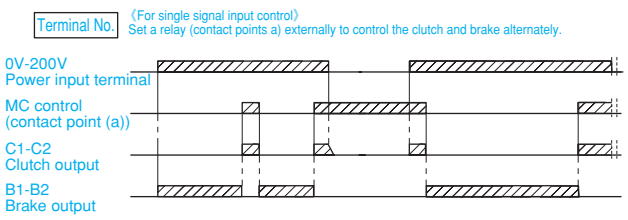

### Connection method for BER (One-shot control)



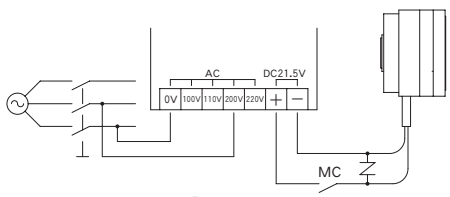




### Connection method for BER (Single signal control)




### Basic connection method for BEZ




## Ordering Information

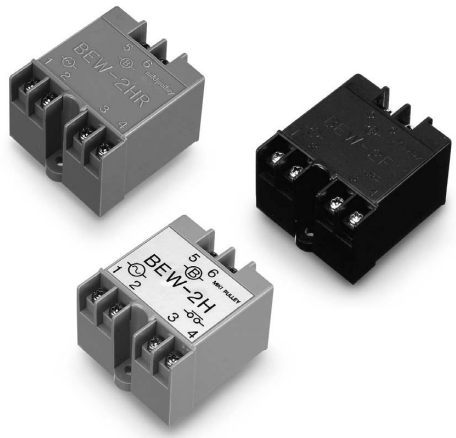
**BE R - 05**

Specification
Standard: Blank With relay: R
For toothed clutch: Z

Size: 05/10/20/40

# BEW model

## Power supply for general control, terminal block type




The BEW is a basic model of the rated voltage DC45/90/180V power supplies for electromagnetic clutch and brake control.

### ■ Correspond to each input voltage of AC100V, AC200V and AC400V.

Simply by connecting and inputting, the required direct current for electromagnetic clutch and brake operation can be obtained for AC100V, AC200V and AC400V specifications.

### ■ Half-wave rectification and full-wave rectification method

There are various types in this model with different specifications, half-wave or full-wave rectification and others. It is compact and lightweight as well.

### ■ Terminal block type

Easy-to-connect terminal block type power supply with direct-current switching terminal.

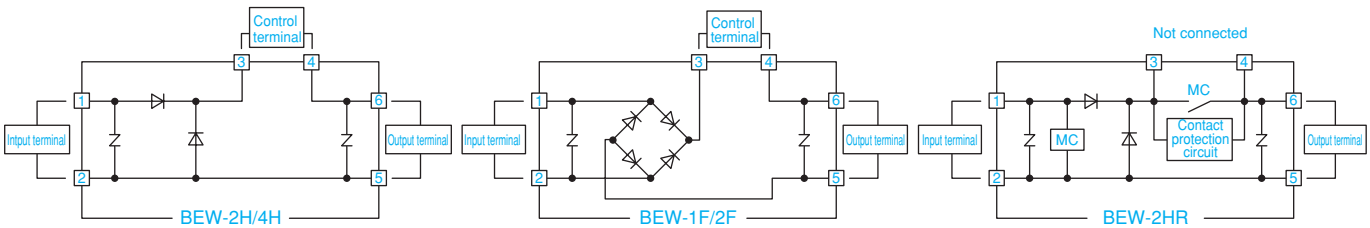
### ■ Environmental product

Conversion to the corresponding parts on the basis of the environmental regulations such as RoHS is promoting.

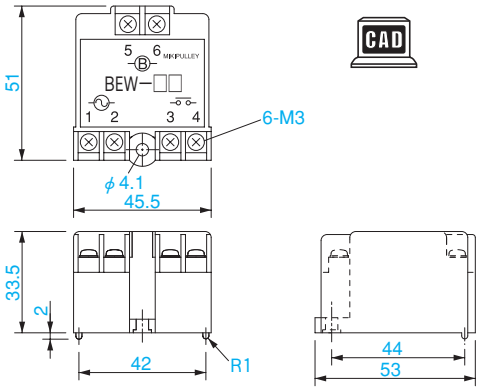
## ■ Specification

| Type | | | BEW-2H | | BEW-4H | | | BEW-2HR | BEW-1F | | BEW-2F | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Input voltage | AC 100 V | ±10% 50/60Hz | ● | | ● | | | | ● | | ● | |
| | AC 200 V | | ● | | ● | | | ● | ● | | ● | |
| | AC 400 V | | | | ● | | | | | | | |
| | Max. input volt. | | AC 250 V | | AC 510 V | | | AC 250 V | AC 250 V | | AC 250 V | |
| Output voltage | Rectification method | | Half-wave rectification | | | | | | Full-wave rectification | | | |
| | When the voltage in parentheses ( ) is input | | DC 90 V (AC200V) | | DC 180 V (AC400V) | | | DC 90 V (AC200V) | DC 180 V (AC200V) | | DC 180 V (AC200V) | |
| Output current | When the ambient temp. is 20°C. The value in parentheses is for 60°C. | | DC 1.0 A (DC0.6A) | | DC 1.0 A (DC0.6A) | | | DC 1.0 A (DC0.6A) | DC 2.0 A (DC1.5A) | | DC 1.0 A (DC0.6A) | |
| Output capacity | When the ambient temp. is 20°C. The value in parentheses is for 60°C. | | 90 W / AC200V (50W) | | 180 W / AC400V (100W) | | | 90 W / AC200V (50W) | 360 W / AC200V (270W) | | 180 W / AC200V (100W) | |
| Size settings | The value in parentheses is input voltage | | DC 45 V (AC100V) | DC 90 V (AC200V) | DC 45 V (AC100V) | DC 90 V (AC200V) | DC 180 V (AC400V) | DC 90 V (AC200V) | DC 90 V (AC100V) | DC 180 V (AC200V) | DC 90 V (AC100V) | DC 180 V (AC200V) |
| | ●: Applicable △: Applicable depending on the clutch and brake model | 02 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | 03 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | 04 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | 05 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | 06 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | 08 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | 10 | ● | ● | | ● | ● | ● | ● | ● | ● | ● |
| | | 12 | | ● | | ● | ● | ● | ● | ● | ● | ● |
| | | 14 | | ● | | △ | ● | ● | ● | ● | ● | ● |
| | | 16 | | ● | | △ | ● | ● | ● | ● | ● | ● |
| | | 18 | | △ | | | ● | △ | ● | ● | △ | ● |
| | | 20 | | △ | | | △ | △ | ● | ● | △ | ● |
| | | 25 | | △ | | | △ | △ | ● | ● | △ | ● |
| Applicable clutch and brake | Miki Pulley clutch and brake Rated voltage DC 45/90/180 V | | Non-excited brake | | | | | | Apply in general | | Intermediate capacity | |
| Dielectric resistance | Terminal - product | | DC 500 V At megger 100MΩ | | | | | | | | | |
| Dielectric strength voltage | | | AC 1000 V 50Hz 1 min. | | | | | | | | | |
| Use environment | Non condensing | | −20 ～ + 60 ℃ | | | | | | | | | |
| Mass | Per product | | 0.055 kg | | 0.055 kg | | | 0.068 kg | 0.060 kg | | 0.057 kg | |

## ■ Structure



## Dimension




●CAD file No.BE7

## Terminal and feature

| Terminal marking | Terminal name | Function explanation |
|---|---|---|
| 1-2 | Power input terminal | Connect a commercial power AC200/220V 50/60Hz. |
| 3-4 | Control terminal | Control the output by opening and closing between the terminals at the relay contact.<br>*Do not connect for the BEW-2HR. |
| 5-6 | Output terminal | Connect an electromagnetic clutch and brake. |

## Characteristics

### ●Output method

The BEW-2H/4H/2HR type power supply inputs a commercial power supply to generate a half-wave rectified DC voltage on the output side. This power supply is characterized by its low cost and simple circuit configuration. However, a large voltage pulsation could lead to variations of electromagnetic clutch and brake performance response or noise generation when applying current. Also, the heating value of electromagnetic coil tends to slightly increase compared with a full-wave rectification or smoothing power supply.

For the above tendencies are unfit for the specification, use of a full-wave rectification power supply (BEW-1F/2F type) or smoothing power supply, or to change to the DC24V specification is recommended.

The BEW-1F/2F type power supply generates a full-wave rectified DC voltage. Compared with a half-wave rectification power supply, this power supply has a smaller voltage pulsation and variability of electromagnetic clutch and brake performance response. Therefore, it can be used not only for a non-excited brake but also for an electromagnetic actuated type clutch and brake. Note that the required characteristics can not be obtained if the rated voltage of the electromagnetic coil does not correspond to the output voltage from the power supply.

## Instruction for use

### ●Protective device

This power supply contains a protective device (varistor) on the input-output side. Therefore, to externally set a protective device is basically unnecessary.

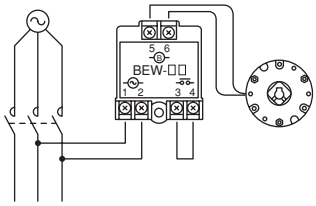
### ● Primary-side control and secondary-side control method

The primary-side control (The 3-4 terminal is a short circuit) that performs the control of electromagnetic clutch and brake by ON/OFF operation of input voltage is less wired, but the armature suction time is extremely long that the brake braking time will be lengthened. (No surge voltage generated.)

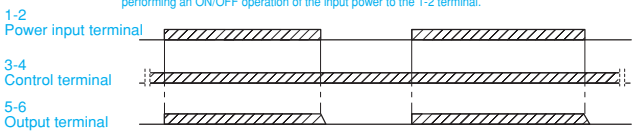
For the secondary-side control that performs the control of the 3-4 terminal at the relay contact, the armature suction time is shortened that the brake braking time will be reduced. However, as the wiring number increases, a surge voltage is generated in a measure. Select the primary-side control or secondary-side control in accordance with the required characteristics.

## Wire connection method and time chart

### ●BEW (Primary-side control)

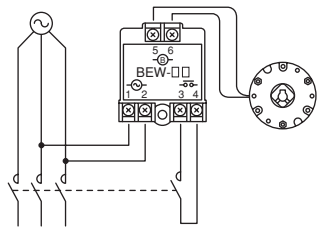



Terminal No. 〈In the case of primary-side control〉 Control the output of the 5-6 terminal by short-circuiting the 3-4 terminal and performing an ON/OFF operation of the input power to the 1-2 terminal.

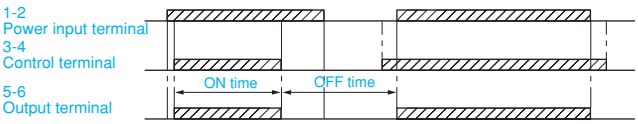



* A surge voltage from the electromagnetic coil is not generated during ON/OFF operation, but the armature suction time is lengthened.

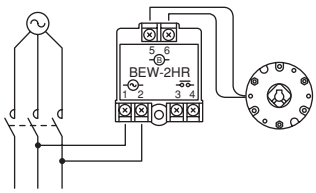
### ●BEW (secondary-side control)



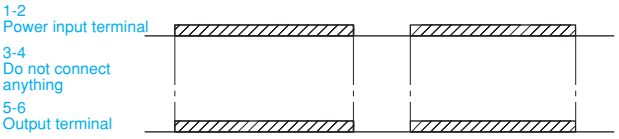

Terminal No. 〈In the case of secondary-side control〉 Control the output of the 5-6 terminal by ON/OFF operation of the 3-4 terminal while the input power of the 1-2 terminal is on.




### ●BEW-2HR




Terminal No. 〈In the case of BEW-2HR〉 Control the output of the 5-6 terminal by ON/OFF operation of the 1-2 terminal.




* The responsiveness of non-excited brake equivalent to the secondary-side control can be obtained in the primary-side control.

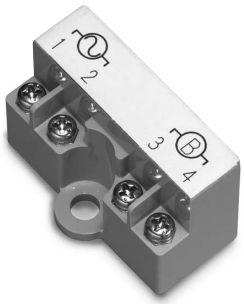
## Ordering Information

BEW- 2 H R

- Specification
  Standard: Blank
  With relay: R
- Rectification method
  Half-wave rectification: H
  Full-wave rectification: F
- Voltage specification/Capacity: 1/2/4

# BEW-S type

**Power supply Compact/Lightweight Terminal block type**



The BEW-S is a compact power supply for the rated voltage DC45/90/180V non-excited brakes.

### ■ Correspond to each input voltage of AC100V, AC200V and AC400V

Simply by connecting and inputting, the required direct current for electromagnetic clutch and brake operation can be obtained for AC100V, AC200V and AC400V specifications.

### ■ Half-wave rectification method

It is compact and lightweight with limited functioins.

### ■ Terminal block type

It is an easy-to-connect terminal block type power supply with simplified construction. Only the input and output sides are set.

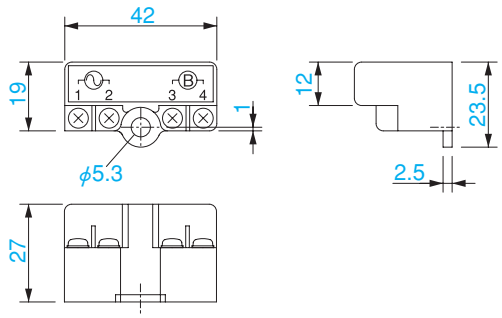
### ■ Environmental product

Conversion to the corresponding parts on the basis of the environmental regulations such as RoHS is promoting.

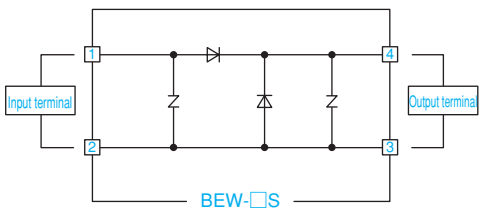
## ■ Specification

| Type | | | BEW-2S | | BEW-4S | | |
|---|---|---|---|---|---|---|---|
| Input voltage | AC 100 V | ±10% 50/60Hz | ● | | ● | | |
| | AC 200 V | | ● | | ● | | |
| | AC 400 V | | | | ● | | |
| | Max. input volt. | | AC 250 V | | AC 510 V | | |
| Output voltage | Rectification method | | Half wave rectification | | | | |
| | When the voltage in parentheses ( ) is input | | DC 90 V (AC200V) | | DC 180 V (AC400V) | | |
| Output current | When the ambient temp. is 20°C. The value in parentheses is for 60°C. | | DC 1.0 A (DC0.6A) | | | | |
| Output capacity | When the ambient temp. is 20°C. The value in parentheses is for 60°C. | | 90 W / AC200V (50W) | | 180 W / AC400V (100W) | | |
| Size settings | The value in parentheses is input voltage | | DC 45 V (AC100V) | DC 90 V (AC200V) | DC 45 V (AC100V) | DC 90 V (AC200V) | DC 180 V (AC400V) |
| | ●: Applicable △: Applicable depending on the clutch and brake model | 02 | ● | ● | ● | ● | ● |
| | | 03 | ● | ● | ● | ● | ● |
| | | 04 | ● | ● | ● | ● | ● |
| | | 05 | ● | ● | ● | ● | ● |
| | | 06 | ● | ● | ● | ● | ● |
| | | 08 | ● | ● | ● | ● | ● |
| | | 10 | ● | ● | ● | ● | ● |
| | | 12 | | ● | | ● | ● |
| | | 14 | | ● | | ● | ● |
| | | 16 | | ● | | ● | ● |
| | | 18 | | △ | | △ | ● |
| | | 20 | | △ | | △ | △ |
| | | 25 | | △ | | △ | △ |
| Applicable clutch and brake | Miki Pulley clutch and brake Rated voltage DC 45/90/180 V | | Non-excited brake | | | | |
| Dielectric resistance | Terminal - product | | DC 500 V At megger 100MΩ | | | | |
| Dielectric strength voltage | | | AC 1000 V 50Hz 1 min. | | AC 1500 V 50Hz 1 min. | | |
| Use environment | Non condensing | | −20 ～ + 60 ℃ | | | | |
| Mass | Per product | | 0.021 kg | | | | |

## ■ Dimension




## ■ Structure




## ■ Terminal and feature

| Terminal marking | Terminal name | Function explanation |
|---|---|---|
| 1 - 2 | Power input terminal | Connect a commercial power AC200/220V 50/60Hz. |
| 3 - 4 | Output terminal | Connect an electromagnetic clutch and brake. |

# Characteristics

## ●Output method

The BEW-2S/4S type power supply inputs a commercial power supply to generate a half-wave rectified DC voltage on the output side. This power supply is characterized by its low cost and simple circuit configuration. However, a large pulsation could lead to variations of electromagnetic clutch and brake performance response or noise generation when applying current. Also, the heating value of electromagnetic coil tends to slightly increase compared with a full-wave rectification or smoothing power supply.
For the above tendencies are unfit for the specification, use of a full-wave rectification power supply (BEW-1F/2F type) or smoothing power supply, or to change to the DC24V specification is recommended.

**Output voltage calculation method**
**Output voltage = Input voltage x a (factor)**
*** a (factor) = 0.45: Half-wave rectification**
**(Example)**
**BEW-2S : AC 100 V × 0.45 = DC 45 V**
**BEW-4S : AC 400 V × 0.45 = DC 180 V**

Note that the required characteristics can not be obtained if the rated voltage of electromagnetic coil does not correspond to the output voltage of the power supply.

# Instruction for use

## ●Protective device

This power supply contains a protective device (varistor) on the input-output side. Therefore, to externally set a protective device is basically unnecessary.

## ● Primary-side control and secondary-side control method

This power supply is based on the "primary-side control" that performs the control of electromagnetic clutch and brake by ON/OFF operation of input voltage. This control method is less wired, but the armature suction time is longer compared with the secondary-side control so that the brake braking time will be lengthened.
This phenomenon appears clearly as the electromagnetic clutch and brake size increases. Therefore, the "primary-side control" is used especially for a small non-excited brake. In addition, a surge voltage (inverse voltage) that is generated in the "secondary-side control" is not generated in the "primary-side control" when the current of the electromagnetic clutch and brake is OFF, therefore the "primary-side control" is effective for a machine that has a susceptibility to noise.

To perform the "secondary-side control" to improve the responsiveness, set the relay contact between the output terminal and electromagnetic clutch and brake as shown in the wiring diagram on the right.
In this regard, connect a discharge device such as varistor between the relay contacts or parallel to the clutch and brake.

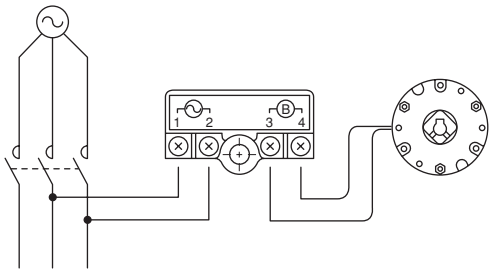
# Ordering Information

**BEW-2S**

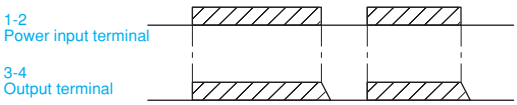
Input voltage spec. Rated input AC200V: 2
Rated input AC400V: 4

# Wire connection method and time chart

## ●Primary-side control

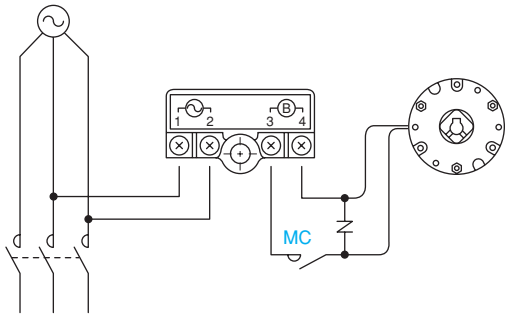



Terminal No. 〈In the case of primary-side control〉 Control the output of the 3-4 terminal by ON/OFF operation of the 1-2 terminal.

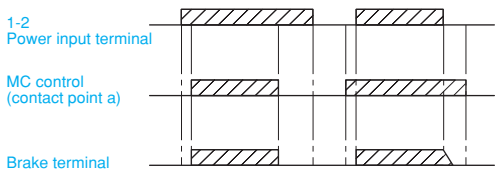



* A surge voltage from the electromagnetic coil is not generated during ON/OFF operation, but the armature suction time is lengthened.

## ●Secondary-side control



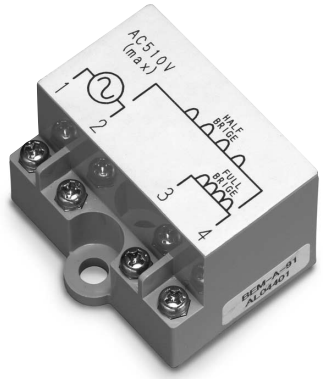

Terminal No. 〈In the case of secondary-side control〉 Control the brake output by an ON/OFF operation of the relay while the input power of the 1-2 terminal is on.



# BEW-W type

**Power supply for both half-wave and full-wave rectifications**
**Terminal block type**






The BEW-W is a compact, large-capacity and wide-range power supply for the electromagnetic clutches and brakes with rated voltage DC45V/90V/180V.

### Wide-range input and output

Simply by connecting and inputting, the required direct current for electromagnetic clutch and brake operation can be obtained for AC100V, AC200V and AC400V specifications. In addition, half-wave/full-wave rectification output can be controlled by changing a connection method. It is applicable to various types of electromagnetic
clutches and brakes.

### Terminal block type

It is an easy-to-connect terminal block type power supply with simplified construction. Only the input and output sides are set. It is also compact and high capacity.

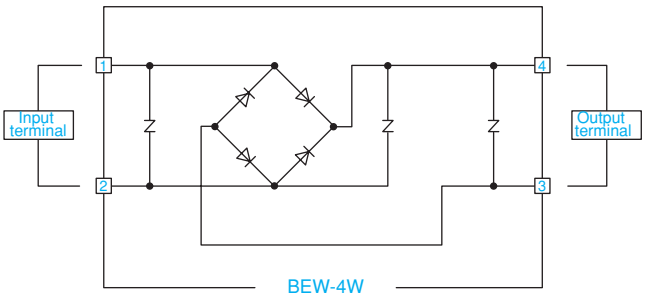
### Environmental product

Conversion to the corresponding parts on the basis of the environmental regulations such as RoHS is promoting.

## Specification

| Type | | | BEW-4W | | | | | |
|---|---|---|---|---|---|---|---|---|
| Input voltage | AC 100 V | ±10% 50/60Hz | ● | | | | | |
| | AC 200 V | | | ● | | | | |
| | AC 400 V | | | | ● | | | |
| | Max. input volt. | | AC 510 V | | | | | |
| Output voltage | Rectification method | | For both half-wave and full-wave rectifications | | | | | |
| | When the voltage in parentheses ( ) is input | | DC 45 V / DC 90 V / DC 180 V / DC 360 V<br>( AC 100 V / AC 200 V / AC400V ) | | | | | |
| Output current | When the ambient temp. is 20°C. The value in parentheses is for 60°C. | | DC 3.0 A<br>(DC2.5A) | | | | | |
| Output capacity | When the ambient temp. is 20°C. The value in parentheses is for 60°C. | | 1080 W / AC400V (Full-wave)<br>(900W) | | | | | |
| Size settings | The value in parentheses is input voltage | | DC 45 V (AC100V Half-wave) | DC 90 V (AC100V Full-wave) | DC 90 V (AC200V Half-wave) | DC 180 V (AC200V Full-wave) | DC 180 V (AC400V Half-wave) | DC 360 V (AC400V Full-wave) |
| | ●: Applicable<br>△: Applicable depending on the clutch and brake model | 02 | ● | ● | ● | ● | ● | |
| | | 03 | ● | ● | ● | ● | ● | |
| | | 04 | ● | ● | ● | ● | ● | |
| | | 05 | ● | ● | ● | ● | ● | |
| | | 06 | ● | ● | ● | ● | ● | |
| | | 08 | ● | ● | ● | ● | ● | |
| | | 10 | △ | ● | ● | ● | ● | |
| | | 12 | △ | ● | ● | ● | ● | |
| | | 14 | △ | ● | ● | ● | ● | |
| | | 16 | △ | ● | ● | ● | ● | |
| | | 18 | △ | ● | ● | ● | ● | |
| | | 20 | △ | ● | ● | ● | ● | |
| | | 25 | △ | ● | ● | ● | ● | |
| Applicable clutch and brake | Miki Pulley clutch and brake Rated voltage DC 45/90/180 V | | Non-excited brake | | | | | |
| Dielectric resistance | Terminal - product | | DC 500 V At megger 100MΩ | | | | | |
| Dielectric strength voltage | | | AC 2200 V 50Hz 1 min. | | | | | |
| Use environment | Non condensing | | −20 ～ +60 ℃ / 10 ～ 90 %RH | | | | | |
| Mass | Per product | | 0.045 kg | | | | | |

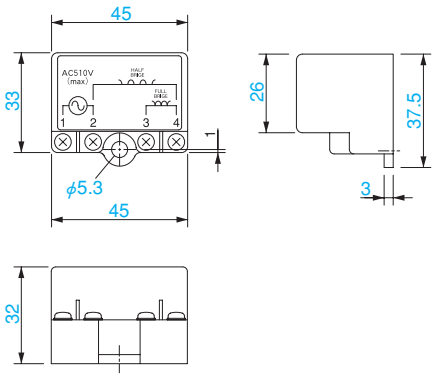
## Structure




## Terminal and feature

| Terminal marking | Terminal name | Function explanation |
|---|---|---|
| 1 - 2 | Power input terminal | Connect a commercial power AC200/220V 50/60Hz. |
| 3 - 4 | Output terminal | Connect an electromagnetic clutch and brake. |

## Dimension




## Characteristics

### For both half-wave and full-wave rectifications

For the BEW-4W type, a half-wave or full-wave rectification can be selected by changing the wire connection as shown in the right figure. Also, this power supply has a large capacity that a wide range of voltage input from low voltage to high voltage can be performed. Therefore, various types of brakes can be supported by this single power supply.

**Output voltage calculation method**
**Output voltage = Input voltage x a (factor)**
***a (factor) = 0.45: Half-wave rectification / 0.9: Full-wave rectification**
**(Example)**
**Half-wave: AC 200 V × 0.45 = DC 90 V**
**Full-wave: AC 100 V × 0.9 = DC 90 V**

Note that the required characteristics can not be obtained if the rated voltage of the electromagnetic coil does not correspond to the output voltage from the power supply.

## Instruction for use

### Primary-side control and secondary-side control method

This power supply is based on the "primary-side control" that performs the control of electromagnetic clutch and brake by ON/OFF operation of input voltage. This control method is less wired, but the armature suction time is longer compared with the secondary-side control so that the brake braking time will be lengthened.
This phenomenon appears clearly as the electromagnetic clutch and brake size increases. Therefore, the "primary-side control" is used especially for a small non-exited brake. In addition, a surge voltage (inverse voltage) that is generated in the "secondary-side control" is not generated in the "primary-side control" when the current of the electromagnetic clutch and brake is OFF, therefore the "primary-side control" is effective for a machine that has a susceptibility to noise.

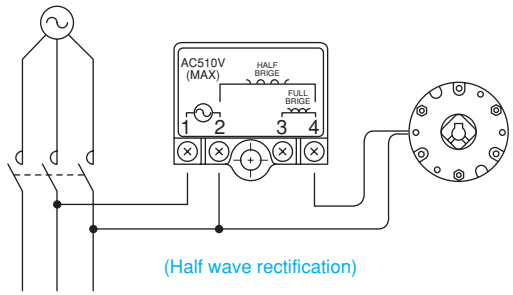
To perform the "secondary-side control" to improve the responsiveness, set the relay contact between the output terminal and electromagnetic clutch and brake as shown in the wiring diagram on the right. In this regard, connect a discharge device such as varistor between the relay contacts or parallel to the clutch and brake.

## Ordering Information

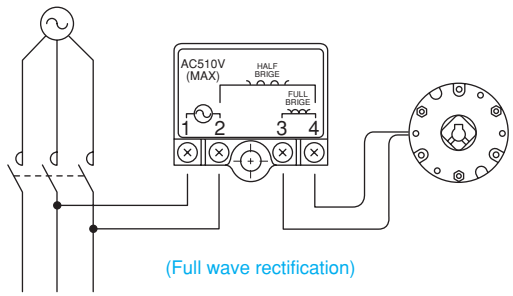
**BEW-4W**

## Wire connection method and time chart

### Primary-side control

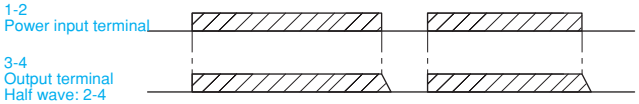



(Half wave rectification)



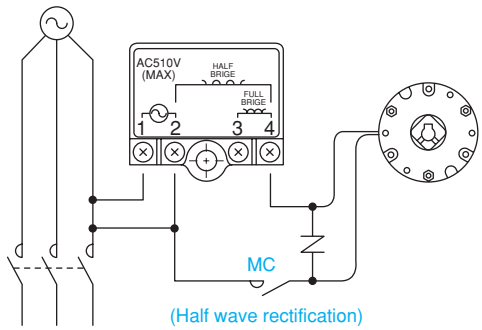

(Full wave rectification)

Terminal No. 〈In the case of primary-side control〉 Control the output of the 3-4 terminal by ON/OFF operation of the the 1-2 terminal.

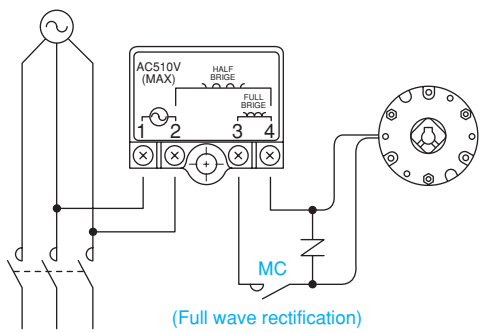



* A surge voltage from the electromagnetic coil is not generated during ON/OFF operation, but the armature suction time is lengthened.

### Secondary-side control

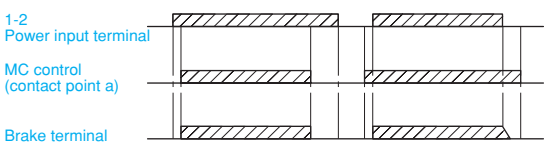



(Half wave rectification)




(Full wave rectification)

Terminal No. 〈In the case of secondary-side control〉 Control the brake output by an ON/OFF operation of the relay while the input power of the 1-2 terminal is on.



# BEW-FH type

**Power supply Compact overexcitation power supply (Full-wave/Half-wave rectification switching type)**


The BEW-FH is a compact and large-capacity overexcitation electromagnetic power supply that can be used for the rated voltage DC45/90/180V electromagnetic clutches and brakes in general.

## Use as an overexcitation power supply

The following effects can be achieved by synchronizing the stationary exciting voltage of power supply with the rated voltage of electromagnetic clutch and brake.

- Longer operating life of an electromagnetic clutch and brake (approx. twice the normal use)
- Shortening of the armature suction time

## Use as a low-excitation power supply

The following effects can be achieved by synchronizing the overexciting voltage of power supply with the rated voltage of electromagnetic clutch and brake.

- Low power consumption (approx. 1/4)
- Suppression of heat generation from a stator (electromagnetic coil) (approx. 1/4)
- Shortening of the armature suction time

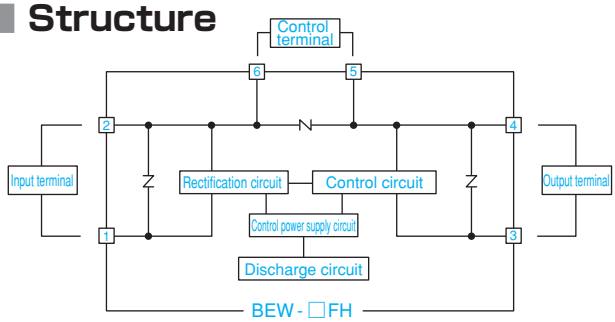
## Terminal block type

Easy-to-connect terminal block type power supply with direct-current switching terminal.

# Specification

| Type | | | BEW-1FH | | BEW-2FH | |
|---|---|---|---|---|---|---|
| Input voltage | AC 100 V | ±10% 50/60Hz | ● | | | |
| | AC 200 V | | | | ● | |
| | Max. input volt. | | AC 80 ～ 130 V | | AC 170 ～ 300 V | |
| Output voltage | Rectification method | | Overexcitation: Full-wave rectification (retain for 0.5 sec.)<br>Stationary excitation: Half-wave rectification | | | |
| | When the voltage in parentheses ( ) is input | | Overexcitation: DC90V<br>Stationary excitation: DC45V (AC100V) | | Overexcitation: DC180V<br>Stationary excitation: DC90V (AC200V) | |
| Output current | When the ambient temp. is 20°C. The value in parentheses is for 60°C. | | DC 1.6 A / (DC1.3A)<br>At stationary excitation | | DC 1.6 A / (DC1.3A)<br>At stationary excitation | |
| | When the ambient temp. is 20°C. The value in parentheses is for 60°C. | | 74 W / (58W)<br>At stationary excitation AC100V | | 144 W / (117W)<br>At stationary excitation AC200V | |
| Output capacity | Purpose of use | | Overexcitation | Low-excitation | Overexcitation | Low-excitation |
| | Clutch brake rated voltage | | DC 45 V | DC 90 V | DC 90 V | DC 180 V |
| Size settings | ●: Applicable | 02 | ● | ● | ● | ● |
| | | 03 | ● | ● | ● | ● |
| | | 04 | ● | ● | ● | ● |
| | | 05 | ● | ● | ● | ● |
| | | 06 | ● | ● | ● | ● |
| | | 08 | ● | ● | ● | ● |
| | | 10 | ● | ● | ● | ● |
| | | 12 | | ● | ● | ● |
| | | 14 | | ● | ● | ● |
| | | 16 | | ● | ● | ● |
| | | 18 | | ● | ● | ● |
| | | 20 | | ● | ● | ● |
| | | 25 | | ● | ● | ● |
| Applicable clutch and brake | Miki Pulley clutch and brake Rated voltage DC 45/90/180 V | | Non-excited brake | | | |
| Dielectric resistance | Terminal - product | | DC 500 V At megger 100MΩ | | | |
| Dielectric strength voltage | | | AC 2000 V 50Hz 1 min. | | | |
| Use environment | Non condensing | | − 20 ～ + 60 ℃ | | | |
| Mass | Per product | | 0.065 kg | | | |

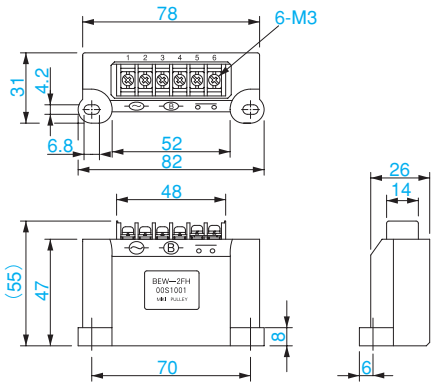
# Structure




# Terminal and feature

| Terminal marking | Terminal name | Function explanation |
|---|---|---|
| 1-2 | Power input terminal | Connect a commercial power AC200/220V 50/60Hz. |
| 3-4 | Output terminal | Connect an electromagnetic clutch and brake. |
| 5-6 | Control terminal | Control the output by opening and closing between the terminals at the relay contact. |

## Dimension




## Characteristics

### Use as an overexcitation power supply

In the BEW-FH, half-wave rectification output is performed after full-wave rectification output for about 0.5 seconds. The following effects can be achieved by synchronizing the steady-state exciting voltage of power supply with the rated voltage of electromagnetic clutch and brake to generate an overexcitation state.

- Longer operating life of the electromagnetic clutch and brake (approx. twice the normal use)
- Shorten the armature suction time (approx. 1/2) to realize a high-frequency operation.
- Longer operating life (approx. twice the normal use)
- Reduction of the starting interference when a non-excited brake and motor are used in combination.

Additionally, the following effects can be also obtained by determining the specification of non-excited brake based on using this power supply.

- High torque
- Downsizing (low profile & compactness)

### Use as a low-excitation power supply

Contrary to the above statement, the following effects can be obtained by combining the overexciting voltage of the power supply with the rated voltage of the electromagnetic clutch and brake to generate a low-excitation state after suctioning the armature.

- Low power consumption (approx. 1/4)
- Suppression of the heat generation of the stator (electromagnetic coil) (approx. 1/4)
- Shortening of the armature suction time

## Instruction for use

### Protective device

This power supply contains a protective device (varistor) on the input-output side. Therefore, to externally set a protective device is basically unnecessary.

### Primary-side control and secondary-side control method

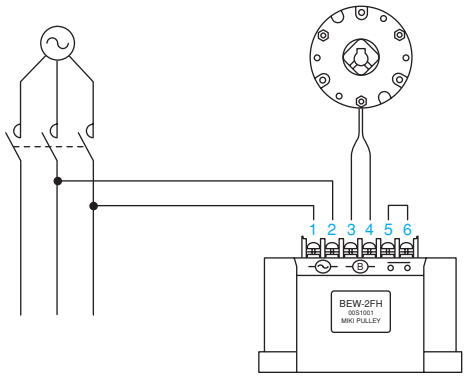
The primary-side control (The 5-6 terminal is a short circuit) that performs the control of electromagnetic clutch and brake by ON/OFF operation of input voltage is less wired, but the armature suction time is extremely long that the brake braking time will be lengthened. (No surge voltage generated.)

For the secondary-side control that performs the control of the 5-6 terminal at the relay contact, the armature suction time is shortened that the brake braking time will be reduced. However, the wiring number increases that a surge voltage is generated in a measure. Select the primary-side control or secondary-side control in accordance with the required characteristics.

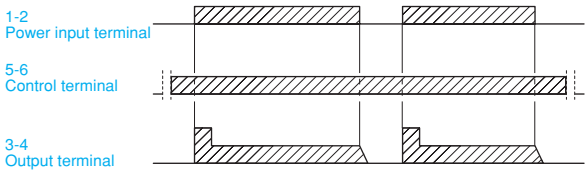
The 5-6 terminal is a part of the circuit run into the brake so that take the voltage and current into consideration when selecting the relay contact.

## Wire connection method and time chart

### Primary-side control

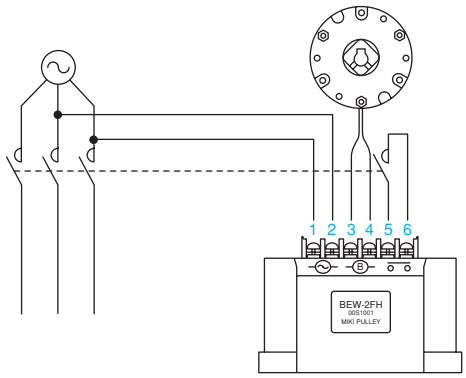



Terminal No. 〈In the case of primary-side control〉
Control the output of the 3-4 terminal by short-circuiting the 5-6 terminal and performing an ON/OFF operation of the input power to the 1-2 terminal.

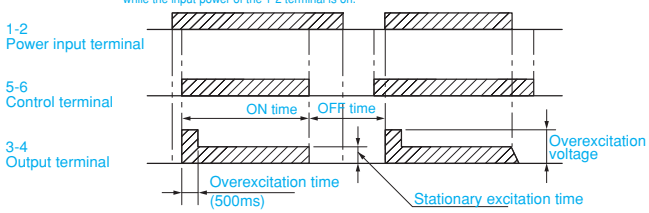



* A surge voltage from the electromagnetic coil is not generated during ON/OFF operation, but the armature suction time is lengthened.

### Secondary-side control




Terminal No. 〈In the case of secondary-side control〉
Control the output of the 3-4 terminal by ON/OFF operation of the 5-6 terminal while the input power of the 1-2 terminal is on.




## Ordering Information

**BEW-1FH**

Input voltage specification
Rated input AV100V: 1
Rated input AV200V: 2

# BEM model

## Power supply Compact/Lightweight Lead wire type

The BEM model is a compact power supply for the rated voltage DC45/90/180V non-excited brakes.

### ■ Correspond to each input voltage of AC100V, AC200V and AC400V

Simply by connecting and inputting, the required direct current for electromagnetic clutch and brake can be obtained for AC100V, AC200V and AC400V specifications.

### ■ Respond to an adverse environment

Since the entire case is molded by resin, it can be used in the presence of powder dust. It is also compact and lightweight.

### ■ Lead wire type

A lead wire input-output type power supply that is suitable for transit connection.

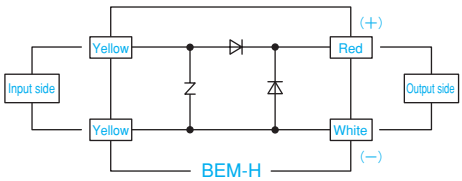
### ■ Environmental product

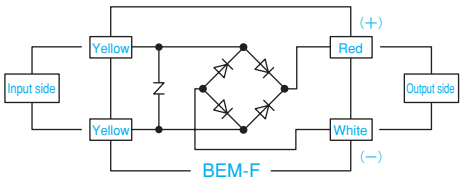
Conversion to the corresponding parts on the basis of the environmental regulations such as RoHS is promoting.

## ■ Specification

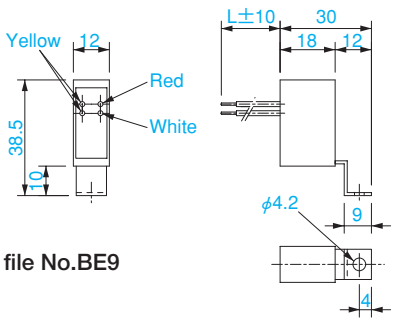
| Type | | | BEM-2H | | BEM-4H | | | BEM-2F | |
|---|---|---|---|---|---|---|---|---|---|
| Input voltage | AC 100 V | ±10% 50/60Hz | ● | | ● | | | ● | |
| | AC 200 V | | ● | | ● | | | ● | |
| | AC 400 V | | | | ● | | | | |
| | Max. input volt. | | AC 250 V | | AC 510 V | | | AC 250 V | |
| Output voltage | Rectification method | | Half wave rectification | | | | | Full wave rectification | |
| | When the voltage in parentheses ( ) is input | | DC 90 V (AC200V) | | DC 180 V (AC400V) | | | DC 180 V (AC200V) | |
| Output current | When the ambient temp. is 20°C. The value in parentheses is for 60°C. | | DC 1.0 A (DC0.6A) | | DC 1.0 A (DC0.6A) | | | DC 1.0 A (DC0.6A) | |
| Output capacity | When the ambient temp. is 20°C. The value in parentheses is for 60°C. | | 90 W / AC200V (50W) | | 180 W / AC400V (100W) | | | 180 W / AC200V (100W) | |
| Size settings | The value in parentheses is input voltage | | DC 45 V (AC100V) | DC 90 V (AC200V) | DC 45 V (AC100V) | DC 90 V (AC200V) | DC 180 V (AC400V) | DC 90 V (AC100V) | DC 180 V (AC200V) |
| | ●: Applicable △: Applicable depending on the clutch and brake model | 02 | ● | ● | ● | ● | ● | ● | ● |
| | | 03 | ● | ● | ● | ● | ● | ● | ● |
| | | 04 | ● | ● | ● | ● | ● | ● | ● |
| | | 05 | ● | ● | ● | ● | ● | ● | ● |
| | | 06 | ● | ● | ● | ● | ● | ● | ● |
| | | 08 | ● | ● | ● | ● | ● | ● | ● |
| | | 10 | ● | ● | ● | ● | ● | ● | ● |
| | | 12 | | ● | | ● | ● | ● | ● |
| | | 14 | | ● | | ● | ● | ● | ● |
| | | 16 | | ● | | ● | ● | ● | ● |
| | | 18 | | △ | | △ | ● | △ | ● |
| | | 20 | | △ | | △ | △ | △ | ● |
| | | 25 | | △ | | △ | △ | △ | ● |
| Applicable clutch and brake | Miki Pulley clutch and brake Rated voltage DC 45/90/180 V | | Non-excited brake | | | | | | |
| Dielectric resistance | Terminal - product | | DC 500 V At megger 100MΩ | | | | | | |
| Dielectric strength voltage | | | AC 1500 V 50Hz 1 min. | | | | | | |
| Use environment | Non condensing | | − 15 ～ ＋ 60 ℃ | | | | | | |
| Mass | Per product | | 0.020 kg | | 0.021 kg | | | 0.023 kg | |

## ■ Structure




## ■ Dimension




●CAD file No.BE9

## ■ Terminal and feature

| Lead wire color | Terminal name | Function explanation |
|---|---|---|
| Yellow (2 lines) | Input side | Connect a commercial power AC200/220V 50/60Hz. |
| Red/White | Output side | Connect an electromagnetic clutch and brake. |

# Characteristics

## For both half-wave and full-wave rectifications

The BEM-2H/4H type power supply inputs a commercial power supply to generate a half-wave rectified DC voltage on the output side. This power supply is characterized by its low cost and simple circuit configuration. However, a large voltage pulsation could lead to variations of electromagnetic clutch and brake performance response or noise generation when applying current. Also, the heating value of electromagnetic coil tends to slightly increase compared with a full-wave rectification or smoothing power supply.
For the above tendencies are unfit for the specification, use of a full-wave rectification power supply (BEW-1F/2F type) or smoothing power supply, or to change to the DC24V specification is recommended.
The BEW-2F type power supply generates a full-wave rectified DC voltage. Compared with a half-wave rectification power supply, this power supply has a smaller voltage pulsation and variability of electromagnetic clutch and brake performance response.

**Output voltage calculation method**
**Output voltage = Input voltage x a (factor)**
***a (factor) = 0.45: Half-wave rectification / 0.9: Full-wave rectification**
**(Example)**
**BEM-2H・4H : AC 200 V × 0.45 = DC 90 V**
**BEM-2F : AC 100 V × 0.9 = DC 90 V**

Note that the required characteristics can not be obtained if the rated voltage of the electromagnetic coil does not correspond to the output voltage from the power supply.

# Instruction for use

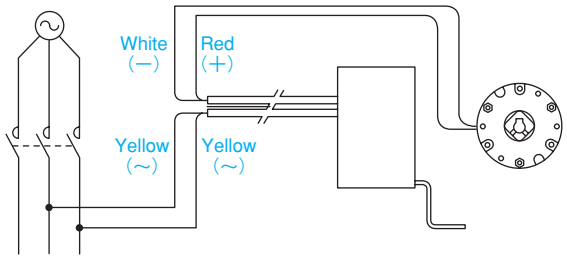
## Primary-side control and secondary-side control method

This power supply is based on the "primary-side control" that performs the control of electromagnetic clutch and brake by ON/OFF operation of input voltage. This control method is less wired, but the armature suction time is longer compared with the secondary-side control so that the brake braking time will be lengthened.
This phenomenon appears clearly as the electromagnetic clutch and brake size increases. Therefore, the "primary-side control" is used especially for a small non-excited brake. In addition, a surge voltage (inverse voltage) that is generated in the "secondary-side control" is not generated in the "primary-side control" when the current of the electromagnetic clutch and brake is OFF, therefore the "primary-side control" is effective for a machine that has a susceptibility to noise.

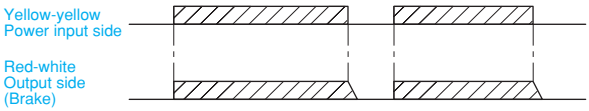
To perform the "secondary-side control" to improve the responsiveness, set the relay contact between the output terminal and electromagnetic clutch and brake as shown in the wiring diagram on the right. In this regard, connect a discharge device such as varistor between the relay contacts or parallel to the clutch and brake.

# Wire connection method and time chart

## Primary-side control

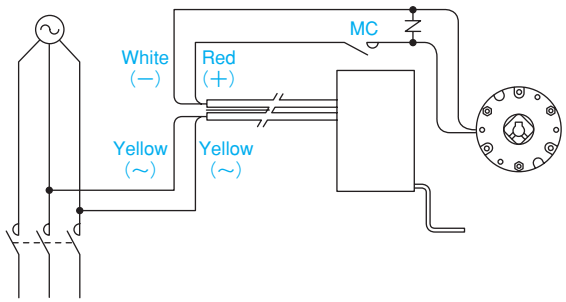



Lead wire 《In the case of primary-side control》 Control the output-side lead wire (red and white) by ON/OFF operation of the input-side lead wire (yellow).

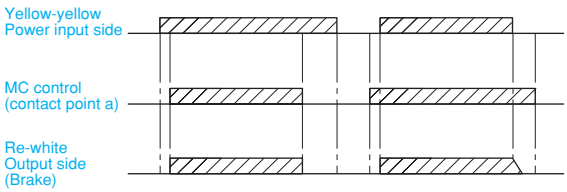



* A surge voltage from the electromagnetic coil is not generated during ON/OFF operation, but the armature suction time is lengthened.

## Secondary-side control




Lead wire 《In the case of secondary-side control》 Control the brake output by ON/OFF operation of the relay while the input-side lead wire (yellow) is on.




# Ordering Information

**BEM- 2 H 120 L**

- Input voltage spec.: Rated input AC200V: 2; Rated input AC400V: 4
- Rectification method: Half-wave rectification: H; Full-wave rectification: F
- Lead wire length: 3-type 120mm: 120; 240mm: 240; 360mm: 360

# BEM-T type

## Power supply Ultracompact/Lightweight Lead wire type


The BEM-T is a compact power supply for the rated voltage DC45/90V non-excited brakes.

### ■ Correspond to each input voltage of AC100V and AC200V

Simply by connecting and inputting, the required direct current for non-excited brake operation can be obtained.

### ■ Free mounting

Due to the compact and slim structure, it can be mounted in any place. Furthermore, the movable mounting part allows for a free selection of input-output direction.

### ■ Easy-to-connect tab terminal output

A tab terminal (110 series) is set on the output side where the non-excited brake is connected to. A connecting space and the number of man-hour can be reduced.

### ■ Respond to an adverse environment

The entire case is molded by resin that it can be used in the presence of powder dust.

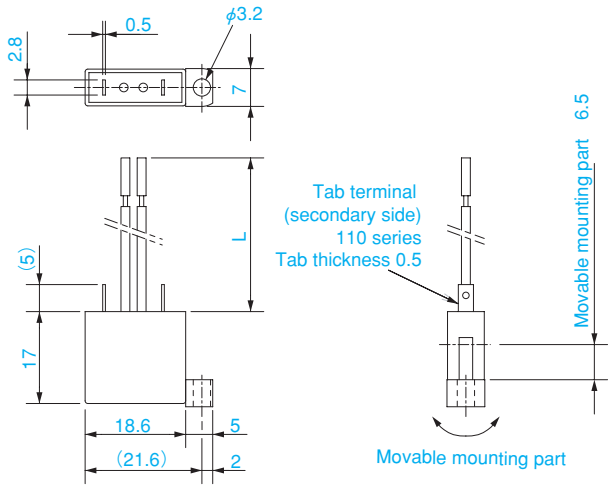
### ■ Environmental product

Adapted to the EU Restriction of Hazardous Substances that bans the use of 6 substances such as mercury or lead.

## ■ Specification

| Type | | | BEM-2T | |
|---|---|---|---|---|
| Input voltage | AC 100 V | ±10% 50/60Hz | ● | |
| | AC 200 V | | ● | |
| | Max. input volt. | | AC 280 V | |
| Output voltage | Rectification method | | Half wave rectification | |
| | When the voltage in parentheses ( ) is input | | DC 90 V (AC200V) | |
| Output current | When the ambient temp. is 20°C. The value in parentheses is for 60°C. | | DC 1.0 A (DC0.6A) | |
| Output capacity | When the ambient temp. is 20°C. The value in parentheses is for 60°C. | | 90 W / AC200V (50W) | |
| Size settings | The value in parentheses is input voltage | | DC 45 V (AC100V) | DC 90 V (AC200V) |
| | ●: Applicable<br>△: Applicable depending on the clutch and brake model | 02 | ● | ● |
| | | 03 | ● | ● |
| | | 04 | ● | ● |
| | | 05 | ● | ● |
| | | 06 | ● | ● |
| | | 08 | ● | ● |
| | | 10 | ● | ● |
| | | 12 | | ● |
| | | 14 | | ● |
| | | 16 | | ● |
| | | 18 | | △ |
| | | 20 | | △ |
| | | 25 | | △ |
| Applicable clutch and brake | Miki Pulley clutch and brake Rated voltage DC 45/90 V | | Non-excited brake | |
| Dielectric resistance | Terminal - product | | DC500V At megger 100MΩ | |
| Dielectric strength voltage | | | AC 1500 V 50Hz 1 min. | |
| Use environment | Non condensing | | − 20 ～ + 60 ℃ | |
| Mass | Per product | | 0.008 kg | |

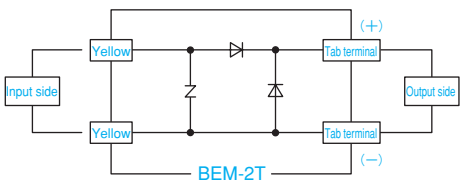
## ■ Dimension




## ■ Recommended mating products for tab terminal

- Receptacle 170043-1 (Mfg by AMP)
- Insulating sleeve 170823-1 (Mfgby AMP)
- ICT insulating coating terminal FA-type 110 series
- ICDEN 280509-FA (Mfg by Nichifu)
- Flat insertion terminal CSS 62853-F (Mfg by Nichifu)
- Insulating cap 62826-F (Mfg by Nichifu)

## ■ Structure



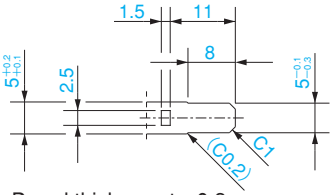

## ■ Terminal and feature

| Lead wire color | Terminal name | Function explanation |
|---|---|---|
| Yellow (2 lines) | Input side | Connect a commercial power AC200/220V 50/60Hz. |
| Tab terminal (2 places) | Output side | Connect an electromagnetic clutch and brake. |

## ■ Design of the mounting part

The standard mounting foot is not only movable but also removable for exclusive mounting. Refer to the recommended dimensions as follows to perform the design, or contact us.

Mounting part recommended dimension




Board thickness t=0.8 ±0.1

## Characteristics

### ●Output method

The BEM-2T type power supply inputs a commercial power supply to generate a half-wave rectified DC voltage on the output side. This power supply is characterized by its low cost and simple circuit configuration, but the voltage pulsation is large that variations of the clutch and brake performance response or noise generation when applying current tend to occur. Also, the heating value of the electromagnetic coil tends to slightly increase compared with the full-wave rectification or smoothing power supply.
For the above tendencies are unfit for the specification, use of a full-wave rectification power supply (BEW-1F/2F type) or smoothing power supply, or to change to the DC24V specification is recommended.

**Output voltage calculation method**
**Output voltage = Input voltage x a (factor)**
*** a (factor) = 0.45: Half-wave rectification**
**(Example)**
**BEM-2T : AC 200 V × 0.45 = DC 90 V**

Note that the required characteristics can not be obtained if the rated voltage of the electromagnetic coil does not correspond to the output voltage from the power supply.

## Instruction for use

### ● Primary-side control and secondary-side control method

This power supply is based on the "primary-side control" that performs the control of electromagnetic clutch and brake by ON/OFF operation of input voltage. This control method is less wired, but the armature suction time is longer compared with the secondary-side control so that the brake braking time will be lengthened.
This phenomenon appears clearly as the electromagnetic clutch and brake size increases. Therefore, the "primary-side control" is used especially for a small non-excited brake. In addition, a surge voltage (inverse voltage) that is generated in the "secondary-side control" is not generated in the "primary-side control" when the current of the electromagnetic clutch and brake is OFF, therefore the "primary-side control" is effective for a machine that has a susceptibility to noise.

To perform the "secondary-side control" to improve the responsiveness, set the relay contact between the output terminal and electromagnetic clutch and brake as shown in the wiring diagram on the right. In this regard, connect a discharge device such as varistor between the relay contacts or parallel to the clutch and brake.

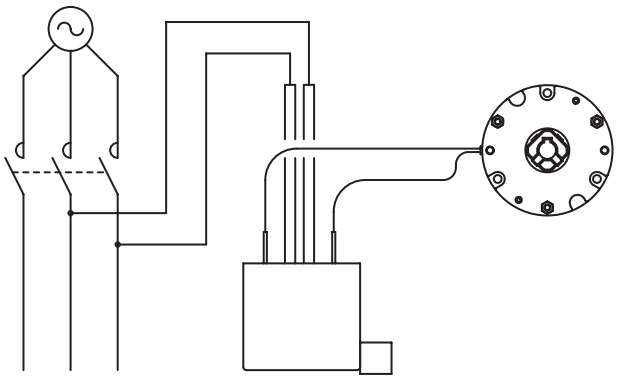
## Ordering Information

**BEM-2T 120 L**

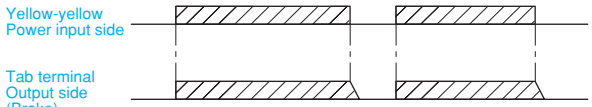
Lead wire length
3-type 120mm: 120
240mm: 240
360mm: 360

## Wire connection method and time chart

### ●Primary-side control

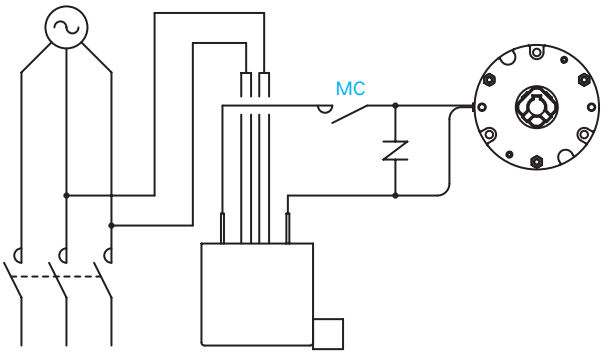


Lead wire 《In the case of primary-side control》
Control the output-side tab terminal by ON/OFF operation of the input-side lead wire (yellow).

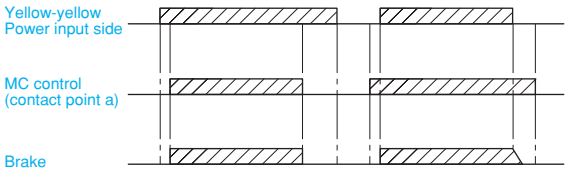



* A surge voltage from the electromagnetic coil is not generated during ON/OFF operation, but the armature suction time is lengthened.

### ●Secondary-side control




Lead wire 《In the case of secondary-side control》
Control the brake output by ON/OFF operation of the relay while the input-side lead wire (yellow) is on.

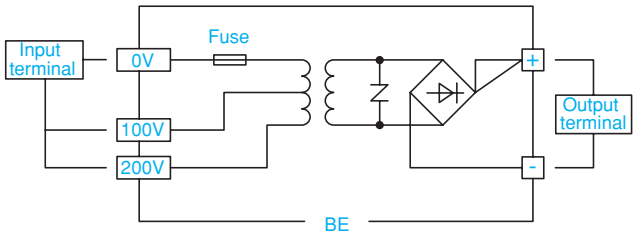


# Power supply unit type

When operating electromagnetic clutches and brakes, power supply units are necessary. All the Miki Pulley's electromagnetic clutches and brakes contain a DC power supply coil. Therefore, to convert a commercial power into DC voltage is required.
Operating characteristics of electromagnetic clutches and brakes are affected by the type or specification of the power supply to create DC power supply voltage.

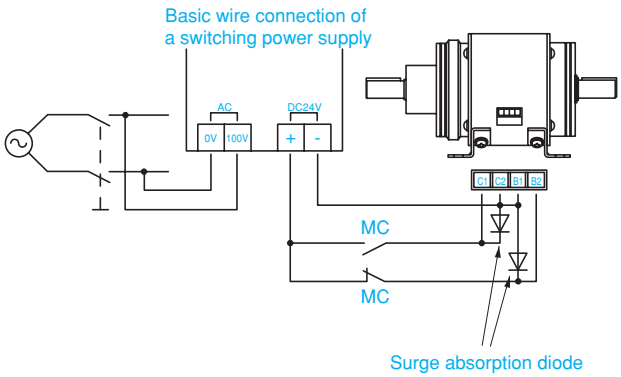
## Trans step-down/Single-phase full-wave rectification power supply unit (BE model)

The BE model is the most common power supply unit for DC 24V electromagnetic clutches and brakes. It has a simple and robust construction. This model is resistance to the surge voltage that is generated during ON/OFF operation of electromagnetic clutches and brakes. It is easy to handle.




## Switching power supply (commercial item)

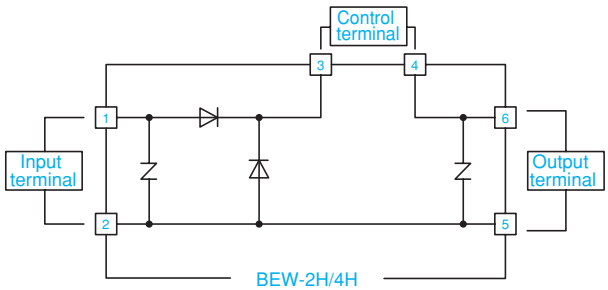
It is widely used for various electric equipments (mainly for DC24V) such as a relay, timer or sequencer. It is a compact and lightweight power supply unit generating a smoothed and stable voltage.
However, it is sensitive to the surge voltage generated by an electromagnetic coil during ON/OFF operation. Also, this usage is not guaranteed by the manufacturer.
When using a switching power supply for electromagnetic clutches and brakes, a diode must be connected parallel to the electromagnetic coil for absorbing the surge. A surge absorption diode slows down the armature suction time.




## Half-wave rectification power supply (BEW/BEM model)

This power supply unit has a circuit combining two diodes. A commercial power supply is directly input to generate a half-wave rectified DC voltage on the output side. Compared with other power supply units, this power supply unit has a very simple circuit configuration. It is also characterized by its low cost and compactness.
However, about 10ms variations will occur by the contact method repeating to supply/stop the voltage by a half cycle of 50Hz/60Hz. The heating value of electromagnetic coil tends to slightly increase compared with a full-wave rectification or smoothing power supply. Also, an excitation noise tends to occur when applying current.
For the above tendencies are unfit for the specification, use of a non-excited brake in combination, full-wave rectification power supply (BEW-1F/2F type) or smoothing power supply, or to change to the DC24V specification is suggested.

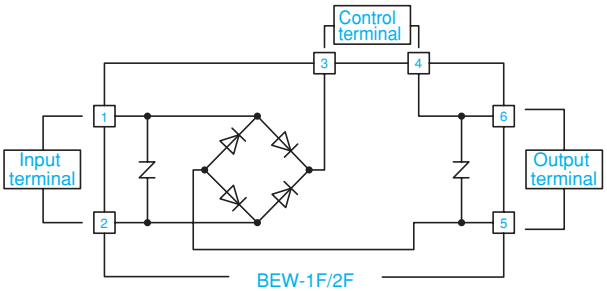
**Output voltage calculation method**
**Output voltage = Input voltage x a (factor)**
*** a (factor) = 0.45: Half-wave rectification**
**(Example)**
**AC 100 V × 0.45 = DC 45 V**
**AC 200 V × 0.45 = DC 90 V**
**AC 400 V × 0.45 = DC 180 V**




## Full-wave rectification power supply (BEW/BEM model)

This power supply unit has a circuit combining four diodes. A commercial power supply is directly input to generate a full-wave rectified DC voltage.
Compared with a half-wave rectification power supply, this power supply is relatively costly, but has a smaller voltage pulsation and variability of electromagnetic clutch and brake performance response.
It can be used for all types of electromagnetic clutches and brakes.

**Output voltage calculation method**
**Output voltage = Input voltage x a (factor)**
*** a (factor) = 0.9: Half-wave rectification**
**(Example)**
**AC 100 V × 0.9 = DC 90 V**
**AC 200 V × 0.9 = DC 180 V**



## ● Overexcitation power supply (BEH/BEJ/BEW-FH model)

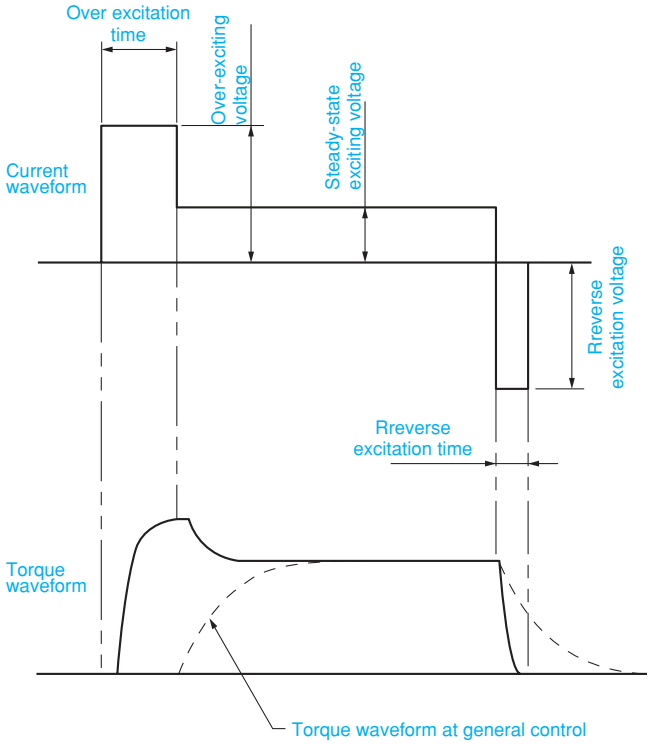
This power supply unit applies and controls an overvoltage for a certain period of time to quicken the armature suction time of electromagnetic clutch and brake, strengthen the generated torque or prolong the operating life. By the use of this power supply unit, the above mentioned characteristics are dramatically enhanced.
However, inappropriate settings such as current-carrying frequency or time could burn out the coil by abnormal heat generation.

## ● Reverse excitation function (BEH model)

The reverse excitation function is a contact method to apply and control an opposite voltage from the voltage before turning OFF the electromagnetic clutch and brake for a certain period of time to quicken the armature suction time. This power supply is effective for larger electromagnetic clutches and brakes. Compared with the BE model, the responsiveness of Miki Pulley's electromagnetic clutch and brake size 25 is improved by approximately 5 times. This will actualize a high-frequency operation with less fighting phenomenon.

※ An optimal value for operating Miki Pulley's electromagnetic clutches and brakes is set in advance. Any special adjustment is not required for installation. If the other electromagnetic clutch and brake is used, the optimal value is not applicable. Contact us for further information.

※ The BEJ and BEH model are smoothing overexcitation power supply units. Compared with other power supplies, the operation responsiveness of electromagnetic clutches and brakes is stable.




## ● Low-excitation power supply (BEW-FH model)

In recent years, non-excitation brakes became compact, slim and very high torque. At the same time, the electromagnetic coil or structural part became more complex and large capacity.
Contrarily, energy saving, recycling, restricting the use of hazardous substances are emphasized at the social level.

Non-excitation brakes require a large suction power when suctioning an armature, but it can hold the state with small electricity after suctioning. Except the required electricity to hold the release state is waste, which means non-excitation brakes spend a lot of wasteful power.
Low-excitation brakes improve these problems to provide the effects described on the right. We offer various suggestions from the perspective of both non-excitation brakes and power supply units to solve those problems.

### ■ Compactness, slimness, high torque, high responsiveness and long operating life

By designing a non-excitation brake using a low-excitation power supply, compactness, slimness, high torque, high responsiveness and long operating life can be achieved.

### ■ Energy saving

By creating a low-excitation state, over 90% of normal electricity usage is reduced. Heat generation of electromagnetic coil is also reduced by over 90%.

### ■ Decrease in failure rate

Abnormal heat generation of electromagnetic coil, burnout of non-excitation brake caused by environment temperature rise or damage around the brake is substantially reduced.

### ■ Improvement of recycling efficiency

It is decomposable to the material level. The recycling efficiency is greatly improved.

# Electromagnetic clutches and brakes control

A power supply unit is essential to operate electromagnetic clutches and brakes. To control electromagnetic clutches and brakes in accordance with operations of machinery, a control device is required.

The high-performance BEH and BEJ models perform a large-capacity current-carrying control by receiving a minute control input from a sequencer. However, if other power units are used, the electrical power added to the electromagnetic clutch and brake is applied directly to the control contact. Therefore, power relays or other power controllers are necessary. Select the appropriate controller in accordance with the machine specification.

## ●Power relay (commercial item)

There is a relay called power relay in general to control a relatively high current below 10A.

This relay guarantees a large power control in both current and voltage values for AC power control. However, it is required to use within extremely low specified values in the case of DC inductive load for DC power control. This is because the relay contact is greatly consumed by the surge voltage (inverse voltage) generated during electromagnetic coil control. Confirm the specified value for the power relay to be used under DC inductive load conditions.

The following indicates a general reference value.

**The case of LY series is manufactured by Omron Corporation**

**[Electromagnetic clutches and brakes primary-side control]**

**AC voltage:** AC110V (Maximum AC250V or under)
**AC current:** AC4A or under
**Capacity:** 100W or under

**[Electromagnetic clutches and brakes secondary-side control]**

**DC voltage:** DC24V (Maximum DC125V or under)
**DC current:** DC1A or under
**Capacity:** 25W or under

※ The secondary-side control indicates the values when Miki Pulley's varistor is used
※ All of the three items must be within the specified values.
※ Refer to the wire connection of each model for primary/secondary side control.
※ The primary-side control value can be applied for the secondary-side control if a diode is used as a discharge device.

## ● Electromagnetic contactor (commercial item)

Electromagnetic contactors and switches used widely to control induction motors are very useful control equipments for large electromagnetic clutches and brakes as well. This electromagnetic contactor can control several times the power in both voltage and current compared with a power relay, and is very effective for high-voltage control.

However, a discharge device such as varistor is needed for the surge voltage (inverse voltage) generated during electromagnetic clutch and brake control. If a large electromagnetic clutch and brake is controlled without discharge device, over 2000V of surge voltage is generated. This voltage exceeds the rated voltage of electromagnetic contactor, which could lead to a shortened operating life.

The following indicates a general reference value.

**In the case of SC series manufactured by Fuji Electric Co., LTD**

**[Electromagnetic clutches and brakes primary-side control]**

**AC voltage:** AC220V (Maximum AC440V or under)
**AC current:** AC3A or under
**Capacity:** 450W or under

**[Electromagnetic clutches and brakes secondary-side control]**

**DC voltage:** DC220V or under
**DC current:** DC2A or under
**Capacity:** 150W or under

※ The secondary-side control indicates the values when Miki Pulley's varistor is used
※ All of the three items must be within the specified values.
※ Refer to the wire connection of each model for primary/secondary side control.
※ The primary-side control value can be applied for the secondary-side control if a diode is used as a discharge device.

## ● Solid state relay/ SSR (commercial item)

SSRs used to control various load devises are suitable for sequencer control, and the number of use is growing in recent years. Most of SSRs are used for controlling AC power, and 80% of the products on the market are for AC power control. When a SSR for AC power control is used for electromagnetic clutches and brakes, the primary-side input voltage is controlled.

The "zero-cross control" that is used for SSR control slows the responsiveness interdependently with the primary-side control. Therefore, caution should be exercised in using electromagnetic clutches and brakes in combination.

The most important specification in SSRs for DC current control is the maximum rated voltage. When controlling electromagnetic clutches and brakes by DC SSRs, the generated surge voltage must be reduced to the rated value of SSR. This means that a discharge device such as varistor or diode is required. Using without discharge device could damage SSR in a short period. Contact the SSR manufacturer or us for more detail.

## ● Contactless control (Power MOS-FET/ Power transistor)

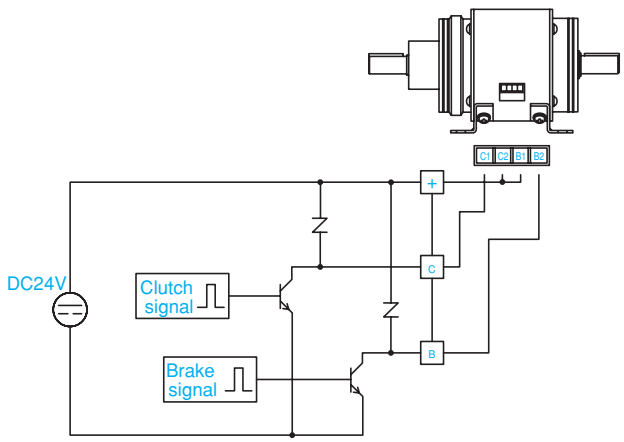
The main purpose of contactless control of electromagnetic clutches and brakes is to enable high-frequency and high-accuracy operations. In a contactless control, there is no delay in output for an input signal. Also, the
maintenance caused by control contact wear is not required. In addition, downsizing can be achieved by creating a control board. There are many advantages in contactless control, but the elemental device needs to be properly selected. An inappropriate selection could cause performance degradation or damage of the element in a short period. It could also affect the peripheral devices.
Refer to the following values as an indication of selecting a general elemental device.

**[Selection example: combination control of 101-12-13 and BE-10]**
**Conditions**
- **Clutch: 101-12-13**
- **Rated voltage: DC24V**
- **Rated current: DC1.09A**
- **Power supply unit: BE-10**
- **Internal trance secondary-side voltage: approx. AC32V**
- **Output peak voltage: AC32V x 1.414= 45.25V**
- **Varistor: 82V product (TNR7V820K)**

**[Selected element]**
- **Rated voltage: 200V or above**
- **Rated current: 5A or above**

### ■Selection points

For the rated voltage of the element, more than the highest voltage applied to the element is required. In the above example, the surge voltage generated during ON/OFF operation of electromagnetic clutches and brakes is the highest value. As characteristics of varistor, there are variations in the limited voltage so that the maximum limited voltage is specified. In the above condition (82V), it is 135V.
Next, a safety factor for the voltage must be determined.
Assuming that the minimum safety factor is 1.3, the rated voltage is 175.5V from 135V x 1.3, more than 200V is minimally required for the element.
For the rated current of the element, three times the actual current value is required. Also, the heating value of element changes depending on the type of element, current-carrying condition or ambient environment. Ultimately, evaluate the element heating value by the use conditions, and confirm if it is within the specified value by actual equipment.




## ●Other controls

### ■ Current control (Electromagnetic clutches and brakes)

This control method is used for a torque control of electromagnetic clutches and brakes.
Torque is transmitted by a suction power generated by the current of electromagnetic coil. Controlling the current value of electromagnetic coil is required to control torque.
Power supply units to perform a current control are available. Contact us for further information.

### ■Voltage control

There are various ways to control a voltage. The following are the examples of voltage control.

- Low-excitation control
  Simple torque control (by voltage adjustment)
  Absorb the shock of connection
  Quicken the release of armature
  Suppress the heat generation of electromagnetic coil
- Overexcitation control
  Quicken the armature suction time
  Up the torque
- Quick excitation control
  Quicken the armature suction time
- Quick overexcitation control
  Quicken the armature suction time
  Up the torque

The power supply voltage must be set to the specified condition to achieve the above controls.

- Prepare several power supply voltages to perform a switching control.
- Control the voltage by volume
- Contactless switching control
- Voltage dividing control by series resistance

### ■Quick excitation control

It is a circuit with a fast time constant to quicken the armature suction time of electromagnetic clutches and brakes.
Set the power supply voltage at higher value and impose resistance in series with the electromagnetic clutch and brake. Then, set the power supply voltage and resistance value in order that the rated voltage DC24V to be added to the electromagnetic coil, also in accordance with other conditions.
For this control method, a large resistance capacitance is required since the same current value as the electromagnetic clutch and brake is applied to the resistance. The resistance heating also needs to be considered.

* What is time constant?
Since electromagnetic clutches and brakes are induction loads, the characteristic is that current value that flows into gradually increases when the DC voltage is applied.
The characteristic has fixed value according to the type and size of electromagnetic clutches and brakes. Bigger the size is, slower the current flows.

### ■Quick overexcitation control

This control reduces the armature suction time more than a quick excitation control by adding a large condenser in a quick excitation control circuit.
Since an overexciting voltage is generated by a condenser, when setting an ON/OFF time you must consider the electromagnetic coil heating and condenser charging time is required.

# Surge voltage and discharge device

## ●What is surge voltage?

When applying current through the electromagnetic coil, it is excited to generate the suction power required for the electromagnetic clutches and brakes.

When it reaches the specified current value, the energy is stored in the inside coil, and the amount of energy becomes larger as the size become larger. When interrupting the current, surge energy equal to the stored energy is generated by an inductive load functioning to keep applying current. As mentioned above, a surge voltage becomes higher as the size becomes larger, and more than 1000V could be generated in the control contact and inside coil, which may cause a dielectric breakdown of the coil or contact burnout of the switch. Therefore, to limit the surge voltage to the appropriate value using a discharge device is very important.

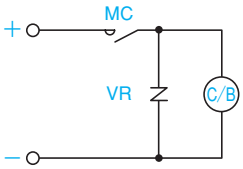
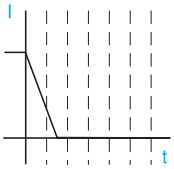
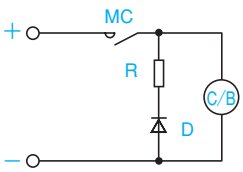
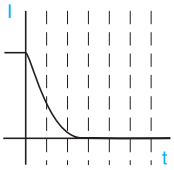
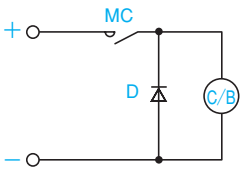
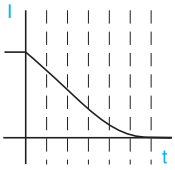
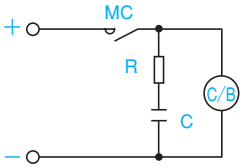
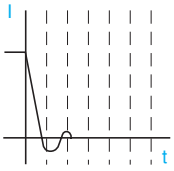
If the surge limited voltage is high, the armature release time is fast. The armature release time is slow if the limited voltage is low. For a selection of discharge devices you must take the machine specification and conditions of power supply unit and control circuit into account, this is very important.

## ●Role of varistor

We recommend using a varistor as a discharge device. It is because a varistor is easy to set the limited voltage required to control electromagnetic clutches and brakes properly, and is capable of large or small surge energy with its small element. Selecting the appropriate varistor enables the electromagnetic clutches and brakes to be carried out the original characteristics.

If the limited voltage is set higher than the appropriate value by mistake, it could cause control contact burnout or damage of power supply unit. Contrary, if the limited voltage is set lower than the appropriate value, it could cause damage of varistor or power supply unit. Even if the phenomenon does not occur, the armature release time tends to be slowed.

## ●Types of discharge devices

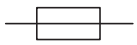
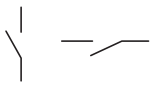
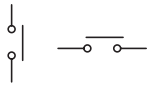
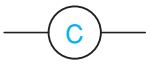
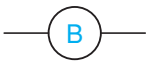
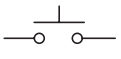
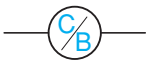
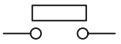
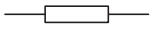
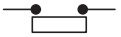
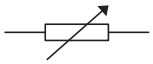
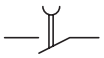
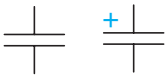
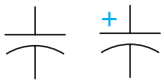
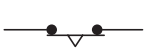
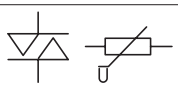
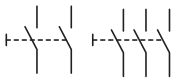
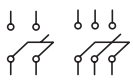
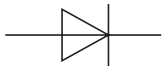
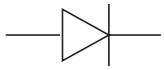
| Types of discharge devices | Circuit diagram | Current decay | Characteristics | Power supply unit | | Clutches and brakes | | Recommended devices |
|---|---|---|---|---|---|---|---|---|
| | | | | Model | Voltage specification | Rated voltage | Size | |
| Varistor |  |  | It has a significant effect to reduce a surge voltage. There is no delay of the armature release time. | BE | DC24V | DC24V | #01 \| #16 | NVD07SCD082 or TNR7V820K (NVD14SCD082 or TNR14V820K) |
| | | | | | DC24V | DC24V | #20 or more | NVD14SCD082 or TNR14V820K |
| | | | | BEW BEM | AC100V−Half wave | DC45V | #01 \| #25 | NVD07SCD470 or TNR7V471K (NVD07SCD220 or TNR7V221K) |
| | | | | | AC100V−Full wave | DC90V | | |
| | | | | | AC200V−Half wave | DC90V | | NVD07SCD470 or TNR7V471K |
| | | | | | AC200V−Full wave | DC180V | | |
| | | | | | AC400V−Half wave | DC180V | | NVD14SCD820 or TNR14V821K |
| Resistance + diode |  |  | The power consumption of the power section can be reduced as well as its resistance capacitance. Since the armature release time becomes slow in a measure, caution is demanded for high-frequency use. | BE | DC24V | DC24V | #01 \| #25 | ☐ Rated voltage of diode<br>・DC24V: 100V or more<br>・AC100V: 400V or mor<br>・AC200V: 800V or moree<br>☐ Rated current of diode<br>・Specification more than the exciting current<br>☐ Resistance<br>・About 10 times the coil resistance |
| | | | | BEW BEM | AC100V−Half wave | DC45V | | |
| | | | | | AC100V−Full wave | DC90V | | |
| | | | | | AC200V−Half wave | DC90V | | |
| | | | | | AC200V−Full wave | DC180V | | |
| Diode |  |  | It is effective to reduce a surge voltage. However, the armature release time becomes slow, and there is a high possibility of occurrence of mutual interference of the clutch and brake. It is not suitable for high-frequency use. | BE | DC24V | DC24V | #01 \| #25 | ☐ Rated voltage of diode<br>・DC24V: 100V or more<br>・AC100V: 400V or mor<br>・AC200V: 800V or moree<br>☐ Rated current of diode<br>・Specification more than the exciting current |
| | | | | BEW BEM | AC100V−Half wave | DC45V | | |
| | | | | | AC100V−Full wave | DC90V | | |
| | | | | | AC200V−Half wave | DC90V | | |
| | | | | | AC200V−Full wave | DC180V | | |
| Resistance + condenser |  |  | The armature release time becomes faster, but a condenser with high pressure tightness is required. | BE | DC24V | DC24V | #01 \| #25 | Condenser: the ratio with contact current is; $\frac{C\,[\mu F]}{1\ [A]} = \frac{0.5\sim1}{1}$ Pressure tightness: 600[V]<br>Resistance: the ratio with contact current is; $\frac{R\,[\Omega]}{E\,[V]} = 1$ Pressure tightness: 1 [W] |
| | | | | BEW BEM | AC100V−Half wave | DC45V | | |
| | | | | | AC100V−Full wave | DC90V | | |
| | | | | | AC200V−Half wave | DC90V | | |
| | | | | | AC200V−Full wave | DC180V | | |

* The protective device NVD☐SCD☐ is manufactured by KOA, and TNR☐V☐K is manufactured by Nippon Chemi-Con Corporation.
* Parenthesis indicates usable product.
*?For details of power supply units and applicable clutches and brakes, refer to respective pages.
* For the power supply unit BEH and BEJ, a protective device can not be used.

# Symbols to be used for electric circuit

## ●Symbols

By rapid technological progress, many new symbols and graphic symbols are established. The following symbols are made based on the JIS handbook and symbols and graphic symbols handbook. The IEC standard or general symbols are described in the "Symbol 1" and the symbols previously used are described in the "Symbol 2".

| Name | Symbol | | Name | Symbol | |
|---|---|---|---|---|---|
| | Symbol 1 (IEC or equivalent) | Symbol 2 (Former symbols) | | Symbol 1 (IEC or equivalent) | Symbol 2 (Former symbols) |
| DC power supply |  | | Motor |  | |
| AC power supply |  | | Induction motor |  | |
| Fuse |  |  | Generator |  | |
| Relay (a contact) |  |  | Electromagnetic clutch |  | |
| Relay (b contact) |  |  | Electromagnetic brake |  | |
| Push-button switch (a contact) |  |  | Clutch or Brake |  | |
| Push-button switch (b contact) |  |  | Transformer |  |  |
| Limit switch (a contact) |  |  | Resistor |  |  |
| Limit switch (b contact) |  |  | Variable resistance |  |  |
| Timer (time-limit operation) (a contact) |  |  | Condenser |  |  |
| Timer (time-limit operation) (b contact) |  |  | Varistor |  |  |
| Knife switch |  |  | Diode |  |  |
| Electromagnetic contactor |  |  | Rectifier (bridge type) |  |  |
| Lamp |  |  | Transistor (NPN type) |  | |
| Buzzer |  |  | Transistor (PNP type) |  | |
| Earth ground |  | | Photo coupler |  | |
| Connect to outer casting |  | | Coil |  |  |

* The symbols deemed most common are used in this catalog.