

# Motor Brake Relay

Type BI 9023  
ministop



Model BI 9023/100  
Model BI 9023/200

## Description

A compact DIN rail mounted motor brake relay, designed for retrofitting to existing DOL and Star Delta starter systems. BI 9023/100 is suitable for motors rated from 7.5 kW to 22 kW, or greater if optimum stopping time is not required. Braking current ( $I_{br}$ ) is adjustable via a potentiometer from 5A to 65A (85A with restricted use), with an adjustable time delays ( $t_{br}$ ) of 1 to 30 sec. Model BI 9023/200 has been designed for high frequency low impedance motor applications.

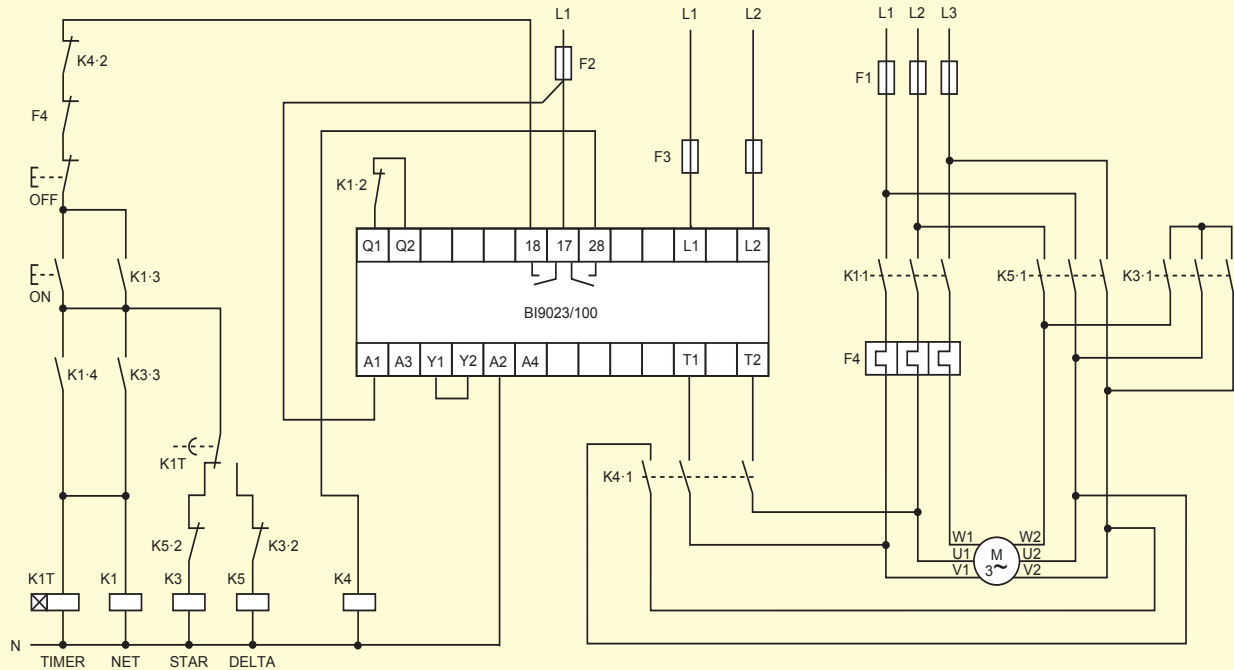
Indication on the braking module is via a green LED for power connected and via yellow LED's for DC current injection and start circuit interlock.

The braking module requires an external contactor to connect the DC output of the relay to the motor. This contactor is controlled by contact 17 - 28, see diagrams 1 & 2. The inter-lock contact 17 - 18 must be wired into the main contactor control circuit to prevent motor restart while injecting braking current. Braking is initiated by a close - open - close Volt free contact sequence at terminals Q1 - Q2.

## Application Circuit Diagram

### BI 9023.38/100 for Star Delta Applications

**NB:** for 400V AC auxiliary supply option, connect A1 to L1 and A2 to L2. (A3,A4, Y1,Y2 are not fitted)



Fuses F3 to be superfast or ultrafast semi - conductor fuses rated at 50A

230V AC auxiliary supply option shown, connect A1 to L1 and A2 - L2, link Y1 - Y2 (Only required for non 400V motors)

Diag 1

## Warning

### Attention !!

This unit **must be isolated** from the mains supply before any work is carried out on the motor or motor control circuit.

Adjustments and wiring should only be carried out by qualified persons.

**NB:** when installing BI 9023/200 on high frequency low impedance motor applications, please ensure that the L1-L2, A1- A2 and the coil connections to K4 contactor are all connected to a 50Hz supply, not the high frequency connection of the motor.

K4 contactor coil voltage to be the same as starter control Voltage

## Special Note

When monitoring the injected DC current we recommend the use of a **Moving Iron or true RMS current measuring instrument**, connected to terminal T2, to allow the amount of DC current flowing in the motor to be limited to no more than 2.8 times the motor rated current for Delta connected motors or 65A (85A with derated cycle time).

If the motor is **Star** connected, limit the DC current to no more than 2 times the rated motor current.

**Fuses F3** always to be replaced with 50A rated superfast or ultrafast semiconductor fuses for 65A applications (85A info on request).

Contactors K4 to be rated at AC1 of the full load motor current only, as this contactor does not have to switch the injected DC current.

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### Description

#### Basic Setting :

Set pot (lb) to min (anti clockwise), set time delay on pot (tb) to 30 sec. Initiate a stop cycle and turn up current pot (lb) slowly to a maximum of no more than 2.8 x the motor line current or 65A. Reduce brake time pot (tb) to a suitable level normally around 1 to 2 seconds longer than the motor takes to stop.

Restart the motor and fine tune the settings until the required stop times are achieved.

#### Wiring Information :

Connect wiring for phases L1, L2 to fuses (F3) and then respectively to terminals L1 and L2 on BI 9023/100.

Connect N/C contact 11 - 12 of IK 8701 trigger relay (if fitted) or N/C auxiliary contact of main contactor, to terminals Q1 - Q2 on BI 9023.

### Application Circuit Diagram

### Description

#### Wiring Information Continued :

If trigger relay IK 8701 is fitted, terminals A1 and A2 should be wired across the coil terminals of contactor K1 (see diagram 3).

Connections A1 and A2 on BI 9023/100 should be connected to a suitable auxiliary supply.

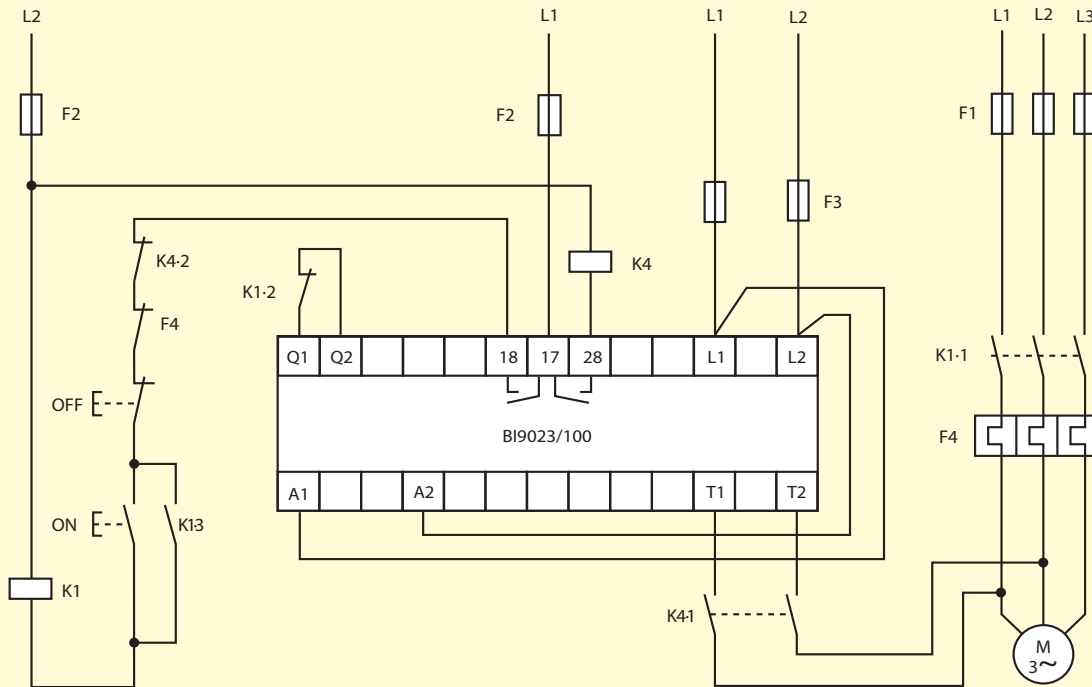
Contact 17-18 should be wired in series with the stop pushbutton circuit via a suitable fuse (5A), (see diag 1 and 2).

All control wiring to be 1.5 mm<sup>2</sup> min or dimensioned to the control fuse circuit rating, conduit or gland entry, 20 mm or 25 mm.

All wiring to fuses F3, and power terminals on BI 9023/100, L1,L2 and T1,T2 to be 6mm<sup>2</sup> stranded min.

### BI 9023/100 for DOL Applications

**NB:** for 110V AC auxiliary supply option, connect to A1 - A2, link A1-Y1, A2-Y2



Fuses F3 to be superfast or ultrafast semi - conductor fuses rated at 50A

400V AC auxiliary supply option shown connect to A1 to L1 and A2 to L2 Diag 2

### Notes

#### Key switch override of braking function:

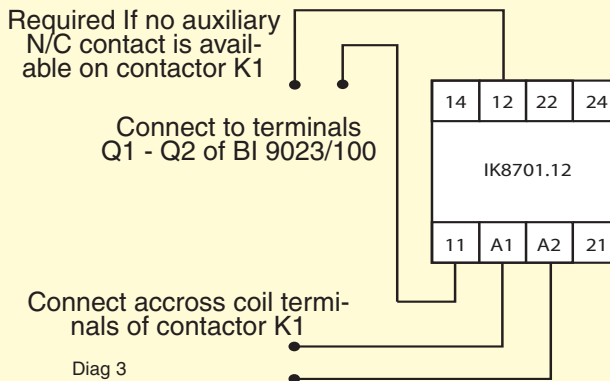
An external key switch with 1 N/O, 1N/C contacts may be used to override the braking function of BI 9023 for machine set up purposes.

The N/O key switch contact should be connected across terminals Q1 - Q2 in parallel with the N/C contact from the common or net contactor K1 (see also star delta diag 1). The N/C key switch contact should be placed in series with the hold on contact K1.3 of K1 contactor coil to create a jogging function and prohibit the machine from auto running.

If key switch is closed during the machine operation, a braking cycle will result. **NB:** limit jog functions to no more than 3 per min / 6 min off.

**NB:** The key should **always** be removed before the machine is used.

### Connection Diagram For IK 8701 Trigger Relay



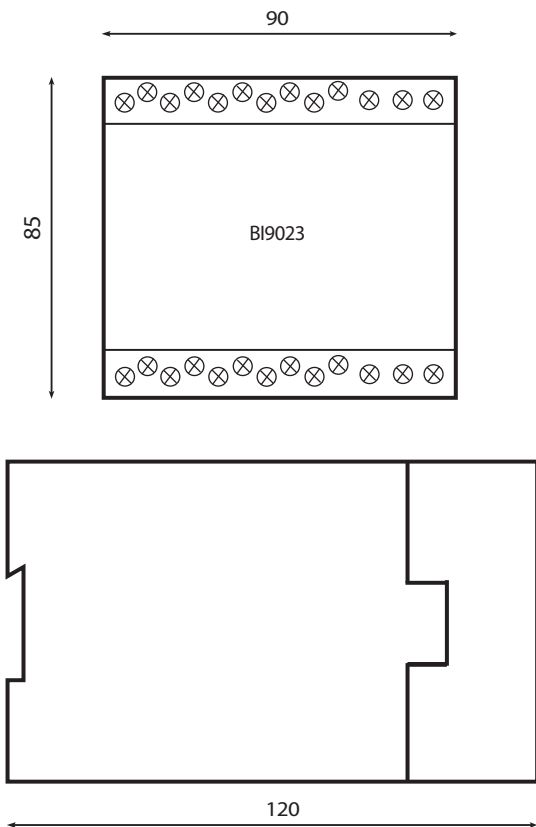
Diag 3

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## Dimensions



## Indication

- Green LED** - (ON) when power connected  
(flashing) when braking.
- Relay 1** - Contact 17-18  
interlocks main contactor out when braking
- Yellow LED 1** - (ON) when relay 1 energised  
17-18 closed, start circuit is enabled.
- Relay 2** - Contact 17-28  
controls DC injection contactor K4
- Yellow LED 2** - (ON) when relay 2 energised  
17-28 closed during braking cycle.
- Yellow LED 2** - (Flashing) ERROR  
indicates a fault, 17-18, 17-28 open.
- 1 - pulse**                    **Over temperature fault on semiconductors.**  
**4 - pulses**                **Phase failure on L1, L2.**  
**6 - pulses**                **Incorrect frequency.**

Faults can be reset after they are cleared, by removing the power to the auxiliary supply terminals A1 - A2 for 5 seconds.

## Notes

### Auxiliary                    Supply                    Options:

#### Option-1, 400V Auxiliary (Standard Option).

AC 400V                    A1- A2                    No Link

#### Option-2, Multi Voltage Auxiliary.

AC 115V                    A1- A2                    Link, A1-Y1, A2-Y2  
AC 230V                    A1- A2                    Link, Y1-Y2  
DC 24V                    A3- A4                    No Link

**NB: Multi Voltage auxiliary is only required if motor Voltage is not 400V.**

## Specifications

Nominal Voltage	L1, L2 200 to,480Vac
Voltage Tolerance	0.8 – 1.1Vn
Auxiliary Voltage	400Vac or 110Vac / 230Vac plus 24Vdc
Frequency	50 to 60Hz
Burden	3VA
Superfast semiconductor fuse	< 6600 I <sup>2</sup> t
Braking Current (ib)	5 - 65A (85A)
Braking Time Delay (tb)	1 to 30 sec
Reaction Time	1 sec
Stops Per Hour @ 65A	20 / Hr @ 30 sec duration
Stops Per Hour @ 85A	15 / Hr @ 20 sec duration
Control Contact Ratings	400V (AC1) 3A
Temperature Range	-20 – +55°C
Protection Class	Case IP65, Terminals IP20
Enclosure Material	Thermoplastic Vo rating UL94
Terminations	2 x 2.5mm <sup>2</sup> solid 2 x 1.5mm <sup>2</sup> stranded ferruled 1 x 6mm <sup>2</sup> stranded ferruled

## Contact Information

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### Information Required With Order

• Model type • Auxiliary supply Voltage • Current •

Example: Motor Brake Module, BI 9023/100, 400V, 85A