MMT-

MMT-115/230RT10AL SPECIFICATION

FOUR QUADRANT REVERSIBLE

DC MOTOR CONTROLLER

Jinan Keya Electronic Co., Ltd

MMT-115/230RT10AL（Four Quadrant Operation）

Ⅰ. Summary

MMT-SCR series DC motor controllers are full-wave positive feedback motor controllers and can control motors in bi-directional mode. It provides four-quadrant operation, which can realize positive and reverse torque in two speed directions.

Ⅱ.Product Features

1. Applicable to permanent-magnet, separate excitation DC motor
2. Large torque for low-speed start-up.
3. The mechanical characteristics of hardness, static error rate of 1%.
4. A wide speed-regulating range (0 - max).
5. A rapid dynamic response process.（adjustable）
6. Automatic and smooth transition process during acceleration or deceleration.
7. Current setting and current limiting protection (If the preset current value is exceeded, the driver stops output automatically.)
8. Setting functions of positive and opposite soft start/soft stop time (adjustable)
9. Keyboard lock-up function.
10. Positive rotation and reverse rotation are selectable.
11. Dual closed loop PI adjustment (Current and Voltage)、The closed-loop feedback is selectable.
12. The speed control mode and torque control mode are selectable.
13. The inertial gliding stop and braking stop are selectable.
14. The input voltage and output voltage are selectable.

Ⅲ. Main Parameters

1. AC Input Voltage (VAC±10% 50/60HZ) ----------115V/230V
2. AC Frequency (Hz) ----------50/60
3. Amarture voltage range 115VAC line (VDC) ----------0- ±9 0
4. Amarture voltage range 230VAC line (VDC) ----------0- ±9 0 /0-±180
5. Excitation voltage at 115VAC line (VDC) ----------100/50
6. Excitation voltage at 230 VAC line (VDC) ----------200/100
7. Maximum bearing capacity (% two minutes) ----------150
8. Operation range of indoor temperature (℃) ---------- 0-50
9. Speed range in open loop (ratio) ---------- 50：1
10. Speed range in closed loop (ratio) ---------- 80：1
11. Regulation of armature feedback loading (% basic speed) ------- ±1
12. Regulation of closed loop feedback (% rated speed) ---------- ±1
13. Adjustment of line of alternating current (% basic speed) ---------±0.5
14. Current range (A DC) ----------1.7-2.5-5.0-7.5-10
15. Forward/reverse speed accelerating scope (s) ----------0.1- 15
16. Dead zone range (% basic speed) ----------0 -±5
17. Range of maximum speed regulation of potentiometer (% basic speed) ----- 55- 110
18. Compensation range in 110VAC line (VDC @ full load) ---------- 0-20
19. IR compensation range in 220VAC (VDC @ full load) ---------- 0 -40
20. Range of forward CL(FCL) and reverse CL(RCL) (% range setting)-- 0 -150
21. Volt range changing with the input voltage（VDC）----------0-±10/ 0 ±15
22. Range of voltage with input variation (% basic speed）---------- ± 0 . 5
23. Ambient Humidity：Relative Humidity≤80RH.（Below dew point）

Ⅳ.Set optional jumper wire

MMT-SCR has the function of customer optional jumper wire, which must be set before implementing control (see the diagram). Letters in bold are set before shipment.

1. BM alternating current input switch, turns BM to the appropriate location "115V" or "320V" to select proper input voltage. 115VAor 230AC.（See **Diagram** 1 ）

Diagram 1

2. J2—The armature current select J2 location which is closest to rated motor current (Note: maximum output current has been set as 150％ of J2 location and can be readjusted through trimming potentiometers of FWD CL and REV CL.) **Table 1 and Diagram2**

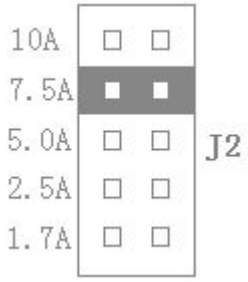


Diagram2

Table 1 Comparison table between location of jumper wire J2 and motor horsepower

motor current at the location of jumper wire J2 （DC Amps）	motor horsepower HP（KW）	
	90V DC	180V DC
10.0A*	1.0 (0.75)	2.0 （1.5）
7.5A	3/4 (0.5)	1 （1.0）
5.0A	1/2 (0.37)	1.0 (0.75)
2.5A	1/4 (0.18)	1/2 (0.35)
1.7A	1/8 (0.12)	1/3 (0.25)

Note: Additional radiator is needed when current is set as 10.0A.

3. J3—motor armature voltage, puts **J3** to the appropriate location "A90" or "A180" to select necessary armature voltage.

Note: for 115V AC input, **J3** must be set as "A90". For 230V input, armature voltage is usually set as "A180". However, for descending operations, armature voltage can also be set as "A90". (See Diagram 3 and Table 2)

If tachometer generator feedback is used, then the jumper wire **J3** must also be used. (Diagram 3) If a 7V/1000PRM generator is used, then jumper wire **J3** must be set to "T7" location. If a 50V/1000PRM generator is used, then jumper wire **J3** to must be set "T50" location.

Note: when tachometer generator feedback is used, IR compensation trimming potentiometer must be adjusted to the minimum setting.

Setting of motor armature voltage jumper wire（J3）

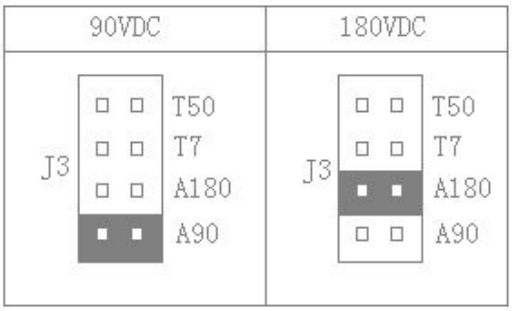


Diagram 3

Table 2—Relationship between location of BM and J3 and AC input as well as motor voltage

Input voltage of AC line	BM location	J3 location	Motor voltage
115V	**115V**	**A90**	**90V**
230V	**230V**	**A180**	**180V**
230V	**230V**	**A90**	**90V**

4. J4—simulated input voltage

The controller works under a 0—± 1 0 VDC signal (see **Diagram 4**), and set J4 at "10V" location. (The signal input terminal has been isolated.)

Diagram 4 Setting of jumper wire J4

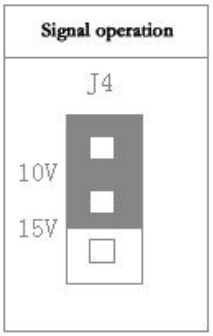


Diagram 4

5. J5—controller mode (speed or torque)

a. When **J5** is set as SPD, it is in speed control mode. In speed control mode, MMT-SCR will provide various speed controls. Motor speed is in direct proportion to input signal. Positive and reverse moment is used to stabilize motor speed.

b. When **J5** is set as TRQ, it is in torque control mode. If motor torque is greater than load torque, the motor operates. The operating rate of motor is in direct proportion to torque setting values set by the main potentiometer. Torque output can be gradually large or small by adjusting ACCEL and DECEL potentiometer.

Setting of jumper wire J5

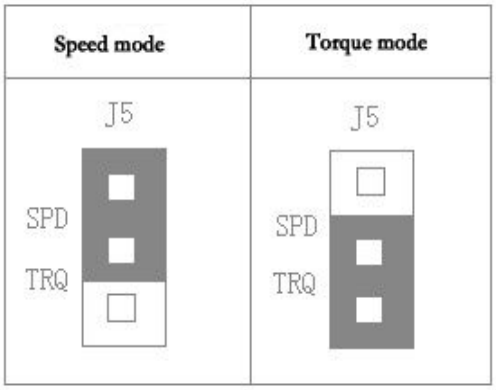


Diagram 5

6. Stop mode selection of **J6-** motor

Motor stops being used together with enable circuit. Set jumper wire J6 to RTS, and moor has brake stop when the enable circuit is disconnected. Set jumper wire J6 to CTS, and motor stops because of inertial glide when the enable circuit is disconnected.

Setting of jumper wire J6

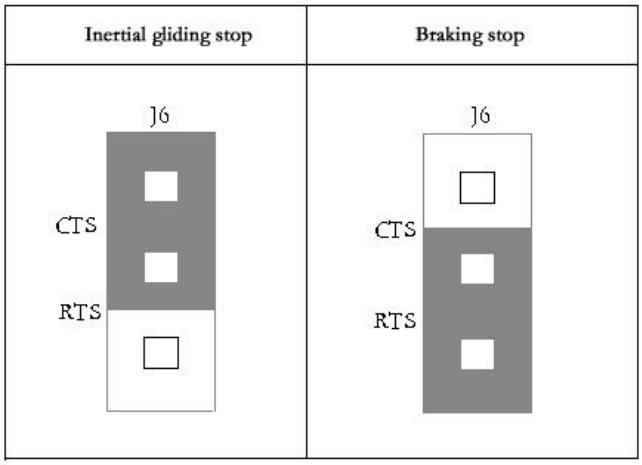


Diagram 6

Ⅳ: Instructions on adjustment of potentiometer（Forward Increased）

1. Time adjustment of positive soft start and reverse soft stop: **FWD ACCEL**

   Adjust potentiometer FWD ACCEL to determine the rising slope (namely the rising time) of motor from 0 to full output speed in positive direction, and descending slope from full output speed to 0 in opposite direction. (Setting time between 0.1 second to 15 second is adjustable.) See **Diagram 7:**

2. Time adjustment of reverse soft start and positive soft stop: **REV ACCEL**

   Adjust potentiometer REV ACCEL to determine the rising slope of motor (namely the rising time) from 0 to full output speed in reverse direction, and descending slope from full output speed to 0 in positive direction. (Setting time between 0.1 second to 15 second is adjustable.) See **Diagram 7:**

3. Dead zone adjustment: **DB**

   The dead zone adjustment potentiometer sets the analog voltage input required by starting control voltage output. (Note: if the setting of dead zone adjustment potentiometer is too low, the motor may vibrate between positive and negative directions. Adjust the potentiometer in dead zone until instability disappears.)

4. Positive (reverse) current limit: **FWD（REV） CL**

   Adjust the potentiometer to set positive (reverse) current. The value of current determines the maximum value of motor torque, which is 150% of the current set by jumper wire J2.

5. Moment compensation adjustment: **IR**

   Adjust the potentiometer to stabilize motor speed under various loads.

6. Maximum speed limit: **MAX**

   Adjust the speed potentiometer to the maximum, and then adjust MAX SPD potentiometer to determine the maximum speed of motor.

7. Response adjustment: **RESP**

   Adjust the potentiometer to set the dynamic response of controller. (Too quick response may result in unstable operation.)

8. Zero adjustment of given signal:**W1**

   Adjust the given potentiometer to zero and output signal is zero after isolation. If it is not zero, adjust W1 to make the output zero.

   (Note: The users do not need to adjust, for it has been adjusted before leaving factory.)

9. Maximum adjustment of given signal: **W2**

   Adjust the given potentiometer to 10V and the output signal is 10V after isolation. If it does not turn to 10V, adjust W2.10V adjust W2.

(Note: The users do not need to adjust, for it has been adjusted before leaving factory.)

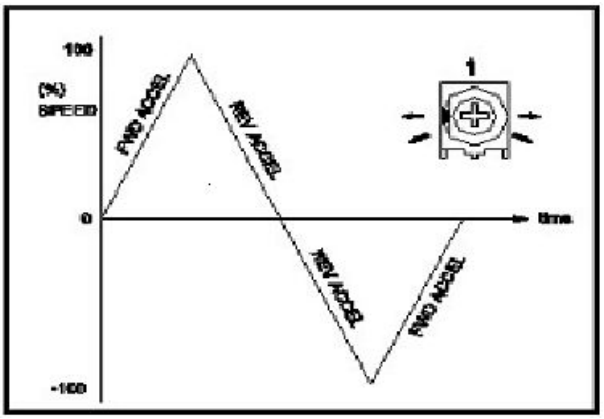


Diagram 7

Ⅴ. The use of connection mode

1. AC line—Connect **AC** line to **L1** and **L2** (see Diagram 8). (Make sure **BM** is set according to the currently used AC line voltage.)

Connection diagram of AC power supply

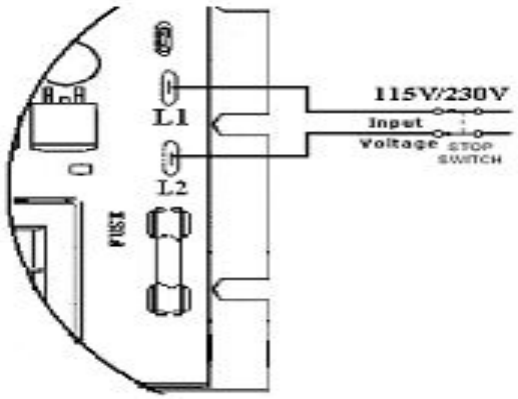


Diagram 8

2. Motor armature—connect motor armature to terminal **M1** (+) and terminal **M2** (-) (see **Diagram 9**).

(Make sure the setting of jumper wire **J3** is in accordance with motor voltage.)

Connection mode of armature

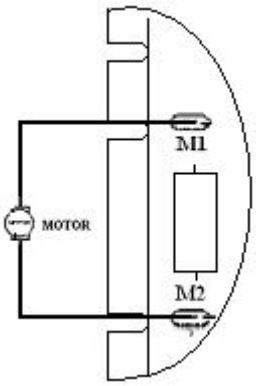
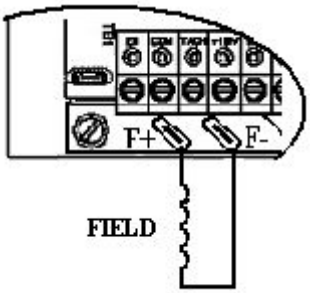


Diagram 9

3. **Excitation**—only for shunt motor

Do not apply terminal F+ and F- to motors of other types. Connect shunt field of motor to terminal F+ and F-, 90VDC motor is correspondent to 100VDC and 180VDC motor is correspondent to 200VDC. For motor of half excitation voltage, 90VDC is correspondent to 50VDC and 180 VDC is correspondent to 100VDC, then connect shunt field of motor to terminal F+ and L1. The connection mode of electric field is shown in Table 3 (Diagram 10).

Connection mode of half excitation



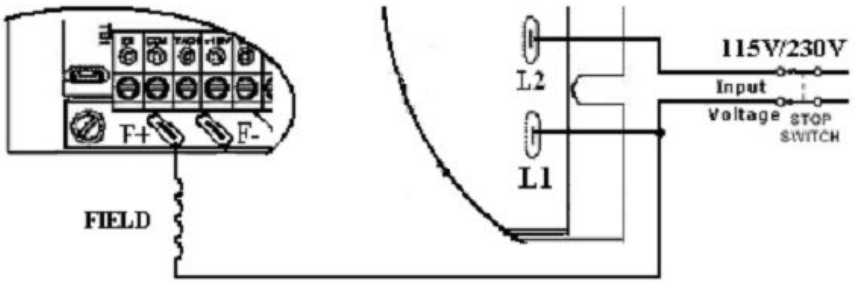


Diagram 10

Table 3 Connection mode of excitation (only for shunt motor)

AC line voltage(VAC)	Motor Voltage(VDC)	Excitation voltage(VDC)	Excitation connection
115	90	100	F+ F-
115	90	50	F+ L1
230	180	200	F+ F-
230	180	100	F+ L1

4. Given potentiometer —the given potentiometer can use different ways getting through terminal "**COM", "+12" and** "**-12**", **"SIG" connection.** A 10KΩ potentiometer is provided with the controller. (5KΩ potentiometer can also be used.) Terminal "**COM", "+12**", "**SIG**" and "**-12**" are isolated from alternating current.)

Note: Jumper wire **J4** must be at the location of "10V". See Diagram 11:

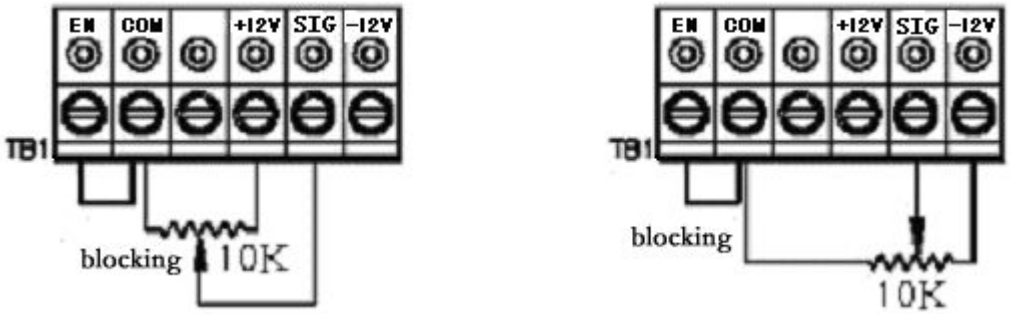
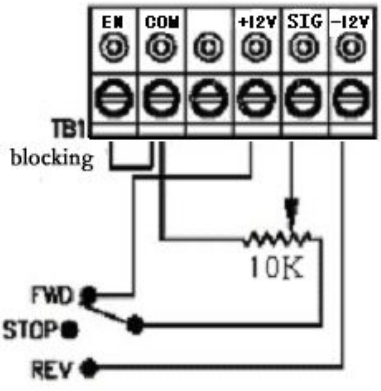


Diagram 11

4.**1 Only for bi-directional operation**—when reversible contact is used, connect terminal **"COM", "+12", "SIG"** and **"-12".** If it is used together with potentiometer, connect terminal "**+12", "SIG**" and "**-12**". See diagram

Connection mode of bi-directional Operation contact



Connection mode of bi-directional operation potentiometer

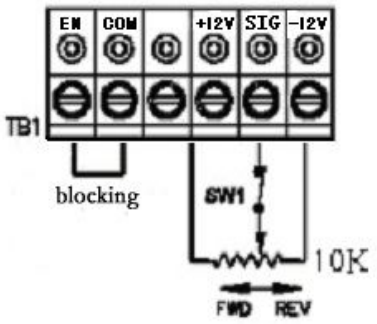
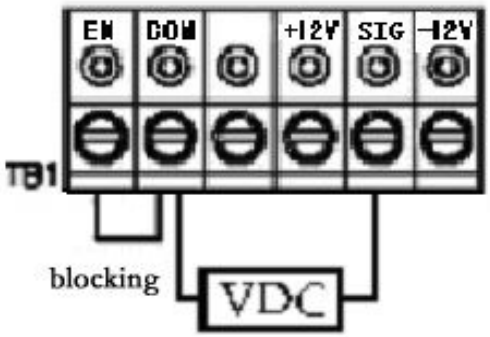


Diagram 12

Note: EN and COM must be short connected to ensure the controller operates.

4.2 Signal control—a analog voltage can be used to replace the given potentiometer. Connect signal to terminal "**SIG**" and "**COM**". Note: Terminal "**COM**" is a shared terminal. Sending a positive signal to "**SIG**" terminal can produce a positive output of the motor. Sending a negative signal to "SIG" terminal can produce a negative output. A 0 ～ ±10VDC is needed to operate controllers from **0±** full output.

Note: Jumper wire **J4** must be at the location of "10V".



0 ～ ±10VDC

Diagram 13

5. Enable switch circuit—contains a two-wire stop circuit (enable), which is used to output electric signal to stop the motor. An isolated single contact closure is needed. If the isolated contact cannot be found, an isolated relay can be used instead.

Note: If two-wire switch circuit is not used, a jumper wire must be set as EN and COM; otherwise, the controller cannot operate.

Warning! Do not take the switch or enable function as safe disconnecting device. It is only used for break in AC line.

5.1 When the contact between "**ENe**" and "**COM**" terminal breaks and jumper wire **J6** is set at "**RTS**" location, motor will brake to stop quickly.

Selection modes of braking stop

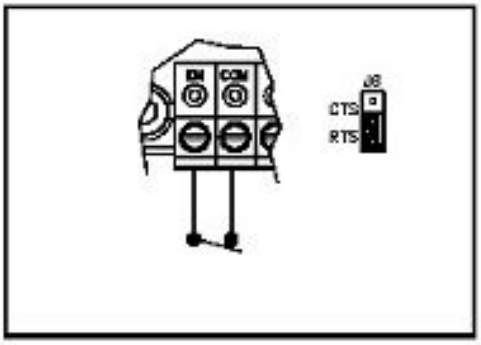


Diagram 14

5.2 Application note (see Diagram 15): if the brake stop is needed, connect a contact and the signal terminal "**SIG**" in series. The break time is equal to **REV ACCEL** setting in positive direction or equal to **FWD ACCEL** setting in negative direction.

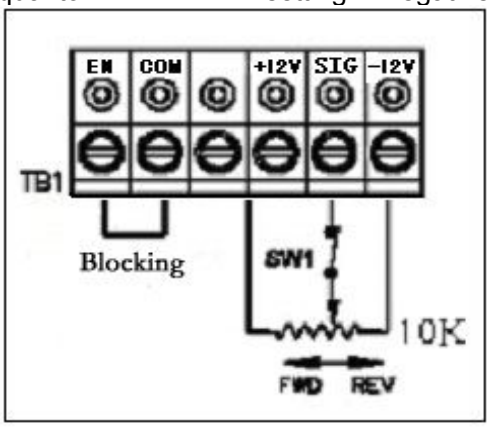


Diagram 15

5.3 If inertial gliding stop is needed, set jumper wire **J6** to **CTS** position. When the contact between "**EN**" and "**COM**" terminal breaks, motor stops because of output inertial

glide. See Diagram 16:

Selection modes of Inertial glide

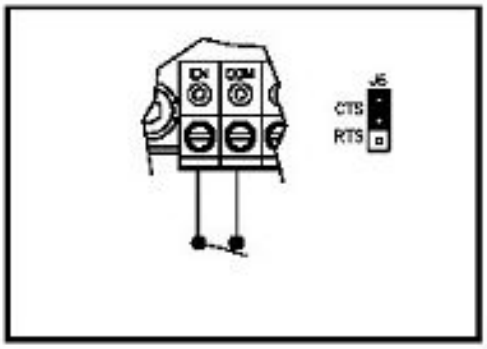


Diagram 16

6. **Speed feedback**—the controller is set as armature feedback before leaving factory. Armature feedback can provide better load adjustment for most applications. For more advanced load adjustment, speed closed-loop mode can be used. Connect a speed feedback generator, and the polarity of which
7. should be the same with that of input signal (see Diagram 17).

Note: If the polarity of speed feedback generator is reversed, the motor will operate at full speed.

Note: For speed closed-loop feedback, jumper wire J3 must be set at proper position.

Note: Refer to the polarity of input signal; check whether the voltage polarity of speed feedback is consistent with the reverse loop lead.

Connection of speed generator feedback:

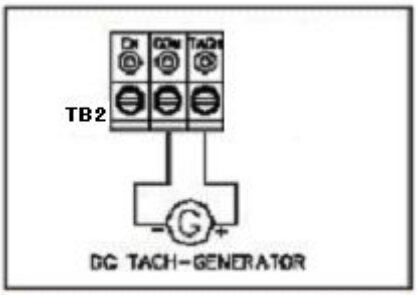


Diagram 17

7. Controller—the wiring diagram is shown in Diagram 18:

Wiring diagram of controller

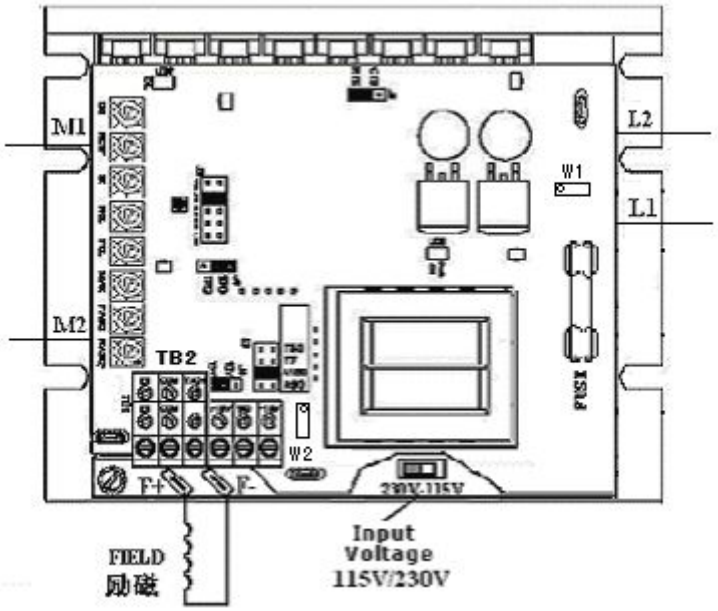


Diagram 18

8. Mounting Dimensions: See Diagram 19

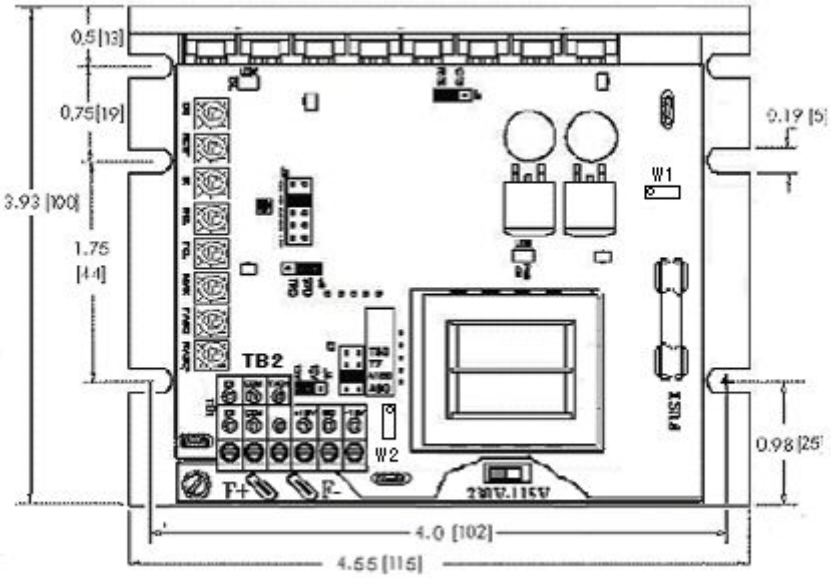


Diagram 19

Ⅵ. Function display light

1. Power on (**PWR ON**)—indicates that the driver has been connected to AC power supply.
2. Overload (**OL**)—indicates that the controller has reached the setting limit of current. The setting value is set by jumper wire J2, potentiometer FWD CL and REV CL. It is normal that the light is on in the application of transient load.

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