MACH3 CONTROL BOX

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THIS MANUAL CONTAINS INFORMATION FOR INSTALLING AND OPERATING THE FOLLOWING PRODUCT:

- **MACH3 CONTROL BOX**

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Tiny Controls Original

Introduction

Tiny controls offers fully assembled and tested Mach3 Control Box, a compact and powerful solution for controlling CNC applications. The box is designed for controlling 3 linear axes X, Y and Z. The system contains all the necessary components required for CNC machining in a single box making the work process quite simple. The Mach3 controller box is based on PP-BOB2-V1 breakout board to control the CNC machines.

The front side of the box consist a cooling fan for cooling down the system, an emergency switch, a rotary switch for power on-off control, a power indicator and slot for DB-25 connector responsible for the communication with the relevant CNC controlling software. The rear side consist all the connectors through which the connections are made for inputs and outputs of CNC machine and the socket for mains power which drives the controller box.

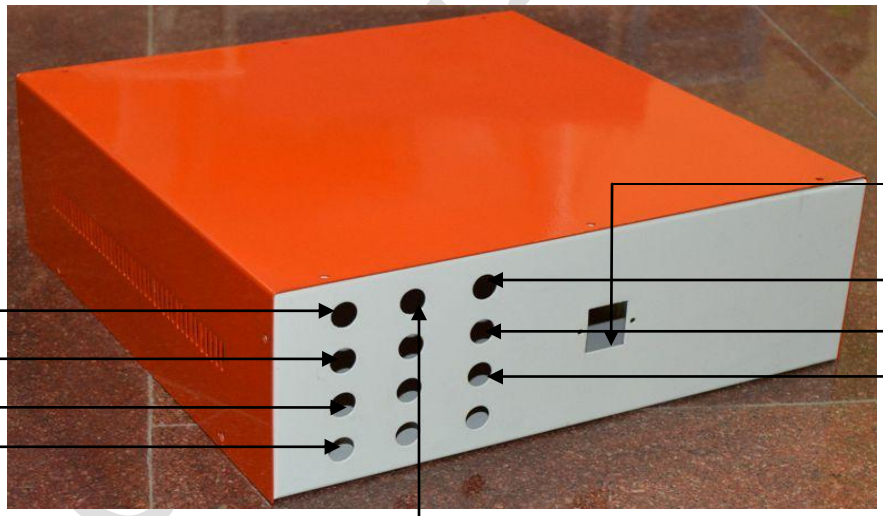
Slots are made on the side walls of the metal powder coated rigid cabinet for proper ventilation of heat dissipated by the components in the system. All the inputs are opto-isolated to reduce spurious signals from noisy machine environment.

The emergency button mounted ensures the safety of components mounted on the control panel. The emergency button if pressed cut the power supply to the stepper drives and the parallel port breakout board whereas the power indicator and cooling fan continues to run.

Features

- Prevention of entry and accumulation of lint, paper, fibers, dust or other foreign materials on the control board.
- Emergency switch for emergency conditions.
- Shields and covers are provided on all connections to ensure safety and long life. Connectors are properly insulated to avoid any chances of sparking within the system.
- Separate input connectors for home, limit and miscellaneous input (Tool zero, Block mode, Start-stop, hold-resume).
- 3 axes output connectors, 1 connector for spindle on-off control and VFD output, 1 connector for coolant flood and mist.
- Power on-off rotary switch and a 220V power indicator. Separate socket for mains power supply which drives the system.

Mach3 control Box Terminals



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Mach3 CONTROL BOX SPECIFICATIONS

Contents	Specifications
Communication Terminal	DB-25 for PC interfacing
Operating Interface	External connectors for connections
Axes output connectors (linear axes)	3
Analog output (0-10 V) Isolated for spindle+ spindle on-off control connector	1
Relay/ Coolants outputs connector	1
Input connector	1
Fuse	2A
Power ON indicator	1
Emergency Switch	1
Supply voltage	220V
Ambient temperature range	0˚-55˚ Celsius
Relative Humidity	< 90% (without condensation)
Dimensions	400x400x130 (in mm)
Weight	14 kg approx.

Note: This box can be mounted for the 4 axes too, 3 linear and 4th is rotary axis as per customer request with additional charges. A provision for X slave for gantry style machines is also made on the request with some additional cost.

Drive can be Tstep-484 or Tstep-087. The rating for both drives is as shown below:

Tstep-087:

Supply voltage: 18-80 V DC
Phase current: 1.2-7.0 A
Chopping frequency: 20 KHz
Auto current reduction: 70% of set current after approx 1 second of inactivity.
Inputs: Step and direction opto-coupled (3.3V or 5V compatible).
Short circuit protection: Motor windings and motor outputs to ground.
Step frequency: 0-200 KHz

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Step pulse: Step on rising edge, minimum low/ high time 2us.
Direction input: Stay 500ns unchanged before and after a step pulse.

Tstep-484:

Supply voltage: 18-48 V DC
Phase current: 0.7- 4.2 A
Chopping frequency: 20 KHz
Auto current reduction: 70% of set current after approx 1 second of inactivity.
Inputs: Step and direction opto-coupled (3.3V or 5V compatible).
Short circuit protection: Motor windings and motor outputs to ground.
Step frequency: 0-200 KHz
Step pulse: Step on rising edge, minimum low/ high time 2us.
Direction input: Stay 500ns unchanged before and after a step pulse.

Power supply:

Option 1: 42V, 10A

Transformer type: EI-CRGO
Total transformer rating: 300VA continuous
Power supply model: ps-v3
Output 1 (unregulated): 100V (15A)
Capacitor at output 1: 11000uF/ 100V DC
No of terminal at output 1: 4
Output 2 (unregulated): 24V (800mA)
Output 3 (regulated): 12V (800mA)
Maximum combined current from output2 and 3: 1A
Terminal for output 2 and 3: 1 each with common GND.

Option 2: 60V, 12.5 A

Transformer type: EI-CRGO
Total transformer rating: 500VA continuous
Power supply model: ps-v3
Output 1 (unregulated): 100 V (15 A)
Capacitor at output 1: 11000uF/ 100V DC
No of terminal at output 1: 4
Output 2 (unregulated): 24V (800 mA)
Output 3 (regulated): 12V (800 mA)
Maximum combined current from output 2 and 3: 1 A
Terminal for output 2 and 3: 1 each with common GND.

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Parallel Port Breakout Board:

Processor: 16 bit controller
Communication terminal: DB-25 connector to interface PC.
Operating interface: Through screw connectors.
Axes drive control type: Step/ Dir 5V
Maximum frequency for step signal: 150 KHz
Supply voltage: 12V DC

Refer to PP-BOB2-V1 manual for more details.

Power supply

The power is configured through this socket. Power supply is configured with a transformer and the TL-PSB1 power supply. All the power supply connections such as the breakout board and drives have been made internally through the power supply card. A slot is provided to connect the power cord to mains supply.

Emergency switch

The emergency switch connected to the controller box is shown in this picture.

DB-25 CONNECTOR to PC CONNECTIONS

Shown here is the parallel port breakout board DB- 25 connector port of Mach3 controller box. The connection to PC is made through this connector.

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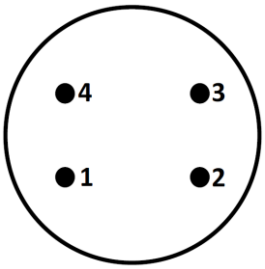
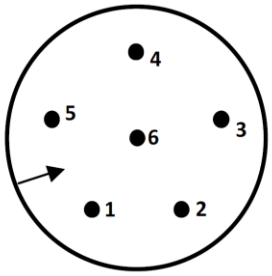
MACH3 CONTROL BOX CONNECTIONS

TERMINALS	CONNECTIONS
1	MA+
2	MA-
3	MB+
4	MB-



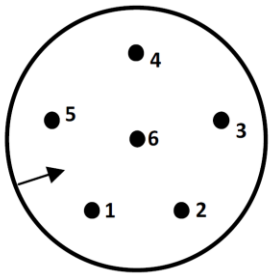
MOTOR TERMINALS

TERMINALS	CONNECTIONS
1	NC (Relay 3)
2	COM (Relay 3)
3	NO (Relay 3)
4	10V IN
5	0V IN
6	0V-10V OUT



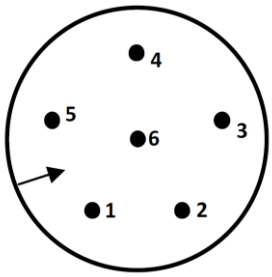
SPINDLE

TERMINALS	CONNECTIONS
1	Coolant Mist NC (Relay 2)
2	Coolant Mist COM (Relay 2)
3	Coolant Mist NO (Relay 2)
4	Coolant Flood NC (Relay 1)
5	Coolant Flood COM (Relay 1)
6	Coolant Flood NO (Relay 1)



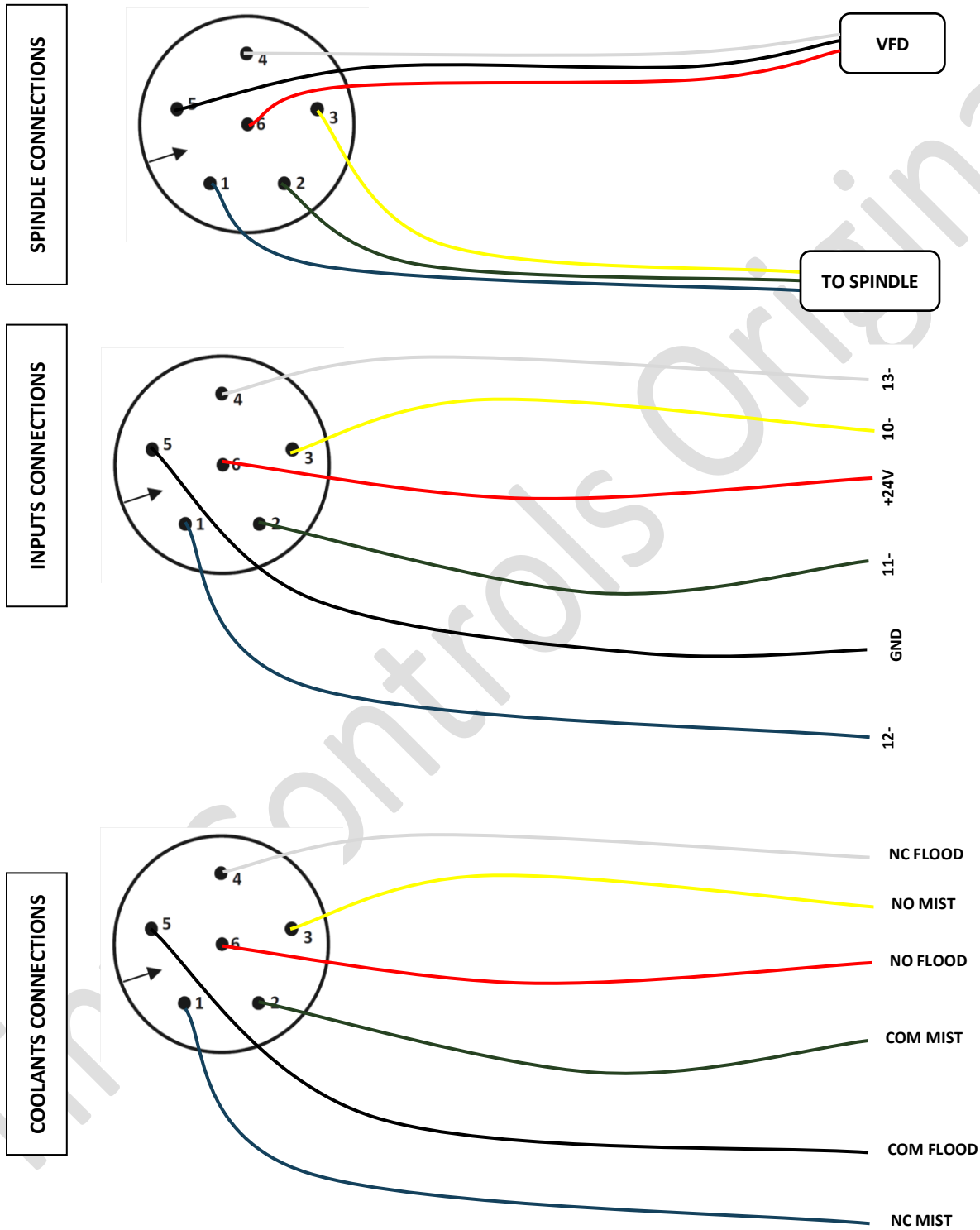
COOLANTS

TERMINALS	CONNECTIONS
1	12-
2	11-
3	10-
4	13-
5	GND
6	+12 V



INPUTS

Connections



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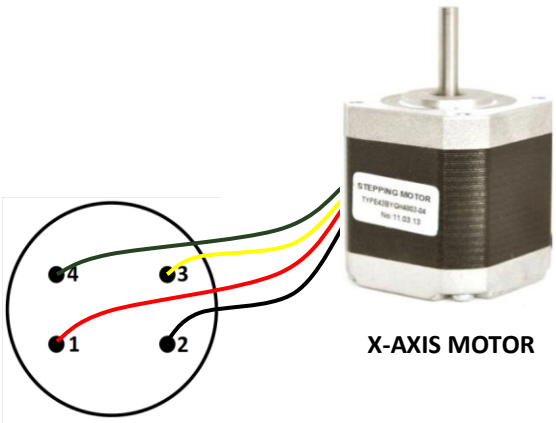
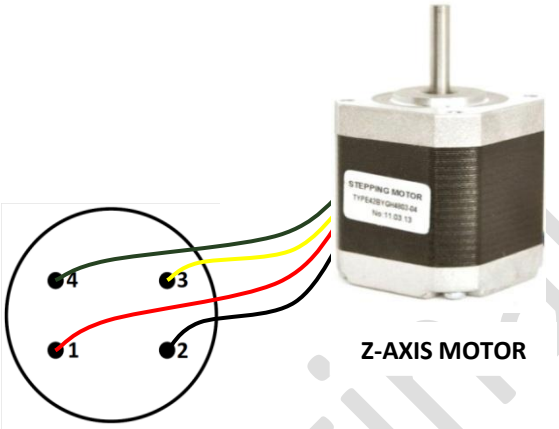
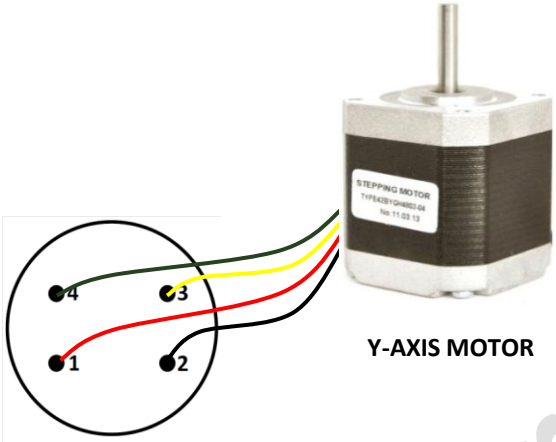


X-AXIS MOTOR



Z-AXIS MOTOR



Y-AXIS MOTOR

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CURRENT SETTING USING "CSET" JUMPER BLOCK IN TSTEP-087 DRIVE

The following table shows the jumper settings for the corresponding currents (in A):

Jumpers				Current (A) for Tstep-087
J1	J2	J3	J4	
1	1	1	1	1.2
0	1	1	1	1.8
1	0	1	1	2.2
0	0	1	1	2.8
1	1	0	1	3.2
1	1	1	0	3.4
0	1	0	1	3.8
0	1	1	0	4.0
1	0	0	1	4.2
1	0	1	0	4.4
0	0	0	1	4.8
0	0	1	0	5.0
1	1	0	0	5.4
0	1	0	0	6.0
1	0	0	0	6.4
0	0	0	0	7.0

However, 1 means jumper mounted and 0 means jumper removed.

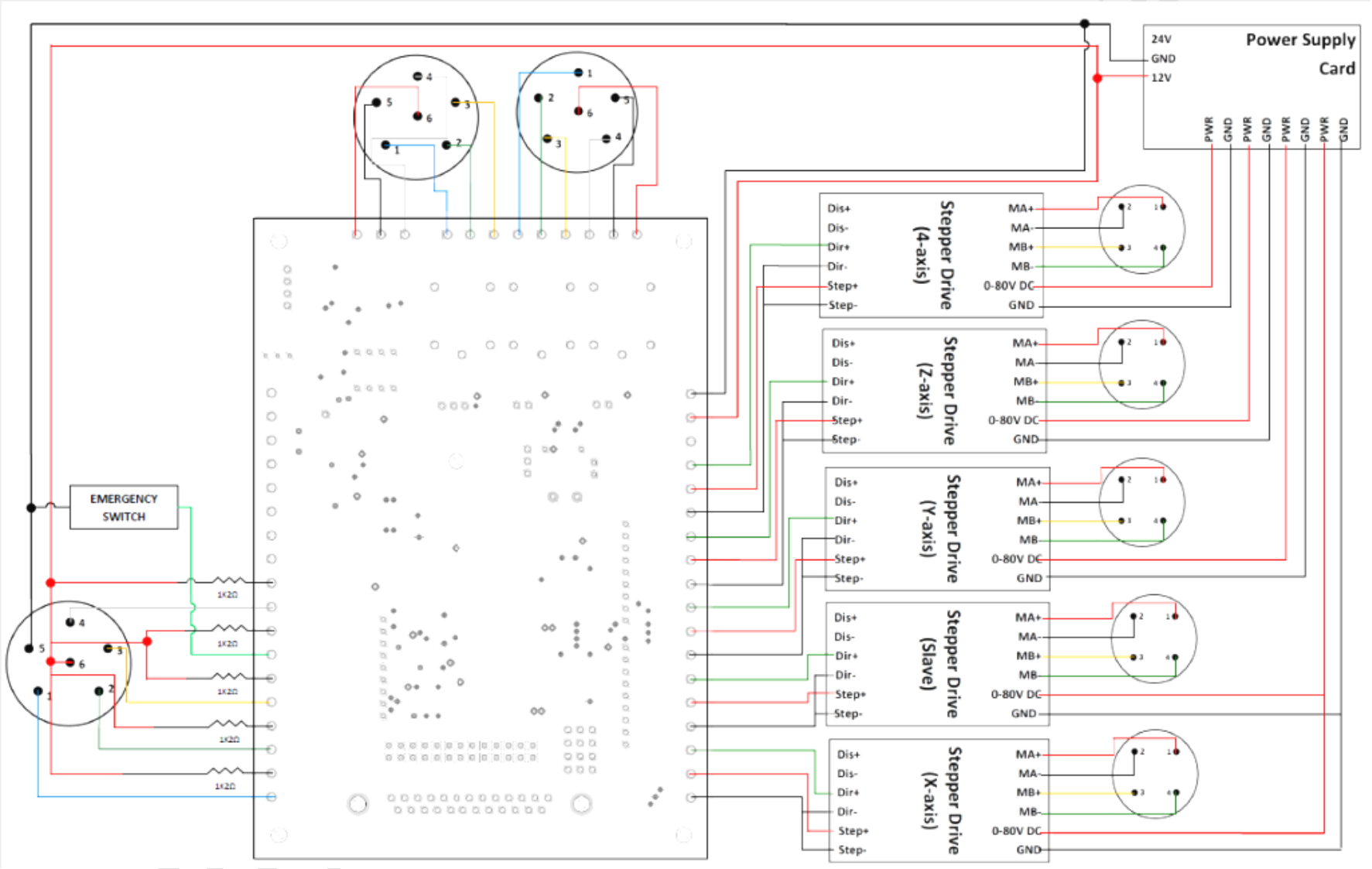
CURRENT SETTING USING "CSET" JUMPER BLOCK IN TSTEP-484 DRIVE

The following table shows the jumper settings for the corresponding currents (in A):

Jumpers				Current (A) for Tstep-484
J1	J2	J3	J4	
1	1	1	1	0.7
0	1	1	1	1.0
1	0	1	1	1.4
0	0	1	1	1.7
1	1	0	1	1.9
0	1	1	0	2.1
1	0	0	1	2.2
0	0	1	0	2.4
1	1	0	1	2.6
0	1	1	0	2.7
1	0	0	1	2.8
0	0	1	0	3.0
1	1	0	0	3.2
0	1	0	0	3.6
1	0	0	0	3.9
0	0	0	0	4.2

However, 1 means jumper mounted and 0 means jumper removed.

CONNECTION DIAGRAM



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