



# TRM Interconnect Card PMC3

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## Safety

**Warning!** Only a competent Electrician may install this system.

**Warning!** Dangerous voltages are present when mains supply is connected.

**Warning!** Even when the motor is stopped there are dangerous voltages present at Power Circuit terminals.



## TRM Interconnect Board Installation Guide

Thank you for choosing **TRM**. TRM products are designed for industrial machines and to give trouble free maintenance for many years.

### **IMPORTANT INFORMATION FOR USERS**

The installation, set-up, test and maintenance procedures given in this user guide should only be carried out by competent personnel trained in the installation of electronic and mechanical equipment. Such personnel should be aware of the potential electrical and mechanical hazards associated with mains powered equipment and with the current regulations in force in your locality.

#### **CE Marking**

TRM interconnect board complies with the requirements of the European

- Low Voltage Directive 73/23/EEC with amendments
- EMC Directive 89/336/EEC with amendments

## Overview

The TRM Interconnect Board is intended to simplify wiring and to ease the installation for OEM's. The board can be powered from 240 VAC/50 Hz or 120 VAC/60 Hz.

The Interconnect Board provides 24 Volts for the motion controller and external sensors etc. and also the power supply for the DC servo amplifiers to run the motors using an external transformer of up to 55 V AC in the secondary. Screw connectors are used for connecting the Inputs/Outputs for a fast connection.

The encoders can be connected in two ways using screw terminals or a crimp connector however we recommend for on-site termination the screw terminals be used unless the correct crimp tooling is available. The connection between the interconnect board and the motion controller is through 2 D-type connectors. D-type connector cables from the interconnect board to the controller can be provided at point of order in different lengths to suit the machine.

The interconnect board **must** be used with an external noise filter.

## Installing the Interconnect Board for the first time

### IMPORTANT

On the interconnect board all connectors have a dot on a corner which signals the starting pin No.1 for the specific connector.

On the following pages the user will find a pin description for all the Interconnect Board connectors, below is a general overview of the connectors normally used:

#### 1. Start and Stop switches

Use connector J15 (see drawing on the last page) to connect a normally closed (NC) stop switch into the pins 1 and 2. Connect a normally open (NO) switch into pins 3 and 4.

#### 2. Emergency Stop Switch

Use connector J13 to connect the Normally Closed (NC) pins of the Emergency Stop switch to pins 1 and 2.

#### 3. Inputs and Outputs (Home switches, sensors etc.)

The Interconnect Board has screw connectors for all inputs and outputs but it has also 4 crimp connectors for inputs 0-3 which have a series resistor in the supply should protection be needed.

#### 4. Motor(s) supply connection to the Drive(s)

J14 is the DC supply connector that should be wired to each Drive, please bare in mind the current capacity of the wires and the connector when terminating to

this connector.

5. Encoder(s) connection

The interconnect board provides 2 options to connect the encoder for each axis. The connectors J3 and J4 are the connectors for axis 0, the connector J3 is a crimp connector and the J4 is a screw connector, the user can decide which connector to use. In the same way for axis 1 the J5 and J6 and axis 2 J17 and J19 are the encoder connectors. Only one connector for each axis should be used.

6. Verify all the following connectors are plugged in:

From Interconnect Board Connectors	To
J1 (D-Type Connector)	37 way D-Type connector Motion Controller
J2 (D- Type Connector)	44 way D-Type connector Motion Controller
J3 or J4 (any)	Encoder Axis 0
J5 or J6 (any)	Encoder Axis 1 (if in use)
J17 or J19 (any)	Encoder Axis 2 (if in use)
J11	Drive Command axis 0
J12	Drive Command Axis 1
J20	Drive Command Axis 2
J13	Emergency Stop
J14	Drive(s) power
J15 (pins 1 and 2)	Stop switch
J15 (pins 3 and 4)	Start Switch
MAINS (6 pin orange connector)	Mains in from Noise Filter
TX (5 pin orange connector)	Transformer Primary
J18 DC IN	Transformer Secondary

- Verify the sensors and switches are connected to the inputs.
- Verify the outputs are connected.
- Link pin 1 and 2 of the OFF connector on the interconnect Board if NC OFF power button is not used.
- Link pin 1 and 2 of the SOL\_COM connector on the interconnect Board if no other supply is to be used.

## Interconnect Board Terminations

### Interconnect Board J1 Connector (37 way)

Pin	Label	Description
1	GND	24 Volt Supply Ground (0V)
2	+24V	24 Volt supply
3	DRV0	Driver Output 0
4	DRV1	Driver Output 1
5	DRV2	Driver Output 2
6	DRV3	Driver Output 3
7	DRV4	Driver Output 4
8	DRV6	Driver Output 6
9	SOLCOM	Protection Diode Common
10	DRV GND	Driver Ground
11	OP/E	Amplifier Enable Emitter
12	IP1	Digital Input 1
13	IP3	Digital Input
14	IP5	Digital Input
15	IP7	Digital Input
16	IP9	Digital Input
17	IP11	Digital Input
18	IP13	Digital Input
19	IP15	Digital Input
20	GND	24 Volt Supply Ground
21	+24V	24 Volt Supply
22	DRV0	Driver Output 0
23	DRV1	Driver Output 1
24	DRV2	Driver Output 2
25	DRV3	Driver Output 3
26	DRV5	Driver Output 5
27	DRV7	Driver Output 7
28	DRV GND	Driver Ground
29	OP/C	Amplifier Enable Collector
30	IP0	Digital Input 0
31	IP2	Digital Input 2
32	IP4	Digital Input 4
33	IP6	Digital Input 6
34	IP8	Digital Input 8
35	IP10	Digital Input 10
36	IP12	Digital Input 12
37	IP14	Digital Input 14

## Interconnect Board J2 Connector (44 way)

Pin number	Label	Description
1	CHA0	Encoder Channel 0 - 'A' Signal
2	CHB0	Encoder Channel 0 - 'B' Signal
3	Z0	Encoder Channel 0 Z pulse
4	CHA1	Encoder Channel 1 - 'A' Signal
5	CHB1	Encoder Channel 1 - 'B' Signal
6	Z1	Encoder Channel 1 Z pulse
7	CHA2	Encoder Channel 2 - 'A' Signal
8	CHB2	Encoder Channel 2 - 'B' Signal
9	Z2	Encoder Channel 2 Z pulse
10	n/c	-
11	n/c	-
12	n/c	-
13	STP0	Ouput 1 (TTL)- GO1
14	STP2	Ouput 5 (TTL)- GO5
15	GND	Ground (0V)
16	5V	Encoder Supply (5 Volt output)
17	CHA0N	Encoder channel 0 - 'A\' Signal
18	CHB0N	Encoder channel 0 - 'B\' Signal
19	GND	Ground (0V)
20	CHA1N	Encoder channel 1 - 'A\' Signal
21	CHB1N	Encoder channel 1 - 'B\' Signal
22	5V	Encoder Supply (5 Volt output)
23	CHA2N	Encoder channel 2 - 'A\' Signal
24	CHB2N	Encoder channel 2 - 'B\' Signal
25	GND	Ground (0V)
26	n/c	-
27	n/c	-
28	GND	Ground (0V)
29	STP1	Ouput 3 (TTL)- GO3
30	SP0	Ouput 6 (TTL)- SP2
31	MC0	Motor Command O/P 0
32	MC1	Motor Command O/P 1
33	MC2	Motor Command O/P 2
34	MC3	Amaloge output
35	VIN	Analogue Input (optional)
36	n/c	-
37	n/c	-
38	n/c	-
39	DIR0	Ouput 0 (TTL)- GO0
40	DIR1	Ouput 2 (TTL)- GO2
41	DIR2	Ouput 4 (TTL)- GO4
42	SP1	Ouput 7 (TTL)- SP1
43	n/c	-
44	n/c	-



## J3 Connector

(Black connector, Encoder axis 0)

Pin	Description
1	Vcc
2	Channel A0
3	Channel B0
4	Channel /A0
5	Channel /B0
6	Channel Z0 (No connection)
7	GND
8	GND
9	No connection
10	No pin

## J4 Connector

(Green, screw terminal, Encoder Axis 0)

Pin	Description
1	Vcc
2	Channel A0
3	Channel B0
4	Channel /A0
5	Channel /B0
6	GND

## J5 Connector

(Black connector, Encoder axis 1)

Pin	Description
1	Vcc
2	Channel A1
3	Channel B1
4	Channel /A1
5	Channel /B1
6	Channel Z1 (No connection)
7	GND
8	GND
9	No connection
10	No pin

## J6 Connector

(Green, screw terminal, Encoder Axis 1)

Pin	Description
1	Vcc
2	Channel A1
3	Channel B1
4	Channel /A1
5	Channel /B1
6	GND

## J17 Connector

(Black connector, Encoder axis 2)

Pin	Description
1	Vcc
2	Channel A0
3	Channel B0
4	Channel /A0
5	Channel /B0
6	Channel Z0 (No connection)
7	GND
8	GND
9	No connection
10	No pin

## J19 Connector

(Green, screw terminal, Encoder Axis 2)

Pin	Description
1	Vcc
2	Channel A0
3	Channel B0
4	Channel /A0
5	Channel /B0
6	GND

### Notes:

- User can choose between connectors for wiring the encoder connection
- Z and /Z channels are only connected to the black connectors
- If an axis is not in use please link A and /A to 5 V and B and /B to 0 V

## J7 Connector

Configurable Input 0

Note:

For inputs 0, 1, 2, 3, the user can select between J7, J8, J9, J10 connectors or pins 3, 4, 5, 6 in the INPUTS A connector.

Pin	Description
1	24 Volts
2	No pin
3	Signal to input 0
4	GND

## J8 Connector

Configurable Input 1

Pin	Description
1	24 Volts
2	Signal to input 1
3	GND
4	No pin

## J9 Connector

Configurable Input 2

Pin	Description
1	24 Volts
2	Signal to input 2
3	No pin
4	GND

## J10 Connector

Configurable Input 3

Pin	Description
1	No pin
2	24 Volts
3	Signal to input 3
4	GND

## J11 Connector

Motor Command Axis 0 (MC0) - Please use Screened Cables

Pin	Description
1	MC0 (+/- 10 V Out)
2	Error
3	No connection
4	No connection
5	Earth (0 Volts reference)
6	Amp enable Collector
7	GND (Screen)
8	No connection

## J12 Connector

Motor Command Axis 1 (MC1) - Please use Screened Cables

Pin	Description
1	MC1 (+/- 10 V Out)
2	Error
3	No connection
4	No connection
5	Earth (0 Volts reference)
6	Amp enable Collector
7	GND (Screen)
8	No connection

## J20 Connector

Motor Command Axis 2 (MC2) - Please use Screened Cables

Pin	Description
1	MC2 (+/- 10 V Out)
2	Error
3	No connection
4	No connection
5	Earth (0 Volts reference)
6	Amp enable Collector
7	GND (Screen)
8	No connection

## J13 Connector (Emergency stop)

Use the normally Closed (NC) Connection on the Emergency Stop Connector for the first 2 pins and Normally Open (NO) connection for the 3rd and 4th pins (IP5 and GND) as shown below.

Pin	Description
1	Emergency Stop (NC)
2	Emergency Stop (NC)
3	No connect (Input 5)
4	No connect (GND)

Note: IP5 is an optional input to alert the system that the ESTOP is pressed.

## J14 Connector (DC Drive Power Supply)

Power cable: form J14 to DC Drive.

Pin	Description
1	+Vcc
2	+Vcc
3	+Vcc
4	GND
5	GND
6	GND

## J15 Connector (Start/Stop)

Pin	Description
1	Stop switch (NC)
2	Stop switch (NC)
3	Start switch (NO)
4	Start switch (NO)

## OFF Connector

The OFF connector can be wired to a NC button to enable the operator to power off the system. If a button is not required please link this out.

Pin	Description
1	Off signal
2	Off signal

## SOL\_COM Connector

A connector is provided to enable the installer to select a different voltage to power the outputs with. If the standard 24V is to be used link pin 1 with pin 2.

Pin	Description
1	24 Volts
2	SOL_COM

## MAINS Connector

Connections from external Noise Filter to interconnect board mains.

Pin	Description
L	Live
N	Neutral
E	Earth

## TX connector

TX Connector board (orange connector 5 pins) to primary winding of the transformer.

Pin	Description
1	Neutral
2	No pin
3	TXR (no snubber)
4	No pin
5	TX live (PTC snubber)

Note: on the TX pin we have incorporated a snubber device to reduce inductive power spikes occurring. After a few seconds a relay shorts this device out preventing it from heating up under normal load.

## J18 Connector

For the Connection of transformer's secondary winding.

Pin	Description
1	DC from Transformer secondary winding
2	DC from Transformer secondary winding

The Transformers secondary winding should be taken to a correctly rated rectifier and then terminated to this connector. Do not connect AC directly to this connector.

## I/O connections

### AUX\_OP connector (TTL outputs)

Pin	Description
1	GO0 (TTL, output 0)
2	GO0 (TTL, output 1)
3	GO0 (TTL, output 2)
4	GO0 (TTL, output 3)
5	GO0 (TTL, output 4)
6	GO0 (TTL, output 5)
7	SP2 (TTL, output 6)
8	SP1 (TTL, output 7)

### OUTPUTS connector

Pin	Description
1	24 Volt out
2	SOL_COM
3	Driver output 0 (output 8)
4	Driver output 1 (output 9)
5	Driver output 2 (output 10)
6	Driver output 3 (output 11)
7	Driver output 4 (output 12)
8	Driver output 5 (output 13)
9	Driver output 6 (output 14)
10	Driver output 7 (output 15)
11	5 V out
12	0 V out

## INPUTS A Connector

Pin	Description
1	GND
2	GND
3	Digital Input 0
4	Digital Input 1
5	Digital Input 2
6	Digital Input 3
7	Digital Input 4
8	Digital Input 5
9	Digital Input 6
10	Digital Input 7

## INPUTS B Connector

Pin	Description
1	No connection
2	Digital input 8
3	Digital input 9
4	Digital input 10
5	Digital input 11
6	Digital input 12
7	Digital input 13
8	Digital input 14
9	Digital input 15
10	Vin

### NOTE:

When using the interconnect board the software uses the following Inputs and Outputs so we advise the user to avoid to use them for any other purpose:

Configurable Input 4 (IP4) = OK signal from the PLD

Configurable Input (IP5) = Emergency Stop Switch

General Output 4 (GO4) = Enable output from Controller



## Troubleshooting the Interconnect Board

### **PROBLEM: System is not turning on**

- Verify the mains cable is connected to the right plug (120 or 240 Vac).
- Verify the STOP and Emergency STOP buttons are released.
- Verify all fuses are OK.
- Verify STOP and Emergency STOP contacts are NC type

### **PROBLEM: Motor is not moving**

Open the cabinet: and verify the following

- Verify voltage between Live and Earth and Live and ground.
- Verify the 5 Volts, 24 volts and Vcc LED's on the interconnect board are all turned on.
- Verify GO4 is 5 Vdc (referred to ground) after pressing the START switch.
- Verify the voltage between R5 and R6 (referred to ground) is around 4.1 V.
- Verify the TX orange connector is firmly in place.
- Verify Input 4 on the interconnect board turns from 5V to 0V (referred to ground) when pressing START switch.
- Verify all fuses are good.
- Verify there is continuity on J13 connector between both ESS terminals (pins 1,2).
- Verify there is continuity on J15 connector between pins 1 and 2.
- Verify the DC IN connector wires are tight and voltage between terminals should be around 77 Vdc for a 55 V transformer.
- Verify the output voltage on the J2 Drive connector pins 5 and 6, if there is output voltage but the motor is still not moving the problem is in the motor, motor cable or motor connection.

If when pressing start button the motors seem to start moving but when releasing the button the system trip out, probably the start button is wired to the stop pins and the Stop button is wired to the start pins. Verify connections on the J13 and J15 connectors.

Additional checks if the motor is still not moving

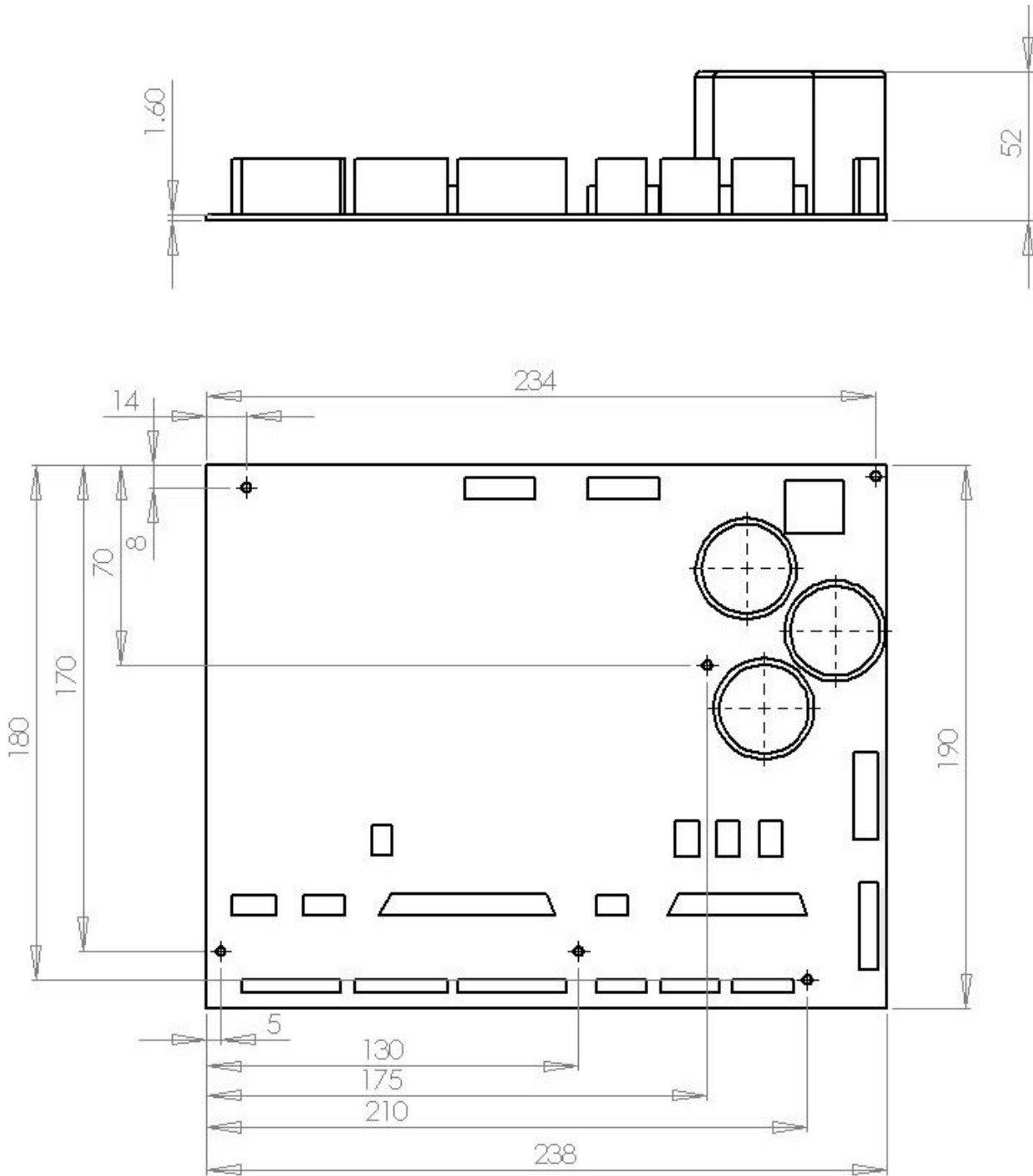
- Verify drive connections
- Verify encoder connections

- Verify drive current limit, gain and offset.

**PROBLEM: Testing the bridge rectifier:**

1. Undo the two wires that go to J18 DC IN connector and measure the voltage between secondary windings on the transformer.
2. Check the AC voltage going into the Rectifier.

# Dimensional Drawing



# Connector Layout

