# MINITACH2-MCU-D™ Tachometer Relay User Manual

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It is advisable to connect up the MINITACH2-MCU-D to your installation and confirm operation before any reprogramming is carried out.

The unit is factory set to:

LED display	**RPM status (0 to 100% of selected range)**	
Input	**NPN open collector RPM sensor**	
Range T1	**1,000 - 10,000 RPM.**	
Alarm mode	**Low RPM**	
Alarm output	**Relay**	
Inrange output	**Optocoupler**	

INITIAL CONNECTIONS

Connect the DC supply and the RPM sensor +ve, 0V and open collector connections to the two 4 way screw terminal block as shown in the diagram below:
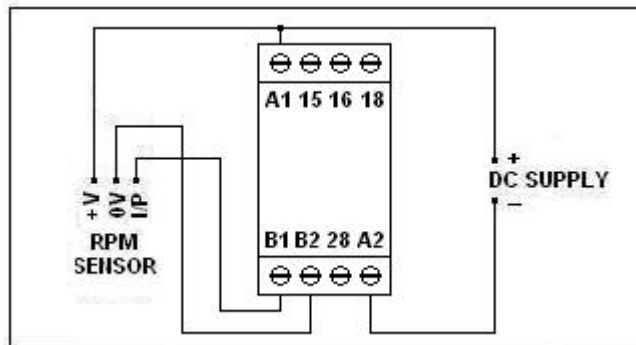
1.0 INITIAL TESTING

If a PNP open collector RPM sensor is used, move the sensor select link to from **NPN** to **PNP.**

Ensure that the RPM sensor is **not** activated.

Set the RPM alarm potentiometer **fully clockwise**.

Switch on the DC power supply to the unit.

The module will power up with a **2 second start up delay** and the green **STATUS** LED will illuminate.

The LED will then blink (on for 25ms) every 2 seconds to indicate RPM **UNDERRANGE** condition.

The relay will also activate to signal a **low alarm condition**.

Activate the RPM sensor increasing the speed to over 1000 RPM.

The LED blinking rate will increase to every 0.8 seconds indicating **10 to 20% max RPM detected**.

Note that the red **OUTPUT 2** LED will illuminate indicating RPM is now **INRANGE.**

Increase the speed further until the green LED changes to **flash** (on for 400ms) every 2 seconds indicating **20 to 40% max RPM detected**.

Slowly turn flow alarm potentiometer anticlockwise until the relay deactivates. **The RPM alarm level** is set to slightly less than present RPM input.

Switch off the DC power supply to the unit.

The Installation is now tested and functioning correctly.

2.0 SETTING UP YOUR APPLICATION

The MINITACH2-MCU-D provides comprehensive RPM alarm features over a wide range of RPM and can be easily configured for your particular application. An integral LED system status indicator is provided for diagnostic purposes and can be set up to indicate RPM or alarm status.

Simply follow the step by step process below to set up your application:

2.1 ALARM ONLY APPLICATIONS

In these applications the unit is set up to provide an alarm output whenever the actual RPM is:

less than (**LOW ALARM**)
or
greater than (**HIGH ALARM**)
or
within a band (**INBAND**) of
or
outside a band (**OUTBAND**) of
or
the set ALARM setpoint.

FIRSTLY REMOVE ALL FOUR SET UP JUMPER LINKS, then choose the alarm mode most suitable for your application:
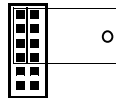
LOW ALARM
In this mode the alarm output is active (on) when the actual RPM is less than the 0 – 100 potentiometer setpoint%. Already factory set.

HIGH ALARM
In this mode the alarm output is active (on) when the actual RPM is greater than the 0 – 100 potentiometer setpoint%. Set up as follows:

Insert the programming plug - facing right
                         - offset, upper (STARTMODE)
                         - onto the vertical left hand 6 pin **SET UP** header.

Switch on the power to the unit

The STATUS LED will **illuminate** continuously to indicate **High Alarm** set.

Switch off the power and **remove** the programming plug.

Repeat the procedure to return to **Low Alarm**.

The STATUS LED will **blink on** continuously to indicate **Low Alarm** reset.

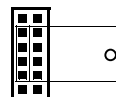Switch off the power and **remove** the programming plug.

INBAND ALARM
In this mode the alarm output is active (on) when the actual RPM is within a preset % band directly below the potentiometer setpoint%. Choose your preset % band from the table below:

BANDSETNUMBER	PERCENTAGE RPM BAND
0	**Unit set to high/low alarm operation**
1	10
2	20
3	30
4	40
5	50

and set up as follows:

Insert the programming plug - facing right
                         - centralised (MYTIME)
                         - onto the vertical left hand 6 pin **SET UP** header.

Rotate the alarm potentiometer **fully anticlockwise.**

Switch on the power to the unit.

The LED will blink slowly to indicate **ready to program.**

Rotate potentiometer full clockwise to start counting in BandSetNumber (eg **3** for 30%).
The LED will flash quite slowly for each count. **Remember digital counting starts at zero not one.**

Count the flashes 0,1,2 then on 3 (in the example) rotate potentiometer fully anticlockwise to **store 3.**

Switch off the power and remove the programming plug.

OUTBAND ALARM
In this mode the alarm output is active (on) when the actual RPM lies outside a preset % band directly below the potentiometer setpoint%.
Set up your preset % band as per the INBAND procedure above then:

Insert the programming plug - facing right
                     - offset, upper (STARTMODE)
                     - onto the vertical left hand 6 pin **SET UP** header.
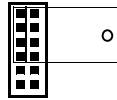
Switch on the power to the unit.

The LED will **illuminate** continuously to indicate **Outband Alarm** set.

Switch off the power and **remove** the programming plug.

Repeat procedure to return to **Inband Alarm**.

The LED will **blink on** continuously to indicate **Inband Alarm** reset.

Switch off the power and **remove** the programming plug.

RPM RANGE
The RPM input range of the module spans 10 to 15,000 RPM in four dual ranges. Identify, from the table below, the range where your maximum and minimum RPM limits are towards the top end.

Normal

T1	1,000 – 10,000 RPM	factory set
T2	500 – 5,000 RPM	**T2**
T3	100 – 1,000 RPM	**T3**
T4	50 – 500 RPM	**T2 & T3**

Hi/Low Alternative

T1 HI	1,500 – 15,000 RPM	factory set
T2 HI	750 – 7,500 RPM	**T2**
T3 HI	250 – 2,500 RPM	**T3**
T4 LO	10 – 100 RPM	**T2 & T3**

Only if the range identified is one of the Hi/Low alternatives:

Insert a red jumper link - vertically
                     - centralised
                     - onto the vertical left hand 6 pin **SET UP** header.

Switch on the power to the unit.

The LED will **illuminate** continuously to indicate **HI/LO** ranges programmed.

Switch off the power and **remove** the programming plug.

Repeat the procedure, if required, to reset normal range.

The LED will **blink on** continuously to indicate normal **T1** to **T4** range reset**.**

Switch off the power and **remove** red jumper link.

2.2 COMPLETING YOUR APPLICATION INSTALLATION

The unit is now ready for final set up and installation testing:

1　　　**Check** your final **alarm band**, **display** status and **pulse width modulation** output set up.

　　　　　Insert the programming plug - facing right
　　　　　　　　　　　　　　　　　　　- centralised (MYTIME)
　　　　　　　　　　　　　　　　　　　- onto the vertical left hand 6 pin **SET UP** header.
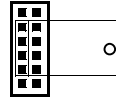
　　　　　Rotate the setpoint potentiometer **fully clockwise.**

　　　　　Switch on the power to the unit and wait for the LED to illuminate continuously.

　　　　　Rotate the setpoint potentiometer **fully anticlockwise.**

　　　　　After one second the unit will automatically count out the BandSetNumber on the LED.
　　　　　Remember digital counting starts at zero not one. (e.g. 3 stored).

　　　　　Band Set digit　　　　Count the flashes 0, 1, 2 & **3**, done.

　　　　　Wait three seconds.

　　　　　Display set digit　　　Count the flashes 0 or 1 (0 RPM display set, 1 Alarm display set).

　　　　　Wait three seconds.

　　　　　PWM set digit　　　　Count the flashes 0 or 1 (0 Inrange output active, 1 PWM output active).

　　　　　The LED will illuminate continuously to indicate **countout complete.**

　　　　　Switch off the power to the unit.

　　　　　Remove the programming plug (MYTIME) from the 2 pin **PROG** header.

2　　　**Set up Range:**　　**T1/T1HI** - **T2** jumper link in left, **T3** jumper link in left.

　　　　　　　　　　　　　　　T2/T2HI - **T2** jumper link out right, **T3** jumper link in left.

　　　　　　　　　　　　　　　T3/T3HI - **T2** jumper link in left, **T3** jumper link out right.

　　　　　　　　　　　　　　　T4/T4LO - **T2** jumper link out right, **T3** jumper link out right.

3　　　**Select** sensor type:　**NPN** jumper link for NPN open collector sensor.
　　　　　　　　　　　　　　or
　　　　　　　　　　　　　　　PNP jumper link for PNP open collector sensor.

4　　　**Select** alarm output:　**OUTPUT** jumper link in left (Relay alarm /Optocoupler inrange)
　　　　　　　　　　　　　　　or
　　　　　　　　　　　　　　　OUTPUT jumper link out right (Optocoupler alarm /Relay inrange)

5　　　DIN rail mount unit.

6　　　Install the RPM sensor and the power, relay and optocoupler connections.

7　　　Set the setpoint% potentiometer to your application ALARM level (e.g. 75%)
　　　　　(Note if a 30% RPM band has been programmed the alarm band will be from 75 – 30 = 45 to 75%).

8　　　Switch on the unit and wait 5 seconds.

9　　　Check that the STATUS LED is blinking slowly (UNDERRANGE).

10　　Check that the appropriate Alarm output state is correct according to your set up:

　　　　　- **on**, LOW ALARM

　　　　　- **off**, HIGH ALARM

　　　　　- **off**, INBAND ALARM

　　　　　- **on**, OUTBAND ALARM.

11　　Switch on the normal RPM for the application (e.g. 50%).

12   Recheck that the Status LED state is correct for the application:

0 to 20% RPM   LED blinks on every 0.8 seconds

20 to 40% RPM   LED flashes on every 2 seconds

e.g. 40 to 60% RPM   **LED flashes on every 0.8 seconds**

60 to 80% RPM   LED blinks off every 0.8 seconds

80 to 100% RPM   LED on continuously.

13   Check that the Alarm output state in this normal RPM condition is correct according to your set up.

14   Check that the appropriate INRANGE output is functioning correctly.

15   Adjust the RPM (over the range of RPM in your application), using the Status LED indication, to check each ALARM state.

16   Finely adjust the setpoint% setting, if necessary, to achieve your application ALARM level.

17   And finally if you wish to protect your set up against unauthorised adjustment:

Switch off the power to the unit.

Temporarily remove all SET UP jumper links.

Insert the programming plug - facing right
                              - offset, lower (LOCKPOT)
                              - onto the vertical left hand 6 pin **SET UP** header
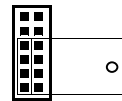
Switch on the power to the unit.

The LED will **illuminate** continuously to indicate setpoint% setting is now **locked.**

Switch off the power and **remove** the programming plug.

Repeat the procedure, if required, to unlock the potentiometer.

The LED will **flash** every two seconds to indicate potentiometer is now **unlocked.**

Switch off the power and **remove** the programming plug.

**Replace** all jumper links into their previous positions.

18   Record your final set up details on configuration label on the side of the unit:

MINITACH2-MCU-D					
PARAMETER	**FACTORY**	**CURRENT SETTINGS**			
ALARM OUTPUT	RELAY	RELAY	OPTO-COUPLER		
PWM OUTPUT	-----------	----------	OPTO-COUPLER		
RANGE SET	T1	T1	T2	T3	T4
RANGE HI/LO	OFF	ON	OFF		
DISPLAY MODE	RPM	RPM	ALARM		
ALARM POLARITY	LOW ALARM	LOW	HIGH	INBAND	OUTBAND
POT SETTING %	50%	%			
BANDSET	0	0	1	2	3 4 5
LOCKPOT	OFF	ON	OFF		
DATE:		SIGNED:			

Installation is now complete.

## 2.3 PULSE WIDTH MODULATION OUTPUT APPLICATIONS

The MINITACH2-MCU-D has an inbuilt pulse width modulation (pwm) feature. This provides a nominal 50Hz pulse width modulated output signal representing 0 – 100% RPM. This output can only be assigned to the optocoupler. The PWM signal can easily be converted to a 0 – 10V/ 0 – 1mA analogue output.
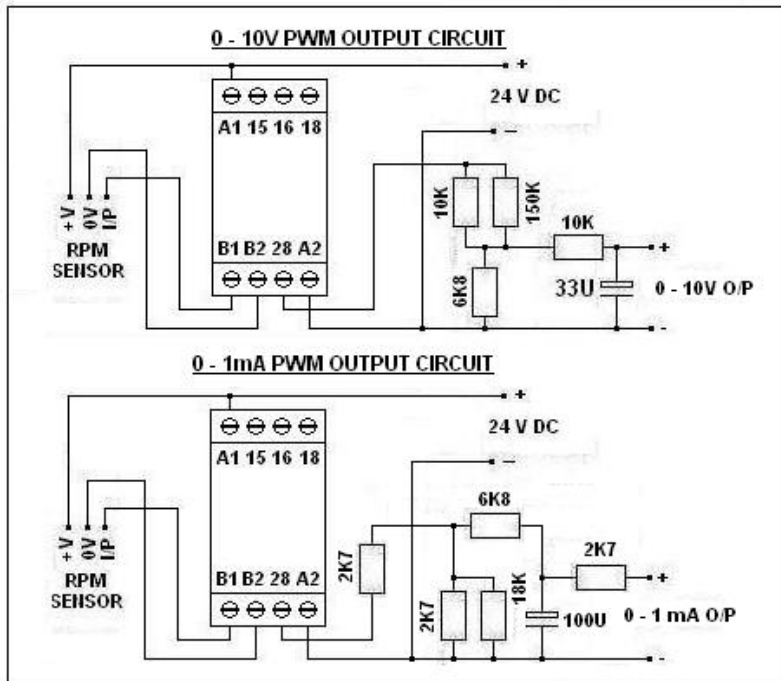
Note: Output load 0 – 10V > = 1Mohm, 0 – 1mA < = 100 ohm.
The potentiometer can be used to calibrate the analogue output to an external reference standard at the normal operating RPM.

Remove all SET UP jumper links.

Insert the programming plug - facing right
                           - centralised (MYTIME)
                           - onto the vertical left hand 6 pin **SET UP** header.
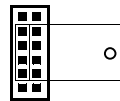
Rotate the RPM alarm potentiometer **fully anticlockwise.**

Switch on the power to the unit.

The LED will blink slowly to indicate **ready to program.**

Skip setting 1   Rotate potentiometer fully clockwise, then on the first flash rotate potentiometer fully anticlockwise to **activate factory setting 1**. This will be reprogrammed later, if required.

The LED will now fast blink to indicate **ready to program.**

Skip setting 2   Rotate potentiometer fully clockwise, then on the first flash rotate potentiometer fully anticlockwise to **activate factory setting 2**. This will be reprogrammed later, if required.

The LED will now fast blink **off** to indicate **ready to program.**

Rotate potentiometer fully clockwise to start counting.

The LED will flash quite slowly for each count. **Remember digital counting starts at zero not one.**

PWM set digit   Count the flashes, 0 then **on 1** rotate potentiometer fully anticlockwise. **PWM OPTO OUTPUT SET.**

The LED will illuminate continuously to indicate **programming complete.**

Switch off the power and **remove** the programming plug.

Note: To return to opto as INRANGE output, repeat procedure and

Count the flashes, **on 0** rotate potentiometer fully anticlockwise. **INRANGE OPTO OUTPUT RESET.**

Now return to section 2.1/Alarm Modes to re-complete your installation.

## 2.4 ALTERNATIVE STATUS DISPLAY FOR YOUR APPLICATION INSTALLATION

After you have completed and tested your application (including PWM feature, if required) you may wish to change the diagnostic status display indication. The factory set status display provides an indication of the current RPM%. The status display can be changed to indicate the current alarm state:

No RPM **UNDERRANGE**	LED **blinks** on every 2 seconds
RPM < lower band RPM/alarm potentiometer	LED **blinks** on every 0.8 seconds
RPM within lower/higher band RPM/alarm pot	LED **on** continuously
RPM > higher band RPM	LED **flashes** on every 0.8 seconds
> 100% **OVERRANGE**	LED **flashes** on every 3 seconds

Set up this display mode using the PROGPLUG programming key as shown below:

Remove all SET UP jumper links.

Insert the programming plug - facing right
  - centralised (MYTIME)
  - onto the vertical left hand 6 pin **SET UP** header.
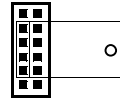
Rotate the RPM alarm potentiometer **fully anticlockwise.**

Switch on the power to the unit.

The LED will blink slowly to indicate **ready to program.**

Skip setting 1

Rotate potentiometer fully clockwise, then on the first flash rotate potentiometer fully anticlockwise to **activate factory setting 1**.
Must now be reprogrammed.

The LED will fast blink to indicate **ready to program.**

Rotate potentiometer fully clockwise to start counting.

The LED will flash quite slowly for each count. **Remember digital counting starts at zero not one.**

Display set digit

Count the flashes, 0 then **on 1** rotate potentiometer fully anticlockwise: **ALARM DISPLAY PROGRAMMED.**

The LED will illuminate continuously to indicate **programming complete**.

Switch off the power and **remove** the programming plug.

Note: To return to RPM DISPLAY, repeat procedure and

Count the flashes, **on 0** rotate potentiometer fully anticlockwise: **RPM DISPLAY RE-PROGRAMMED.**

If you change the display status, return to section 2.1/Alarm Modes and re-program the inband/outband %band set up.

3.0 RETURNING TO FACTORY SETTINGS

When you start using the programmable features in the unit you can if necessary return to the factory settings and start again.

Simply:

Remove all SET UP jumper links.

Rotate the setpoint% potentiometer fully clockwise.

Insert a red jumper link - vertically
                                         - centralised
                                         - onto the vertical left hand 6 pin **SET UP** header

Switch on the power to the unit.

The LED will either **illuminate** continuously to indicate **HI/LO** ranges programmed
or
The LED will **blink on** continuously to indicate normal **T1** to **T4** range reset.

Rotate the setpoint% potentiometer fully anticlockwise to switch off the LED.

Rotate the setpoint% potentiometer fully clockwise.

The LED will **flash on/off** continuously to indicate **RESET ACTIVATED.**

Rotate the setpoint% potentiometer fully anticlockwise.

The LED will illuminate continuously to indicate **FACTORY SETTINGS restored.**

Switch off the power and **remove** the programming plug.

Restore all four jumper links to their **factory set** positions.

Tempatron: Eltime House, Hall Road, Maldon, Essex, CM9 4NF UK.

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