CMCP7504
Machine Monitoring System

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System Overview

STI's CMCP7504 is a general-purpose monitoring system capable of continuously monitoring up to 4 channels of vibration, position, or temperature. The CMCP7504 can be configured to operate as a standalone protection system or it can be connected to a host device such as a PLC, DCS or SCADA system. Local bar graph displays provide the overall amplitudes and alarm status along with a user identifiable tag name. In addition, the CMCP7504 also allows for a single temperature input and speed input for a tag readout on the display allowing for a total of 6 measurement points.

The STI CMCP7504 can accept up to four signal processing modules. Various modules are available for different sensor and measurement types. Each input module can process the signal from one sensor and up to four modules can be installed in a CMCP7504. The available input modules are:

> AA - Acceleration Module
> AV - Velocity Module, Accelerometer Input
> VV - Velocity Module, Velocity Sensor Input
> EV - Enveloped Acceleration Module, Accelerometer Input
> SV – Velocity Module, Seismic Velocity Sensor Input
> RV - Radial Vibration Module, Proximity Probe Input
> TP - Thrust Position Module, Proximity Probe Input
> AM - Analog Input Module, 4-20mA or 1-5 VDC Input
> TM - Temperature Input, 100 Ohm Platinum RTD or 10mV/Deg. C

The **(AA) Acceleration Module** is for connecting to Piezoelectric accelerometer with a mV/g output. The signal is processed for continuous monitoring and the overall amplitude is converted into a 4- 20mA output, proportional to the full-scale range selected, for transfer to a PLC, DCS or other facility control system. Acceleration can be displayed in g's with either RMS or Peak detection.

The **(AV) Velocity Module** is for connecting to Piezoelectric accelerometer with a mV/g output. The signal is processed for continuous monitoring and the overall amplitude is converted into a 4-20mA output, proportional to the full-scale range selected, for transfer to a PLC, DCS or other facility control system. Velocity can be displayed in terms of either in/sec or mm/sec with either RMS or Peak detection.

The **(VV) Velocity Module** is for connecting to Piezo-Velocity sensor with a mV/in/s or mV/mm/s output. The signal is processed for continuous monitoring and the overall amplitude is converted into a 4-20mA output, proportional to the full-scale range selected, for transfer to a PLC, DCS or other facility control system. Velocity can be displayed in terms of either in/sec or mm/sec with either RMS or Peak detection.

The **(EV) Enveloped Acceleration Module** is for connecting to a Piezoelectric accelerometer with a mV/g output. The signal is processed to calculate an Acceleration Enveloping value within 500-10kHz (Filter #3) for continuous monitoring and the overall amplitude is converted into a 4-20mA output, proportional to the full-scale range selected, for transfer to a PLC, DCS or other facility control system. Enveloped Acceleration is displayed in terms of gE.

The **(SV) Seismic Velocity Module** is for connecting to an electromechanical velocity sensor (coil type). The signal is processed to calculate the overall Velocity within a selected bandwidth for continuous monitoring and the overall amplitude is converted into a 4-20mA output, proportional to the full-scale range selected, for transfer to a PLC, DCS or other facility control system. Velocity can be displayed in terms of either in/s or mm/s.

The **(RV) Radial Vibration Module** is for connecting to eddy current probe systems (also referred to as a proximity probe system) with a mV/mil or mV/mm output. The signal is processed for continuous monitoring and the overall amplitude is then converted into a 4-20mA output for transfer to a PLC, DCS or other facility control system. Radial vibration can be displayed in terms of mils or microns Peak to Peak. The CMCP7504 does not provide -24VDC power to the eddy probe system.

The **(TP) Thrust Position (Axial Position) Module** is for connecting to eddy current probe system (also referred to as a proximity probe system) with a mV/mil or mV/mm output. The signal is processed for continuous monitoring and the overall amplitude is then converted into a 4-20mA output for transfer to a PLC, DCS or other facility control system. Thrust Position can be displayed in terms of millimeters (mm) or microns (um). The CMCP7504 does not provide -24VDC power to the eddy probe system.

The **(AM) Analog Input Module** is for connecting an analog signal (4-20mA or 1-5VDC). The signal is processed for continuous monitoring and the overall amplitude is then converted to a 4-20mA output for transfer to a PLC, DCS or other facility control system. Analog Inputs can be displayed in the user choice of terms.

The **(TM) Temperature Input Module** is for connecting either a 100 Ohm Platinum RTD or, most commonly, a 10mV/°C signal from a dual output accelerometer such as STI's CMCP786T or CMCP785T. The signal is processed for continuous monitoring and the overall amplitude is then converted to a 4-20mA, proportional to the full-scale range selected, for transfer to a PLC, DCS or other facility control system. Temperature inputs can be displayed in terms of °C or °F.

The **(XX) Empty Slot** is used for when an input module is left empty, allowing the user to order the system as a 1, 2 or 3 channel monitoring system.

System Features
Relays and Alarms
The CMCP7504 Machine Protection System is designed to comply with the API 670 standard and offers machine protection functions. The CMCP7504 provides 2 relay contact outputs, 1 for alert and 1 for danger, for each channel. A global System OK relay is also provided. Local alarm status for each channel is also provided on the bar graph display.

Buffered Outputs
For each channel, the sensor's raw signal is available as a buffered output. Buffered outputs for each channel are available at the BNC connector, located on the front cover, and at the terminal strip on the main board. These buffered outputs are commonly used to connect portable data collectors or permanently installed analysis devices in parallel to the CMCP7504 for FFT diagnostics.

Analog Outputs
The CMCP7504 provides a 4-20mA output for each channel. The 4-20mA output is proportional to the full-scale range selected on the input module. The full-scale ranges available are shown on the input module specification sheets below.

AUX Temperature

A single temperature input is provided on the CMCP7504 and does not require the use of an input module. The Auxiliary Temperature channel accepts a signal from a dual output accelerometer (10mV/°C) or a PT100 RTD to be connected to the system and the value displayed on the screen. Visual alarming is available if alarm limits are set. Visual alarming will change the color of the readout on the display when an alarm condition is met. Relay and analog outputs are not provided with this channel.

AUX Speed

A single speed input is provided on the CMCP7504 and does not require the use of an input module. The Auxiliary Speed channel accepts a signal from a 2 or 3 wire pulse output sensor and the value will be displayed on the screen. The number of events per revolution may also be programmed to allow for measuring equipment with more than 1 target.

Modbus Output

A Modbus TCP/IP output and RTU output are provided on the CMCP7504. See "Modbus Output" setup page. The Modbus output can be taken back to a control system for livestreaming data.

DataView Overall Value Saver

The DataView Overall Value Saver feature allows for recording of the overall value for each of the four channels. A removable internal SD card, with a 1 GB of memory, stores the overall values for each channel every minute. The data is saved as a .txt file and time stamped for retrieval at a later time if necessary.

SignalSaver

The SignalSaver feature records the sensor's signal for 30 seconds when an alarm condition is met. The signal is saved on the removable internal SD card and is in a .wav file format. The .wav file can then be imported into a portable data collector, or online system, allowing for viewing of the time waveform and FFT. All files are timestamped and logged onto the SD card until cleared by the user. On average 1 year of data can be saved.

Speed Sync

Speed Sync allows the user to enable alarms when the machine speed is within a specified range when a speed sensor is connected to the monitor. To configure speed sync first setup the pulses per revolution then set the Low (L1) and High (H1) speed limits and check the "Sync Type" box for the channel you want it to apply to. When the machine speed is within this limit, the alarms will be enabled. This allows for machines to coast up and coast down without having an alarm.

Configuration Utility

The configuration of each channel's processing parameters (for example the measurement units or alarm setpoints) is performed using a simple configuration software called the MMS Manager. The MMS Manager can be installed on a Windows operating system (2000 or newer) and connects to the CMCP7504 using a generic USB cable which is supplied with the system.

Function and Parts Description (Outside)

1 **Display Module**
   The display module shows the overall value, bar graph, user defined alert and danger setpoints, point name and sensor status for each channel.

2 **Push Buttons**
   A push button keypad is used to reset the relays for each channel. To reset, click the menu button and select the channel to reset. The dotted button, far left, will display the system's serial number and firmware version when depressed.

3 **BNC Buffered Outputs**
   For each channel, the sensor's raw signal is available as a buffered output at the front panel BNC connector. The BNC connectors may be used to connect a portable data collector for further signal diagnostics.

Function and Parts Description (Internal)
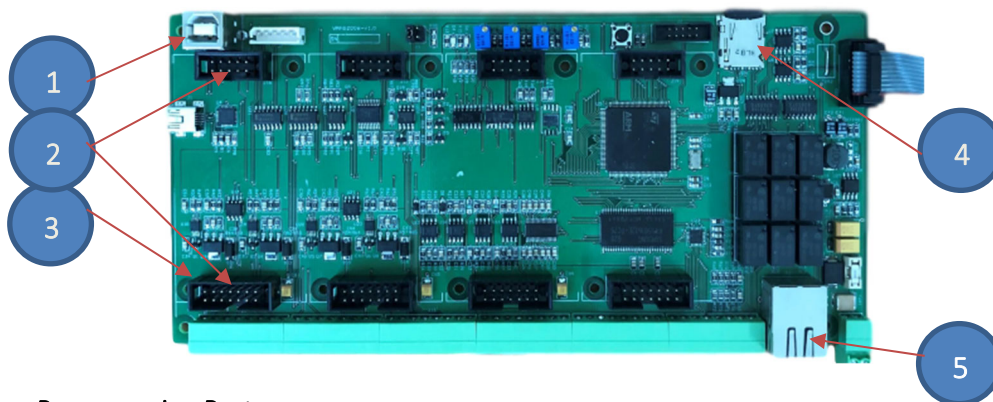
1   **Programming Port**
        Type B USB programming port. Connect cable here to program using MMS application.

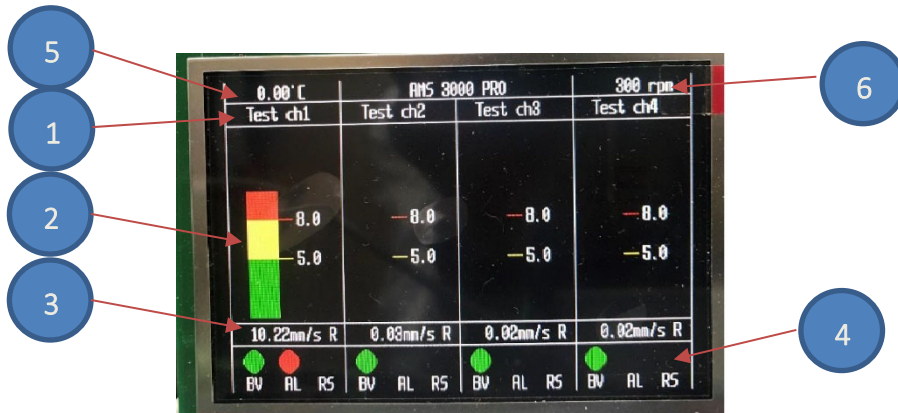2   **Input Module Slots (4)**
        Four slots for installing up to four input modules.

3   **Input/Output Terminals (Screw Terminals)**
        Sensor inputs, relay outputs, 4-20mA outputs, Modbus RTU and power connections.

4 **Micro SD Card**
SD Card Slot for DataView and SignalSaver
5 **Ethernet Port**
Modbus TCP Output

Display Overview

1 **Channel Name**
Software Programmable

2 **Bar Graph**
OK   Green
Yellow   Alarm (Alert)
Red   Alert (Danger)

3 **Overall Value**
Shown in Engineering Units, Software Programmable

4 **Channel Status**
(BV)   Bias Voltage
Green = OK
Red = Not OK
(AL)   Alarm
Yellow = Alert
Red = Danger
(RS)   Speed Sync
Off = Not Used
Blue = Channel in Speed Sync

5 **Aux. Temperature Reading**
10mV/°C or PT100 Input from External Sensor

6 **Aux. Speed Reading**
2 or 3 Wire Tachometer or 4-20mA Input from External Sensor

Installation

The CMCP7504 should be mounted in a location where it is not exposed to unnecessary radiant heat or strong magnetic fields. Various enclosures are available through STI for the CMCP7504 which include windowed or solid door enclosures constructed of fiberglass, painted steel or stainless steel for outdoor applications. The CMCP7504 can be panel mounted using the four corner holes or a din rail mounting plate can be used to install on TS35 type din rail. Refer to page 34 for mounting dimensions.


CMCP7504 Shown Installed in a Painted Steel Enclosure

Cable Glands

The CMCP7504 housing is provided with four pre-drilled holes and cable glands. An M20x1.5 threaded cable gland is provided for power and three M25x1.5 glands for signal inputs and output wires. NPT adapters are available through STI. All unused openings must be closed with blind plugs or seals.
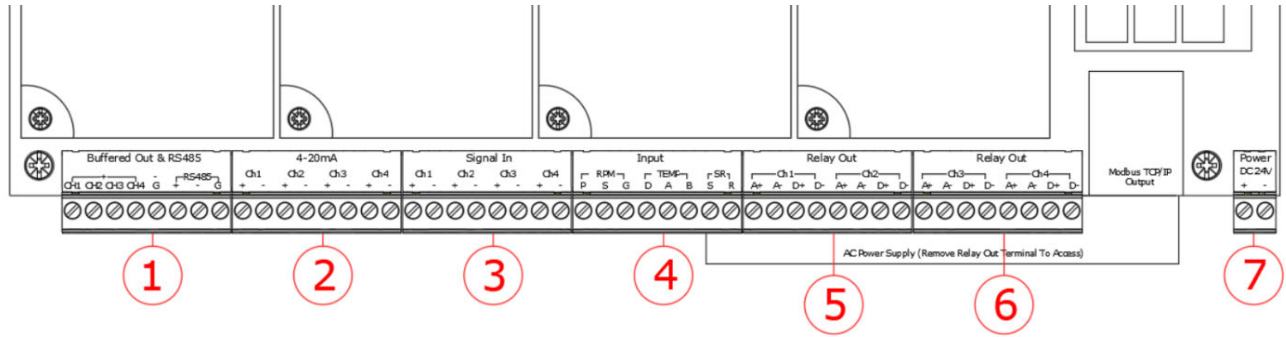
Power

The CMCP7504 features an internal AC to DC power supply, mounted underneath the main input board. The power supply is rated for 90-240VAC, 50 or 60Hz. The power supply is then connected to the CMCP7504's 24VDC input terminals. To access the AC power input terminals, remove terminal blocks #5 and #6 temporarily. The CMCP7504 may also be powered directly with 24VDC by connecting directly to the terminal block #7 (DC Power Input).
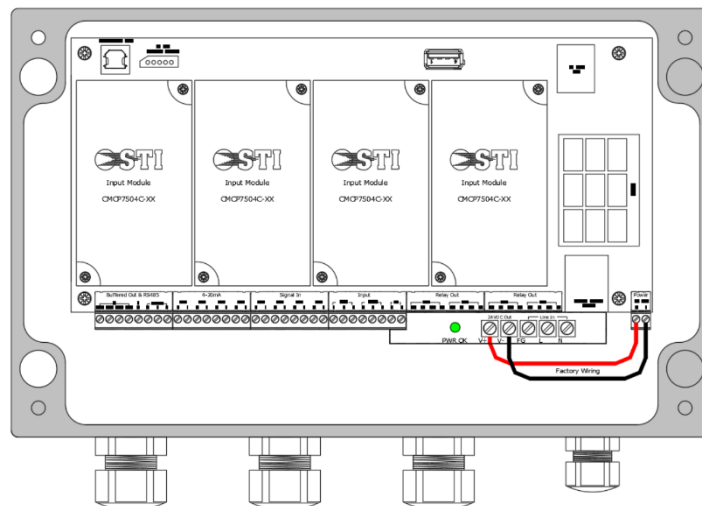
System Wiring

The image below shows the terminal block arrangement on the main input module. The terminal strips are removable to allow for ease of wiring.

Terminal	Pin	Description	Terminal	Pin	Description	Terminal	Pin	Description
1 – Buffered Output and Modbus RS485	1	Ch. 1 Buffered Output +	4 – Aux. Inputs and System OK Relay	1	Speed Input, Power	7 – DC PWR	1	+24VDC
	2	Ch. 2 Buffered Output +		2	Speed Signal		2	0V
	3	Ch. 3 Buffered Output +		3	Speed/Temp GND			
	4	Ch. 4 Buffered Output +		4	Temp. Input ,10mV/°C			
	5	Buffered Output GND		5	Temp. Input, PT100 +			
	6	Modbus RS485 D+		6	Temp. Input, PT100 -			
	7	Modbus RS485 D-		7	System OK Relay +			
	8	Modbus RS485 Ground		8	System OK Relay -			
2 – 4-20mA Outputs	1	Ch. 1 4-20mA Output +	5 – Alarm (Alert) Relay Outputs	1	Ch. 1 Alert Relay +			
	2	Ch. 1 4-20mA Output -		2	Ch. 1 Alert Relay -			
	3	Ch. 2 4-20mA Output +		3	Ch. 2 Alert Relay +			
	4	Ch. 2 4-20mA Output -		4	Ch. 2 Alert Relay -			
	5	Ch. 3 4-20mA Output +		5	Ch. 3 Alert Relay +			
	6	Ch. 3 4-20mA Output -		6	Ch. 3 Alert Relay -			
	7	Ch. 4 4-20mA Output +		7	Ch. 4 Alert Relay +			
	8	Ch. 4 4-20mA Output -		8	Ch. 4 Alert Relay -			
3 – Sensor Inputs	1	Ch. 1 Signal Input +	6 – Alarm (Danger) Relay Outputs	1	Ch. 1 Danger Relay +			
	2	Ch. 1 Signal Input -		2	Ch. 1 Danger Relay -			
	3	Ch. 2 Signal Input +		3	Ch. 2 Danger Relay +			
	4	Ch. 2 Signal Input -		4	Ch. 2 Danger Relay -			
	5	Ch. 3 Signal Input +		5	Ch. 3 Danger Relay +			
	6	Ch. 3 Signal Input -		6	Ch. 3 Danger Relay -			
	7	Ch. 4 Signal Input +		7	Ch. 4 Danger Relay +			
	8	Ch. 4 Signal Input -		8	Ch. 4 Danger Relay -			

Removing/Installing Input Modules

The CMCP7504 can accept up to four input modules which allow for various types of sensors. DIP switches or jumpers for full scale range and/or frequency range selections are located on the bottom side of the module. The input modules are secured to the main board using two screws, located at the top right and bottom left corner of each module. To remove the input module, remove the two screws and lift the module up. To install, align the connectors on the input module and press down, then re-install the two corner screws. If the screw holes do not align, remove the module and check connector alignment. Note, the CMCP7504 should always be powered off when removing or installing input modules.
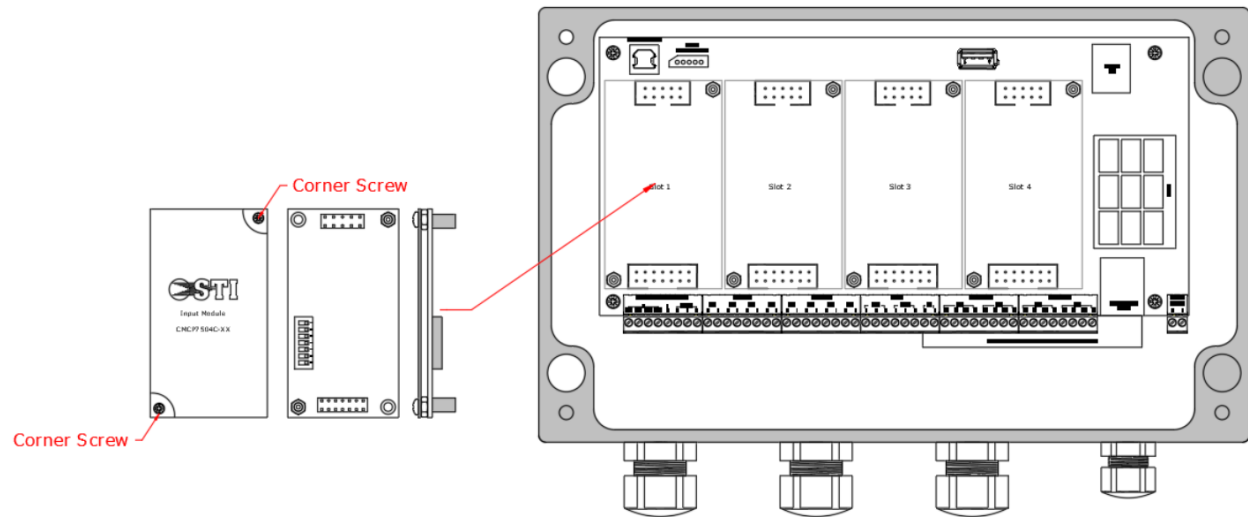
Input Module Characteristics

The CMCP7504 supports accelerometers, velocity transducers, eddy current probes (proximity probes) and all voltage or current outputs sensors. Once processed, the data can then be used for continuous monitoring and overall value transmission to a PLC, DCS or other control system. The table below shows the standard processing parameters. When available, the frequency range can be set using a jumper or DIP switch on each input module. The frequency range is not selected using the MMS Manager. The following section will review the available full-scale ranges and frequency ranges available for each module.

Module	Sensor Type	High Pass	Low Pass
(AA) Acceleration)	IEPE Accelerometer	2Hz	20kHz
(AV) Velocity	IEPE Accelerometer	2Hz or 10Hz	1kHz or 2kHz
(VV) Velocity	Piezo-Velocity Transducer	2Hz or 10Hz	1kHz or 2kHz
(SV) Seismic Velocity	Electromechanical Velocity Sensor	5Hz, 10Hz or 15Hz	1kHz or 1.5kHz
(EV) Enveloped Acceleration	IEPE Accelerometer	500Hz – 10kHz (Filter #3)	
(RV) Radial Vibration	Eddy Current Probe	2Hz	2kHz
(TP) Thrust Position	Eddy Current Probe	DC	
(AM) Analog Input	4-20mA or 1-5VDC	N/A	
(TM) Temperature Input	100 Ohm RTD or 10mV/°C	N/A	

Table 1: Available Sensor Inputs and Characteristics for the CMCP7504

CMCP7504C-AA Acceleration Module – IEPE Accelerometer Input

The AA Acceleration module accepts any IEPE accelerometer and conditions the signal to g's Acceleration. To determine the full-scale range, match the sensor's sensitivity to the Range column. For example, a 100mV/g sensor on Range 1 would have a 0-5.00g range. A 50mV/g sensor on range 3 would have a 30g range. An internal 0.5x gain adjustment switch allows the full-scale range to be reduced when used with higher sensitivity sensors.

DIP Switch Settings (SW1 – SW7)

Sensor Power	SW1	SW2
IEPE Power On	On	On
IEPE Power Off	Off	On

Factory Default = IEPE Power On

Signal Gain	SW3	SW4
1x Gain	On	Off
0.5 Gain	On	On

Factory Default = 1x Gain

Full Scale Range	SW5	SW6	SW7
Range 1	On	Off	Off
Range 2	Off	On	Off
Range 3	On	On	Off
Range 4	Off	On	On
Range 5	On	On	On

Factory Default = Range 2

Switches SW1 – SW7

Acceleration Module
CMCP7504C–AC
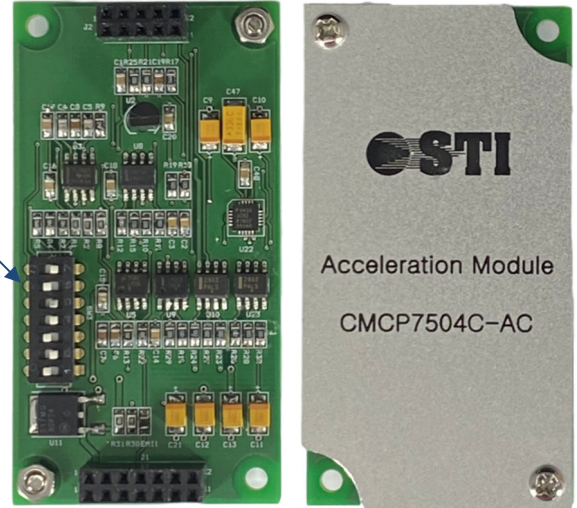
Range Selection Table (1x Gain)

Input	Range 1 g's	Range 2 g's	Range 3 g's	Range 4 g's	Range 5 g's
500 mV/g	1.00	2.00	3.00	4.00	5.00
100 mV/g	5.00	10.00	15.00	20.00	25.00
50 mV/g	10.00	20.00	30.00	40.00	50.00
10 mV/g	50.00	100.00	150.00	200.00	250.00

Range Selection Table (0.5x Gain

Input	Range 1 g's	Range 2 g's	Range 3 g's	Range 4 g's	Range 5 g's
500 mV/g	0.20	0.40	0.75	0.80	1.00
100 mV/g	1.00	2.00	3.00	4.00	5.00
50 mV/g	2.00	4.00	6.00	8.00	10.00
10 mV/g	10.00	20.00	150.00	200.00	250.00

Sensor Wiring

Signal Input Terminal Block
Ch1 Ch2 Ch3 Ch4
+ - + - + - + -

Signal
0V
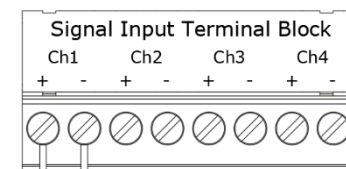
IEPE Accelerometer
When grounding at the instrument end, connect the shield to the - terminal.

CMCP7504C- AV Velocity Module – IEPE Accelerometer Input

The AV Velocity module accepts any IEPE accelerometer and conditions the signal to either mm/s or in/s velocity. To determine the full-scale range, match the sensor's sensitivity to the Range column. For example, a 100mV/g sensor on Range 1 would have a 0-0.50 in/s (12.7mm/s) range. A 50mV/g sensor on range 3 would have a 3.00 in/s (75mm/s) range.

DIP Switch Settings (SW1 – SW7):

Sensor Power	SW1
IEPE Power On	On
IEPE Power Off	Off

Factory Default = IEPE Power On

Frequency Range	SW2	SW3	SW4
10Hz to 1kHz (ISO)	Off	On	Off
2Hz to 2KHz (ISO LF)	On	Off	On

Factory Default = 10 to 1kHz (ISO)

Full Scale Range	SW5	SW6	SW7
Range 1	On	Off	Off
Range 2	Off	On	Off
Range 3	On	On	Off
Range 4	Off	On	On
Range 5	On	On	On

Factory Default = Range 2

Switches SW1 – SW7

Range Selection Table

Input	Range 1		Range 2		Range 3		Range 4		Range 5	
	in/s	mm/s	in/s	mm/s	in/s	mm/s	in/s	mm/s	in/s	mm/s
500 mV/g	0.10	2.50	0.20	5.00	0.30	7.50	0.40	10.00	0.50	12.50
100 mV/g	0.50	12.50	1.00	25.00	1.50	37.50	2.00	50.00	2.50	62.50
50 mV/g	1.00	25.00	2.00	50.00	3.00	75.00	4.00	100.00	5.00	125.00
10 mV/g	5.00	125.00	10.00	250.00	15.00	375.00	20.00	500.00	25.00	625.00

Sensor Wiring

Signal Input Terminal Block
Ch1   Ch2   Ch3   Ch4
+ -   + -   + -   + -

Signal
0V

IEPE Accelerometer
When grounding at the instrument end, connect the shield to the - terminal.

CMCP7504C-VV Velocity Module Input – Piezo-Velocity Sensor Input

The VV Velocity module accepts any Piezo-Velocity sensor and conditions the signal to either mm/s or in/s velocity. To determine the full-scale range, match the sensor's sensitivity to the Range column. For example, a 100mV/in/s (4mV/mm/s) sensor on Range 1 would have a 0-0.50 in/s (12.7mm/s) range. A 500mV/in/s sensor on range 3 would have a 0.30 in/s (7.5mm/s) range.

DIP Switch Settings (SW1 – SW7):

Sensor Power	SW1
IEPE Power On	On
IEPE Power Off	Off

Factory Default = IEPE Power On

Frequency Range	SW2	SW3	SW4
10Hz to 1kHz (ISO)	Off	On	Off
2Hz to 2KHz (ISO LF)	On	Off	On

Factory Default = 10Hz to 1kHz (ISO)

Full Scale Range	SW5	SW6	SW7
Range 1	On	Off	Off
Range 2	Off	On	Off
Range 3	On	On	Off
Range 4	Off	On	On
Range 5	On	On	On

Factory Default = Range 2

Switches SW1 – SW7

Velocity Module(V>V)
CMCP7504-VV

Range Selection Table

Input	Range 1		Range 2		Range 3		Range 4		Range 5	
	in/s	mm/s	in/s	mm/s	in/s	mm/s	in/s	mm/s	in/s	mm/s
500 mV/g	0.10	2.50	0.20	5.00	0.30	7.50	0.40	10.00	0.50	12.50
100 mV/g	0.50	12.50	1.00	25.00	1.50	37.50	2.00	50.00	2.50	62.50
50 mV/g	1.00	25.00	2.00	50.00	3.00	75.00	4.00	100.00	5.00	125.00
10 mV/g	5.00	125.00	10.00	250.00	15.00	375.00	20.00	500.00	25.00	625.00

Sensor Wiring

Signal Input Terminal Block
Ch1 Ch2 Ch3 Ch4
+ - + - + - + -

Signal
0V

Piezo-Velocity Sensor
When grounding at the instrument end, connect the shield to the - terminal.

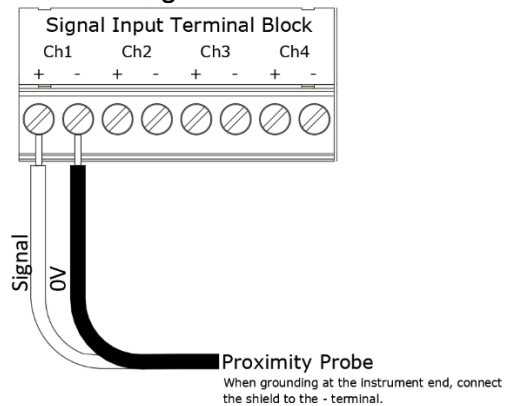## CMCP7504C-RV Radial Vibration Module– Proximity Probe Input

The RV Displacement module accepts an input from a proximity probe driver and conditions the signal to displacement in terms of mils or microns. To determine the full-scale range, match the sensor's sensitivity to the Range column. For example, a 200mV/mil (7.87 V/mm) sensor on Range 1 would have a 0-5 mil (127 micron) range. A 100mV/in/s sensor on range 3 would have a 30mil (190.50 micron) range.

Jumper Settings (E1 – E3):

Full Scale Range	E1	E2	E3
Range 1	ON	OFF	OFF
Range 2	OFF	ON	OFF
Range 3	ON	ON	OFF
Range 4	OFF	ON	ON
Range 5	ON	ON	ON

Factory Default = Range 2

Jumpers E1 – E3
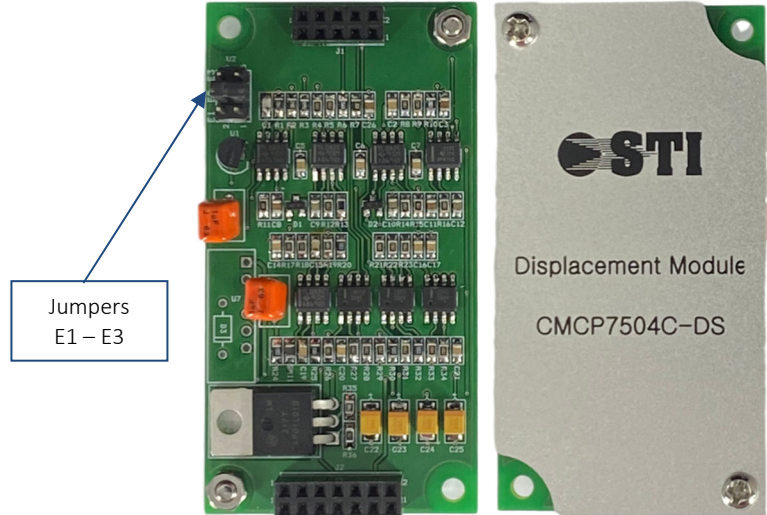
Range Selection Table

Input	Range 1		Range 2		Range 3		Range 4		Range 5	
	mils	microns	mils	microns	mils	microns	mils	microns	mils	microns
200 mV/mil (7.87 V/mm)	5.00	127.00	10.00	254.00	15.00	381.00	20.00	508.00	25.00	635.00
100 mV/mil (3.94 V/mm)	10.00	63.50	20.00	127.00	30.00	190.50	40.00	254.00	50.00	317.50

Sensor Wiring

Signal Input Terminal Block

Ch1   Ch2   Ch3   Ch4
+ -   + -   + -   + -

Signal
0V

Proximity Probe
When grounding at the instrument end, connect the shield to the - terminal.
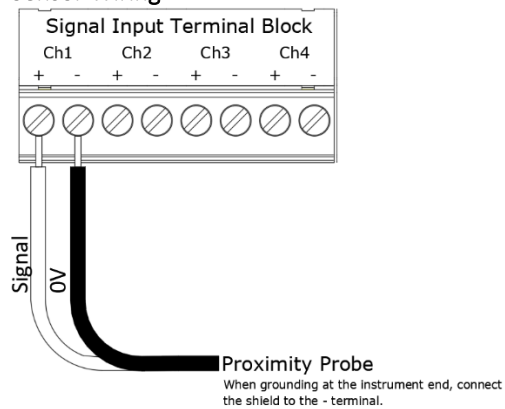
CMCP7504C-TP Thrust Position Module– Proximity Probe Input

The TP Thrust Position module accepts an input from a proximity probe driver and conditions the signal to position in terms of mils or microns.

Input	Range
200 mV/mil	0-25 mils
100 mV/mil	0-50 mils
7.87 V/mm	0-638 um
3.94 V/mm	0-1,270 um
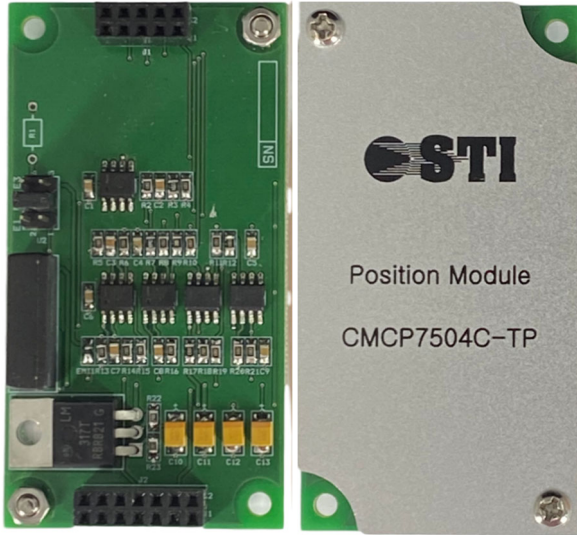
Note: Jumper should always remain on E2.

Sensor Wiring

Proximity Probe
When grounding at the instrument end, connect the shield to the - terminal.

CMCP7504C-GE Enveloped Acceleration Module– IEPE Accelerometer Input

The GE Enveloped Acceleration Module accepts an input from any IEPE accelerometer and conditions the signal to Enveloped Acceleration for bearing fault detection. The module has a default frequency range of 500 to 10kHz (Filter #3) and provides three different full scale range options.

DIP Switch Settings (SW1 – SW4):

Sensor Power	SW1
IEPE Power On	On
IEPE Power Off	Off

Factory Default = IEPE Power On

Full Scale Range	SW2	SW3	SW4
Range 1	On	Off	Off
Range 2	Off	On	Off
Range 3	OFF	Off	On

Factory Default = Range 2

Switches
SW1 – SW4

Range Selection Table

Full Scale Range	Range 1	Range 2	Range 3
Input (mV)	gE's	gE's	gE's
500 mV/g	6.00	4.00	2.00
100 mV/g	80.00	30.00	10.00
50 mV/g	60.00	40.00	20.00
10 mV/g	300.00	200.00	100.00

Sensor Wiring

Signal Input Terminal Block
Ch1   Ch2   Ch3   Ch4
+ -   + -   + -   + -

Signal
0V

IEPE Accelerometer
When grounding at the instrument end, connect the shield to the - terminal.
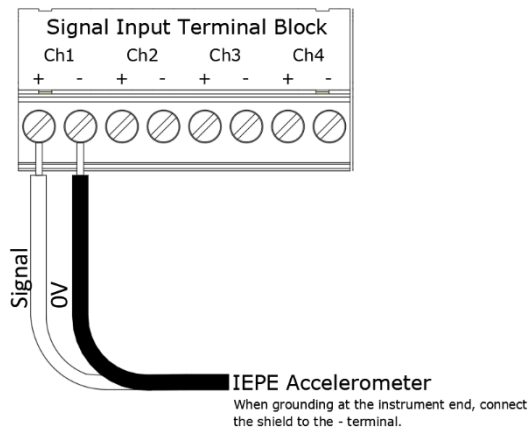
CMCP7504C-SV Seismic Velocity – Electromechanical Velocity Input
The SC Seismic Velocity Module is designed to work with electromechanical velocity (coil) sensors.

DIP Switch Settings (SW1 – SW6)

High Pass Filter Options	SW1	SW2
15Hz High Pass	OFF	ON
10Hz High Pass	ON	OFF
5Hz High Pass	ON	OFF

Factory Default = 10Hz High Pass

Low Pass Filter Options	SW3
1.5kHz	OFF
1kHz	ON

Factory Default = 1.5kHz Low Pass

Input Signal Sensitivity	SW4	SW5	SW6
28.5 mV/mm/s	ON	OFF	OFF
22 mV/mm/s	OFF	ON	OFF
16.7-17.5 mV/mm/s	OFF	OFF	ON

Factory Default = 28.5mV/mm/s

Switches SW1-SW6

Full Scale Range: 0-100mm/s RMS (0 to 3.9 in/s)
Signal Detection: RMS or Peak (Software Selectable)

Sensor Wiring

Signal Input Terminal Block
Ch1   Ch2   Ch3   Ch4
+ -   + -   + -   + -

Signal
0V

IEPE Accelerometer
When grounding at the instrument end, connect the shield to the - terminal.
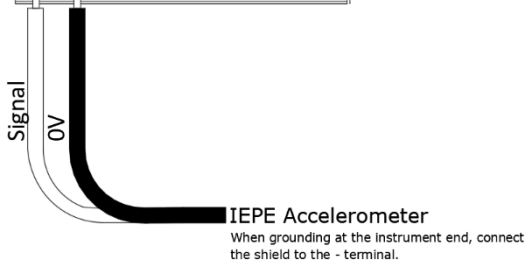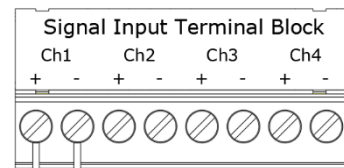
CMCP7504C-AM Analog Input Module – Voltage or Current Input

The AM Analog Module accepts inputs from either Voltage or Current output transmitters.

Input Selection (SW1 – SW3)

Input Signal	SW1	SW2	SW3
0 to +5VDC	ON	OFF	OFF
0 to -5VDC	OFF	ON	OFF
0 to 20mA	ON	OFF	ON
+1 to +5VDC	ON	OFF	OFF
-1 to -5VDC	OFF	ON	OFF
to 20mA	ON	OFF	ON

Factory Default = 4 to 20mA

Switches
SW1 - SW3
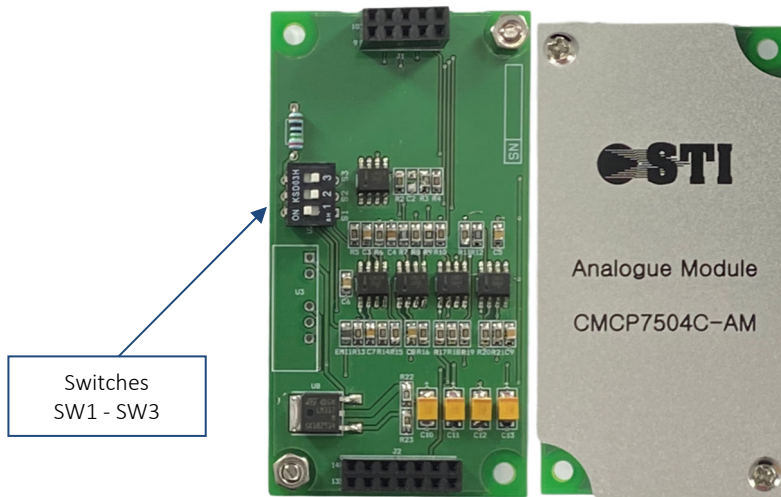
Sensor Wiring
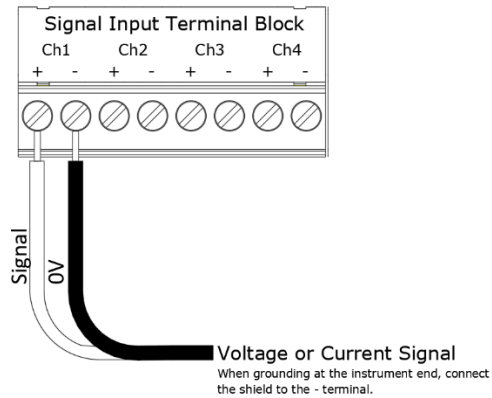
CMCP7504C-TM Temperature Module – Voltage or RTD Input

The TM Temperature Module accepts an input from either a 10mV/°C sensor, such as the CMCP700T Dual Output Accelerometers, or a PT100 style RTD. The default factory setup is 10mV/°C to accept an input from a dual output accelerometer such as the CMCP786T.

Input Signal Table

	SW1	SW2	SW3	SW4	SW5	SW6
PT100	ON	ON	OFF	OFF	OFF	OFF
10mV/°C	OFF	OFF	ON	ON	OFF	OFF

Factory Default = PT100

Switches SW1 – SW6

Sensor Wiring

10mV/°C Temperature Sensor
When grounding at the instrument end, connect the shield to the - terminal.

PT100 RTD
When grounding at the instrument end, connect the shield to the - terminal.
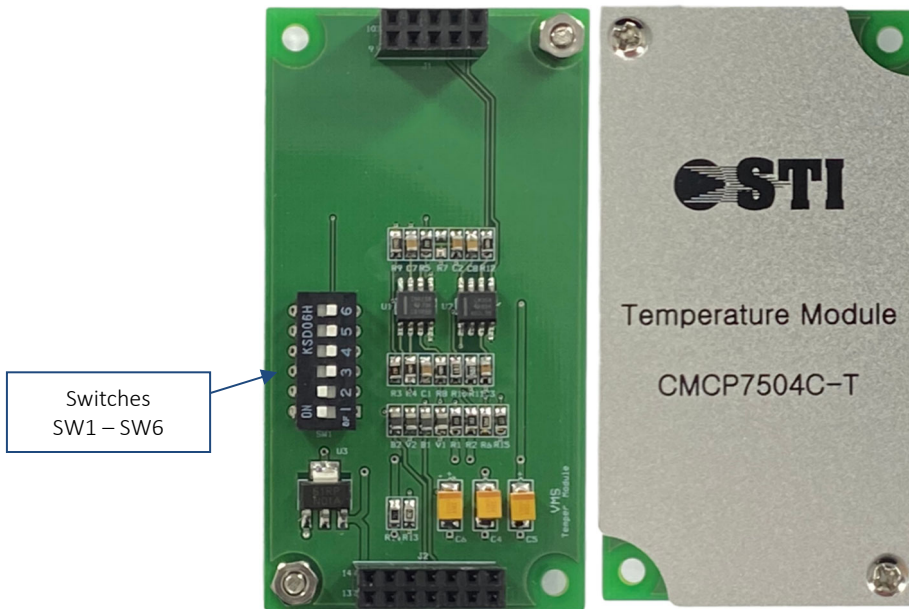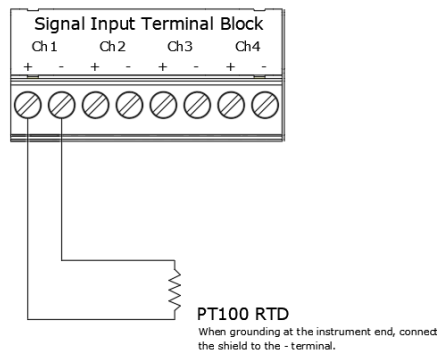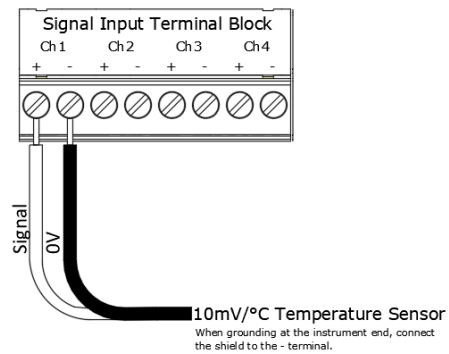
AUX Temperature Input

When used, the Auxiliary (AUX) Temperature will allow for a single temperature channel to be shown on the display. This function can be turned on by selecting "Used" in the drop-down menu or turned off by selecting "Not Used". The AUX Temp input accepts either a 100 Ohm Platinum RTD or a 10mV/°C output commonly found in dual output sensors. When a dual output sensor is used, be sure the check the box in the CMCP7504 Setup Application.
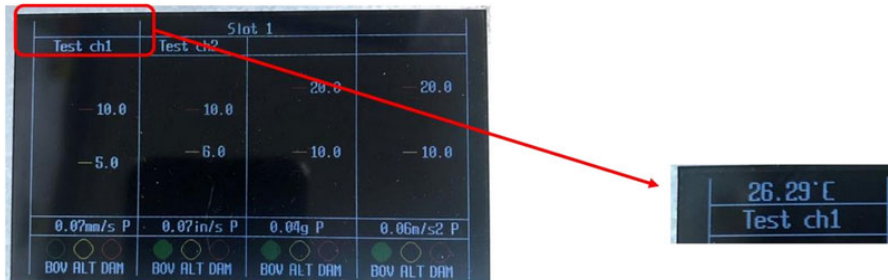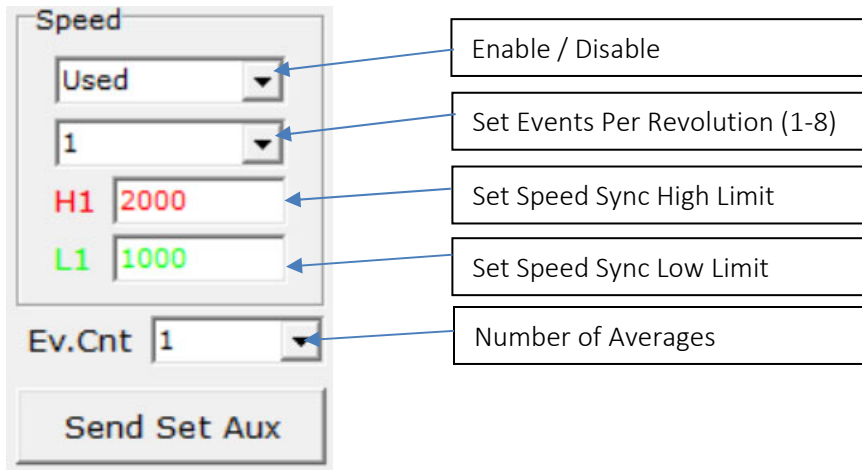

Sensor Wiring (PT100 RTD)
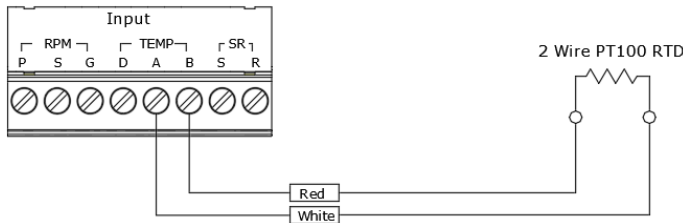
Sensor Wiring (10mV/°C from Dual Output Accelerometer)
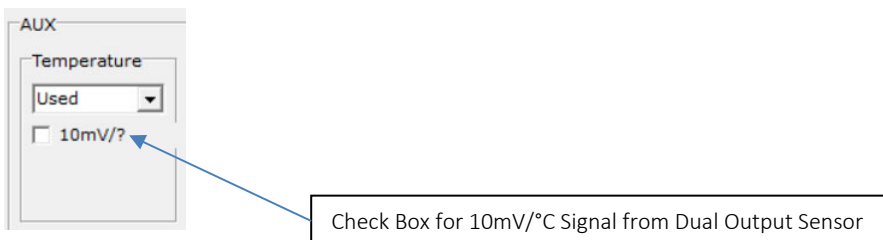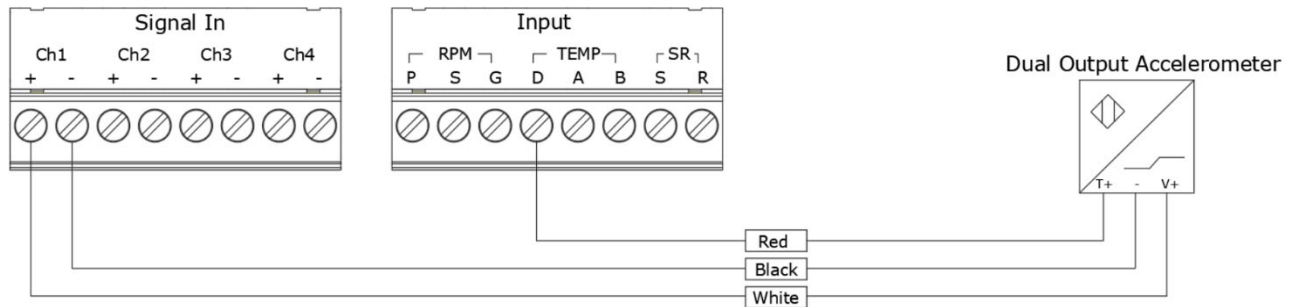
Aux. Speed Input

The Auxiliary (AUX) Speed input allows for a single speed reading from a 2 or 3 wire proximity sensor to be shown on the display in terms of RPM. The speed input can then be used for Speed Sync alarms. Auxiliary inputs are not monitored and provide a local readout only.


| Control	Description
Used	Enable / Disable
1	Set Events Per Revolution (1-8)
H1 2000	Set Speed Sync High Limit
L1 1000	Set Speed Sync Low Limit
Ev.Cnt 1	Number of Averages
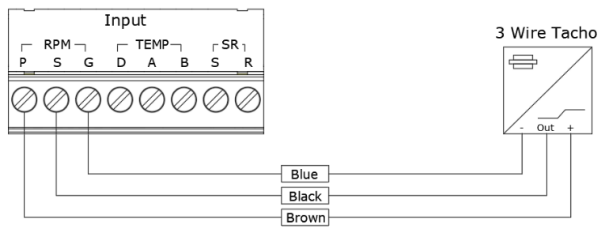
3 Wire Tacho Wiring

2 Wire Tacho Wiring
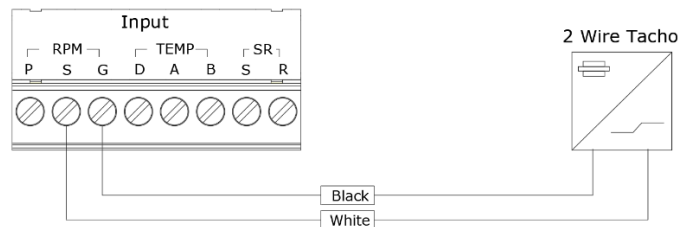
Speed Sync

Speed Sync allows the user to enable alarms when the machine speed is within a specified range. To configure Speed Sync simply turn on the Aux. Speed channel, set the number of pulses per revolution and the Low (L1) and High (H1) speed limits, in terms of RPM, then check the "Speed Sync" box next to the channel you want to apply it to. When the machine speed is between the specified range the alarms will be enabled. This allows for machines to coast up and coast down without causing alarms. The graph below shows how to enable Speed Sync for a 100 to 800 RPM range. The graph shows that the alarms will only be active between 100 and 800 RPM>
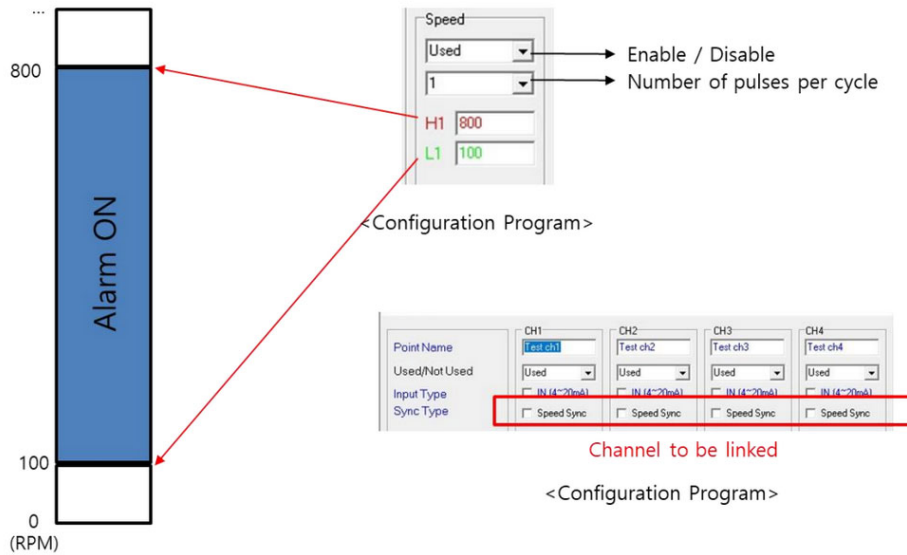
When Speed Sync is enabled, a blue indicator will be displayed on the front panel to indicate that channel is tied to Speed Sync and the RPM will be displayed in the upper right corner.
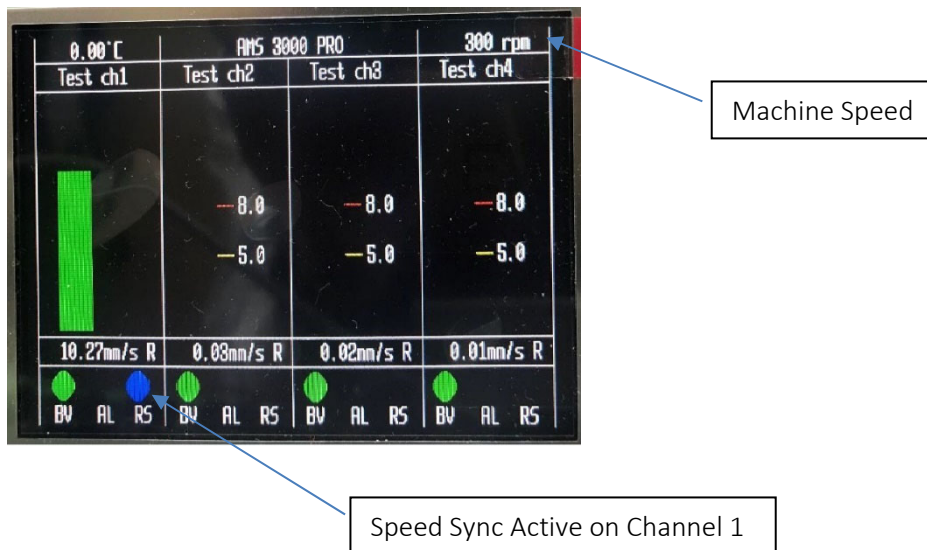
Relay Outputs

The CMCP7504 has seven relay driver outputs that can be used to indicate system status, warning by alert and alarm by danger. Relay outputs can be configured by using the threshold options in the configuration program. The system relay driver is energized only when the system status is OK. The system relay driver will be de-energized during power loss and when detecting internal system faults. Two additional relays are provided with each channel, one for Alert and one for Danger. Alert and Danger relays are configured using the configuration software and can be configured for Normally Energized or Normally De-energized

Relay Wiring
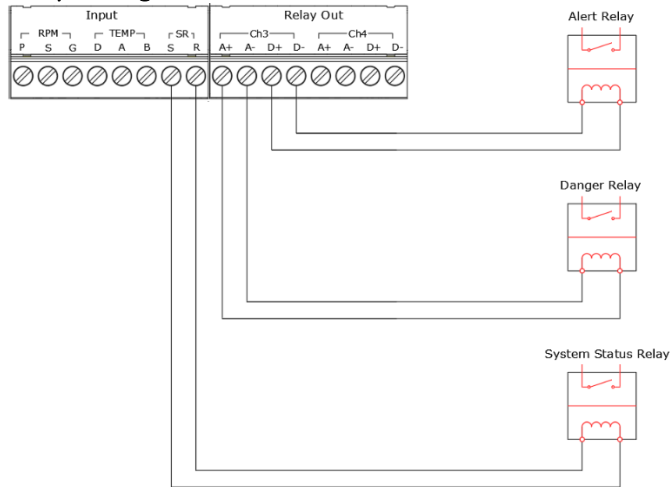
Alarm Reset

When alarms are set to latching, an alarm reset will need to be performed to clear the alarms. Alarms can only clear once the values drop below the alarm threshold and the reset button is depressed. An alarm condition will be shown by a Yellow (Alert) or Red (Danger) AL indicator at the bottom of the bar graph.
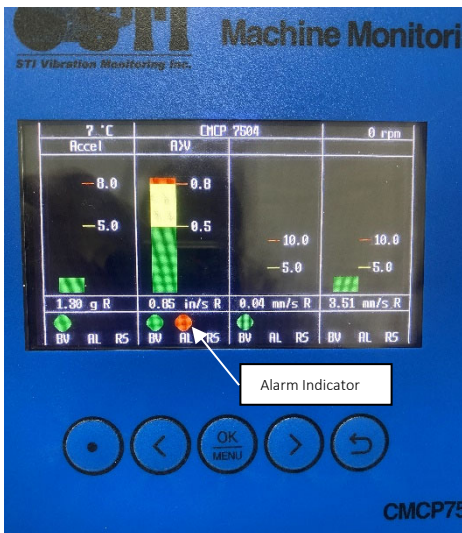

To clear the alarm, press the OK button on the front keypad and select the channel using the left or right arrow keys. Once the channel is selected press OK. Use the return arrow button to return to the bar graph display.

Configuration Software Overview (MMS Manager)

The MMS Manager software, provided on a USB thumb drive, allows the user to configure the following parameters;

> Transferring or Downloading the CMCP7504 Configuration File
> Set the Measurement Point Name
> Set Engineering Unit Selection
> Set Alarm and Danger Alarm Limits
> Set Alarm Operation (Latching or Non-Latching)
> Set Alarm Time Delay
> Set Full Scale (Min/Max) Range
> Set Bar Graph View Scale
> Enable/Disable Auxiliary Temperature and Speed Input Settings
> Enable/Disable Speed Sync
> Configure Modbus RS485 and TCP Outputs

The screenshot below shows the single page Configuration Application for the CMCP7504.
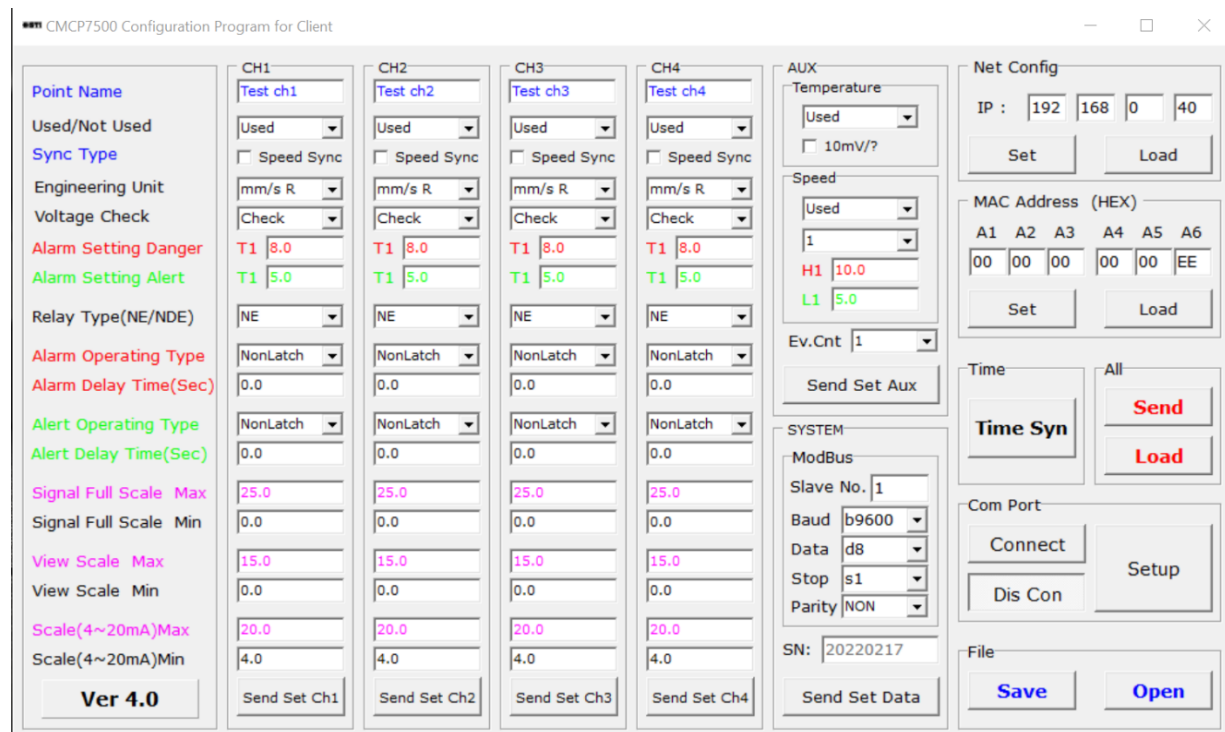


Communications Driver Installation

Follow the instruction below to install the driver package for the CMCP7504.

- Press the Windows key + X.
- Click Device Manager.
- Once device manager is open, select the device under serial bus, right click it then click Update Driver Software. This will launch the update driver software wizard. Select the Silicone Labs CP2101 driver from the USB thumb drive provided with the system and complete the installation.
- Once the installation is complete, restart your computer.

Connecting the CMCP7500 Configuration Program

To connect to the CMCP7504 use the supplied USB-A to USB-B communications cable. The directions and images below will guide you through the setup.
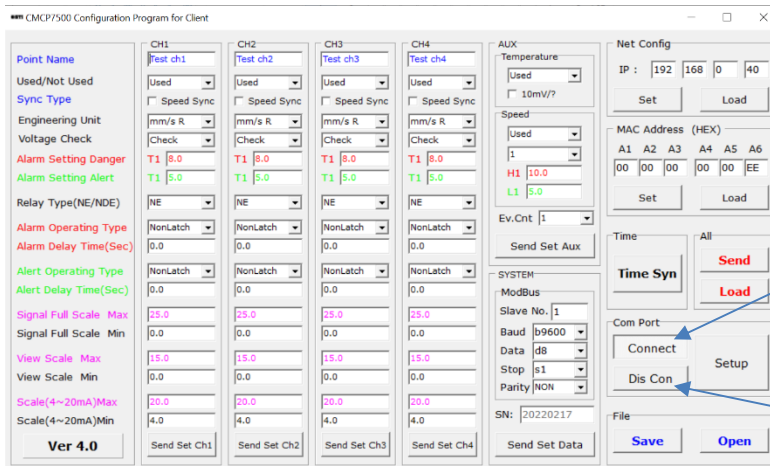
1. Select "Setup" to setup the connection.

Setup Button to Establish Communications
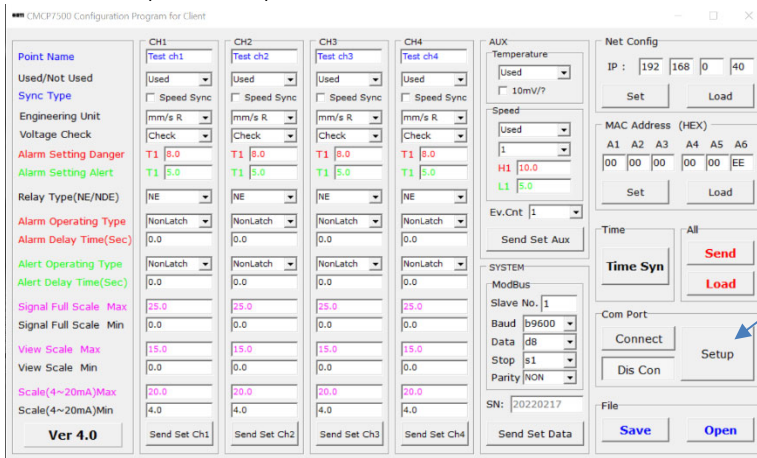
2. Select the COM port and verify the settings then click OK.

Select COM port
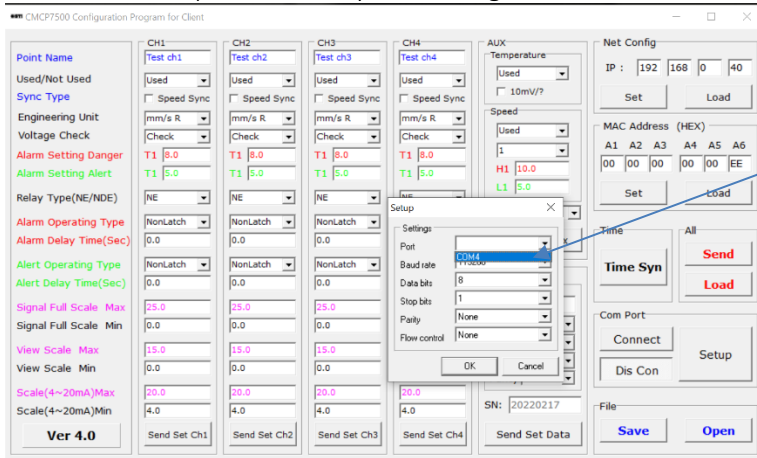
3. Click Connect to Connect to the CMCP7504


Connect Button

Disconnect Button

4. The configuration pre-loaded onto the CMCP7504 may be recalled by clicking the "Load" button. All parameters from the CMCP7504 will be uploaded into the application.


Load Data
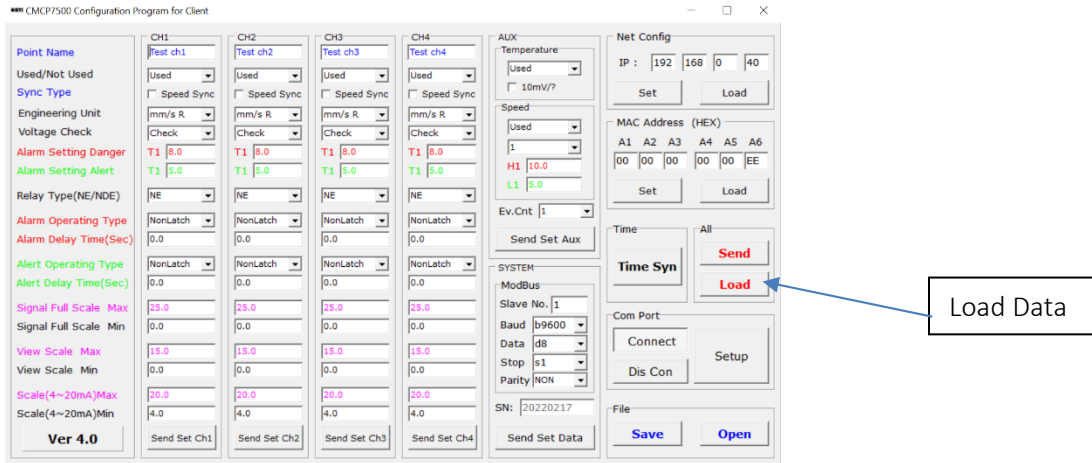
5. To change the configuration, enter the information for each parameter. Once complete, click "Send All" or alternatively click "Send Set Ch" to send configuration data for each channel individually.


Send All Data

Send Individual Channel Set
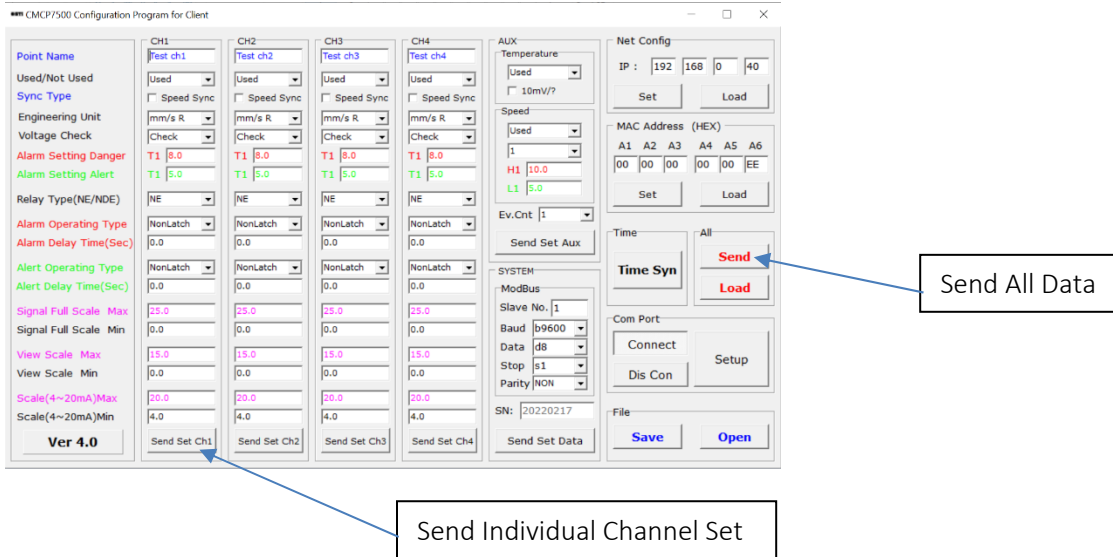
6. To synchronize the time and date settings for DataView, click "Time Syn". The local time from your PC will be synced to the CMCP7504 for recording the overall values.


Time Sync
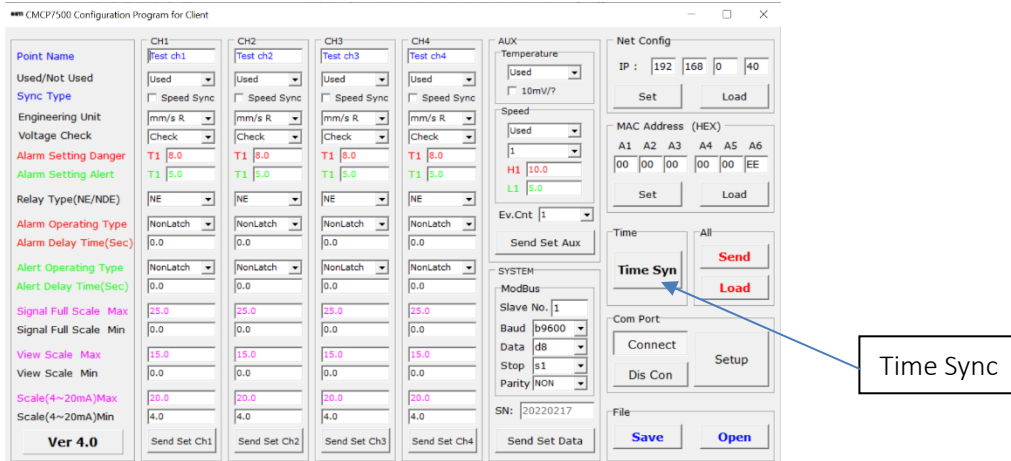
7. To configure the Modbus TCP IP address, enter the units IP address under the Net Config section. If necessary, a MAC address may be entered. Use the "Load" button to recall the settings from the CMCP7504 to the program.

Modbus TCP IP Address Setting
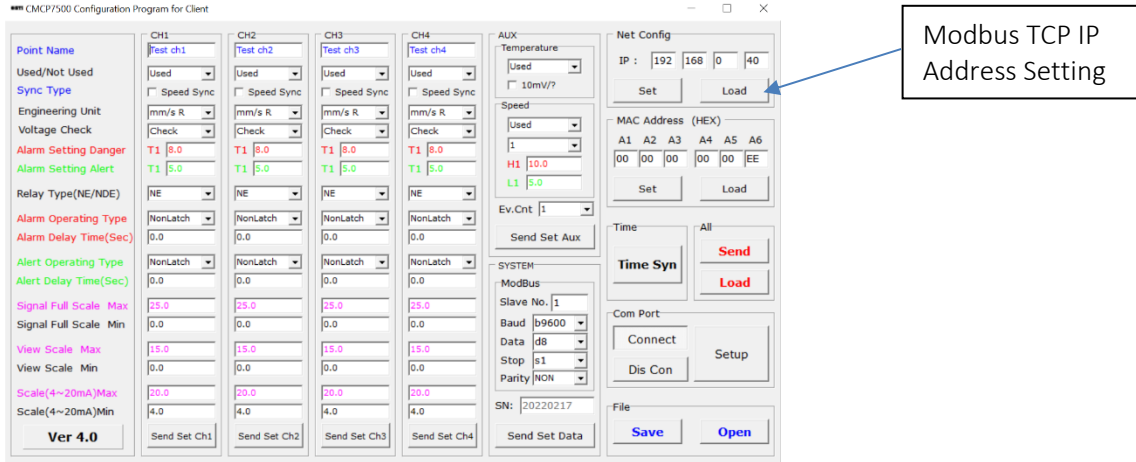
8. Once setup has been complete, click Disconnect.
Refer to the next section for more information on each parameter.

Disconnect
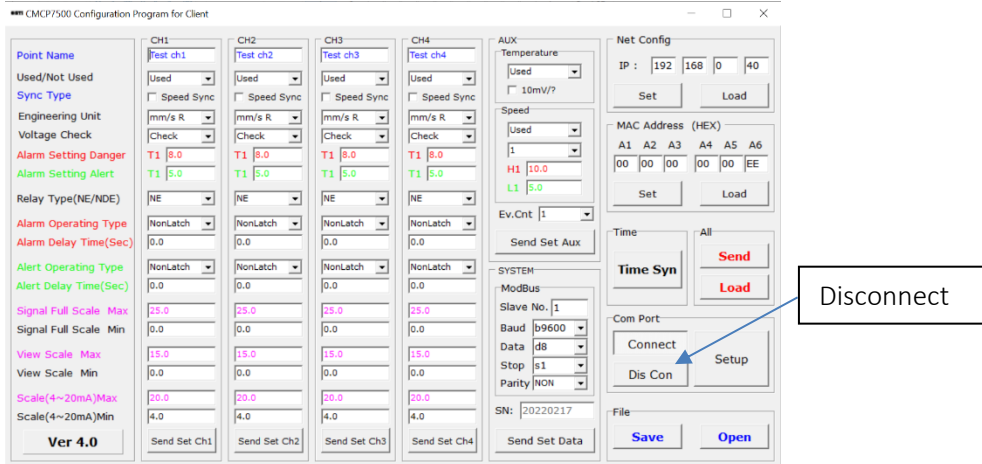
9. Configuration files can be saved on a local PC and re-opened to easily setup additional CMCP7504.

Save/Load Configuration
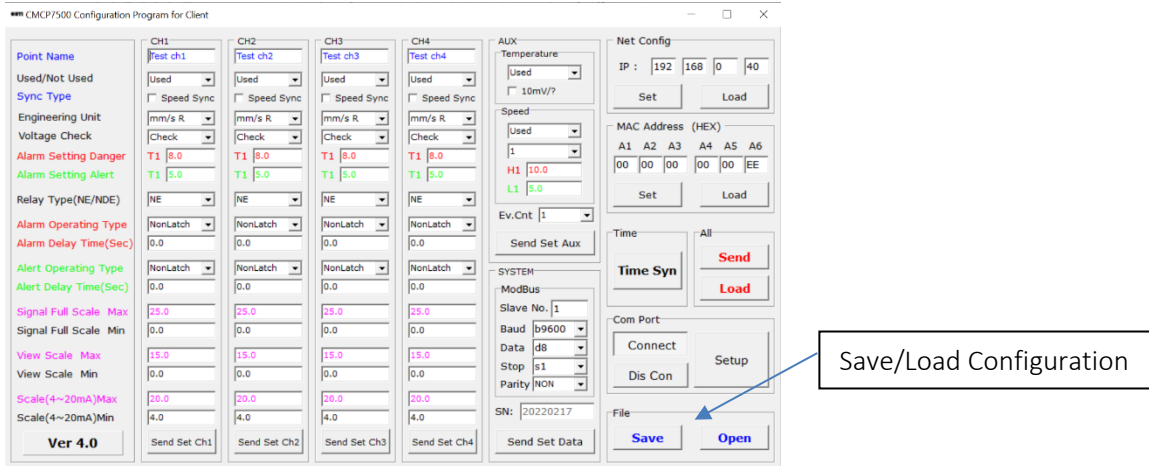
Point Name
Input any "Point Name" desired through abbreviations or full words. 12 character maximum.

Point Name	Test ch1

Used/Not Used
Enables/disables channel.

Used/Not Used	Used ▼

Speed Type
Speed sync allows the user to alarm between specific speeds when used with the Aux. Speed input. To active simply check the speed sync box and enter the high (H1) and low (L1) speed limits in the speed sync setup box.

Sync Type	☐ Speed Sync

Engineering Units
The engineering units drop down box allows the user to set the desired units in English or Metric. The selected units should match the input modules installed. The system supports both English and Metric units as well as RMS, Peak, Peak to Peak.

Engineering Unit	mm/s R ▼

Voltage Check
Voltage check is used with Piezo style accelerometers and velocity sensors. When set to "Check" the CMCP7504 will monitor the sensors bias voltage. Voltage check must be disabled for all other sensor types.

Voltage Check	Check ▼

Alert and Danger Alarm Setup
This section allows the user to set both the Alert and Danger (Alarm) setpoints along with the time delay and relay operation. All Danger alarm parameters are shown in red text, all Alert alarm parameters are shown in green text.

Alarm Setting Danger	T1	8.0
Alarm Setting Alert	T1	5.0

Relay Type
The CMCP7504 supports both Normally Energized and Normally De-Energized relay contacts. Select NE for Normally Energized or alternatively NDE for Normally De-Energized.

Relay Type(NE/NDE)	NE ▼

Relay Operation

Three levels of relay operation are available.

NonLatch	Relays will automatically clear after amplitude falls below alarm levels
Latch	Relays will remain latched until the reset button is depressed.
Bypass	Relays are disabled.

Alarm Operating Type — NonLatch

Alert Operating Type — NonLatch

Relay Delay Time (Seconds)

A time delay of 0 to 10,000 Seconds (sec) can be added to each alarm. STI suggests using 3 to 10 second time delays. When a time delay is used, the amplitude must remain above the alarm value for the selected time before the relays change state.

Alarm Delay Time(Sec) — 0.0

Alert Delay Time(Sec) — 0.0

Signal Scaling

The Signal Scaling section is used to set the CMCP7504's analog outputs to match the configuration of the sensor input module and display. The Full Scale Min and Full Scale Max should be set according to the range selected on the sensor input module, for example, if the input module is set for a 0 to 2.00 in/sec range the Signal Full Scale Max should be set for 2.00 and Signal Full Scale Min to 0.00.

Signal Full Scale Max — 25.0
Signal Full Scale Min — 0.0

View Scale

The View Scale is used to adjust the CMCP7504's bar graph display. The View Scale should match the sensor input module's range or it can be set to display a portion of the full scale range. For example, if the range is set to 0-5g's, and the amplitude is typically less than 1g, the user may prefer to set the View Scale for 0 to 1g to better show the signal on the display.

View Scale Max — 15.0
View Scale Min — 0.0

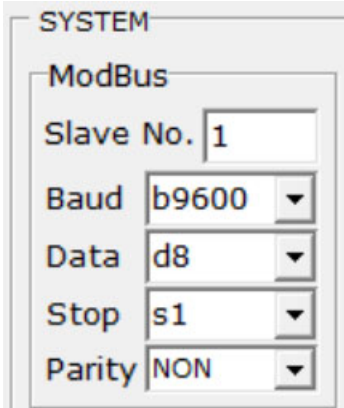### Scale (4-20mA) Max and Min

The CMCP7504 supports 4 different analog output ranges, 0-20mA, 4-20mA, 20-4mA and 20-0mA. By default the CMCP7504 is set to 4mA min and 20mA max for the standard 4-20mA output range. Any of the four ranges may be entered and the scale will be proportional to the range of the input module.

Scale(4~20mA)Max — 20.0
Scale(4~20mA)Min — 4.0

Modbus Outputs
Configuring the Modbus RS485 Output

The CMCP7504 provides a two wire (half duplex) Modbus RS485 output for connecting to a PLC, DCS, SCADA or other system. The Modbus settings can be found in the MMS Manager. The default Baud Rate is 9600 and the Default Node ID Number is 1. The Modbus settings can be changed using the MMS Manager. Up to 4 CMCP7504's can be connected to the same RS485 line by changing the Node ID Number from 1 to 4.
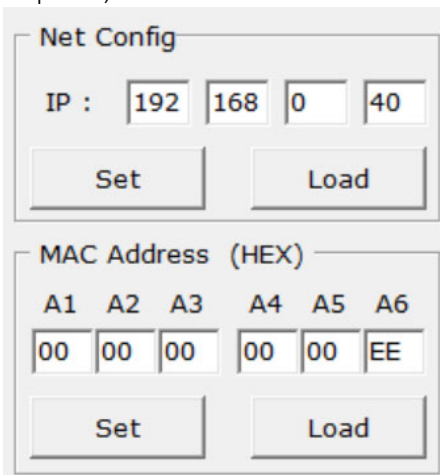
SYSTEM
ModBus
Slave No. 1
Baud   b9600
Data   d8
Stop   s1
Parity NON

Modbus RS485 Settings:

Mode:	RTU
Modbus Address:	1 thru 4 (Default is 1)
Hardware Interface:	RS485 2 Wire (Half Duplex)
Baud Rate:	4800, 9600, 19200 (Default is 9600)
Data Bits:	8
Stop Bits:	1 or 2 (Default is 1)
Parity:	None, Odd or Even (Default is 1 None)
Function Code:	FC04 and FC03
Retries:	3

Configuring Modbus TCP Output

To program the Modbus TCP output, enter the systems IP address in the Net Config section and click Set to send the configuration file to the CMCP7504, or click Load to load to view the current configuration data. If required, a MAC address can be entered. Any random MAC address may be used.

Net Config
IP : 192 168 0 40
Set   Load

MAC Address (HEX)
A1 A2 A3   A4 A5 A6
00 00 00   00 00 EE
Set   Load

Input Registers

The input register function codes (FC04) allow you to view sensor status <u>and</u> alarm status over Modbus. Registers 30001 thru 30004 provide the overall vibration values as an integer or decimal.

Modbus Register	Content	Data Type
30001	Analog 1, Overall Value	16 Bit Signed Integer
30002	Analog 2, Overall Value	16 Bit Signed Integer
30003	Analog 3, Overall Value	16 Bit Signed Integer
30004	Analog 4, Overall Value	16 Bit Signed Integer
30005	Analog 1, Sensor and Alarm Status	
30006	Analog 2, Sensor and Alarm Status	
30007	Analog 3, Sensor and Alarm Status	
30008	Analog 4, Sensor and Alarm Status	

| Function	Not Used	Bias Voltage	Not Used	Danger Alarm	Not Used	Alert Alarm	Sensor Status
Bit #	16 thru 9	8	7 thru 5	4	3	2	1
	X	0 = Sensor Fault 1 = Sensor OK	X	0 = No Alarm 1 = Alarm	X	0 = No Alarm 1 = Alarm	0 = On 1 = Off

Holding Registers

The holding register function codes (FC03) allow you to view sensor status and alarm status. Registers 40001 thru 40008 provide the overall vibration values as 32-Bit Floating Point values.

| Register	Content	Data Type
40001	Analog 1, Overall Value	Floating Point, LSRF
40003	Analog 2, Overall Value	Floating Point, LSRF
40005	Analog 3, Overall Value	Floating Point, LSRF
40007	Analog 4, Overall Value	Floating Point, LSRF

Viewing System Confirmation Setup

To view the systems communication and firmware configuration, press and hold the left button on the keypad. Once depressed the display will show the system settings.
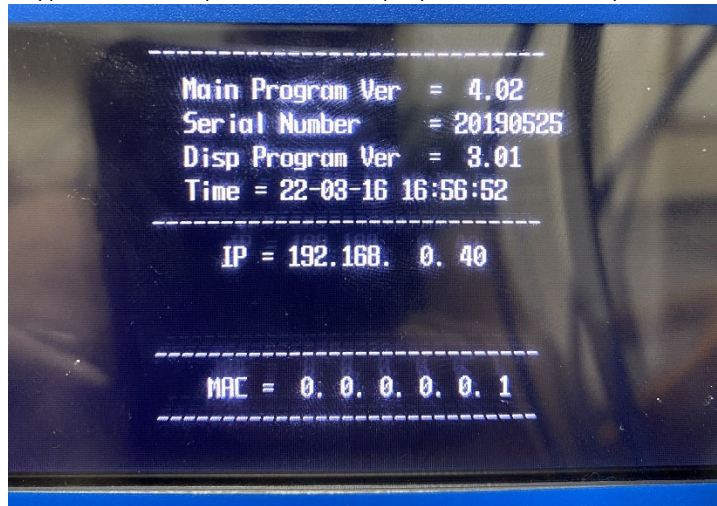
DataView – Overall Value Saver

STI's DataView Overall Value Saver continuously stores the overall value for each channel every minute, allowing users to export the data and review or trend the machine's history. The overall values are stored on the removable Micro SD card in .txt format. The data for each channel is then displayed in the proper engineering units and in order by channel number. Refer to the CMCP7504 Configuration Program or the CMCP7504's local display for measurement type and engineering units.
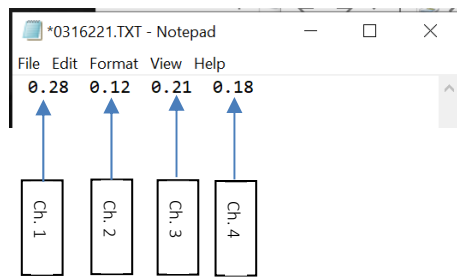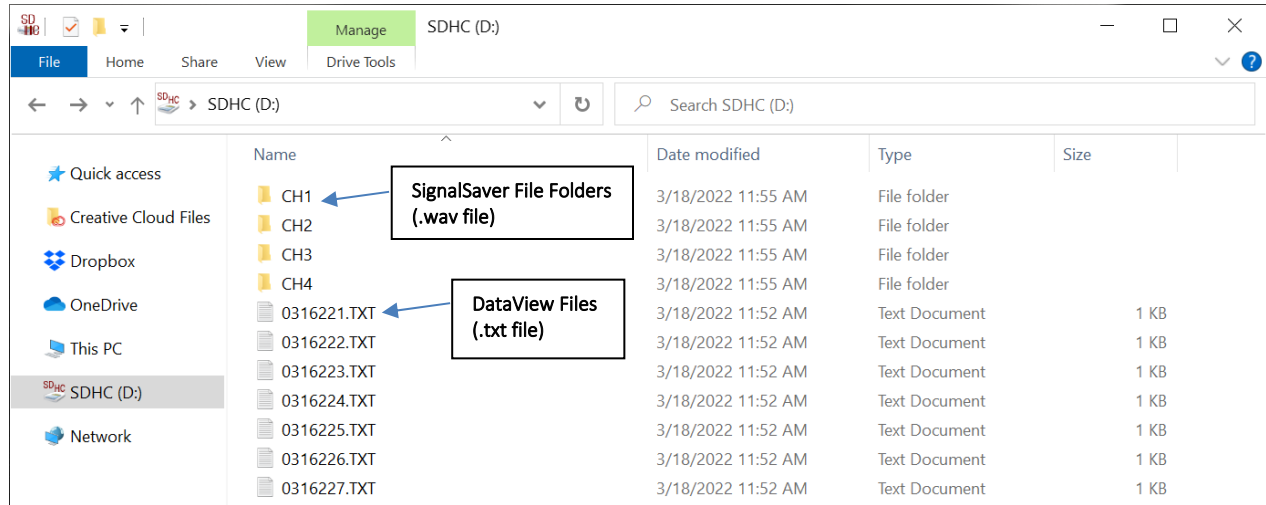

The data shown in the txt file represents the overall value for each channel and is shown in engineering units. Each txt file is saved by Month/Day/Year/Recording Number.

SignalSaver – Raw Signal Recording

STI's SignalSaver feature automatically records the sensor's raw signal for 30 seconds when an alarm condition is detected. To enable, simply set the alarm limits for each channel and be sure the SD card is installed on the main circuit board. The CMCP7504 will automatically record the sensor's signal and save it as a .wav file which can then be exported to a portable data collector or online condition monitoring system for fault analysis. The files are stored on the SD card in the channels folder, for example signals for Channel 1 can be found in the CH1 folder, signals for Channel 2 can be found in the CH2 folder. File names are saved by Month/Day/Year/Recording Number.
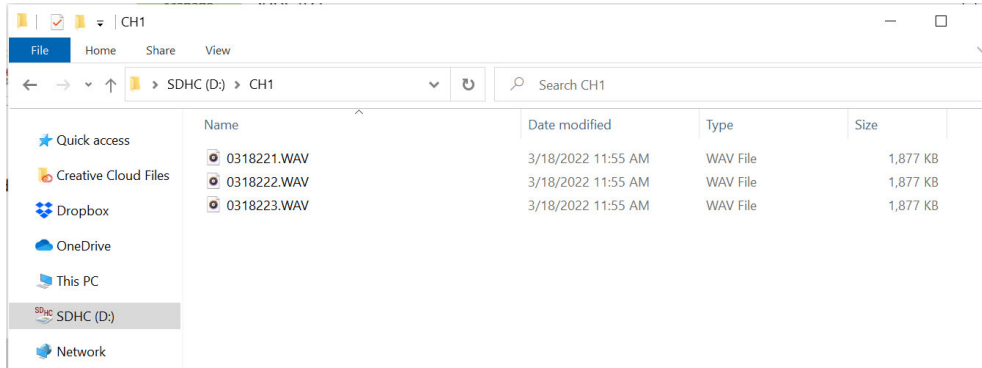
The image below shows the .wav file in waveform and FFT format when viewed using a Microlog GX.
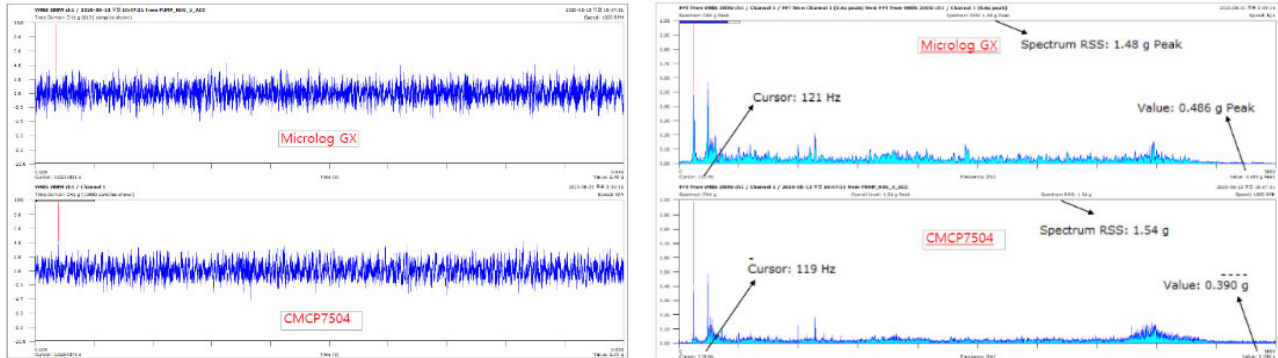
Refer to your device's manual for instructions on uploading .wav files.

Technical Specifications

Power Requirements
Supply Voltage:	90 to 240 VAC (50/60Hz) to Internal Power Supply
	18-36 VDC Direct to Main Board (DC Input Terminals)
Power Consumption:	30W

Input Signal
Sensor Types:	Accelerometers, Velocity Transducers, Eddy Current Probes, Current and Voltage Output Sensors
Monitored Inputs:	4
Unmonitored Inputs:	2 (Aux. Speed and Aux. Temp) – for Display Purposes Only
Measurement Accuracy:	+/-1% of Full Scale
Frequency Range:	Jumper Selectable – Refer to Input Module Characteristics
Sensor OK:	Continuous Monitoring of Bias Voltage for Piezo Style (IEPE/ICP) Sensors

Buffered Outputs
BNC Buffered Output:	4 Total (1 Per Channel)
Terminal Block Output:	4 Total (1 Per Channel)
Buffered Output Sensitivity:	Same as Sensor Sensitivity

Output Signals
Analog Output:	Isolated 4-20mA
Digital Outputs:	Modbus RS485 and Modbus TCP
Relay Contacts:	
System OK:	1 Total (Global)
Alert:	4 Total (1 Per Channel)
Danger:	4 Total (1 Per Channel)
Relay Rating:	Form C SPDT, 1A @ 30VDC/250VAC
Relay Operation:	Bypass, Latching, Non-Latching
Relay Reset:	Push Button Reset (Front Panel)

Environmental
|	
Operating Temperature:	-20 to 80°C (-4 to 176°F)
Storage Temperature:	-55 to 125°C (-67 to 257°F)
Humidity:	0-95% Relative Humidity, Non-Condensing
IP Rating:	IP65 (Standalone),
	IP66 (with Optional Enclosure)

Mechanical (See Next Page for Detail)
|	
Weight:	6.5 lb (2.95kg)
Color:	Power Coated Gray
Dimensions:	10.24" x 6.3" x 3.54" (260x160x90mm
Mounting Options:	4 Hole Corner Mount
	Optional Din Rail Mounting Plate
Cable Entries:	3 Each M25x1.5 Threaded Hole, Cable Glands Provided
	1 Each M20x1.5 Threaded Hole, Cable Gland Provided

Software
Compatibility:	Windows 10, Windows 11
Driver:	Silicone Labs CP2101 USB to UART Bridge Controller
	https://www.silabs.com/documents/public/software/CP210x_Universal_Windows_Driver.zip

Dimensions

Mounting Dimensions:

9.45
[240.03]

4.33
[109.98]

Ø0.30
[Ø7.62]

Mounting Screws Not Provided
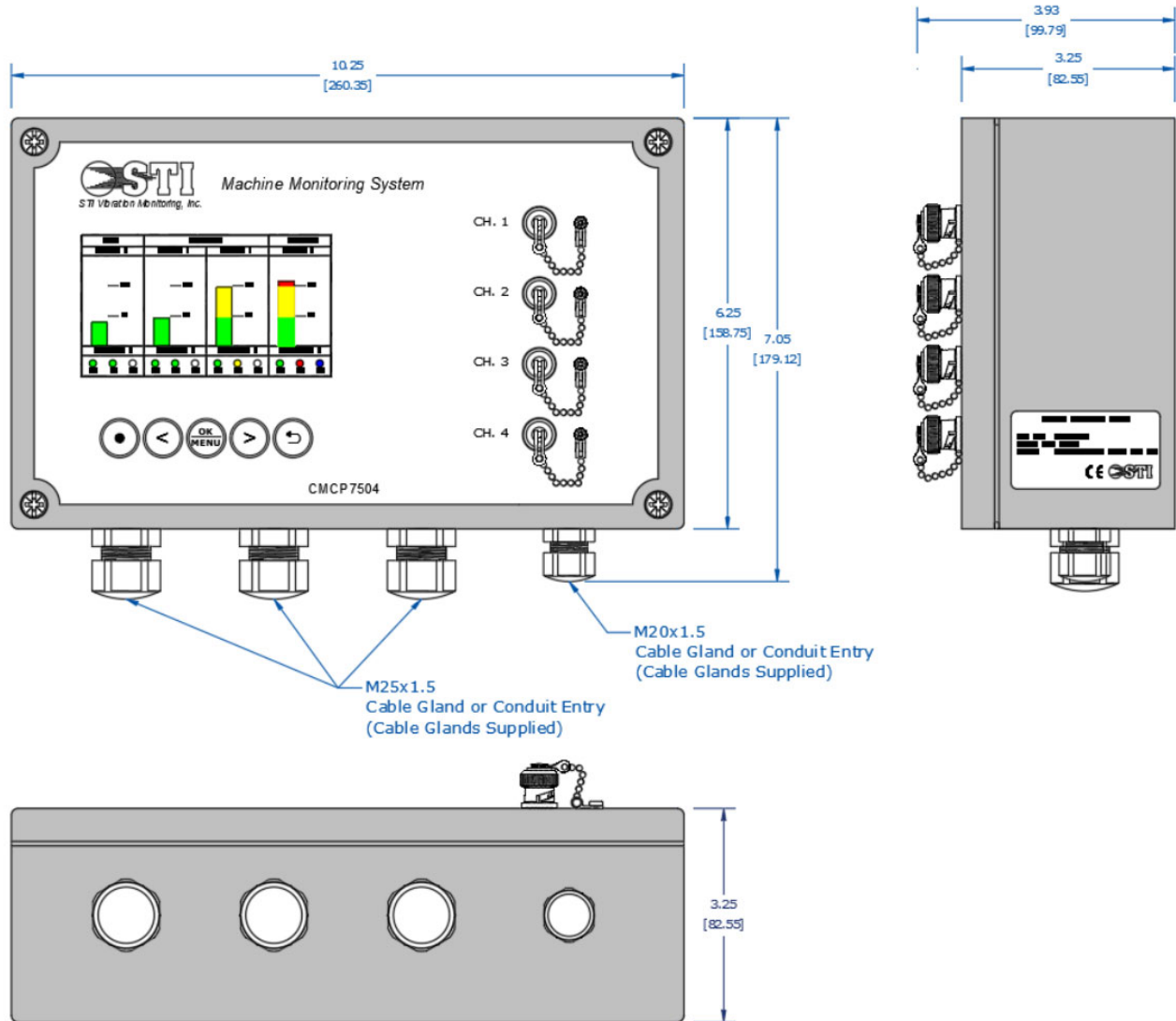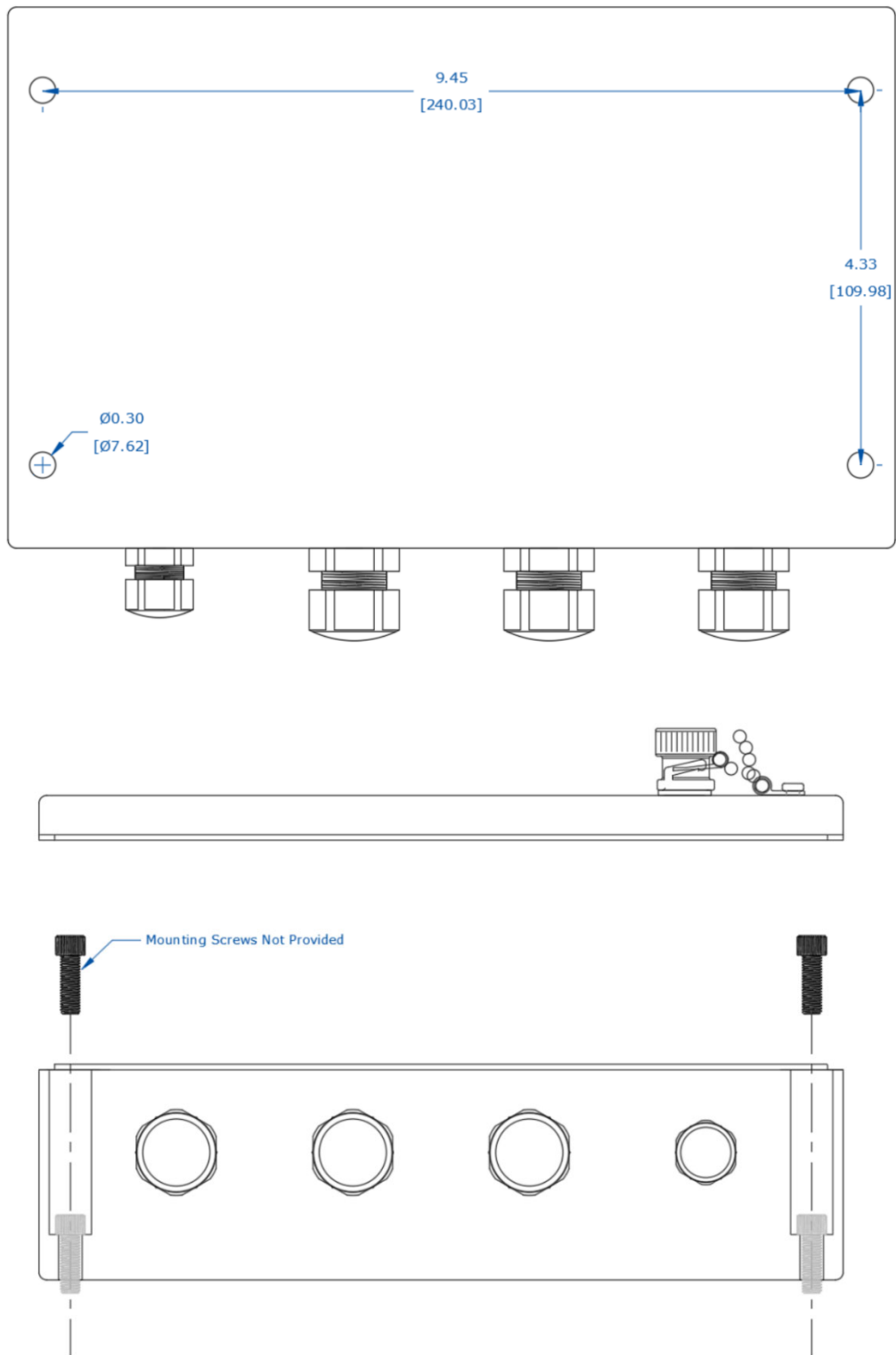
Revision History

Date	Rev.	Release Notes
November 10, 2017	1.0	Initial Release
February 18, 2018	2.0	Updated Input Module Specifications
		Updated Application Images
December 2, 2019	3.0	Added SignalView, SignalSaver
March 22, 2020	4.0	Added SpeedSync
November 15, 2021	5.0	Added Modbus TCP Instructions and Setup Info
December 14, 2021	6.0	Revised Register Map
March 16, 2022	7.0	Revised Programming for Version 4.0 Software