ecotech
environmental monitoring solutions

9400TP

Termination Panel

User Manual

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www.ecotech.com

Each Ecotech 9400TPIM Terminal Panel has a unique ID number.

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1 Introduction

The Ecotech series of Data loggers achieve a very high standard of accuracy due to the use of RS232 protocols to log data from various analysers. However it is not always the case that an analyser or an instrument will have RS232 capabilities. Hence the 9400TP Termination Panel fills this void by not only allowing logging of non RS232 instruments, but also controlling digital signals and detecting external alarms.

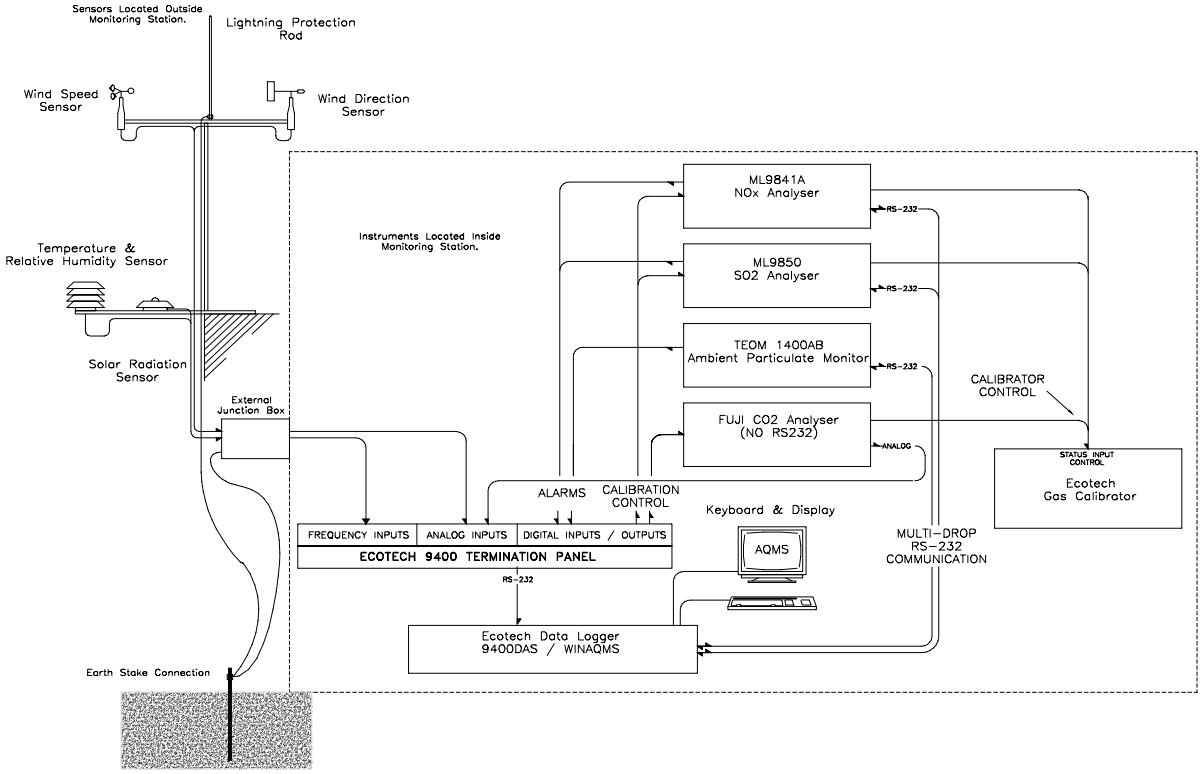


Figure 1: A typical Data Logging System

1.1 Description

Using the analogue or frequency inputs, all types of instruments can be connected to the Ecotech Dataloggers. The 9400TP has digital inputs and outputs for system control. It can be easily used on the bench or it can be rack mounted using the rack mounting shelf (PN: A-HAR-3012). The 9400TP has 48 screw terminals. Each one is numbered in sequence as well as an indication of its function directly below it on the printed circuit board.

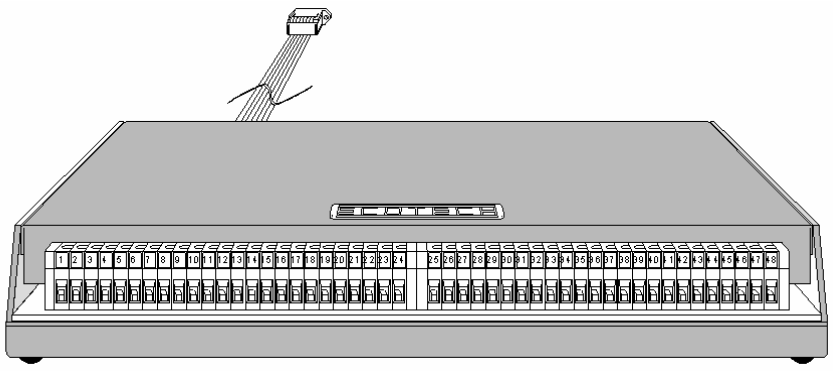


Figure 2: 9400TP Termination Panel

1.2 9400TP Features

The 9400TP includes two printed circuit assemblies (PCA) inside its enclosure:

- The Terminationl Panel PCA, (PN: D-ECO-9400E1) which provides the terminals and associated circuitry to connect external sensors.
- The 9400TPIM PCA, (PN: D-ECO-9400TPIM-S) which contains the circuitry for the analog to digital conversion and serial interface.

- Together they provide the following features:
  - 48 way numbered terminal block (orange).
  - 16 Analogue input channels (CH1 to CH16).
  - 8 Differential Analogue inputs (CH1 to CH16).
  - ± 10V range.
  - 16 bit Resolution analogue to digital converter (±3mV).
  - 13 Frequency / Counter Inputs.
  - 8 Digital Outputs, (4 optically Isolated).
  - 8 Digital Inputs, (4 optically isolated).
  - Lightning protection on analog & frequency inputs.
  - Jumper configurable digital inputs & outputs.
  - Interfaces directly to existing 9400DAS & WinAQMS data loggers using one RS232 cable.
  - Optically Isolated RS232 serial interface.
  - Operates from a single +12V supply, either external or from the WINAQMS Datalogger (port TPIM) or the 9400DAS (Port 4, 5 & 6). The power supply has a floating ground.
  - Jumper settable address so that up to 8 9400TPIMs can be daisy chained together for expansion up to 128 analogue channels.
  - Built in temperature sensor.
  - ± 12V & + 5V supplies.
  - Black anodised aluminium case.
  - 19” Rack mounting kit. (optional).

1.3 Ecotech Dataloggers and Software Packages

The 9400TP may be connected to two types of dataloggers manufactured by Ecotech:

- The 9400DAS datalogger which uses the AQMS® software running on Microsoft DOS® platform.
- The WINAQMS® datalogger which uses the WINAQMS® software running on Microsoft WINDOWS NT ® platform.

2 9400TP Connection.

The 9400TP has a single ribbon cable fitted with a DB9 female connector. This provides the RS232 communications between the 9400TP and the data logger.

NOTE: This is not a standard RS232 connection as it also contains the +12V power supply.

DO NOT CONNECT THE 9400TP TO A STANDARD COMPUTER SERIAL PORT.

2.1 Connecting to WINAQMS Logger

The serial cable must be connected to port TPIM of the WINAQMS logger. All software configuration of the 9400TP is completed within WINAQMS. If you have more than one 9400TP, then the additional one can be connected in parallel (i.e. daisy chain). If you are using daisy chaining, then the hardware address of the second 9400TP board must be changed as shown in section 2.3 below.

2.2 Connecting to the 9400 DAS

The RS232 cable must be connected to port 4, 5 or 6 of the 9400DAS. All software configuration of the 9400TP is completed within AQMS. If you have more than one 9400TP, then the additional one can be connected to one of the other ports. If you do not have sufficient ports, then the additional termination panel can be connected in parallel (i.e. daisy chain). If you are using daisy chaining, then the hardware address of the second 9400TP board must be changed as shown in section 2.3 below.

2.3 Changing the Hardware Address.

The 9400TP has a hardware address setting. If it is necessary for several termination panels to be connected in parallel, each 9400TP will require a different address.

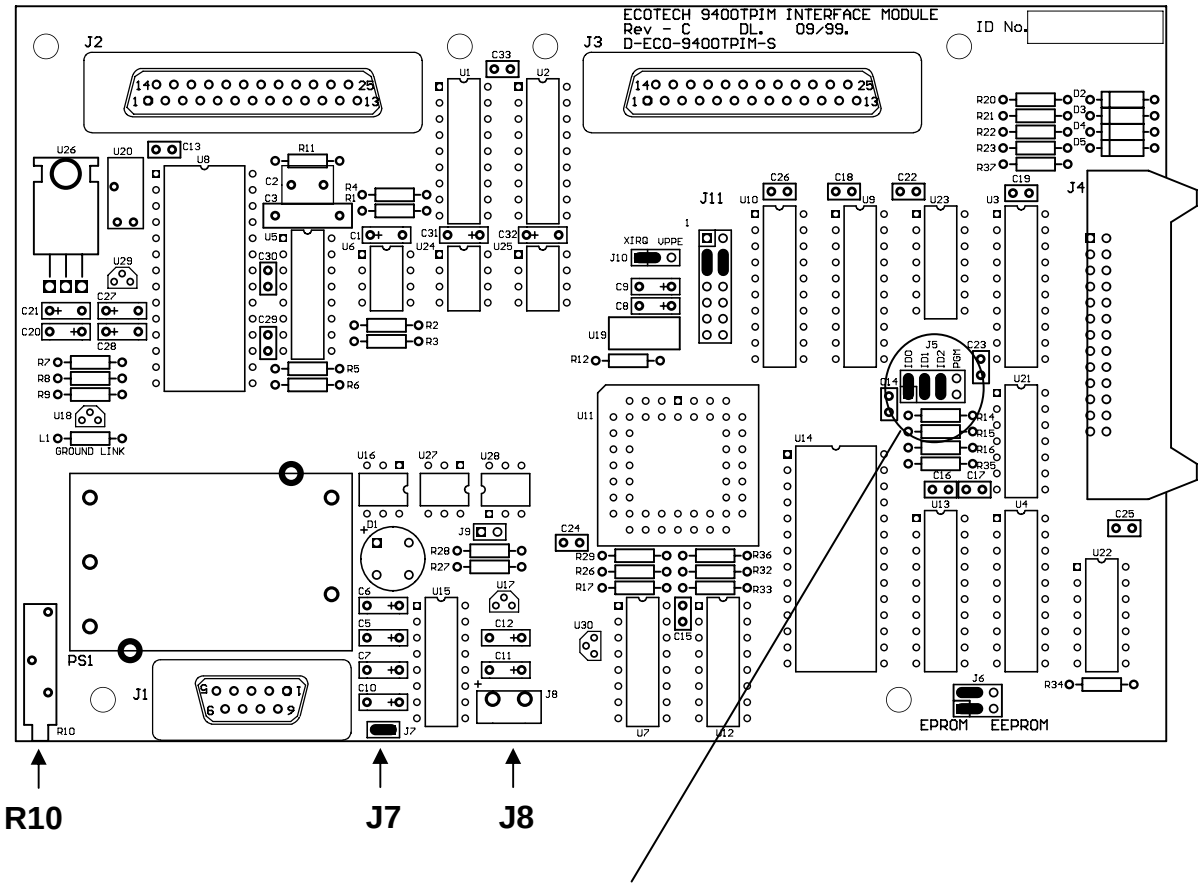
2.3.1 Default Factory Setting

Figure 3 shows the default factory configuration of the 9400TP (address = 0). By changing the jumper configuration of J5 on the 9400TPIM, the hardware address of the 9400TPIM can be set between 0 and 8. Figure 4 shows the jumper positions for different addresses . If you are only using one 9400TP on a given port, there is no need to change the hardware address.

2.3.2 To change the J5 jumper setting:

- Observe electrostatic precautions: wear an antistatic writs strap connected to the datalogger ground or another ground connected terminal.
- Remove the RS232 connector from the back of the WINAQMS or 9400DAS (power off),
- Open the 9400TP enclosure by removing the 4 screws on the side,
- Remove the 3 screws holding the 9400TPIM in place,
- Carefully remove the 9400TPIM PCA from the three DB connectors without twisting it. (try using a screwdriver).
- Change the Jumper J5 settings as required.
- Replace the 9400TPIM, screws, lid and cable.

Figure 3: 9400TPIM Default Factory Jumper Configuration



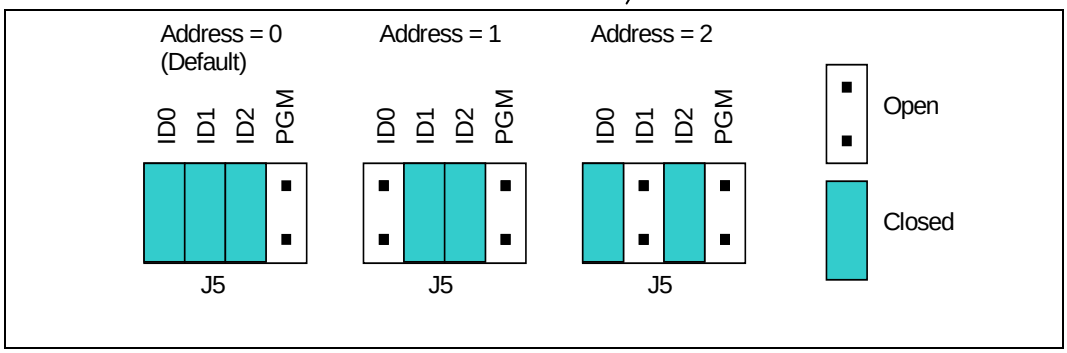


Figure 4. 9400TPIM (J5), Hardware Address Jumper Configuration.

2.4 Power Supplies

2.4.1 Input Connections

The 9400TP can be powered from a single +12V power source. This can be connected in two ways.

- The first and most common method is through the 9 pin DB9 RS232 cable. This cable has been suitably modified to accommodate the +12V power supply on Pin 7 of this connector. The serial ports for connecting the 9400TP on the WinAQMS and 9400DAS data loggers, have been modified to provide the +12V supply. **Do not connect to any other serial port.** (Refer to section 2.1 & 2.2). J7 on the 9400TPIM board must be closed in order for this method to work.
- The second method is to connect the +12 V power supply directly to the 9400TPIM board. This is useful when connecting the 9400TP to a standard computer running WINAQMS or AQMS. The +12V supply can come from a 12V plug-pack or some other power source. The +12V supply can be connected to J8 on the 9400TPIM board (see Figure 3). It can be soldered on directly or a connector can be fitted. When using this method, it is important to remove the jumper from J7 so as not to damage the computer serial port.

2.4.2 Output Connections

The 9400TP has three DC voltage outputs available on the 48 way terminal strip.

- The +12 volt supply located on terminal 26 is to be used for powering sensors which require a 12 volt supply. The maximum load is up to 200mA. This supply has overload protection however caution should be used when connecting it up.
- The other is a +5 volt supply (terminal 28). This is current limited to around 100 mA and should only be used as a reference for a wind direction sensor.
- Terminal 30 can also be used to provide a -12V supply if the jumper (J1) on the termination panel board is moved to the –12V position. The jumper allows the operator to use terminal 30 as either a frequency input (default) (F5) or as a -12V supply.

Terminals 27 & 29 are common grounds for all of these supplies. These supplies all have lightning protection.

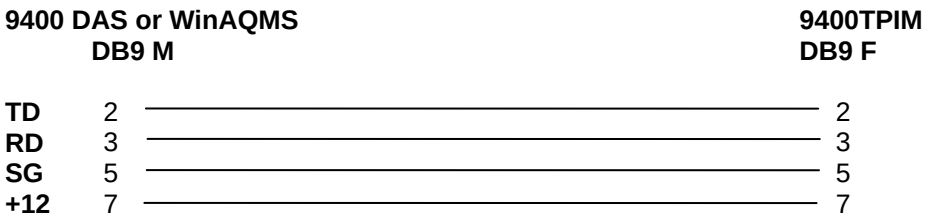


Figure 5. 9400TPIM RS232 Cable configuration.

3 9400TP Input / Output Configuration

When setting up a data logger for use, it is recommended that you spend some time deciding which inputs are most suitable for your particular application. Then you can proceed with hardware configuration of the 9400TP, and then the software configuration of the data logging software.

The software settings for the different channels are explained in section 3.3 for the WINAQMS software and section 3.4 for the AQMS software.

Figure 6 shows the factory default configuration of the 9400TP as well as the locations of the various features.

3.1 9400TP Jumpers

The functions of the 9400TP inputs and outputs, may be altered by changing some of the jumpers located on the Termination Panel PCA.

The table below is a summary of the functions of these jumpers.

Table 1: 9400TP Jumpers Summary

Jumper	Default Setting Function	Alternative Setting Function
J1	Frequency Input (F5)	-12 V
J2	Digital Output OP0 – OP3 +5V Pull up	Digital Output OP0 – OP3 open collector output
J3	Digital Input IP0 TTL Input	Digital Input IP0 CC Input
J4	Digital Input IP1 TTL Input	Digital Input IP1 CC Input
J5	Digital Input IP2 TTL Input	Digital Input IP2 CC Input
J6	Digital Input IP3 TTL Input	Digital Input IP3 CC Input
J7	Temperature Input	Analog or Frequency Input

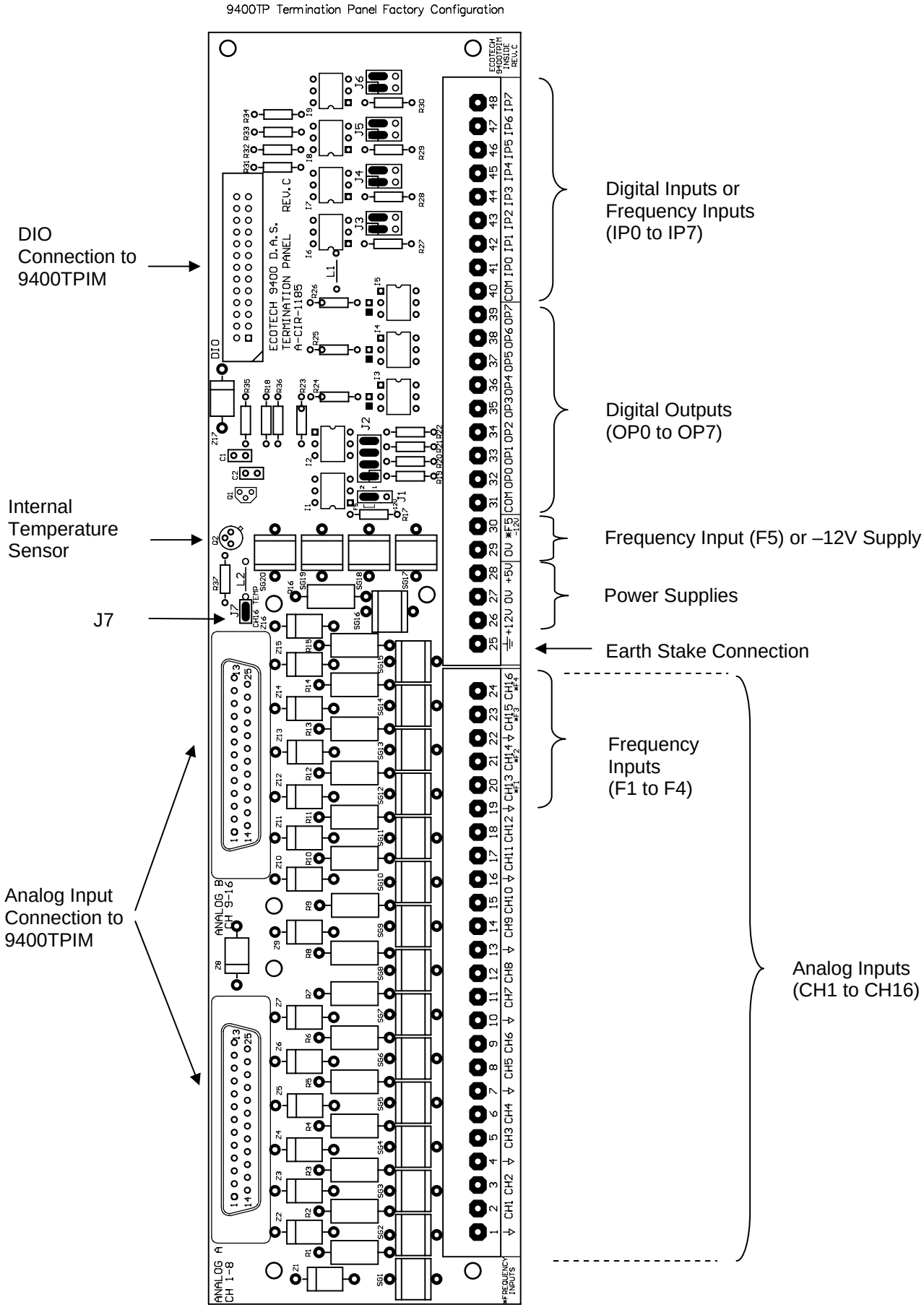
3.1.1 Access to Jumpers

The 9400TP configuration may be altered by changing jumpers located on the terminal panel PCA. To gain access to the jumpers, open the 9400TP enclosure by unscrewing the 4 screws located on its sides using a No 1 Philips screwdriver.

Turn off the power before changing any jumpers.

Note:
Observe electrostatic precautions if you need to change jumper settings.

Figure 6: 9400TP Termination Panel Factory Configuration

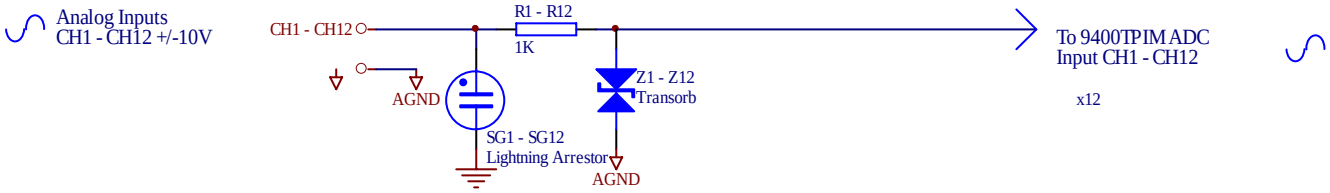


3.2 Hardware Configuration

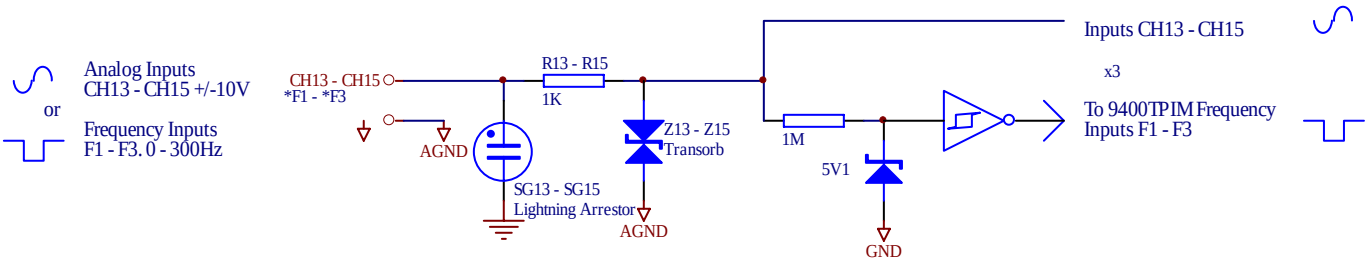
3.2.1 Analog Inputs

There are 16 analog input channels available on the termination panel, each with ± 10V input range. These inputs each have single stage lightning protection circuitry.

CH1 to CH12. Standard Analog Inputs.



CH13, CH14, CH15 are dual purpose inputs. They can be used as either analog inputs **OR** frequency/counter inputs (**F1, F2 & F3**), depending on the software configuration. Refer to section 3.2.3 for frequency configuration of these inputs.



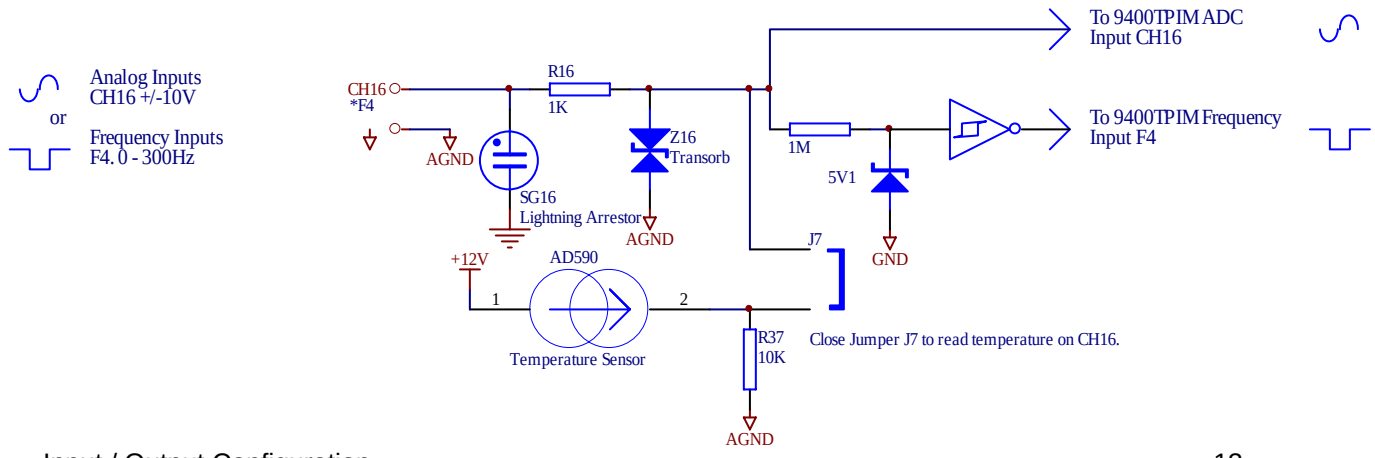
3.2.2 Temperature Input

CH16 has three functions: Standard analog input, Frequency/counter input, or Internal Temperature.

The default configuration of this input is as a temperature sensor. This is useful for measuring the rack temperature where the data logger is operating. e.g. Room Temperature.

The AD590 temperature sensor is mounted on the 9400TP. In the software configuration of this channel you will need a multiplier of 100 and offset of -273 to obtain a reading in ^{o}C. To calibrate the sensor, you will need to change the offset in the software configuration.

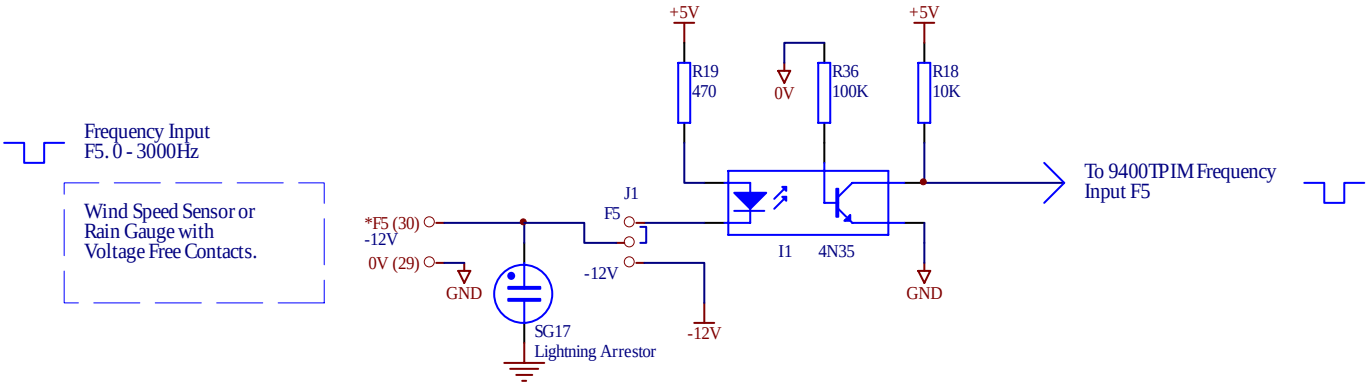
CH16 can be set up as an analog/frequency input by removing the jumper on J7. Figure 6 shows the location of J7 on the termination panel. You may have to remove the 9400TPIM board to access this jumper.



3.2.3 Frequency Inputs.

The frequency inputs are designed for sensors such as wind speed sensors which give a frequency output proportional to the wind speed. As mentioned before **CH13, CH14, CH15 & CH16** may be used as frequency inputs instead of analog inputs. These are frequency inputs **F1 to F4**. They have a range of 0 to 400Hz.

There is a another dedicated high speed opto-isolated frequency input **F5**. This is found on pins 29 & 30. It senses a contact closure type input. There is no need for any external components. Just connect the sensor wires into pins 29 and 30. This input has a maximum frequency of 3000Hz. It also has lightning protection as most wind speed sensors are susceptible to lightning strikes.



Digital inputs **IP0 to IP7** can also be used as frequency inputs (refer to section 3.2.6 for hardware configuration). These also have a maximum range of 400Hz.

Note
Frequency inputs F1 to F4 require a switching signal of +4V or greater.

3.2.4 Counter Inputs.

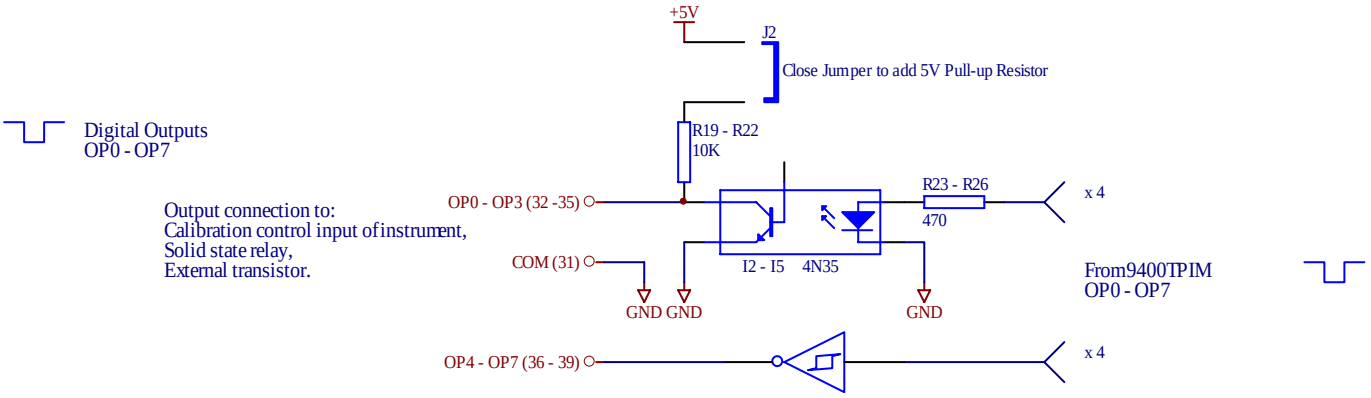
Counter inputs are useful for connecting a tipping bucket rain gauge to the 9400DAS and WinAQMS data loggers. Each of the frequency inputs (13 in total) can be used as counter inputs also. They only difference is the software setup.

3.2.5 Digital Outputs

The 9400TP has eight digital outputs, **OP0 to OP7**. These can be used for controlling calibration equipment or indicating alarm conditions.

- The first four outputs (**OP0 to OP3**) are optically isolated.
- The default factory set-up for the opto isolators (**OP0 to OP3)** is in an inverting configuration with +5V pull-up resistors on the outputs (collectors) and all the commons (emitters) connected to terminal pin 31.
- When this output is turned on, the output will drop from 5V to 0V.
- The pull-up resistor for each output can be removed by removing the appropriate jumper on J2.
- The common terminal (COM) is linked to the 0V rail of the analog input side of the 9400TP. However it can be disconnected for total isolation by cutting the track on the bottom side of the PCB.
- The total current that the opto-isolator can sink is around 20mA.

- The opto-isolators can also be wired for non-inverting operation if you feel like moving a couple of resistors on the PCB (Contact Ecotech for further details).
- Outputs **OP4 to OP7** are wired straight through from the 9400TPIM board.

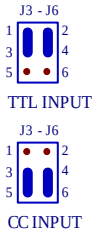


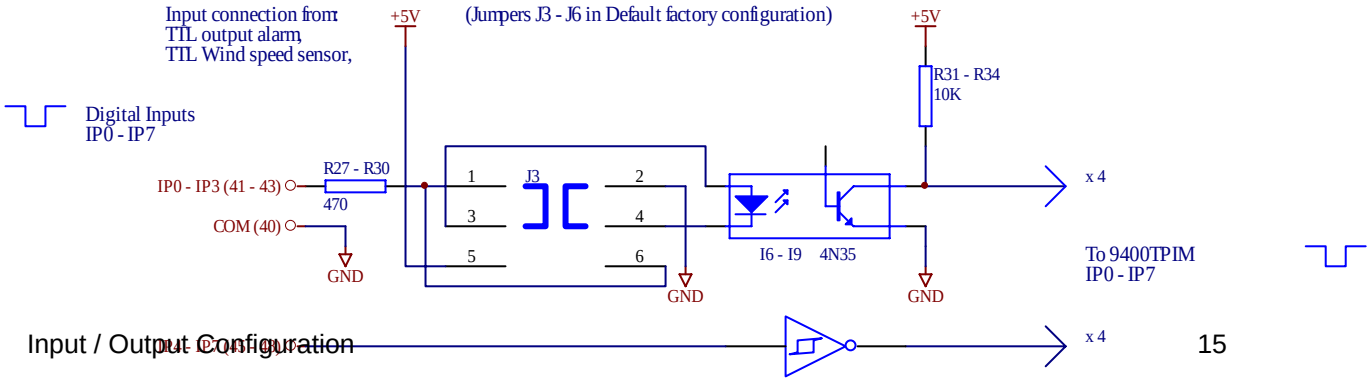
Note: If the Digital outputs of the Termination panel (OP4, OP5, OP6 or OP7) are connected with a GasCal's digital inputs then a 100ohm resistor should be placed in series with this connection in order to prevent damage to either devices.

3.2.6 Digital Inputs

The digital inputs **IP0 to IP7** to the 9400TP are used for recording alarms from analysers and Out Of Service status inputs. They can also be used as frequency or counter inputs.

- There are eight digital inputs of which the first four **IP0 to IP3** are optically isolated. The other four **IP4 to IP7** are wired straight through to the 9400TPIM board.
- Terminal 40 is the common of all the opto-isolators. It is linked to the 0V rail. However if this link is cut, it can be totally isolated like the digital outputs.
- The polarity of the inputs can be changed within the Data logger software.
- The input configuration for **IP0 to IP3** can be changed by moving the Jumpers (J3, J4, J5, J6). J3 is for IP0, J4 is for IP1 ….
- If J3 - J6 are left in their factory default setting (TTL INPUT) they will accept a TTL input of +4V and above.
- If the J3 - J6 jumpers are moved to the CC INPUT position, then the digital input will be suitable for using with a contact closure input.
- All these inputs can be used as frequency or counter inputs.





3.3 Software Configuration with WINAQMS

The purpose of this section is to show how to configure the TPIM card. Communication settings, some aspects of Channel Information, Digital Input and Output are covered in the following sub-sections. Refer to the WINAQMS manual for more information. The scope of this manual will only cover the sections directly relevant to setting up the 9400TP.

3.3.1 Analyser Parameters

In WINAQMS the TPIM configuration parameters can be accessed by clicking the "Analyser Parameters" button on the menu bar.

Select TPIM in the Analyser pop-down menu to display the screen shown below:

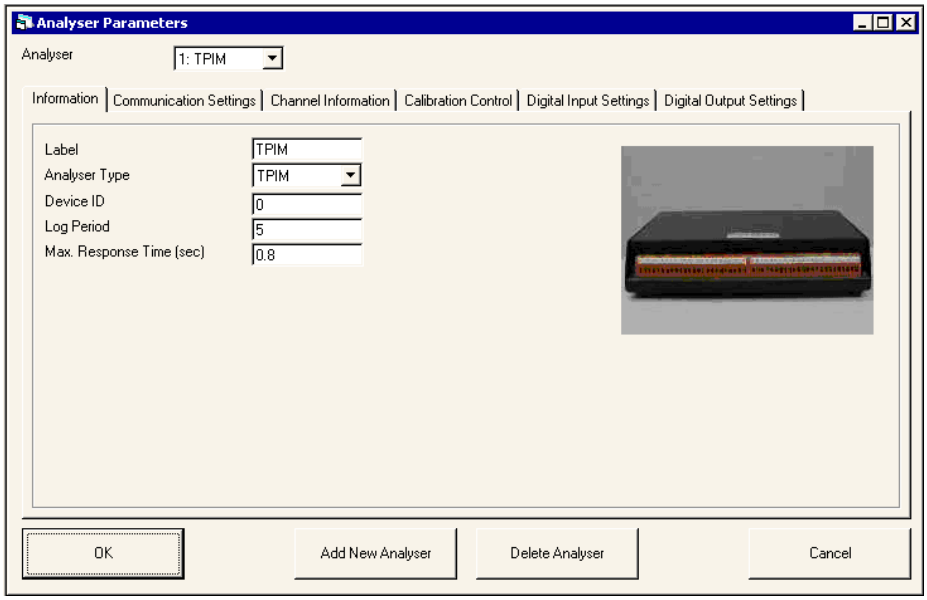


Figure 7 TPIM Information Card

3.3.2 Communication Settings

Click the Communication Settings tab. The screen below shows the default TPIM settings in WINAQMS. The

In order for the WINAQMS software to communicate with the 9400TPIM board inside the 9400TP, the communications settings must be as follow:

- Analyser Type "TPIM"
- Device ID "0" (This is the hardware address of the 9400TPIM).
- Max. Response Time > 0.5 Sec.
- Serial Port: usually 2 or 4. Check WINAQMS hardware configuration.
- Baud Rate "4800".
- 8 Data Bits, 1 Stop Bit, no Parity.

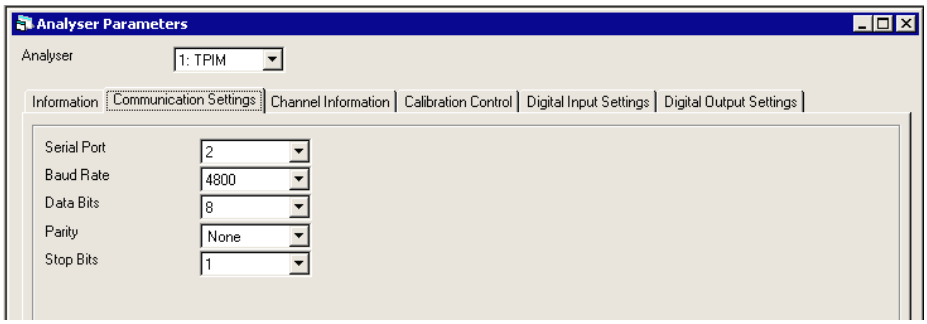


Figure 8 TPIM Communication Settings Card

3.3.3 Channel Information

The Channel Information tab shows details on the input data channels for the analyser. To add a channel to the system click on the Add Channel button. To remove a channel, highlight it by clicking on the grey block at the left end of the channel row and click on the Delete Channel button. The fields present in the Channel Information tab includes those listed below and more if you scroll across.

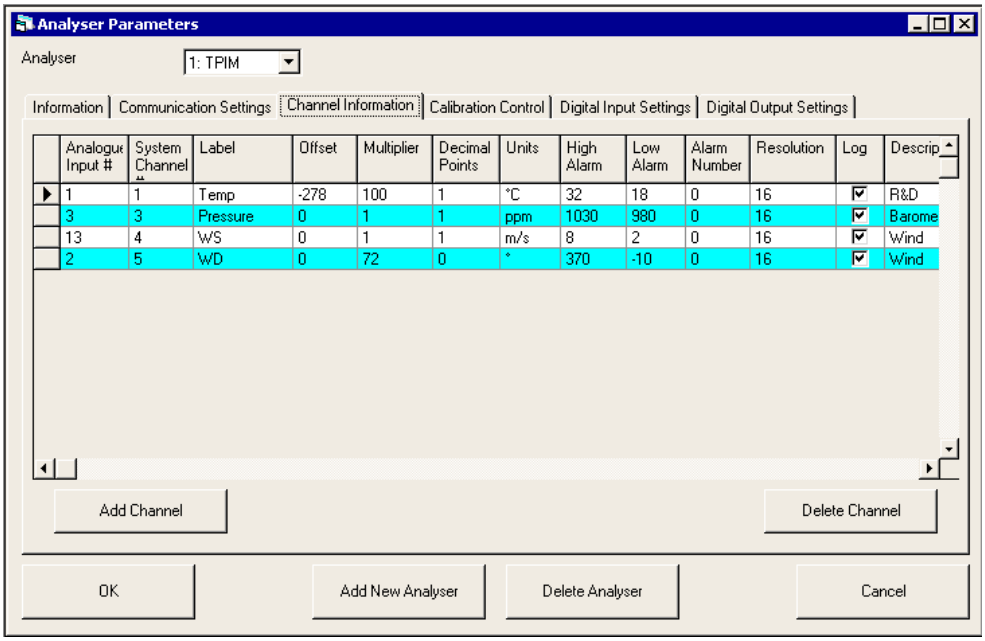


Figure 9: Channel Information Card

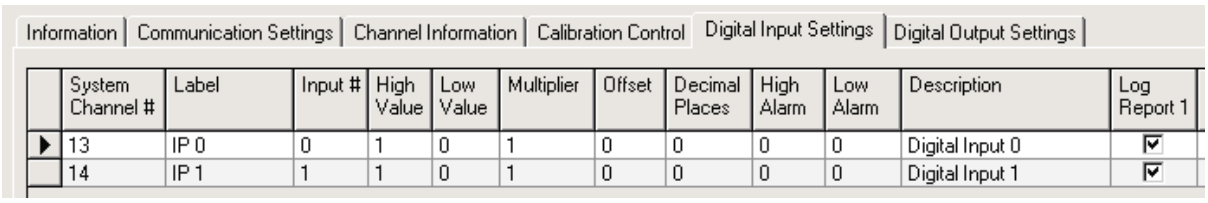
- **Analogue Input #** is the physical channel number on the analyser, while System Channel # is the number that WinAQMS uses to identify the channel
- The **Label** field allows you to enter a label to easily identify the channels in other parts of WinAQMS.
- The **Log** check box determines whether the channel data will be recorded in the database. If unticked, the channel will still request data but there will be no data recorded in the database.
- The **Description** field is a fifty-character text field.

- Each channel has a **Channel Type**, which can change depending on the type of analyser. For TPIM type Analyser there are the following options:
    - Voltage
    - Frequency
    - Counter
- The **Input Type** field determines what mathematical property of the data received over the log period will be stored. Options include: Average (default), Max, Min, Total (should be used for counter inputs) and standard deviation.

3.3.4 Digital Input and Output Settings

The Digital Input Settings tab show the digital input channels and their settings for the currently selected analyser.

- **Input #** 0 refers to digital input IP0.
- **Input #** 1 refers to digital input IP1.
- The **High Value** and **Low Value** fields show the value that is recorded into the database for the digital channels when they are high or low.
- All other fields have the same function as described in Channel Information

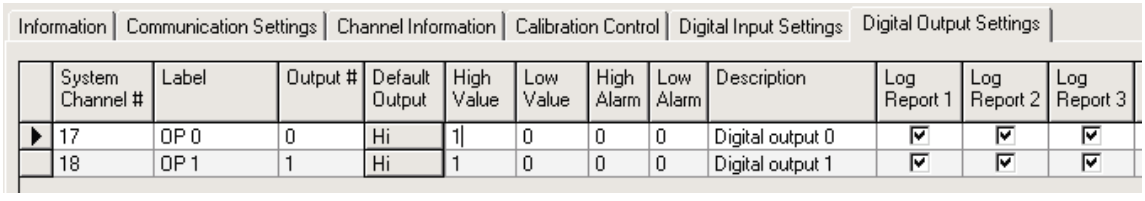


	System Channel #	Label	Input #	High Value	Low Value	Multiplier	Offset	Decimal Places	High Alarm	Low Alarm	Description	Log Report 1
▶	13	IP 0	0	1	0	1	0	0	0	0	Digital Input 0	☑
	14	IP 1	1	1	0	1	0	0	0	0	Digital Input 1	☑

Figure 10: Digital Input Setting Card

The Digital Output Settings tab show the digital output channels and their settings for the currently selected analyser.

- **Output #** 0 refers to digital output OP0.
- **Output #** 1 refers to digital output OP1.
- The **High Value** and **Low Value** fields show the value that is recorded into the database for the digital channels when they are high or low.
- The **Default Output** sets the default status of the output on powerup.
- All other fields have the same function as described in Channel Information



	System Channel #	Label	Output #	Default Output	High Value	Low Value	High Alarm	Low Alarm	Description	Log Report 1	Log Report 2	Log Report 3
▶	17	OP 0	0	Hi	1	0	0	0	Digital output 0	☑	☑	☑
	18	OP 1	1	Hi	1	0	0	0	Digital output 1	☑	☑	☑

Figure 11: Digital Output Setting Card

3.4 Software Configuration with 9400DAS (AQMS)

Once the hardware configuration has been sorted out, it is then time to set up the software. There are many menus in the AQMS software. For a detailed description of each feature, refer to the "9400 Data Acquisition System Reference Manual Revision 3.00" supplied with the 9400 data logger. The scope of this manual will only cover the sections directly relevant to the 9400TP.

3.4.1 Communications Settings

In order for the AQMS software to communicate with the 9400TPIM board inside the 9400TP, the communications settings must be correct. These parameters are set in the Channel AllocationWindow:

- Set the Baud rate to 4800. (cannot be changed).
- Set the RS232 Port number to 4, 5 or 6 depending on which port is being used. (Note: On the 9400DAS these are the only ports you can use with the 9400TP).
- The Physical Input Number reflects the hardware address of the 9400TPIM and the channel number of the 9400TPIM. Refer to section 2.3. the default setting is "0".

3.4.2 Analog Inputs

To set up Analog Inputs in AQMS, Use the following parameters in the Channel Allocation window:

- Set Type to "EV"
- Set Physical Input number to 0.01 to 0.16 for channels CH1 to CH16.
- If the hardware address of a second 9400TPIM has been set to 1, use 1.01 to 1.16 for channels CH1 to CH16.
- If you are using the internal temperature sensor, use CH16.

Figure 12 shows the Channel Allocation window for setting up analog inputs in AQMS. Channels 1 to 5 are using CH1 - 5 of the first 9400TPIM (address = 0). Channels 6 to 8 use CH9, CH10 & CH16 of the second 9400TPIM with address = 1.

Channel number	Label	Inp. type	Inst. type	Physical input number	Baud rate	RS232 port number
1	ch1	EV	9400TPIM	.01	4800	4
2	ch2	EV	9400TPIM	.02	4800	4
3	ch3	EV	9400TPIM	.03	4800	4
4	ch4	EV	9400TPIM	.04	4800	4
5	ch5	EV	9400TPIM	.05	4800	4
6	ch9	EV	9400TPIM	1.09	4800	4
7	ch10	EV	9400TPIM	1.10	4800	4
8	ch16	EV	9400TPIM	1.16	4800	4

Figure 12 The Channel Allocation Window for 9400TPIM Analog Inputs

3.4.3 Differential Inputs

In AQMS, differential inputs may be directly read from adjacent analog input channels.

I.e. (CH2 - CH1), (CH4 - CH3) to (CH16 - CH15).

To set-up the Differential inputs in AQMS, use the following parameters in the Channel Allocation window:

- Set Type to "EV"
- Set Physical Input number to:
    - 0.17 for CH2 - CH1
    - 0.18 for CH4 - CH3
    - : :
    - 0.24 for CH16 - CH15.

3.4.4 Frequency Inputs

To set up the Frequency inputs in AQMS, use the following parameters in the Channel Allocation window:

- For ALL frequency inputs, set Type to either "EF" or "FF".
- If the frequency input is 0Hz, type "EF" will respond with –9999, type "FF" will respond with 0.0.
- Set the Physical Input number to:
    - 0.13 for F1 on CH13 (terminal 20),
    - 0.14 for F2 on CH14 (terminal 21),
    - 0.15 for F3 on CH15 (terminal 23),
    - 0.16 for F4 on CH16 (terminal 24),
    - 0.17 for F5 frequency input (terminal30).
- To use the digital inputs as frequency inputs, set the Physical Input number to 0.00 to 0.07 for inputs IP0 to IP7.

3.4.5 Counter Inputs

To set-up the Counter inputs in AQMS, use the following parameters in the Channel Allocation window:

- For ALL Counter inputs, set Type to "EC"
- For F1 to F4, set Physical Input number to 0.13 to 0.16 for channels CH13 to CH16.
- For F5 (terminal 30) set Physical Input number to 0.17.
- To use the digital inputs as counter inputs, set the Physical Input number to 0.00 to 0.07 for inputs IP0 to IP7.
- In the Channel Parameters window, set the type to "T" which will calculate the total number of counts during the reporting period.

3.4.6 Digital Inputs

To setup the Digital inputs in AQMS, use the following parameters in the Physical Bit Allocation window:

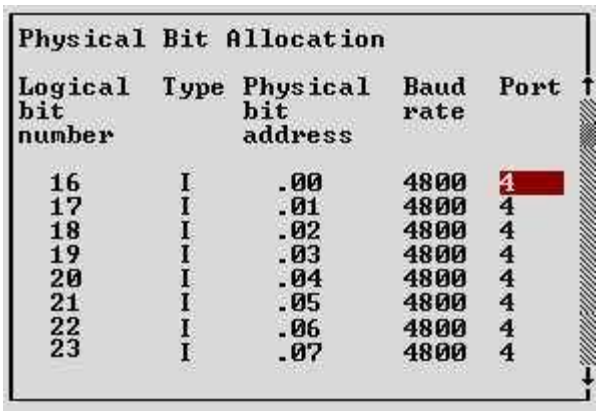


Figure 13: AQMS Physical bit Allocation for the 9400TPIM digital inputs

- Logical bit number 16 to 23 correspond to digital inputs IP0 to IP7 respectively.
- Set Type to "**I**"
- Set Physical Bit Address to 0.00 to 0.07 for digital inputs IP0 to IP7.

3.4.7 Digital Outputs

To setup the Digital outputs in AQMS, use the following parameters in the Physical Bit Allocation window:

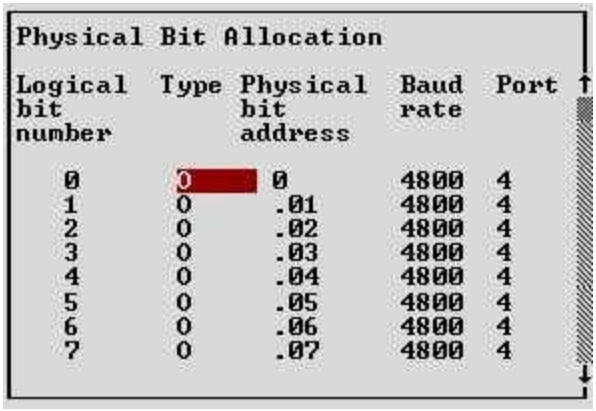


Figure 14: AQMS Physical bit Allocation for the 9400TPIM digital outputs

- Logical bit number 0 to 7 correspond to logical outputs OP0 to OP7 respectively.
- Set Type to "O"
- Set Physical Bit Address to 0.00 to 0.07 for digital outputs OP0 to OP7.

You can test the digital outputs using the *Operate Solenoids* menu.

4 Lightning Protection

The 9400TP termination Panel is usually used for connecting meteorological sensors to the data logger. As these sensors are always located in wide open areas and usually mounted on tall conductive masts, they are in the high risk category of being struck by lightning. Even an indirect strike can induce large voltage surges into equipment wiring. It is for these reasons that the 9400TP has various forms of protection.

- All the analog inputs are fitted with a surge protection device and a dissipation resistor to protect against voltages of ± 12 volts and over.
- Each analog input has lightning protection devices which are capable of handling huge voltage surges (> 90V) without destruction.,
- These are also on the Frequency input (F5) , the + 12 volt supply, the + 5 volt supply and the 0 volt rail.
- All the lightning protection devices are connected to a common EARTHING point (terminal 25), which is separate to all the other ground points.
- This EARTH terminal should be wired to an earth stake as close as possible to the termination panel.

Refer to section 3.2 for details on input and output protection.

In very hazardous locations, additional lightning protection is available by adding an Ecotech Lightning Protection Board (A-CIR-1455). This unit can be mounted outside a station to prevent large surges from entering the station and damaging sensitive equipment. In these situations it is advisable to also mount a lightning rod on the mast. For further information in relation to additional lightning protection, contact Ecotech.

5 Field Calibration

5.1 Analog Inputs

The 9400TPIM analog to digital conversion is very stable and adjustments should not be required. However the procedure following is recommended for QC purposes every 12 months.

It is best to perform this operation with nominal loading on the +12V output (terminal 26).

Equipment required:

- Digital multimeter (DMM) with 3 ½ digit display.
- Philips screwdriver, No 1
- Small blade screwdriver (for pot. Adjustment).
- Nail polish

Procedure:

1. Power down the 9400TP by disconnecting the serial cable.
2. Open the 9400TP enclosure by removing the 4 screws on the side,
3. Reconnect the serial cable to power up the 9400TP Termination Panel. Wait at least 10 minutes before proceeding.
4. Measure the 5V reference at terminal 28 (ground is terminal 27).
5. Connect the 5V to an analog input.
6. Monitor the analog channel using the datalogger.
7. Locate the 10 turn trim pot. R10 at the back left corner of the 9400 TPIM PCA (Figure 3, page 9). Adjust R10 so that the datalogger and the DMM agree. The datalogger reading may vary by ± 0.003V. Adjust for best fit. For most data logging systems 0.1% of full scale is sufficient.
8. Check your adjustment using two more analog inputs.
9. Lock R10 with the nail polish.

If a multipoint linearity check is required, use a variable DC source over the range –10V to +10V. The R10 pot should be adjusted only at 5.000V DC.

5.2 Temperature Sensor

The temperature sensor mounted in the 9400TP can only be calibrated within the WinAQMS or AQMS software. This is simply done by adjusting the Offset (usually –273) until the data logger reads the same as a calibrated temperature probe. If the analog input calibration (section 5.1) was performed, then you will have to recalibrate the temperature sensor.

5.3 Frequency Inputs

The frequency counter inputs may be checked using a calibrated frequency generator. However no adjustment is possible.

If the calibration gives incorrect results refer to the trouble shooting guide (section 6).

6 Trouble Shooting

Problem	Check
For any problem with the inputs or outputs, start with these three checks.	• Check the Terminal panel DB9 connection. • Check that the 9400TPIM Board is plugged in correctly to its sockets. • Check that the ground/0V connection is correct.
No Response from Terminal Panel via RS232 cable.	• Check that the RS232 cable is properly connected to port 4,5 or 6 of the Datalogger (9400) or TPIM (WINAQMS). • Check that there is +12V at terminal 26 and 27. • Check the address setting in the Datalogger software and on 9400TPIM Board. • Check jumper J7 on the 9400 TPIM Board. • Check the Software setup. • Check that 9400TPIM DB9 connector is plugged in.
Analog Input Voltage reading incorrectly	• Measure the voltage on the input, check that it is within range (±10V). • Check that the channel is set up correctly in hardware and software. • Try the alternative input setup to see if the problem is uniform. • Check for excessive loading of the +12V or +5V outputs. Measure these voltages and check that they are stable. • If all above checks are OK, and if the problem is found on all analog inputs, calibrate using RV10 as shown page 23.
Frequency/Counter input reading incorrectly	• Check that the signal amplitude is sufficient to drive the input (over +4V). • Check that the signal frequency is within range • Check Software and Hardware configurations. • Check that the pulse width/duty cycle are within range (>5%). • Check for bouncy reed switch.
Digital Outputs	• Check the jumper and software configurations.
Digital Inputs	• Check the jumper and software configurations.

If the problem is still present after these checks, contact Ecotech Service Department.

7 Upgrading the Early 9400TP

7.1 Scope

Termination panels manufactured before December 1999 were fitted with the PICO, 8 channel, ADC card instead of the 9400TPIM card, and the DIO board was installed inside the 9400 DAS data logger.

These early Termination Panels can be upgraded by fitting the 9400TPIM board which replaces the old PICO board. After doing this, your old termination panel will carry all the features of a new 9400TP Termination Panel.

7.2 Parts Required

D-ECO-9400TPIM-S	9400TPIM Printed Circuit Assembly.
	26 way IDC Ribbon Cable.

7.3 Procedure

- Observe electrostatic precautions.
- Turn off the 9400DAS data logger.
- Disconnect the 9400TP ribbon cables.
- Open the 9400TP enclosure by removing the 4 screws located on its sides.
- Remove the 2 screws holding down the PICO Board.
- Remove the IDC 26 ribbon connector and cable tie.
- Remove the PICO Board.
- Fit the new 9400TPIM Board.
  If the PICO Board had a DB25 RS232 connector, then the RS232 cable will have to be replaced with a cable fitted with DB9 connectors.
- Screw in the new 9400 TPIM Board.
- Connect the 26 way ribbon cable between the new 9400TPIM Board and the 9400TP Board.
- Connect the RS232 cable to either port 4 or 5 of the 9400 Datalogger.
  Do not connect to the DIO port, this port is no longer used.
- Turn on the Data logger and check that there is+12V at terminal 26.
- Re-configure AQMS Menu Screens “Channel Allocation”, Physical Bit Allocation” and “Channel Parameters.
- Check that all inputs and outputs are functioning before you replace the lid.

Note:
Digital outputs OP4-OP7 and inputs IP4-IP7 will have a different mode of operation.

8 List of RS232 Commands

8.1 Notations used in this Section

8.1.1 Symbols

[…] Enter the information as requested between the brackets. Note that the brackets are not part of the command.

 Press “Enter”

8.1.2 Syntax

Each Input/Output command consists of two CAPITAL LETTERS (example: VI for Analog Input, DO for Digital Output) followed by three or four digits and the “Enter” key symbolized by 

Other commands include INIT which is used to reset counter inputs and ID for device identification. Each command is illustrated by an example. Do not press the space bar at any time when entering commands.

8.2 List of Commands

8.2.1 Analog Input

VI[A][BB] 

A=Address	Enter 0 for Default Address
BB= Channel Index	01 to 16

Example:

VI007  is the command for “Read Channel 07”

8.2.2 Differential Input

VI[A][BB]

A=Address	Enter 0 for Default Address
BB=Channel pair index	17 to 24

Examples:

VI017  is the command for Read [Channel 2]–[Channel 1]

VI024  is the command for Read [Channel 16]–[Channel 15]

8.2.3 Frequency Input

FI[A][CC] 

A=Address	Enter 0 for Default Address
CC= Input Index:	13 to 17 for inputs F1 to F5
	0 to 07 for inputs IP0 to IP7

Example:

FI013  This commands reads the frequency input F1.

8.2.4 Counter Input

CI[A][DD]↵

A=Address	Enter 0 for Default Address
DD= Input Index:	13 to 17 for inputs F1 to F5
	41 to 48 for inputs IP0 to IP7

Example:

CI048↵	This command sets up input IP07 as a Counter Input and reads it to default address.

8.2.5 Digital Output

DO[A][EE][F]

A=Address	Enter 0 for Default Address
EE= Output Index	00 to 07 for outputs OP0 to OP7
F=Output Status	0 for Low, 1 for High

Example:

DO0051↵	Sets Digital Output OP5 High.

8.2.6 Digital Input

DI[A][G]

A=Address	Enter 0 for Default Address
G= Input Index	00 to 07 for inputs IP0 to IP7
	Returns 1 or 0.

Example

DI004↵	Reads Digital Input IP4.

8.2.7 Counter Inputs Reset

INIT[A]

A=Address	Enter 0 for Default Address

Example:

INIT0↵	resets all Counter Inputs to 0.

8.2.8 Device Identification

ID[A]↵

A=Address	Enter 0 for Default Address

Example: ID0↵ returns “9400TPIM V4.0”

9 Termination Panel Connections

9400TP Termination Panel. Rev.C						
Markings		**Description**	**Lightning Protection**	**Input Number**	**Baud rate**	**Connected To?**
1	⇩	Ground	Yes			
2	CH1	Channel 1	Yes	1	4800	
3	CH2	Channel 2	Yes	2	4800	
4	⇩	Ground	Yes			
5	CH3	Channel 3	Yes	3	4800	
6	CH4	Channel 4	Yes	4	4800	
7	⇩	Ground	Yes			
8	CH5	Channel 5	Yes	5	4800	
9	CH6	Channel 6	Yes	6	4800	
10	⇩	Ground	Yes			
11	CH7	Channel 7	Yes	7	4800	
12	CH8	Channel 8	Yes	8	4800	
13	⇩B	Ground	Yes			
14	CH9	Channel 9	Yes	9	4800	
15	CH10	Channel 10	Yes	10	4800	
16	⇩	Ground	Yes			
17	CH11	Channel 11	Yes	11	4800	
18	CH12	Channel 12	Yes	12	4800	
19	⇩	Ground	Yes			
20	CH13	Channel 13 (F1)	Yes	13	4800	
21	CH14	Channel 14 (F2)	Yes	14	4800	
22	⇩	Ground	Yes			
23	CH15	Channel 15 (F3)	Yes	15	4800	
24	CH16	Channel 16 (F4) & Temperature	Yes	16	4800	
25		EARTH				
26	+12V	+ 12 volt supply	Yes			
27	0V	0 volt	Yes			
28	+5V	+ 5 volt reference	Yes			
29	0V	Common	Yes			
30	F5	Frequency input (F5) or –12V supply	Opto	17	4800	
31	COM	Common /0V	Yes			
32	OP0	Output 0	Opto	0	4800	
33	OP1	Output 1	Opto	1	4800	
34	OP2	Output 2	Opto	2	4800	
35	OP3	Output 3	Opto	3	4800	
36	OP4	Output 4	No	4	4800	
37	OP5	Output 5	No	5	4800	
38	OP6	Output 6	No	6	4800	
39	OP7	Output 7	No	7	4800	
40	COM	Common / 0V	Yes			
41	IP0	Input 0	Opto	0	4800	
42	IP1	Input 1	Opto	1	4800	
43	IP2	Input 2	Opto	2	4800	
44	IP3	Input 3	Opto	3	4800	
45	IP4	Input 4	No	4	4800	
46	IP5	Input 5	No	5	4800	
47	IP6	Input 6	No	6	4800	
48	IP7	Input 7	No	7	4800	

10 List of Figures

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