

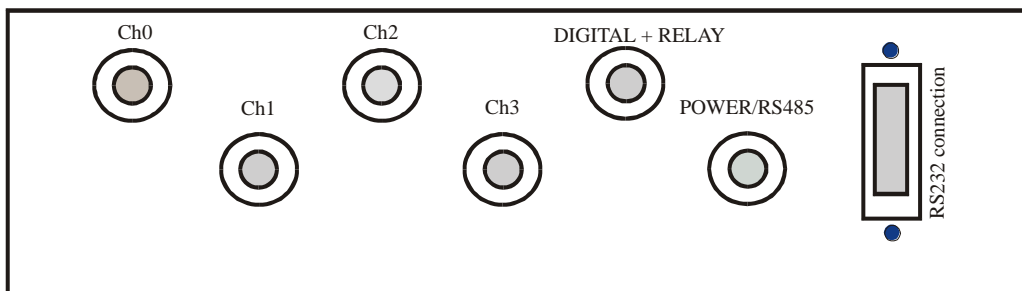
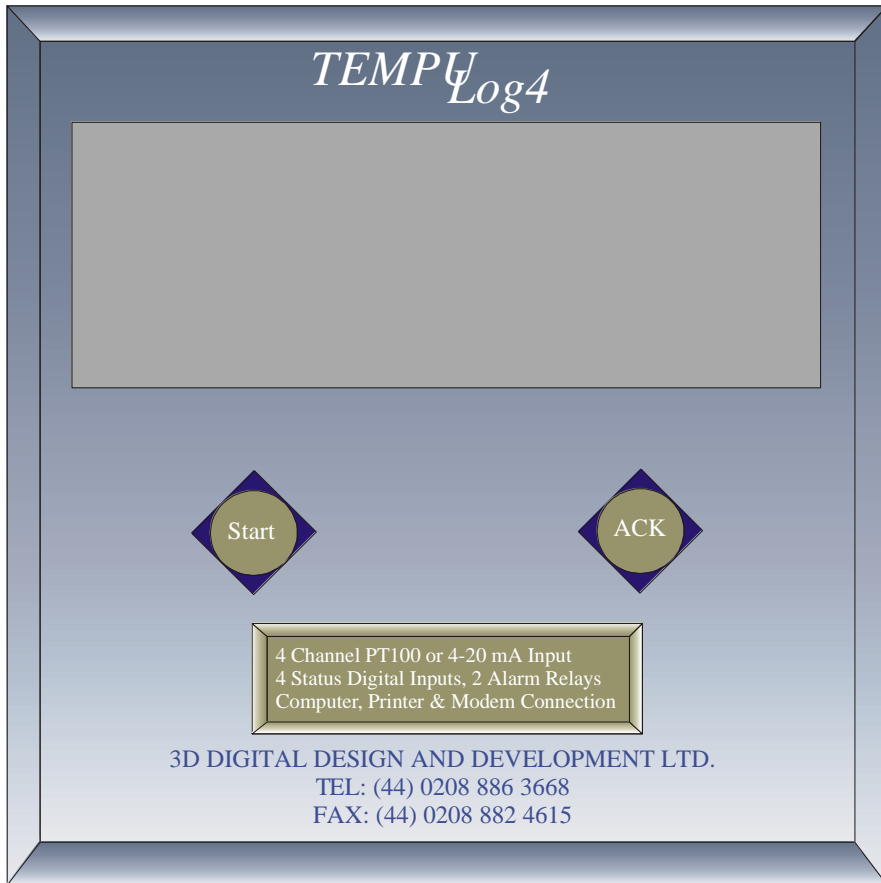
# Tempulog4

*Temperature,  
4-20 mA & Digital Status  
Data Logger and Alarm System*

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Tempulog4 manual  
Version: 1.1, 1st February 2000

### Quick Start



Front View  
Input / Output connections



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## Introduction:

The Tempulog4 is the latest addition to 3D range of temperature data loggers and offers you a number new of features designed to cover the widest scopes of applications

The Tempulo4 supports 4 channel of analog inputs; each channel may be configured under software control to accept PT100 2,3 and 4 wire or 4-20 mA. The 4-20 mA transmitters power supply is in cooperated as part of the Tempulog4 circuit.

There are 4 status digital inputs which may be used as events input (door open / door close) or may be used as defrost interlock.

The Tempulog4 support connection to: Host PC, Serial Printer and Modem. There are two serial port options, RS232 for direct connection to PC and RS485 for connecting up to 254 Tempulog4s over two-wire RS485 network.

There are two separate change over alarm relays, one relay for high alarm and the second is for low alarm.

## Hardware:

### Analog Input

The Tempulog4 is a self-contained data logger, which accepts the following inputs

- a) PT100 2,3 or 4 wire configuration over temperature range  $-100^{\circ}\text{C}$  to  $+200^{\circ}\text{C}$ . Software linearization is implemented over the full range.
- b) 4-20 mA process signal from a variety of transmitters. The 4-20 mA input is converted to corresponding engineering units i.e. RH%, PSI, Kp, RPM, etc.
- c) Voltage input in the range: 0-2.5 volts

The analog inputs are connected to terminal screws on the PCB and the connecting cables are fed via panel mounted waterproof glands.

The analog inputs should be connected using screen cable in order to minimize any interference. It is also recommended to use to use 4 wire PT100 configuration, since this will simplify the calibration of the probes, in this case the probe could be calibrated near the Tempulog4. Normally two fixed resistors are used for calibration. When a 4 wire PT100 system is used, only one channel need to be calibrated and this calibration is copied to the other three channels. When calibrating, the user should obtain high tolerance resistors with 0.1% accuracy or better. It is possible to purchase these directly from 3D.

### Status Input

There are 4 status digital inputs, these are designed to monitor door open / door close signal or to inhibit the alarm if a freezer enters the defrost cycle. In addition each Status Digital Input may be configured as an **ALARM INPUT**, the user could select high alarm or low alarm, this means that if the external contact opens to indicate an alarm condition then this a high alarm and this alarm is associated with High Alarm Relay Contact of the tempulog4. If the external alarm closes to indicate an external alarm then the user must use low alarm and in this case the Tempulog4 Low alarm

relay contacts will be activated. These types of alarm may be used to detect mains power failure or pressure drop etc.

When the status input is configured for events, then the Tempulog4 will log the following data every time the digital input channels status i.e. door open from door close position and from door open to door close position:

**Digital Channel Number, Open or Close, Time and Date**

The event inputs demand a great deal of memory and they should be used carefully. The digital input connections should be made with screened cable in order to reduce interference from other electrical devices such as compressors, pumps etc.

**Alarm relays:**

The Tempulog4 supports two independent changeover alarm relays, these may be used as High / Low alarm or as High / High alarm. These relays are fail relays i.e. the relay is normally close when the Tempulog4 is functioning normally and the mains supply is present, should a channel go into alarm then the corresponding relay is opened. Similarly when there is a power failure the alarm relay is opened. This alarm relay contact may be used to operate an Autodialer or may be integrated in the company security system.

The alarm relay is activated as long as a channel is operating outside the set point limits. The alarm relay will be reset under two conditions:

- a) The alarmed channel returns to normal condition i.e. within the high and low alarm set points.
- b) The operator acknowledges the alarm condition.

In both cases the alarm conditions are recorded with time stamp. In addition the alarm acknowledgement will be recorded with time stamp.

Should more than one channel goes into alarm the same alarm relay will be operated, however the alarm events from each channel are recorded separately as well as the alarm acknowledgements.

The alarm relay contact rate is 24 volts DC at 500 mA no inductive. This rating should not be exceeded otherwise permanent damage to the instrument will occur

**Internal Buzzer:**

There is an internal buzzer, which is used to alert the operator should one or more channels go into alarm. The operator may mute the buzzer by press the ACK switch on the keypad. This action will also be recorded as alarm acknowledgement event. The internal buzzer is quite audible from a distance of few meters.

**Computer Connection:**

The Tempulog4 supports two serial ports for communication with host computer or other device such as modem or serial printer.

The main communication port is the RS232 serial port. This port is connected to the PC serial and the cable connection is as shown in Annex A.

The second serial communication is over RS485. This is a two wire network where a number of Tempulog4 are connected together and then connected to a host PC through an RS232 to RS485 adapter (available from 3D).

Each Tempulog4 incorporates 8-way switch for setting the unit address. This address is in the range 1 to 254. With 245 units connected over this network will support up to 1016 temperature probes and 1016 status digital inputs.

The Windows software will address each Tempulog4 in turn.

Each Tempulog4 stores all the configuration information on non-volatile memory. These include:

- a) Tempulog4 unit name
- b) Tempulog4 address number
- c) Channel name
- d) Channel sensor type i.e. PT100, 4-20 mA or voltage input
- e) Channel calibration parameters and measurement unit i.e. °C, °F, RH% etc.
- f) Alarm set points for each channel
- g) Alarm delay for each channel
- h) Data logging rate
- i) Serial communication connection i.e. Computer, Printer or Modem

This information is retained even when the internal battery is removed.

The alarm settings are checked every second when the Tempulog4 scans all analog inputs

The Windows software uses this information when real time display is called.

### **Power Supply:**

The Tempulog4 hardware incorporates a board mounted user replaceable AA 3.6 Volts. This battery performs two basic functions:

- a) Power supply to the real time clock
- b) Power supply to the Tempulog4 when the mains power supply is absent.

When the main power supply is removed the Tempulog4 will automatically turn the LCD display off and the microprocessor enters low power sleep mode, however the Tempulog4 will continue data logging at the selected rate, the alarm relays will be activated. When the mains power supply is returned the Tempulog4 will automatically switches back LCD and the alarm relays are deactivated if all the channels are operating within the set points.

The on board battery will provide power for data logging for four weeks of data logging. The Battery 3.6 volts AA lithium

If the battery is replaced the stored data is not effected, however the real time clock should be reset from the host computer.

The battery lifetime should about 5 year if there are few power failures, which last few minutes.

The mains power is used to generate the 4-20 mA transmitter power supply. The excitation voltage is 15 volts with maximum current of 100 mA. This supply is switched off when there is main failure, since the internal battery is only 3.6 volts. The Tempulog4 will continue data logging from the 4-20 mA inputs. The user should not over load the 4-20 mA power supply since this will effect the microprocessor power supply and drain the internal battery. If the instrument is used in a very electrically noisy area it is recommended to use a mains filter where the power supply adapter is plugged in. These are available from most high street retailers.

## **Wiring Specification**

The operator or the insulator should make sure that good quality screen cable is used for PT100 temperature probe extension cable or to bring 4-20 mA process signal to the Tempulog4. We suggest 4 core screen cable 7/0.2 mm cable or the equivalent in the EU i.e. 4 core 1mm cross section screened cable. The user must insure that the screen of the cable is connected to a good earth point. Using good quality cables will ensure reliable and continuous system operation.

## **Basic Operation:**

The Tempulog4 is fully configurable from the host computer using the Windows 95/98/NT4.0 software which is supplied as part of the Tempulog4 package which includes: 4 PT100 4 temperature probes, Windows software and RS232 cable

The Tempulog4 may be configured as follows:

- a) Stand Alone with serial printer: this mode allows the Tempulog4 to be connected to any serial printer. The printer setting is for: 8 bits, no parity, 1 stop bit. The Tempulog4 will print the readings from the temperature or 4-20 mA transmitters every time data is logged to the internal memory. The print format is as shown below. Should a channel go into alarm this will be indicated on the printer with the character (\*) to highlight alarm condition. The user must make sure that there is sufficient paper in the printer. The data is saved on the non-volatile memory and could be downloaded to the computer for further analysis and export to spreadsheet for obtaining management information. In this mode the user press the START key to Stop and Start the data logging and the ACK key to acknowledge a channel alarm status
- b) Computer Connection. In this mode the Tempulog4 is connected to a host computer serial port, this could be COM1, COM2, COM3 or COM4. This connection is made with the RS232 cable supplied. The Windows software allows the user to view the temperatures on the computer screen, view all four channels in real time graphical format with time axis scrolling and zoom option, download stored data etc. (see software section). It is to be noted that the Tempulog4 DOES NOT need to be connected to the computer the all time and the program may be launched

only when the user wishes to communicate with the instrument. The Tempulog4 operates and functions FULLY independently from the host computer and it not advisable to operate the Tempulog4 as a computer interface i.e. without any built-in memory or intelligence.

- c) Modem Connection. In this mode the Tempulog4 is connected to a modem which is connected in turn to the public telephone network. The modem is normally connected to another modem via the telephone line and located at a different location. This method allows the computer to be located anywhere in the country or the world as well as allowing number of computers to connect to the Tempulog4. When the Tempulog4 is connected to the host PC via the Modem, the same functionality as the direct computer connection will be available. The Tempulog4 must initialize the modem on power-up, therefor the user should power the modem first in order for the modem electronics to sufficient time to carry out internal initialization. In case of power failure the Tempulog4 will re-initialize the modem again

The software instructs the user to the configuration mode and to disconnect the computer and to connect either the printer or the modem to RS232 serial port

To change the operation mode of the Tempulog4, it necessary to connect the PC to the Tempulog4 and to run the Windows software.

## Memory Configuration:

The Tempulog4 employs 64000 non-volatile memory for storing instrument configuration, logged data, which includes Event inputs and alarms status. The memory size for the data logging is 32000 readings. This memory is circular in design, this means that the data logging does not stop when the memory is full, instead the **oldest** recorded data will be over written and this process will be repeated when the memory is refilled

The recorded data remains secure even when the power supply is removed or when the battery is changed.

## Installation

After unpacking and checking that the following items are included in your shipment:

- 1) Tempulog4
- 2) 4 pieces of PT100 4 wire probes with one meter lead
- 3) RS232 Cable for connecting the Tempulog4 to the host PC
- 4) Mains power adapter
- 5) Windows 95/98/NT4.0 software
- 6) Tempulog4 user and installation manual



>	C	H	A	N	N	E	L		O				5	1	.	5	°	C
	C	H	A	N	N	E	L		1				2	2	.	2	°	C
	C	H	A	N	N	E	L		2				2	2	.	3	°	C
	C	H	A	N	N	E	L		3				2	2	.	1	°	C

The > indicate that the channel temperature is above the high alarm set point, if the temperature of a given probe is below the alarm set point then the < is displayed before the channel name.

If one of the temperature probes is damaged or disconnected from the Tempulog4, then a FAULT message will displayed and the alarm relay is activated

	C	H	A	N	N	E	L		O			-	2	4	.	5	°	C	
	C	H	A	N	N	E	L		1		F	A	U	L	T			°	C
	C	H	A	N	N	E	L		2				2	2	.	3	°	C	
	C	H	A	N	N	E	L		3				2	2	.	1	°	C	

The internal buzzer will also operate as soon as the alarm delay is expired. Pressing the ACK key for few seconds may reset the alarm relay and the buzzer. If the operator wishes to stop the logging cycle, the START key must be pressed and held till the Begin Recording message is display, however if any channel is in alarm then the alarm **MUST** be acknowledged first before the termination of the logging cycle is possible.

To terminate the data logging cycle, press and hold the START key, the following message will appear on the screen:

					T	E	M	P	U	L	O	G	4					
			P	R	E	S	S		S	T	A	R	T		T	O		
			E	N	D			R	E	C	O	R	D	I	N	G		

**Note** all that all LCD display messages may be programmed from the Windows software, thus allowing the display to be in English, German, French, Dutch, Spanish etc.

## Recorded Data

The following parameters are recorded when the Tempulog4 is in the logging mode:

- Time and date of each temperature logged
- Time and date of each alarm occurrence
- Time and date of each status event input if enabled
- Time and date of each alarm being acknowledged

- e) Time and date the logging cycle is terminated

### **Multiple Recording**

The Tempulog4 data logging cycle may be started and stop as many times as the operator wish. When data is downloaded to the host PC and the graph option is selected a blue band will be displayed during the time between each logging cycle. This blue band will indicate that no data was logged during this period. If the logged data is displayed in tabulated form using the report option from the Windows software, then the break in the logging cycle is easily seen as the report display the time of each temperature recording.

### **Connection To Printer**

The Tempulog4 may be connected to a **serial printer** using the correct RS232 cable, which is available from 3D or your local dealer.

The data format for serial communication: Baud Rate 4800, Data bits 8, No Parity and One stop bit.

The Windows Software allows you to select the print rate, this could be the same as the data logging rate or any rate from one printout per minute to 1 printout every 24 hours. Note connecting the Tempulog4 to a printer, computer or Modem **DOES** not effect the data being logged to the internal memory. The user may run the software to download the data from the Tempulog4 for archiving and further analysis. In addition data downloading does NOT erase the stored data in the Tempulog4. Clearing logged data is only possible through the Windows Software

### **Connection To Modem**

The Tempulog4 makes an ideal data logging and alarm instrument for remote application; this may be achieved by connecting a modem to the serial port of the Tempulog4 and then to public telephone network. The Windows software will configure the Tempulog4 for modem operation, which it in turn initialized and configure the modem, thus allowing a remote computer (running the modem software available from 3D).

The Tempulog4 modem software allows the host computer to be connected to the modem and carry the normal functions of data downloading, real time display etc. This software will emulate the PC RS232 based software

The Modem, connection cable and associated software are available from 3D.

### **Connection To Autodialer**

The Tempulog4 supports two independent changes over alarm relays; one of these alarm relay contacts may be used to activate an Autodialer which alert a

remote site over public telephone network or over mobile phone. The Autodialer will transmit a message regarding the location of the alarm. The Autodialer will be automatically reset from the remote telephone.

The Autodialer may be programmed to dial up to six telephone numbers when the Tempulog4 goes into alarm.

You can purchase the Autodialer from 3D or your local dealer.

### Connection to Security System

The alarm relay contacts may be integrated into the company security system. Either of the two relay may be used for this purpose, since the relay provide volt free contacts which are either normally open or normally close, this should suit most security systems.

### Multi-drop Connection

When more than four channels of temperature recordings are needed a number of Tempulog4 may be connected in a daisy chain fashion, thus allowing up to 254 units to be connected over RS485 two wire serial bus.

Each Tempulog4 must have a separate address, the 8 way dual in line switch inside the Tempulog4 may be used achieve this.

Below is the switch setting for the various addresses:

Tempulog4 address	SW1	SW2	SW3	SW4	SW5	SW6
1	ON	OFF	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	OFF
3	ON	ON	OFF	OFF	OFF	OFF
.	.	.	.	.	.	.
62	OFF	ON	ON	ON	ON	ON
63	ON	ON	ON	ON	ON	ON

3D supply an RS232 to RS485 adapter for your PC as well as Multi-drop Tempulog4 Windows Software.

The maximum distance between the Tempulog4 and the host computer under this configuration is 1000 meters. For this application a screened cable is essential . Cable Grade V has been found to provide reliable operation over 12000 meters installation

### Probes Connection

All input and out put connections are as shown in Figure No. 1

Use a good quality screen cable for connecting your sensor and digital input.

Use the **CORRECT** size, flat blade screwdriver and do NOT apply excessive force when you carry out the connections to the PCB mounted terminal screws

Below is the list of all inputs and outputs:

- 1) RS232 Connection
- 2) RS485 Connection
- 3) DC Power supply from a mains adapter maximum 17.5 volts
- 4) Status Digital input
- 5) PT100 2,3 or 4 connections
- 6) 4-20 mA inputs

There are six PCB mounted links; these are used as follows

- a) Links mark PM, these are the links for accepting PT100 temperature probe or 4-20 mA current loop input. Place the two way link between the center pin the pin marked P if you wish to use PT100 temperature on the corresponding channel, place the two link between the center pin and the pin marked M if you wish to use 4-20 mA process input signal with channel. Remove this link if you wish to log a voltage signal
- b) The three-way link near to the internal buzzer is used to enable the sounder or mute the sounder. Placing the two links between the center pin the pin marked on will enable the internal alarm buzzer. Place the two link between the center pin and the pin marked Off if you wish to mute the internal alarm buzzer
- c) The 3 way link mark RS485 termination which is located near the battery holder, is used to provide termination for the RS485 serial network if this Twmpulog4 is the last unit on the RS485 network.



- a) Channel name: each channel could have up to 9 characters as the channel name.
- b) Sensor type: the user may select the type of input for each channel. There are three options: PT100, 4-20 mA process signal from any 4-20 mA transmitters such relative humidity, pressure, flow etc. or voltage input from sensor signal conditioning amplifier such load cell, pressure gauge etc.
- c) Channel status: to select if the channel is required to be logged and monitored or out off service.
- d) Engineering Units: this selects the engineering unit (maximum length 3 characters) of the measurement such °C, °F, RH%, RPM, PSI, Kp etc.
- e) Low Eng. value: this set the minimum value of input of the selected sensor. This limit is set to -100°C if the sensor is PT100 or 0 RH% for relative humidity when using 4-20 mA transmitter. When the input sensor is 4-20 mA the low engineering value is related the signal input when the current is 4 mA, this could be -150°C when thermocouple transmitter is used.
- f) High Eng. Value: this sets the maximum physical parameter to be measured with the chosen sensor type, this is set to +200°C if a PT100 probe is used to measure temperature, however this could be +1200°C if type K thermocouple 4-20 mA transmitter is used as the type of input sensor. Thus the high engineering value depends on the sensor type and range.
- g) Alarm delay: this option is used to inhibit the operation of the internal alarm relays and the internal buzzer for a specified period of minutes. This is useful if goods are loaded or unloaded from say a cold store or freezer etc. After the elapse of the alarm delay and the channel is still within the alarm limits, then the internal alarm relay and the buzzer will be activated. This LCD display will show a “\*” in front of the channel which in delayed alarm.
- h) Low Alarm Value: this is the low set point for a given channel and should a channel value goes below this point then the alarm relay and buzzer will be activated. This must be set at the low engineering value or higher.
- i) High Alarm Value: this is the high set point at which the channel will go into alarm condition, which will cause the alarm relay and the buzzer to operate after the elapse of the alarm delay. This should be related to the maximum engineering value. This alarm value should be set with this limit.
- j) Interlock: the Tempulog4 supports 4 digital inputs, these may be used as an alarm interlock when a freezer enters the defrost cycle and the temperature could exceed the high alarm value. In this case the alarm function will be inhibited as long as the interlock is active. The user may select whether the freezer operates a relay close or relay open when the defrost cycle is in progress. The digital input may be also used as an event input i.e. door open door close i.e. digital status, in this case every time the digital input goes from open to close or close to open, an event will be recorded with time and date stamp. The user may also use to ignore the status of the digital input.

## 2) Unit Configuration

These parameters and common to all channels and relate to Tempulog4 as an instruments

- a) Unit Type: this refers to the model of the data logger

- b) Unit name: this allows the unit to be called a suitable name such as the company or the department name.
- c) Serial mode: the Tempulog4 may be connected the following serial device: Computer, Printer and Modem. The software will set the Tempulog4 accordingly and informs the user of the steps require i.e. Remove the PC serial cable and connect the Modem and cable to the Tempulog4 etc. The Tempulog4 needs to initialize the external serial communication device. The operator should use the appropriate RS232 cables for each modem. Modems and cables are available from 3D Ltd.
- d) Monitor Mode: this allows the user to start and stop the logging cycle, monitor is the standard mode i.e. the Tempulog4 is carry the data logging operation and alarm checking. The idle mode should be selected if the user wishes to terminate the logging cycle or to reconfigure the Tempulog4
- e) Date format: this allows the operator to select the date format i.e. European (dd/mm/yyyy) or USA format (mm/dd/yyyy). The same date format should be used in the downloading option; otherwise the software will indicate that there is no data logged.
- f) Temperature: this allows the user to select the temperature measurement unit i.e. Celsius of Fahrinhate
- g) Date: this allows the operator to set the Day, the Month and the Year
- h) Time: this allows the Hours, the Minutes and the Seconds to be set according to local time
- i) Log Rate: this is rate at which data is logged to the Tempulog4 non-volatile memory. This log rate is common to all the four channels. The log rate may be set from one reading per minute to one reading every 24 hours
- j) Print rate: this is rate at which Tempulog4 printouts out the logged date, this rate could be the same as the log rate or any rate greater that the log rate, this should be between the log rate and once per 24 hours. Normally the printout rate and the log rate are set to the same value i.e. once per 10 minutes or 30 minutes etc/

### Download:



The Tempulog4 stores the temperature data on a daily file based on 24 hours clock i.e. the day starts at midnight and finishes at midnight. This file stores the readings from the four channels, in addition there is a separate file for events i.e. channel alarm times, this includes the time of the alarm and the time at which the channel comes out of alarm and returns to normal operation within the two alarm

set points, operator alarm acknowledgement and Events input from the four status inputs.

The download process transfers the logged data files to the PC hard disk and save the files in CSV format, this means that the downloaded file may be opened directly into Excel Spreadsheet for further analysis and data presentation.

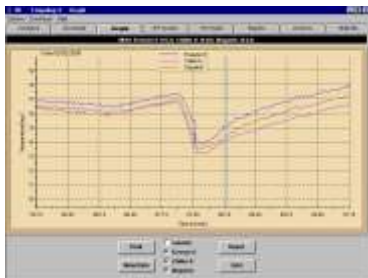
The download data is also used by other components of the software, this include Report, Graph, Archiver , etc.

The download function may be used to download a single day's data or data from a number of days. Both of these are specified by selecting the date of the data for the single day download and by specifying the start date and the finish date for the range of days to be downloaded.

The data file name is normally in the format: dd/mm/yyyy, Archiving uses this format and Multi-files options. The user may select any file name when downloading a single day data. If the daily download file name is not of the above format, then this file can not be used in the Archiver and Multi-files

It may be advisable to backup all data files to a floppy diskette every one or two weeks for security.

## Graph



This option allows the user to downloaded data to viewed in a graphical form. The first step to use this option is to select file to be view. A graph will be open showing the file name and with channel zero selected, the user may select other channels to be displayed on the graph. If the mouse is move to the graph area the software will show the selected channel and the temperature value as well as the time, this will be displayed at top of graph, there will be a line which is moved when the mouse is moved across the graph. There will be a blue band shown on parts of the graph if the data logging cycle was stopped and restarted.

The graph option supports a zoom function, this is achieved by moving the mouse to the section of the graph to be zoomed and then holding the left mouse and dragging it across the section, this will draw a block box to show the section which will be used, when the mouse left button, the graph will zoom to the selected section, the zoom operation may be repeated. To reset the graph to the original size, the user must mouse click the button marked reset

The displayed graph may be printed or sent to the clipboard to used by other Windows application

## R/T Screen



This option will display all the four channels in a standard instrumentation format with channel name and engineering units. The normal channel value is yellow, this will change to red should the high alarm set point is exceed and it will change to blue if the set point is below the alarm set point. The channel reading background will change to red to indicate alarm condition. The user may acknowledge the alarm from the PC software by positioning and clicking the left mouse on the reading of the channel in alarm

From this display it is possible to log data to the PC hard disk directly without any interference with the actual data logging on the Tempulog4 own memory.

The user needs to specify a file name and a log rate, this achieved by clicking on the start log button at the base of the R/T display.

The real Time Screen is used to show the operator the current values of the four inputs to the Tempulog, in addition the four digital status inputs are display at bottom of the screen, if there is a change in the status input then the display will change from OFF to ON or visa versa .

The R/T screen should not be used constantly since this might interfere with the operation of the data logger if used over a period of days. It is to be noted that the Tempulog4 is a data logger and NOT an interface and it operates totally independently from the host PC.

## R/T Graph



This option allows the user to view the four input channels of the Tempulog4 in real time graphical format with an instrument display. The axis X represents the current time while the Y-axis represent the temperature. The graph will automatically scale to show graph over 24-hour period. The operator may also view the graphs from the last hour, this achieved by click on the button at the top of the graph which allows the selection between full scale and last hour.



- 1) Change Directory
- 2) Download
- 3) Report
- 3) Graph

The Archiver displays the present month calendar and the user could select any given date for carry one of the above functions, however to view report or graph a file must exist, if there is a file for a given day then the date is shown in **BOLD**.

The months may brought forward or backward by clicking on the right or the left icons on the display.

The Archiver uses the same part of the software as the standard taps.

## Multi-file



This option allows data to be viewed either in a tabulated form or in graphical form over a selectable period for one day to two months, the graph may be zoomed to show a single date or part of the day, naturally the user must have data recorded over the dates span of interest

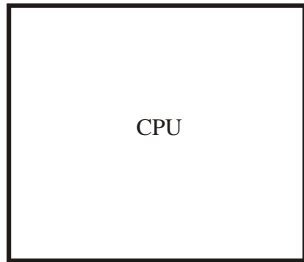
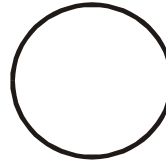
The multi-file option will calculate the maximum, minimum and the average temperature per day over the selected period.

The Multi-file analysis option is similar to the multi-file report and graph, however this option allows the user to select data from one day up to 365 day.

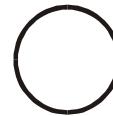
The graph option shows three traces per channel these the maximum, minimum and average temperature over the full selected days. Again the user may zoom and print this graph

### Tempulog4 Input / Output Connection

On ● ● ● Off  
Sounder

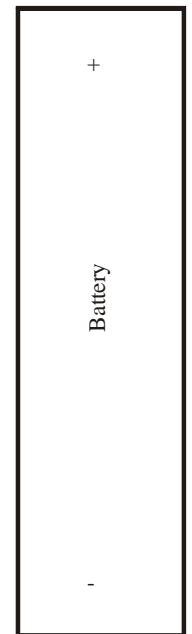


CPU



ON  
8 WAY SWITCH

1 2 3 4 5 6 7 8

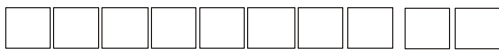


+

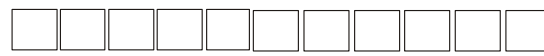
Battery

-

P M P M  
● ● ● ● ● ● ● ●



A B C D A B C D +15 V  
Ch1 Ch3



GND In0 In1 In2 In3 GND NO COM NC NO COM NC



+ -  
Power

P M P M

● ● ● ● ● ● ● ●



A B C D A B C D +15 V  
Ch0 Ch2

Digital Status Inputs

HIGH ALARM LOW ALARM

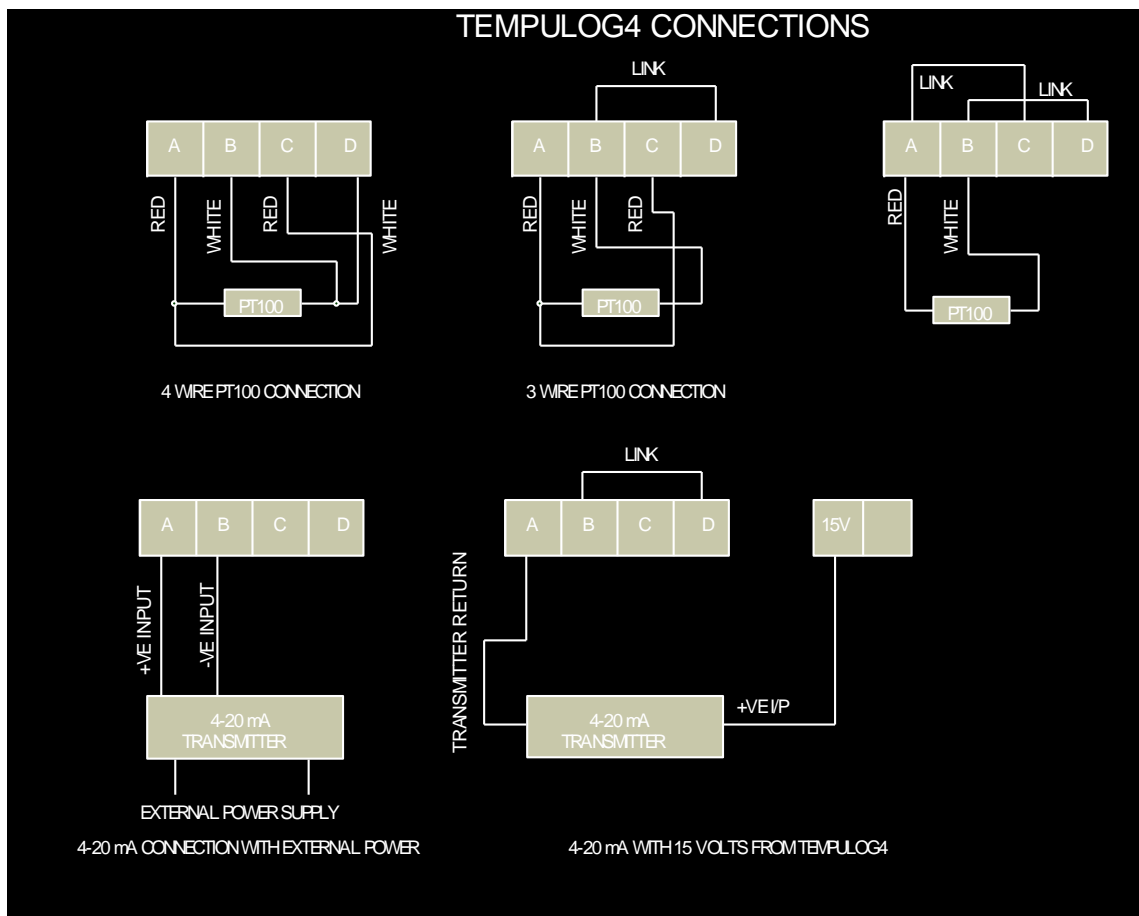


TX RX GND + - Shld  
RS232 RS485

RS232

On ● ● ● Off

RS485 termination



### PC, Modem & Printer RS232 Connections for Tempulog 4/8/16, TPS8 & NTL2000

9 Way Male D Type to Tempulog

9 / 25 Way Male D Type to Modem

25 Way Male D Type To Printer

