

LAND

AMETEK[®]
PROCESS & ANALYTICAL INSTRUMENTS



DTT

Drawing Tower Thermometer

User Guide

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Health and Safety Information



Read all of the instructions in this booklet - including all the **WARNINGS** and **CAUTIONS** - before using this product. If there is any instruction which you do not understand, **DO NOT USE THE PRODUCT.**

Safety Signs



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or personal injury.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to the user or users, or result in damage to the product or to property.

NOTE

Indicates a potentially hazardous situation which, if not avoided, could result in damage or the loss of data.

Signs and Symbols used on equipment and Documentation



Caution, risk of electric shock.



Caution, attention to possibility of risk of damage to the product, process or surroundings. Refer to instruction manual.



Caution, hot surface.



Protective Conductor Terminal.



Observe precautions for handling electrostatic discharge sensitive devices.

Equipment Operation

Use of this instrument in a manner not specified by Land Instruments International may be hazardous. Read **and understand** the user documentation supplied **before** installing and operating the equipment. The safety of any system incorporating this equipment is the responsibility of the assembler.

Protective Clothing, Face and Eye Protection

It is possible that this equipment is to be installed on, or near to, machinery or equipment operating at high temperatures and high pressures. Suitable protective clothing, along with face and eye protection must be worn. Refer to the health and safety guidelines for the machinery/equipment before installing this product. If in doubt, contact Land Instruments International.

Electrical Power Supply

Before working on the electrical connections, all of the electrical power lines to the equipment must be isolated. All the electrical cables and signal cables must be connected exactly as indicated in these operating instructions. If in doubt, contact Land Instruments International.

Storage

The instrument should be stored in its packaging, in a dry sheltered area.

Unpacking

Check all packages for external signs of damage. Check the contents against the packing note.

Lifting Instructions

Where items are too heavy to be lifted manually, use suitably rated lifting equipment. Refer to the Technical Specification for weights. All lifting should be done as stated in local regulations.

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Return of Damaged Goods

IMPORTANT If any item has been damaged in transit, this should be reported to the carrier and to the supplier immediately. Damage caused in transit is the responsibility of the carrier not the supplier.

DO NOT RETURN a damaged instrument to the sender as the carrier will not then consider a claim. Save the packing with the damaged article for inspection by the carrier.

Return of Goods for Repair

If you need to return goods for repair please contact our Customer Service Department. They will be able to advise you on the correct returns procedure.

Any item returned to Land Instruments International should be adequately packaged to prevent damage during transit.

You must include a written report of the problem together with your own name and contact information, address, telephone number, email address etc.

Design and Manufacturing Standards

The Quality Management System of Land Instruments International is approved to BS EN ISO 9001 for the design, manufacture and on-site servicing of combustion, environmental monitoring and non-contact temperature measuring instrumentation.



Approvals apply in the USA

Approvals apply in India



Operation of radio transmitters, telephones or other electrical/electronic devices in close proximity to the equipment while the enclosure doors of the instrument or its peripherals are open, may cause interference and possible failure where the radiated emissions exceed the EMC directive.

The protection provided by this product may be invalidated if alterations or additions are made to the structural, electrical, mechanical or pneumatic parts of this system. Such changes may also invalidate the standard terms of warranty.

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1 Introduction

1.1 About this guide

This guide gives the information necessary for you to operate a LAND **DTT** Drawing Tower Thermometer.

1.2 About The DTT Drawing Tower Thermometer

The LAND **DTT** Drawing Tower Thermometer is a highly accurate, non contact thermometer designed for independent or STAND ALONE use.

The thermometer features include:

- Stand Alone operation.
- Built in Averager or Peak Picker for signal conditioning.
- Built in Emissivity controls.
- Electrical connections for a 4 to 20mA output, linear over the temperature span of the thermometer.



Fig. 1 - **DTT** Drawing Tower Thermometer

225001

1.5 Specifications

Model:	DTT 800/2600C	DTT 1500/4700F
Temperature Range		
Operating:	800 to 2600°C	1500 to 4700°F
Specified:	1000 to 2600°C	1830 to 4700°F
Wavelength:	1µm	
Response Time:	Adjustable 5ms to 5s (0 to 95%)	
Emissivity:	Adjustable 0.10 to 1.00	
Output:	4 to 20mA	
Field Of View (Nominal):	112.1	
Target Diameter (Uses DT1 Optic Head)	4mm at 450mm (0.15in at 17.7in)	
Accuracy		
Repeatability:	≤2°C/4°F	
Absolute:	≤0.75%K	
Stability		
Temperature:	0.3°/°amb	
Time:	2°C/Year	4°F/Year
Vibration:	3g any axis, 10 to 300Hz	
Humidity:	0 to 99% non condensing	
Sealing:	To IP54 Requirements	
Ambient Temperature		
Optic Head:	200°C	392°F
Lightguide:	200°C	392°F
Detector		
Specified:	0 to 70°C	32 to 158°F
Operating:	-10 to 80°C	14 to 176°F
Weight:	1.7kg	3.75lbs
CE	EN 50-082-2 (immunity), EN50-081-1 (emission), IEC 1010 (safety)	

Fig. 2 - DTT Drawing Tower Thermometer Specifications

225002

2 DTT Thermometer Dimensions

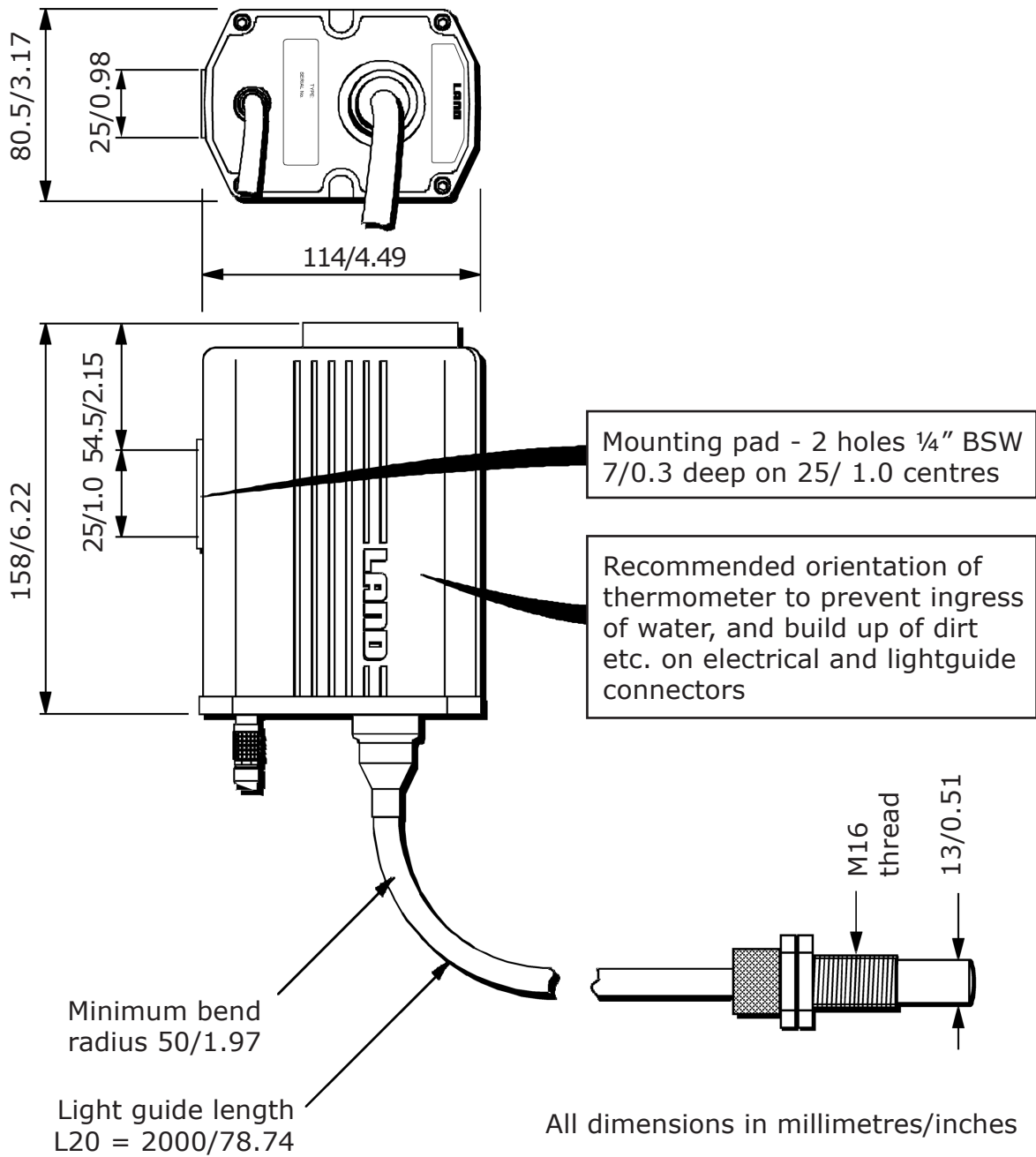


Fig. 3 - DTT Drawing Tower Thermometer Dimensions

225003

3 Using the Thermometer

Before final installation of the thermometer, the internal controls (i.e. Emissivity, Averager response speed or Peak picker decay rate) must be set to match the particular measurement characteristics. This involves removing the internal chassis from the thermometer cover.

3.1 Removing the Chassis from the Thermometer Cover

CAUTION

Ensure that the thermometer is disconnected from the power supply before removing the chassis from the cover.

Ensure that the thermometer is dismantled in a clean laboratory or office environment.

- 1) Refer to Fig. 4. Use the 2.5mm Hex screw driver to loosen the four captive screws (A).
- 2) Slide the chassis out of the thermometer cover.

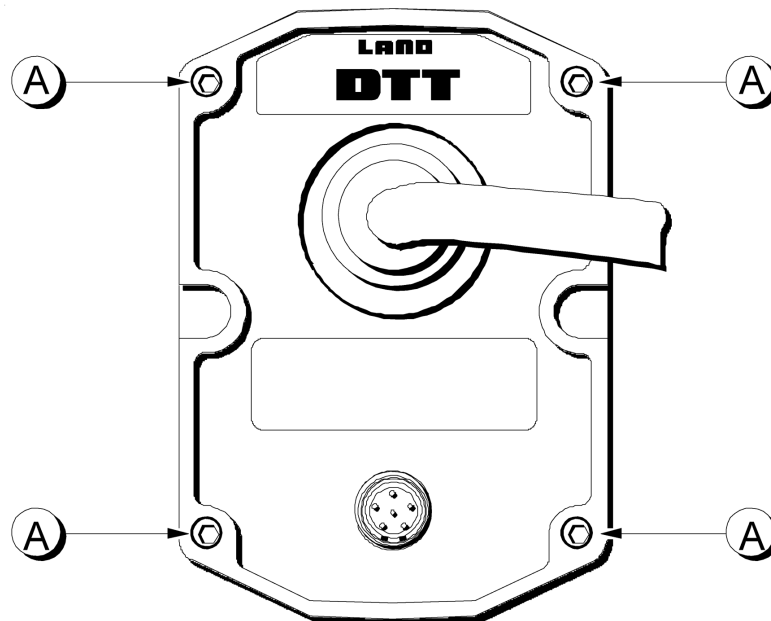


Fig. 4 - Location of Thermometer Cover Securing Screws

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3.2 Location of Controls

The Emissivity and Peak Picker/Averager control switches are located on the left hand circuit board, when viewing the thermometer from the rear.

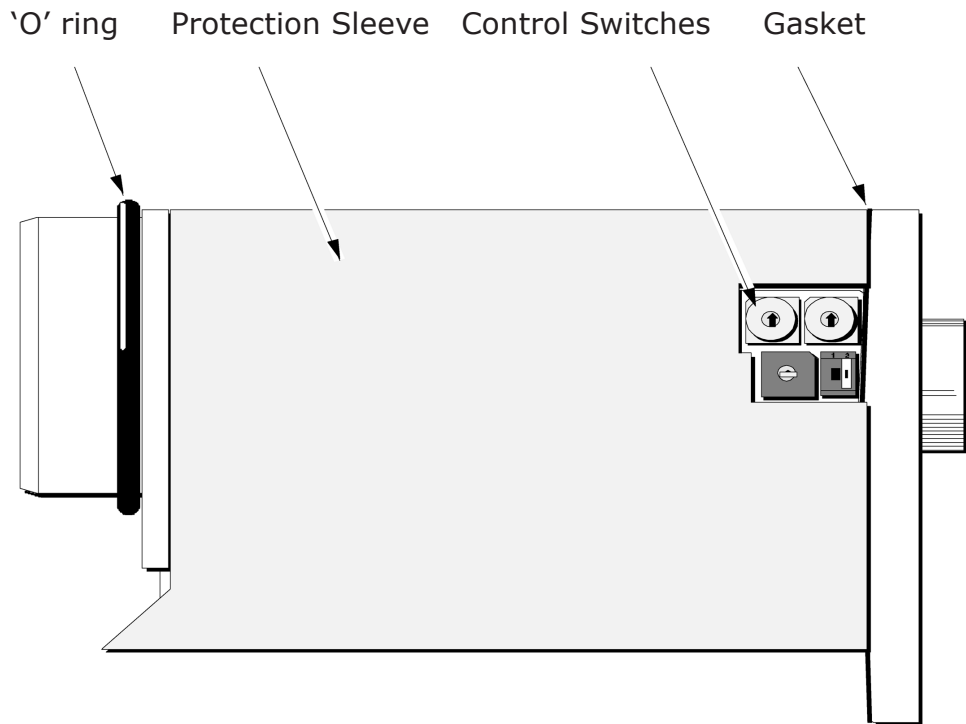


Fig. 5 - Location Of Internal Control Switches

225005

3.3 Setting the Emissivity

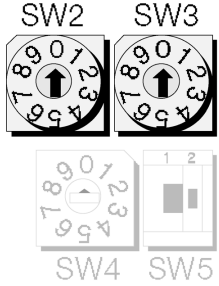
Switches	Emissivity	SW 2	SW3
	0.10	1	0
	0.80	8	0
	0.83	8	3
	0.95	9	5
	1.00	0	0
	1.09	0	9

Fig. 6 - Emissivity Switch Settings For **DTT** Thermometers

225006

NOTE



An emissivity value of above 1.00 is not common in the majority of measurement applications.

The emissivity value is set using switches SW2 and SW3. Refer to Fig. 6.

The emissivity can be set in the range 0.10 to 1.09 in steps of 0.01.

When switch SW2 is set from 1 to 9, this denotes the first figure **after** the decimal point of the emissivity value. e.g. for an emissivity value of '0.83', set SW2 to '8' and SW3 to '3'.

When switch SW2 is set to 0, this denotes a '1' **before**, and a '0' after, the decimal point of the emissivity value.

e.g. for an emissivity value of '1.00', set SW2 to '0' and SW3 to '0'.

3.4 Setting the Time Functions

The **DTT** thermometer is fitted with both Averager and Peak picker time functions. These functions are set using the switches SW4 and SW5.

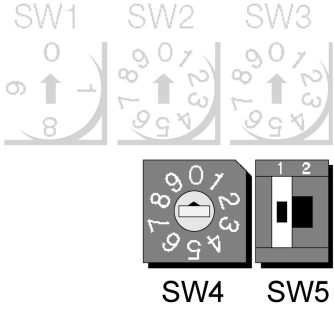



Switches	SW4	Averager	Peak Picker
	 SW4	 SW5	 SW5
	Setting	Response time to 95% (m s)	Decay rate (%/s)
	0	5	30
	1	10	29
	2	20	27
	3	50	24
	4	100	20
	5	200	15
	6	500	10
	7	1000	5
	8	2000	3
9	5000	1.5	

Fig. 7 - Averager And Peak Picker Time Function Selection

225007

3.4.1 Averager

The Averager time function is selected by setting switch SW5, to position 1. The Averager response time can be set, via switch SW4, to any of the ten values shown in Fig. 7. A graphical explanation of the Averager time function is given in Fig.8.

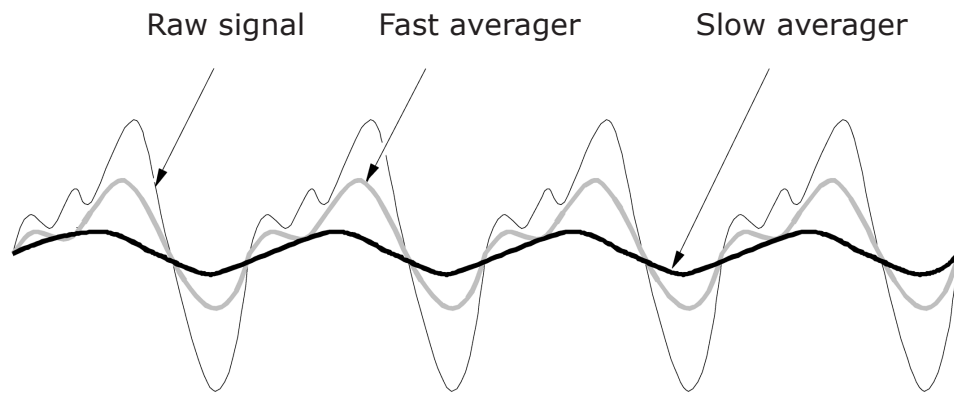


Fig. 8 - Typical Output Of Averager Time Function

225008

3.4.2 Peak Picker

The Peak picker time function is selected by setting switch, SW5, to position 2. The Peak picker decay rate can be set via switch SW4, to one of the ten values shown in Fig. 7.

The CMD (Command) input (see Fig. 12) enables remote resetting of the Peak picker time function. When the CMD input is open circuit, the Peak picker operates under the control of switches SW4 and SW5. When the CMD input is short circuit, the Peak picker function is RESET and the output signal reverts to tracking the input, regardless of the setting switches SW4 and SW5.

A graphical explanation of the Peak time function is given in Fig. 9.

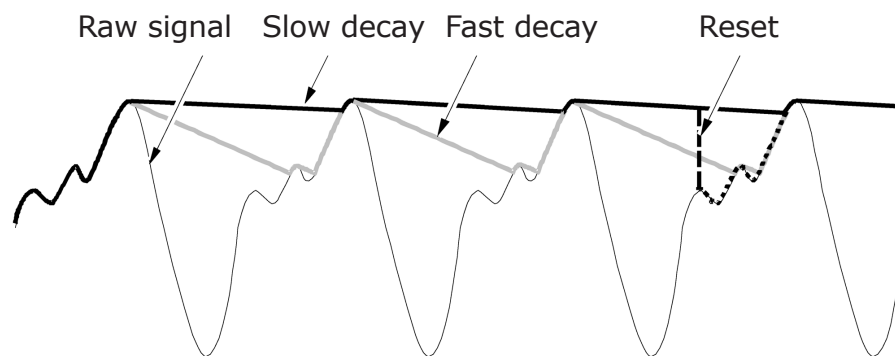


Fig. 9 - Typical Output Of Peak Picker Time Function

225009

3.5 Replacing The Chassis Into The Thermometer Cover

When all internal controls have been set to suit your requirements, replace the thermometer chassis into the cover.

- 1) Ensure that the gasket is fitted correctly on the inner face of the thermometer rear panel and slide the chassis into the thermometer cover.
- 2) Refer to Fig. 4. Tighten the four captive screws (A) using the 2.5mm Hex screw driver.

3.6 Electrical Connections

The electrical connections for the thermometer power supply, peak picker reset and temperature output are made via the 6-way socket on the rear of the thermometer. See Fig. 10.

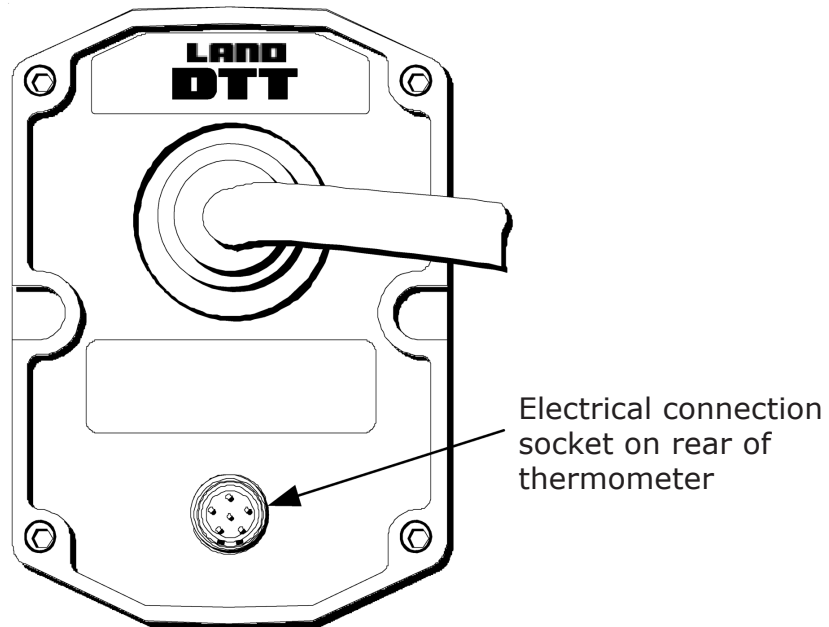


Fig. 10 - Location Of 6-Way Electrical Connection Socket

225010

Electrical connection to the thermometer must be made by either the pre-wired plug (LAND Part N° 029.673) or via the plug housed in the Back Cap (LAND Part N° 091.562).

To connect the cable;

- 1) Refer to Fig. 11. Align the red marker near the lugs of the pre-wired plug with the red marker above the keyway in the socket on the thermometer.
- 2) Push the plug into the socket.

To disconnect the cable;

- 3) Grip the locking sleeve section of the plug.
- 4) Pull the plug outwards to release the locking mechanism and disconnect the cable.

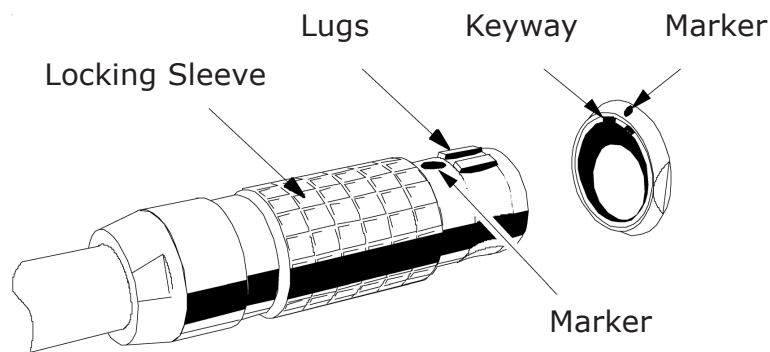


Fig. 11 - Connection Of The Pre-wired Cable To The Thermometer

225011

3.6.1 Cable Connection schedule

DTT thermometers can be connected, via the 6-way socket, to any compatible power supply and display equipment. A description of the required connections is given in the cable connection schedule, Fig. 12.

Cable Colour	Function
YELLOW	4 TO 20mA linear temperature signal drive
BLUE	4 TO 20mA linear temperature signal return
WHITE	CMD (Command) input
SCREEN	Screen
RED	23 to 48V, ≤200mA dc power (positive)
BLACK	23 to 48V, ≤200mA dc power (negative)
GREEN	CMD (Command) input
Recommended output load resistance: 100 Ohms	
Maximum output load resistance: 400 Ohms	
CMD (Command) input:	Voltage free switch closure Switch open = PEAK PICK Switch closed = TRACK (or RESET)

Fig. 12 - **DTT** Thermometer Cable Connection Schedule

225012

3.6.2 Electrical Connection To Land DPU Power Supply

It is recommended that the **DTT** thermometer is used in conjunction with the Land DIN Power supply Unit (DPU). In addition to providing the correct power supply voltage for the thermometer, the DPU has simple connections for mains supply, temperature output signal and Peak picker reset command signal.

To connect the thermometer to the DPU, connect the 6-way cable from the thermometer across pins 1 to 7 of the DPU as shown in Fig. 13. A description of each signal connection is given in the interconnection schedule, Fig. 14.

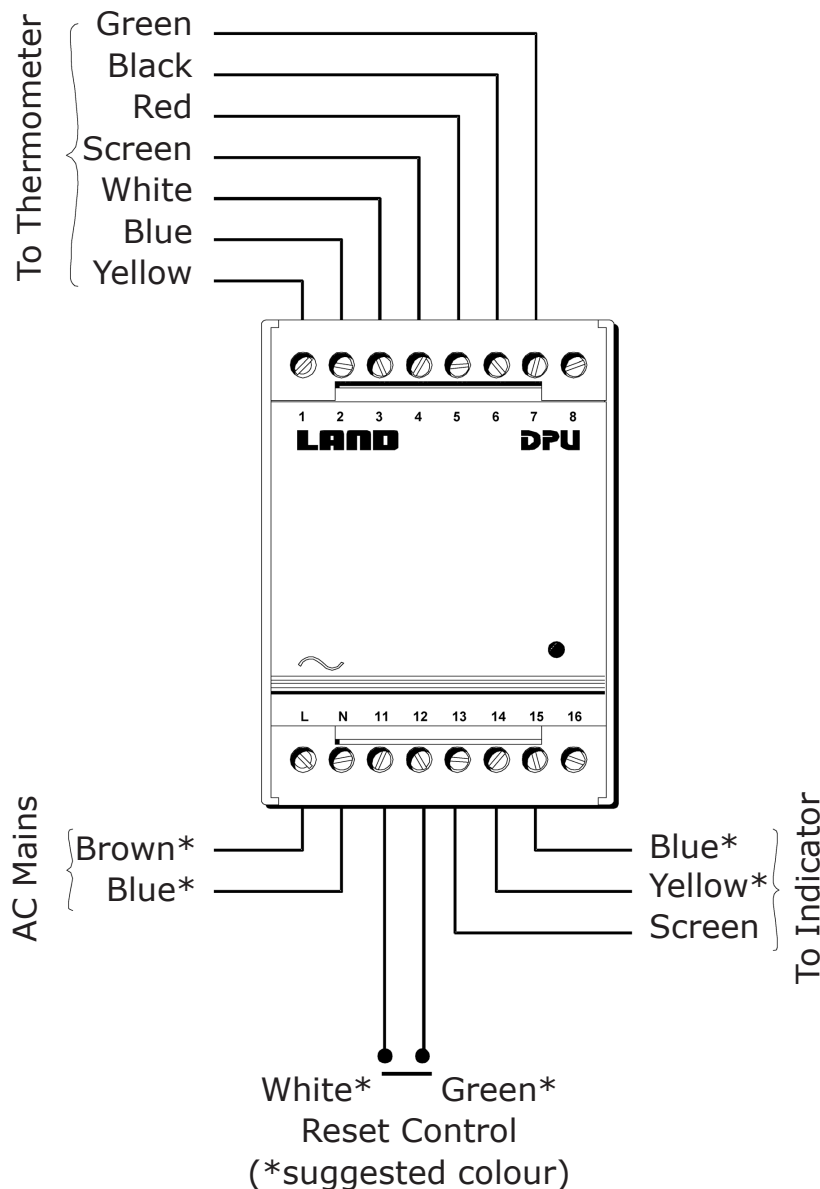


Fig. 13 - DPU Interconnections

225013

	DPU Pin No.	Cable Colour	Function
DPU to DPU Connections	1	Yellow	4 TO 20mA linear temperature signal drive
	2	Blue	4 TO 20mA linear temperature signal return
	3	White	CMD (Command) input
	4	Screen	Screen
	5	Red	23 to 48V, <200mA dc power (positive)
	6	Black	23 to 48V, <200mA dc power (negative)
	7	Green	CMD (Command) input
	8	No Colour	No connection
External Connections to DPU	9	Brown/Red	AC Mains Live
	10	Blue/Black	AC Mains Neutral
	11	White	CMD (Command) input *
	12	Green	CMD (Command) input *
	13	Screen	Screen
	14	Yellow	4 TO 20mA linear temperature signal drive
	15	Blue	4 TO 20mA linear temperature signal return
	16	No Colour	No connection
*Notes	Recommended output load resistance:		100 Ohms
	Maximum output load resistance:		400 Ohms
	CMD (Command) input:		Voltage free switch closure Switch open = PEAK PICK Switch closed = TRACK (or RESET)

Fig. 14 - DTT To DPU Interconnection Schedule

225014

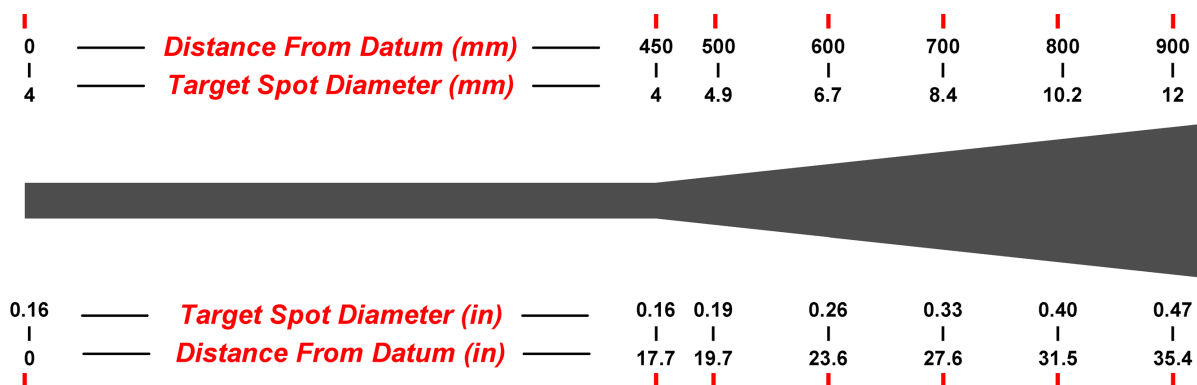


Fig. 15 - Target Size Sighting Diagram

225015

4 Emissivity

In order to obtain accurate temperature measurements, the emissivity value of the target surface must be known. For the use of **DTT** in the drawing tower application, Land Infrared recommends that the emissivity value within the thermometer should be set to 1.00.

5 Maintenance

5.1 Optic Head

After initial installation, make regular inspections of the lens in order to establish a cleaning cycle.

If the lens requires cleaning, it is preferable to do so without disconnecting the lightguide from the optic head.

Clean the lens with a soft cloth and a little alcohol if necessary. Take care not to scratch the lens.

5.2 Air Supply

If an air purge is used with the **DTT** thermometer, the air filter must be checked and cleaned at regular intervals, determined by the cleanliness of the air supply.

Check the filter daily for the first week or two and then, depending on experience, move to a weekly or monthly routine.

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PRODUCT WARRANTY

Thank you for purchasing your new product from Land Instruments International. This Land manufacturer's 'back-to-base' warranty covers product malfunctions arising from defects in design or manufacture. The warranty period commences on the instrument despatch date from the Land Instruments International Ltd. factory in Dronfield, UK.

36 MONTHS WARRANTY



Building upon the reputation for reliability and longevity that System 4 and UNO thermometers have earned, Land are delighted to be able to provide our customers with an industry-leading 36 month warranty for the following products:-

- SPOT thermometers, accessories and mountings and special instruments based on SPOT.
- System 4 thermometers, processors, accessories and mountings and special instruments based on System 4.
- UNO thermometers, accessories and mountings and special instruments based on UNO.
- Application-dedicated processors based on LANDMARK[®] Graphic.
- ABTS/S and ABTS/U
- FTS
- VDT/S and VDT/U
- DTT
- FLT5/A

This 36 month warranty is provided as standard for all orders for the products listed above received from 1st May 2002.

We believe that our customers expect us to set the standard in terms of performance, quality, reliability and value for money. This 36 months warranty, as a part of an on-going program of continuous improvement, is just one way in which Land strive to maintain our position as the temperature measurement partner of choice.

24 MONTHS WARRANTY

The following Land Instruments International products are provided with a 24 months warranty:

- ARC
- FTI-E
- NIR

12 MONTHS WARRANTY

All Land Instruments International products not provided with either a 36 month or 24 month warranty (see lists above), are provided with a 12 months warranty.

PRODUCT WARRANTY

EXCLUSIONS FROM WARRANTY

It should be noted that costs associated with calibration checks which may be requested during the warranty period are not covered within the warranty.

Land reserve the right to charge for service/calibration checks undertaken during the warranty period if the cause is deemed to fall outside the terms of the warranty.

This Land manufacturer's warranty does not cover product malfunction arising from:-

- incorrect electrical wiring.
- connection to electrical power sources outside the rating of the product.
- physical shock (being dropped, etc.) and impact damage.
- inappropriate routing, support, physical shock & strain protection, etc. of the lightguide (Fiberoptic thermometers only).
- environmental conditions exceeding the IP / NEMA rating of the product.
- environmental conditions outside the Ambient Temperature, Humidity and Vibration rating of the product.
- environmental contamination (solvent vapours, deposition of airborne contamination, cooling liquids of non-neutral pH, etc.).
- overheating as a result of interruption of water/air flow through cooling jackets or of incorrect installation.
- inappropriate modification of product (drilling holes in thermometer bodies, etc.).
- inappropriate recalibration which results in product calibration being taken outside specification.
- improper resealing of thermometer following parameter adjustment (UNO, FLT5/A, etc.).
- attempted repair by a non-Land-authorized repair centre.

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