THE DCT150M-W DIGITEMP DIGITAL THERMOMETER FOR TANKS AND TANK CONTAINERS

INSTRUCTION MANUAL

The DigiTemp DCT150M-W is a battery powered digital thermometer for tanker and tank containers, which provides reliable, economic and accurate temperature monitoring for a wide range of industrial applications in hazardous process areas, where potentially explosive atmospheres may be present. The DCT150M-W has a wide temperature operating range from -50°C to +150°C and a guaranteed battery life of 6 years with no maintenance. The DCT150M-W wireless thermometer provides real time updates of temperature readings to communication gateways including satellite systems operating in the IEEE 802.15.4 frequency range. The DigiTemp DCT150M-W is housed in a robust glass reinforced nylon case with a fully integrated sealed polycarbonate face which is waterproof to IP67 and which eliminates surface electrochemical corrosion problems. The DCT150M-W is suitable for hostile environments without additional protection.

iNSTALLATION REQUIREMENTS

Prior to installing this thermometer, these instructions should be fully read. Failure to do so could result in permanent damage to the unit. Particular attention should be given to the following points:-

- The Near Field Communication function of this device must not be used in a hazardous area (safe area use only).
- This equipment shall not be exposed to strong electromagnetic fields exceeding 1A/m rms or 3V/m rms when located in a hazardous area These values are maximum limits and may be limited further in accordance with the Canadian Electrical Code or the National Electrical Code or IEC/EN 60079-14, as well as local requirements (as applicable).
- The installer and user must take appropriate measures to avoid accumulation of electrostatic charge on the non-conductive enclosure surface. Clean only with a damp cloth.
- The equipment enclosure must be sufficiently thermally isolated from hot or cold process vessels that its local ambient remains within the specified ambient temperature range.
- The equipment must not be allowed to become immersed in dust.

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- The temperature probe is an isolated metal part with capacitance of 75pF. The installer must determine suitability for the application.

- This transmitter has been approved for use a separation distance of at least 20 cm from all persons.

No changes or modifications to the product can be made unless they have been expressly approved by Quantum Cryogenics as this could void the user's authority to operate the equipment

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ATEX Hazardous Area Compatibility

Ensure that the gauge is suitable for use in the environment of the hazardous zone. This should be done by reference to the ATEX code of the DigiTemp which is also marked on the face of the instrument and stated on the certificate.

II 2 GD Ex ib IIC T4...T3 Gb EX ib IIIC T135°C....T184°C Db -35°C ≤ Ta ≤ +60°C

Permitted process temperatures are as follows:-

Process Temperature Range For Gas Atmospheres	Applicable Temperature Class
-50°C to +105ºC	T4
-50°C to +150ºC	T3

Process Temperature Range For Dust Atmospheres	Applicable Temperature Marking
-50°C to +101ºC	T135°C
-50°C to +150ºC	T184°C

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HAZLOC Hazardous Area Compatibility

Ensure that the gauge is suitable for use in the environment of the hazardous zone. This should be done by reference to the HAZLOC code of the DigiTemp which is also marked on the face of the instrument and stated on the certificate.

Class I, II, III, Div 2, Groups A-D, F-G, Nonincendive/ Non incendaire
Class I, Zone 1, AEx ib IIC T4/T3 Gb, Zone 21, AEx ib IIIC T135°C /T184°C Db,
Ex ib IIC T4/T3 Gb
Ex ib IIIC T135°C /T184°C Db
-35°C ≤ Ta ≤ +60°C
Control drawing-A3-00614, Rev08

Max. Process Temperature (Gas Atmospheres)	**Temperature Class**	**Max. Process Temperature (Dust Atmospheres)**	**Temperature Class**
-50°C to +105°C	T4	-50°C to +101°C	T135°C
-50°C to +150°C	T3	-50°C to +150°C	T184°C

In the event that the equipment is to be exposed to any unusual external effects or to aggressive substances please contact Quantum Production Ltd for further advice

INSTALLATION

Installation should only be undertaken by qualified personnel familiar with safety practices and standards relating to intrinsically safe electrical equipment.

OPERATING INSTRUCTIONS

The DCT150M-W samples the temperature measured at the sensor once every minute. In practice, due to the slow change in the temperature of the wall and the contents of the tank being measured, the temperature is unlikely to change by more than a few degrees between samples. If, however, the sensor is removed from the tank and subjected to extremes of temperature change such as plunging into hot oil, for example, it is likely that the temperature seen will change by a greater degree at the next sample occasion, due to the fact that the temperature shown on the display is fixed between samples. The DCT150M is functioning perfectly correctly and merely indicating the actual temperature of the sensor at one minute intervals.
As with any thermometer, it should be noted that it takes time for the sensor to reach the temperature of the product measured and this should be taken into account. The DCT150M-W is wireless enabled allowing wireless transmission to compatible remote communication devices. This

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allows continuous transmission of the sensor temperature and battery life to the communication device without requirement for cabling. An NFC device is fitted to the unit that can be used to switch on the wireless device, allowing the units to be purchased and stored without depleting the battery life. The NFC can also be used with smart phone applications for changing the display from C to F and also for logging of data which can be downloaded to a smart phone. If interfacing with a wireless system please contact Quantum Production for further details.

The near field communication of this device must not be used in a hazardous area and it should also be noted that the equipment should not be exposed to strong electromagnetic fields exceeding 1A/m rms or 3V/m rms when located in a hazardous area.

This transmitter has been approved for use a separation distance of at least 20 cm from all persons.

The installer and user must take measures to avoid accumulation of static charge on the non-conductive enclosure surface. Please refer to instructions in cleaning section below.

No changes or modifications to the product can be made unless they have been expressly approved by Quantum Cryogenics as this could void the user's authority to operate the equipment.

MOUNTING THE SENSOR

In order to monitor the authentic temperature of the tank and its contents, good thermal contact must be made between the temperature sensor and the tank. It is therefore important to mount the sensor in an effective manner to achieve this.

The sensor is housed in a stainless steel tube of diameter approximately 6mm and length 50mm at the end of a flexible lead. The temperature probe is an isolated metal part with capacitance of 75pF. Isolated metal parts can accumulate electrostatic charge, which can potentially be sufficient to cause an ignition of flammable atmospheres. The capacitance is a measure of how much charge they could store. The user/installer must determine whether this would present a hazard in the installed configuration. For example, if the isolated part is installed in an area with a high, dust laden airflow, it is likely that it could accumulate a significant charge. If it is earthed to a metal frame, however, and under cladding without significant airflow, then it would be less likely to accumulate a charge.

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1. Surface Mounting

The sensor housing may be fixed to the outer surface of the tank in either of the ways described below:

i) The sensor housing may be fixed to the outer surface of the tank by means of stainless steel saddle clips (see Fig 1 below). The saddle clips should be of a size to allow the sensor housing to slide into position, after the clips have been welded to the tank, without using undue force, and then be held firmly in position by the use of a 'setting' high thermal conductivity silicone sealant.

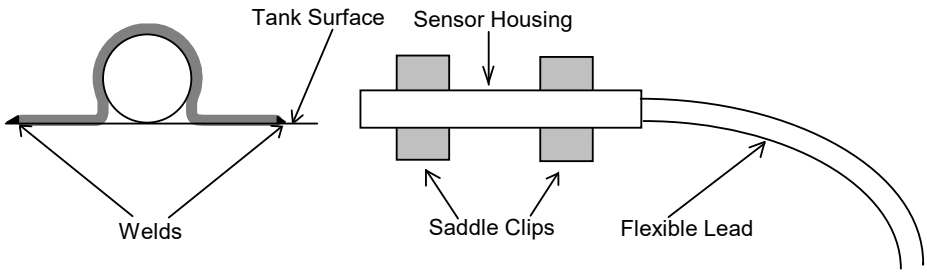

Fig. 1

ii) Alternatively, the sensor housing may be fixed to the outside surface of the tank by inserting it into a stainless steel tube of suitable diameter which has been pre-welded to the tank surface (see Fig.2 below). The tube should be of such a size that the sensor housing can easily slide into it without the use of undue force and then be held in position by the use of a 'setting' high thermal conductivity sealant which is suitable for use in the environment of the hazardous zone.

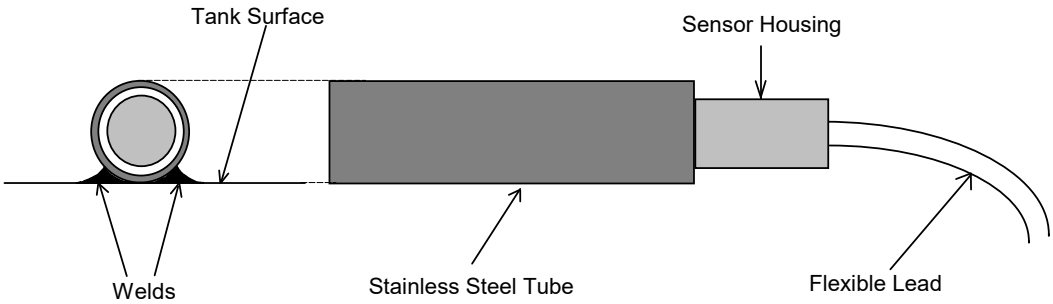

Fig 2

NOTE	**NEVER weld clips or tube in place with sensor already fitted**

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2. Thermowell or Thermal Pocket Mounting

The sensor can also be mounted in a Thermowell or Thermal Pocket a tube welded to the tank surface and projecting in to the tank.) The internal diameter of the tube projecting in to the tank must be such that the sensor housing slides in to it easily. In fitting the sensor housing in to the tube, thermal contact can be made by use of a 'non-setting' silicone around the sensor housing and then (making sure that there are no sharp edges to damage the sensor cable), by carefully clipping the sensor lead to the tank surface.

FIXING OF THE CASE

The case dimensions of the DCT150M Digital Tank Thermometer are shown in Fig 3 below. The case is designed to be 'flush fitted' in to a circular hole of diameter 4 inches (122 mm.) in the outer skin of the tank and to be fixed in position by means of rivets or screws. Six fixing holes (Ø5 mm) are provided around the fixing flange of the unit on a PCD of 135mm.

The thermometer flange should be sealed to the outer skin of the tank by means of a 'setting' silicone sealant that is suitable for use in the environment of the hazardous zone.
Care must be taken when installing to ensure that the enclosure is sufficiently thermally insulated from the surface of the tank so that its local ambient temperature remains between -35°C and 60°C.

The equipment must not be allowed to become immersed in dust during installation or ongoing operation. Cleaning should only be undertaken with a damp cloth. No other solvents should be used.

WARNING	**The flange of the thermometer is not curved. If the flange is to be fitted to a curved surface, suitable spacers MUST be used to avoid excess stress**

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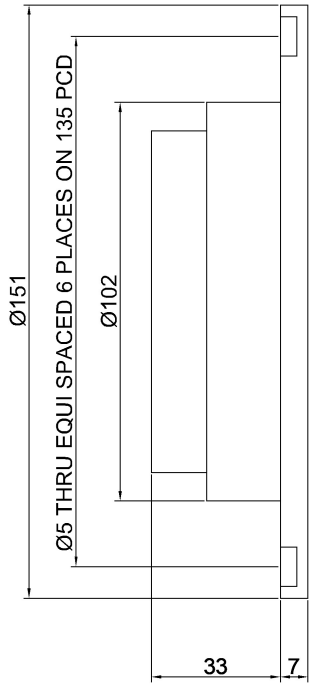

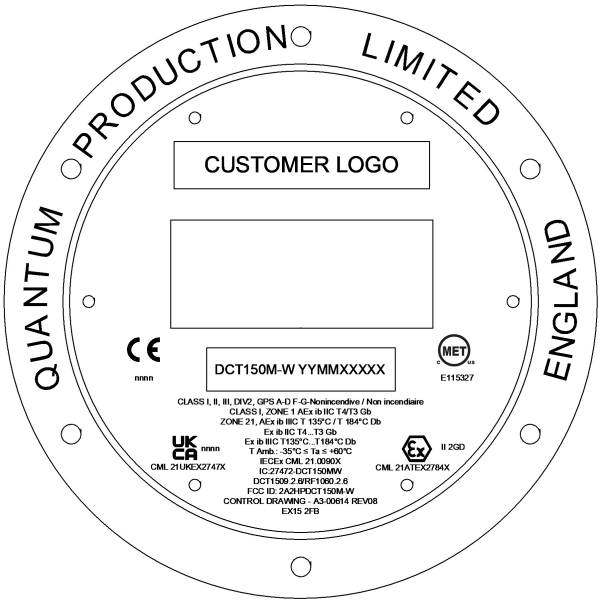

Fig 3

THE FLEXIBLE SENSOR LEAD - PRECAUTIONS

The flexible sensor lead between the sensor housing and the case of the thermometer is NOT ordinary cable. The sensor has to sense temperatures up to +150°C and down to -50°C and the cable has to withstand such temperatures. The cable insulation is a special high temperature material and, when installing, great care must be taken not to damage it.

When fitting the sensor, pay particular attention to the following points:-

1. **Do not pull, tug or stretch the sensor cable and ensure that the lead is not resting or snagged against a sharp edge or trapped between two surfaces**

2. **If the lead is too long, it can be coiled and held together by a high temperature tie-wrap, making sure that the tie wrap used is kept WELL AWAY FROM THE HOT TANK SURFACE.**

3. **After fitting the sensor, make sure that all of the space above the sensor (between the sensor and the outside shell of the tank) is fully thermally insulated.**

4. **The maximum amount of insulation must be fitted around the sensor between the tank and the outer skin to ensure that the sensor is not losing heat to the atmosphere**

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PRODUCT LABELLING

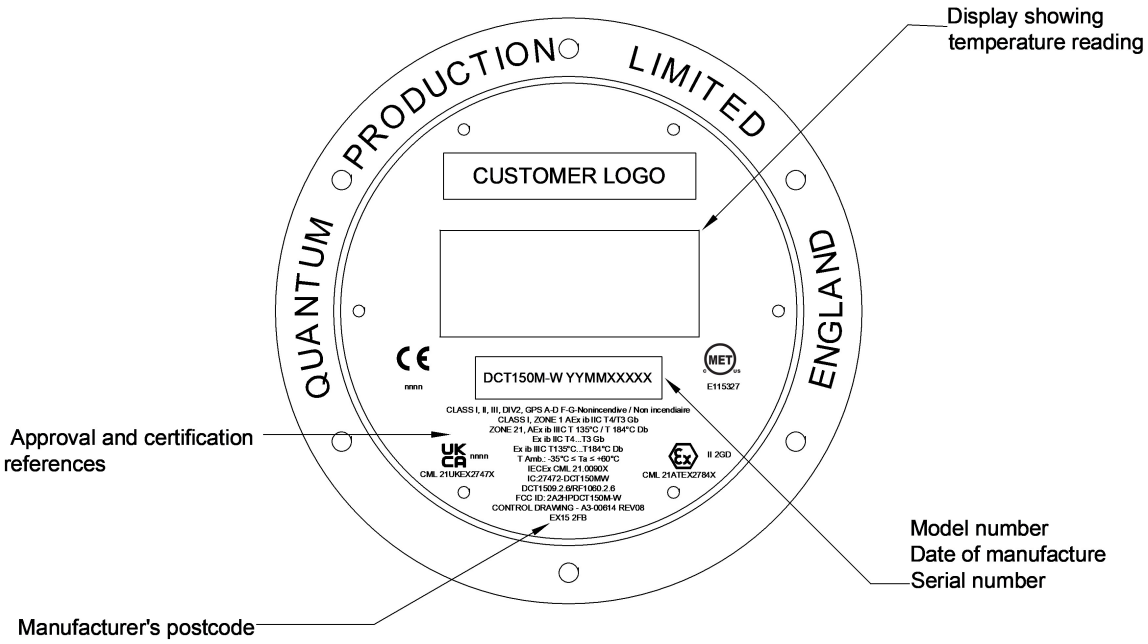

Fig 4

CLEANING

Care must be taken to remove the risk of discharges due to static electricity, so cleaning of the flange and front face of the thermometer should only be undertaken by wiping with a damp cloth. It is not good practice to clean the face of the unit using a dry cloth. Strong solvents should not be used to clean the flange and front face.

MAINTENANCE

The DCT150M-W does not require any user maintenance other than cleaning as indicated above. The face of the unit is permanently sealed to the enclosure and should not be removed. Refurbishment and replacement batteries can be undertaken by returning the unit to Quantum Production Ltd

WARRANTY

The DCT150M-W is guaranteed to be free of manufacturing defects for a period of six years from the date of purchase. To obtain service under this warranty, the instrument should be returned to Quantum Production Ltd. It should be noted that if the DCT150M-W is used in a manner that has not been specified in these instructions, the protection provided by the manufacturer may be impaired.

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SPECIFICATIONS

Range	-50°C to +150°C / 58ºF to 302ºF	
Sensor	PT1000	
Accuracy	°C to +100°C typically 0.9°C +/- one digit 150°C typically 2.0°C +/- one digit 50 °C typically 1.0°C +/- one digit	
Sample Time	Variable - 60 seconds provides typical 7 year life	
Lead Length	1 metre (customised lengths up to 15m available upon request)	
Display	4 Digits, 7 segment LCD (optional Fahrenheit °F configuration)	
Resolution	1°C	
Dimensions	ø150 × 40 mm (rear cut out ø100 mm)	
Fittings	6 fixing holes (ø5 mm) equi-spaced on a 135 mm PCD	
Enclosure	Glass fibre reinforced nylon with fully integrated sealed polycarbonate front face. Sensor enclosed in ø6 mm x 50 mm sheath stainless steel.	
Ingress Protection	IP67	
Serial Number	Displayed on front face with year/month of manufacture in format DCT150M-W-YR/M/SERIAL NUMBER	
Weight	500g	
Energy	Battery Nominal Battery Voltage Battery Capacity Battery Certification	Lithium Thionyl Chloride 3.6V(Nom), (3.9Vdc SC) 4.8Ah UN38.3 Certified
Environmental	Operating Temperature Atex/HAZLOC Ambient Temperature	-50°C ...150°C -35°C ... 60°C
IEEE 802.15.4	Frequency Range	2405 MHz...2480 MHz
Environment	RoHS	WEE/MP3538PZ/SCH

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ATEX Cert No:	CML 21ATEX2784X-Issue 0	2014/34/EU Ex II 2 GD Ex ib IIC T4...T3 Gb Ex ib IIIC T135°C....T184°C Db
UKEX Cert No	CML 21UKEX2747X-Issue 0	UKSI 2016 No. 1107(as amended) Ex II 2 GD EN IEC60079-0:2018/EN60079-11:2012 Ex ib IIC T4...T3 Gb Ex ib IIIC T135°C....T184°C Db
IECEx Cert no	ECEx CML 21.0090X-Issue 0	EN IEC 60079-0:2017/EN60079-11:2011 Ex ib IIC T4...T3 Gb Ex ib IIIC T135°C....T184°C Db
HAZLOC	E115327	IEC/EN/UL/CSA C22.2 no. 60079-0 IEC/EN/UL/CSA C22.2 no. 60079-11 CSA C22.2 no. 213 / UL 121201 UL/CSA C22.2 no. 61010-1 Class I, II, III, Div 2, Gps A-D, FG – Nonincendive / Non incendiaire Class I, Zone 1, AEx ib IIC T4/T3 Gb, Zone 21, AEx ib IIIC T135°C/T184°C Db Ex ib IIC T4/T3 Gb, Ex ib IIIC T135°C/T184°C Db
EMC	ETSI 301 489	EN 55024
FCC	FCC ID	2A2HPDCT150M-W

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

ISED	HVIN	DCT1509.2.6/RF1060.2.6
	Certification Number	IC:27472-DCT150MW

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