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Model DS5000 Dewpoint Monitor

Instruction Manual

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Instruction Manual

for the

DS5000 Dewpoint Monitor

Index

1 General Information

- The DS5000 Monitor is a DIN style panel mounted moisture monitoring device designed to work in conjunction with the DT45 Dewpoint Transmitters.
- The readout of moisture content is displayed on a backlit, 4 digits, seven segment LCD, in any one of **six** selectable engineering units (see DS5000 specification). The selected unit is displayed on a separate seven segment LED.
- The user has the option of displaying pressure corrected or uncorrected moisture values.
- The instrument can be operated from either an AC or DC power source (see DS5000 specification for details).
- The DS5000 operation is controlled by a four-button membrane keypad. The user-friendly software uses a simple menu selection process and incorporates several hot keys to read the transmitter temperature and the two alarm trigger points.
- Two fully customer controllable access security levels.
- The Model DS5000 utilises the advanced DT45 Dewpoint Transmitter, which allows complete interchange ability of transmitters.
- The calibration data is stored within the transmitter and is readable from the DS5000 display.
- The DS5000 can perform auto-calibration and implement offsets on the attached transmitter. All the values are stored on the transmitter retaining the interchangeability of the transmitters.
- The DS5000 has two full range alarms that can be set as rising or falling edge triggered. These alarms are visual (LED), audible and activate changeover relays for remote indication or control.
- The DS5000 also has two independently, variable span, fully controllable linear outputs. 1) 4-20mA and 2) 0 to 5V. The voltage output can be factory set to 0-100mV or 0-1V.
- Details of normal operation, engineering unit selection, transmitter data and configuration of the instrument are described within this manual.

2 Safety Information

Read the safety information below, **before installation.**

2.1 Warning

Hazardous voltages may be present on instrument terminals. The equipment must be installed by suitably qualified personnel and the instrument must be mounted in a position that provides protection, behind the panel, to at least IP20.

2.2 Isolation

The power supply terminals and associated internal circuitry are isolated from all other parts of the equipment in accordance with EN61010-1 for connection to a category II supply (pollution degree2).

Any terminals or wiring connected to the input or output, which are accessible in normal operation, must only be connected to signals complying with the requirements for Safety Extra Low voltage (SELV) circuits.

The mains supply to the instrument must be protected by an external 1-amp fuse and a suitable switch or circuit breaker, which should be near the instrument.

Note: *The instrument contains no user serviceable parts.*

3 Installation

3.1 Installing the Instrument into a Panel

Make a cut-out in the donor panel 138.0 x 68.0mm (DIN 43700).

The maximum panel thickness is 8mm and, if an effective IP65 weatherproof seal is required, the minimum recommended panel thickness is 1.6mm.

Pass the instrument case through the cut-out in the donor panel and attach the two retaining screws to the studs on either side of the case.

Tighten the retaining screws onto the back of the donor panel until the instrument is clamped securely in position. The screws must be tightened sufficiently to affect a seal between the front of the donor panel and the back of the instrument bezel, but never over tightened.

3.2 Instrument Wiring

Wire the DS5000 as per figure 1.1 below.

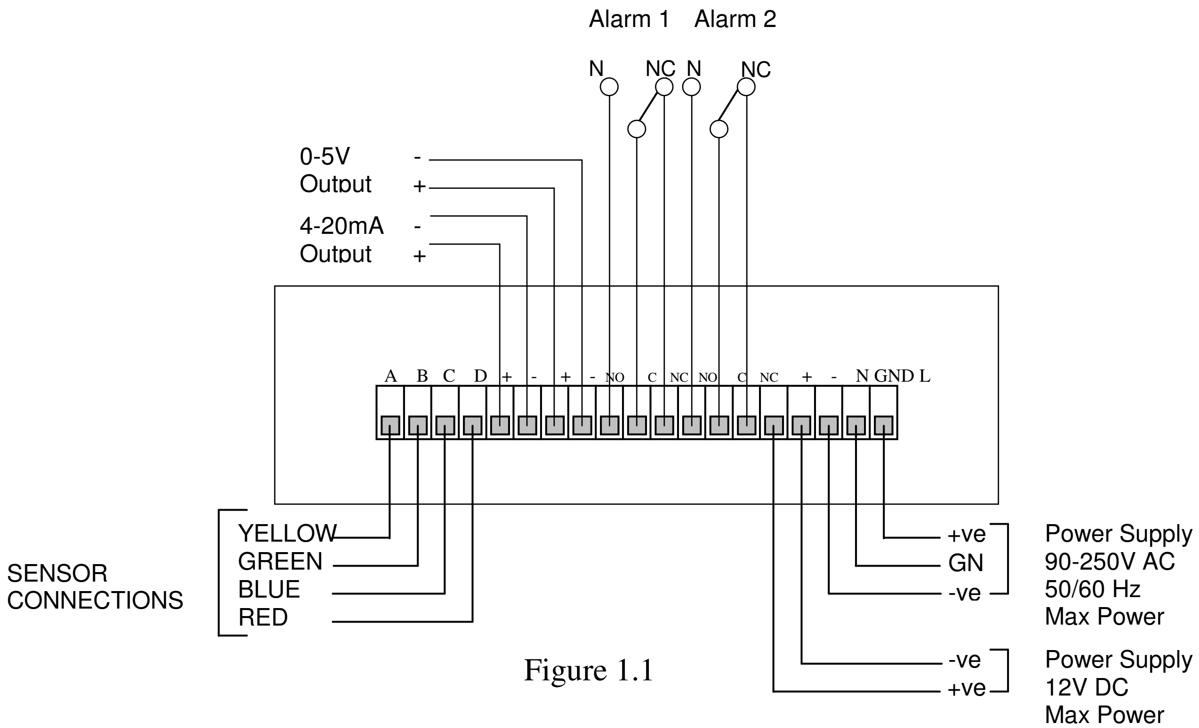


Figure 1.1

3.3 Power Supply Cable

The DS5000 can be powered by either a 90-250V AC or 12V DC supply. Connect the required supply cable to the appropriate terminals as shown in figure 1.1.

The AC power supply should be between 90 and 250V AC @ 50/60Hz.

The power supply wires are retained by screws. Ensure that the exposed section of the wire is fully inserted and that no loose strands are exposed.

3.4 Alarm and Output Cable Connectors: -

Connect the required cables to the appropriate terminals as shown in figure 1.1, noting the normally open and normally closed relay contact positions, and that the correct polarity and the maximum load specification are strictly observed for the analogue outputs.

Ensure that the wire is fully inserted and that no loose strands are exposed.

3.5 Sensor Cable

Connect the sensor cable as shown in figure 1.1. Ensure that the correct colour coding is observed and that the cage is securely clamped onto the bootlace ferrules on the cable provided.

Root the sensor cable to the intended site of the sensor.

4 Installing the Air/Gas Sampling System

The piping installation schematic diagram (see section 4.1) shows all components, which could be used in a dry gas measurement application although not all the items shown will be required for every installation.

Care should be taken to ensure that the sample presented to the measuring sensor is not contaminated with any component that will damage, contaminate or affect the sensor in a way that will impair the system accuracy.

It is strongly recommended that the sample should not contain particulate matter, oil or other heavy hydrocarbon condensate. If these components contaminate the sample system and/or the measuring sensor, the system response time will be lengthened, although the sensor calibration will not be effected.

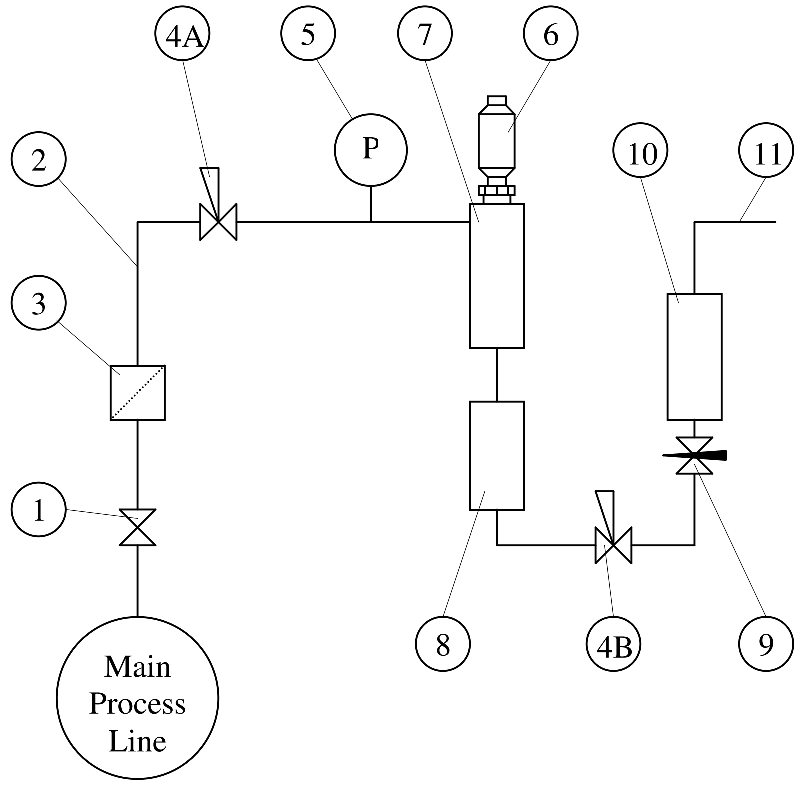
The sample must not contain Ammonia, Chlorine, Ozone or any wet acid vapours or liquid as these will permanently damage the sensor and impair calibration accuracy.

The flow rate, although not critical to the sensor measurement, should be low enough to avoid abrasion to the sensor surface without being so low as to extend the system response time to an unacceptable level. In general, a flow rate of between 2 and 3 litres/min at NTP will give the right balance.

The sensor is a variable capacitor, which is directly affected by changes in partial pressure of water vapour, and these changes, that are proportional to the dew/frost point temperature, are displayed on the instrument indicator.

The measuring sensor can be installed directly into the process line but this does create problems with access for maintenance and calibration. It is for these reasons that we recommend that the sensor be installed in a bypass, fast loop or total loss sample system where the sensor is accessible without interrupting the main process flow line.

4.1 Piping installation Schematic



Notes

a. The sample point should be on the upper surface of the horizontal pipe, or from a vertical section of pipe, wherever possible.

b. The sample tube should run upwards from the sample point. If this is not possible, then an inspection port or drain tap should be installed at the lowest point in the sample system.

4.2 Piping Schematic Component Index

1) Sample Isolation Valve - This is a recommended item as it allows access to the sample system without interrupting the main process line.
2) Sample Tube – This should be stainless steel for dry air or gas applications but copper or carbon steel can be used where wetter gases are to be measured. If any section of the sample tube must be flexible then PTFE should be used. In most cases, 3mm OD (1/8”) is sufficient as it provides good system response time within minimum flow. 6mm OD (1/4”) tube can be used where pressure drops across the 3mm tube are too high
3) Filter Unit – A filter unit is recommended when the samples are likely to contain particulate matter. If the air/gas sample contains heavy hydrocarbon condensate, the filter must be of the coalescing type with a drain. The filter unit should be positioned as close to the sample point as practical.
4) Pressure Reduction Valve or Pressure Regulator – If the sample is to be measured at atmospheric pressure then the valve 4A should be fitted and 4B omitted from the system. If the sample is to be measured, at full line pressure and the exhaust vented to atmosphere, then valve 4B should be fitted and 4A omitted from the system. If measurements are to be taken at full line pressure and the sample is to be returned to a part of the main line or a vent, which is at a pressure higher than atmospheric, and the input to that line needs a controlled pressure then both 4A and 4B will be required.
5) Sample Pressure Gauge – This is not a critical part of the moisture measurement but may be required if Dew/Frost point measurements are to be made at higher than atmospheric pressure.
6) Measuring Sensor.
7) Sensor Holder.
8) Desiccant Chamber – This item is required when the sampling is to be intermittent. When installed it prevents the ingress of wet air to the sample system, while the sample is not flowing, improving the response time.
9) Flow Control Valve – This can be a separate item or combined with the flow indicator.
10) Flow Indicator – The recommended sample flow is 2 to 3 SL/M.
11) Sample Exhaust – The exhaust can be vented to atmosphere or returned to the process line as discussed above.

5 Installing and Commissioning the DT45 Sensor

It is advisable to carry out an initial purge routine of the sample loop, before installing the sensor, in order to remove the possibility of sensor damage on start-up.

Refer to the sample system schematic in section 4.1. Open the inlet isolation valve slowly, until a small flow of air/gas at atmospheric pressure flows through the inlet pipe work to the sensor holder and exhausts through the sensor entry port of the sensor holder.

Allow this purge to continue for about 15 to 20 minutes to remove any residual moisture from the sample pipe work and components.

Close the inlet isolation valve and install the sensor into the sensor holder. Locate and secure the four pin sensor cable connector in positioned on the sensor. Use the locking screw in order to affect a weatherproof seal.

NOTE

The Plug and socket will only locate in one position as the 0V pin is different to the other three pins. However, the plug is designed so that when the retaining collar is loosened the plug can rotate. Take care not to overly twist the wires within the DT45 case.

Open the inlet valve slowly, again and, by opening all valves after the sensor holder, allow a low-pressure purge through the whole sample system. (Note. If a closed by-pass loop is installed, this section of the procedure is not possible).

Set the required pressures and flows within the sample loop.

This completes the installation and commissioning but, on initial start-up, it could take several hours for the system to reach equilibrium.

The instrument will now indicate the dewpoint of the air/gas surrounding the sensor, at sensor pressure and the analogue outputs will be giving voltage and mA signals proportional to the indicated dewpoint.

6 Default Instrument Configuration

The standard factory settings are as follows

- The instrument will display the moisture content in ^{o}C Dewpoint.
- Both alarms are set to trigger when rising above 20^{o}C.
- The internal buzzer is set to on.
- The pressure compensation value is set at 0Barg.
- The 4-20mA output is set to the full range of the transmitter e.g. 4mA = -80^{o}C
20mA = 20^{o}C
- The voltage output is set to the full range of the transmitter e.g. 0v = -80^{o}C
5v = 20^{o}C
- All ACAL calibrations are removed.
- All offsets are removed.
- All security codes are disabled.

7 Resetting the DS5000

It is possible to reset the DS5000 to factory set conditions by powering up the unit while any one of the four front panel keys is pressed. See ‘Default Instrument Configuration’ above for details of the default values.

8 Programming the DS5000

8.1 Principle of Entering Numerical Data

Wherever a numerical number has to be entered into the DS5000 the following text will be found. “Use the ‘▲’, ‘▼’, ‘↪↩’, & ‘↵’ keys to enter ……”. The basic principle used to enter numerical values (integer and floating point) is described here.

The first character of the LCD display flashes to indicate it is active. Use the ‘▲’ and ‘▼’ keys to select the required number between 0 and 9 (-1 and 9 in some engineering units) then press the ‘↪↩’ key to make the second character flash. Use the ‘▲’ and ‘▼’ keys to select the required number between 0 and 9 then press the ‘↪↩’ key to make the third character flash. Continue this process until all four characters are entered. In the case of a floating-point numbers, press the ‘↪↩’ key again makes the decimal point (dp) active. Use the ‘▲’ and ‘▼’ keys to position the dp in the required position. A subsequent press of the ‘↪↩’ key makes the first character active again. Pressing the ‘↵’ key at any point confirms the numerical value.

> **Note –** The Passwords used within the DS5000 are made off four integers and does not use the dp.
>
> **Note** – The only way to leave the numerical part of this routine without saving it is to allow the 60-second timeout to occur.

9 Configuring the DS5000

To activate the Systems Menu press the key sequence ‘↵’ ‘↪↩’ ‘↵’. This will display the ‘**SYS**’ message on the LCD as portrayed in the System Menu Map (see Appendix A). Pressing the ‘↵’ key again enters the system menu map at the ‘**unit**’ screen on the base level. There are 11 base level options described below:

> **Note:** The default set-up will go directly from the SYS message to the unit screen. However, if the user has set a SYS password, then the user is prompted to enter the correct password before continuing on to the base level.
>
> **Note:** Most of the screens within the menu have an active 60-second timeout. Therefore, if no keys are pressed within this period the unit reverts automatically to normal operation. In most cases where the 60-second timeout occurs, changes made are not implemented.

9.1 unit

Description - The unit menu option allows the user to select the required engineering units (See DS5000 Specification section 14 for details). **Once the engineering unit is selected the DS5000 will only display and accept inputs in that chosen unit.**

The current engineering unit is displayed in the seven segments LED during normal operation

> **Note:** When the engineering unit is altered, the LCD display changes to show the current moisture level in the selected unit.

Operation – While '**unit'** is displayed press the '↵' key to enter the subroutine. The LED now flashes the currently selected engineering unit while the LCD display shows the corresponding moisture level. Use the '↪↩' key to scroll through the options until the required unit is flashing on the LED. Press the '↵' key to select the new engineering units. Pressing the '▲' key at any time reverts to the ' **unit**' screen without saving any unit changes.

> **Note:** See DS5000 Specification for detailed information on Engineering Units.

9.2 AL 1 & 2

Description – The AL 1 & 2 menu option allows the user to set 2-alarm trigger points. The trigger points can be any value within the operating range of the currently selected engineering units. The alarm triggers can be either a risings moisture levels (Hi), or a falling moisture levels (Lo).

Operation – While '**AL 1** or **AL 2**' are displayed pressing the ' ↵' key enters the subroutine. The LCD now displays either '**Hi**' or ' **Lo**'. Use the ' ↪↩' key to select the required option and then press the '↵' key.

> **Note** - If the '▲' key is pressed instead of the ' ↵' key the DS5000 will return to the ' **AL 1 or AL 2**' screen on the base level, without saving any changes.

Once the '↵' key is pressed, ' **SET1** or **SET 2**' will be displayed. The user can now escape using the '▲' key or continue by pressing the ' ↵' key. The current or default trigger point value is displayed. Use the '▲', ' ▼', ' ↪↩', & ' ↵' keys to enter the required trigger point. Pressing the '↵' key confirms the alarm settings and returns to the ' **AL 1** or **AL 2**' display.

> **Note** – The only way to leave the numerical part of this routine without saving is to allow the 60-second timeout to occur.

9.3 bELL

Description – The bELL menu option allows the user to set the internal buzzer to On or Off.

Operation – While '**bELL**' is displayed press the ' ↵' key to enter the subroutine. The LCD now displays either '**On**' or ' **OFF**'. Use t he '↪↩' key to select the required option and then press the '↵' key. If the ' ▲' key is pressed instead of the ' ↵' key, the DS5000 will return to the '**bELL**' screen on the base level, without saving any changes.

9.4 PrES

Description – The PrES menu option allows the user to enter the line pressure and sensor pressure in PSIg, barg**,** Mpa (PAS) or kg/cm^2 (gcS), so that the displayed absolute moisture readings (PPMv, PPBv, g/m^3 and lb/MMSCF) can be pressure corrected and pressure dewpoint can be displayed. When a pressure has been entered into the DS5000 the LED display alternates between the current engineering unit and a '≡' icon to indicate the data displayed is pressure corrected.

Operation – While '**PrES**' is displayed press the '↵' key to enter the subroutine. Use the '↪↩' key to run through the pressure options, until the required units are displayed. Press the '▲' key to escape or the '↵' key to move to the next screen. Use the '↪↩' key to select either line pressure '**LP**' or sensor pressure '**SP**' and then press the '↵' key. Use the '▲', '▼', '↪↩', & '↵' keys to enter the required pressure value. Pressing the '↵' key confirms the entered value and returns to the '**LP**' or '**SP**' option screen. The user then has the option of entering the other pressure or escaping using the '▲' key.

> **Note –** See section 11 on Pressure Correction for more detailed information.

> **Note** – The only way to leave the numerical part of this routine without saving is to allow the 60-second timeout to occur.

9.5 4-20

Description – The 4-20 menu option allows the user to set the operating range over which the 4-20mA output will span. The default setting is for the output to cover the full operating range of the transmitter e.g. 4mA to equal –80°C and 20mA to equal 20°C. However, it is possible to set a more focused span, such as 4mA to equal –60°C and 20mA to equal –20°C.

Operation – While '**4-20**' is displayed press the '↵' key to enter the subroutine. The LCD now displays either '**Hi**' or '**Lo**'. Use the '↪↩' key to select the high or low range limit whichever is required, and then press the '↵' key.

> **Note** - If the '▲' key is pressed instead of the '↵' key the DS5000 will return to the '**4-20**' screen on the base level.

The LCD will now display the current High or Low range value. Use the '▲', '▼', '↪↩', & '↵' keys to enter the new value. Pressing the '↵' key confirms and **saves** the new range setting and returns to the '**Lo**' or '**Hi**' display. The other range limit can now be set by following the same process if required. Pressing the '▲' key returns to the '**4-20**' display.

> **Note –** Once the enter key is pressed to set either the high or low range limit, that value is written to memory and will not revert to the previous value even if the 60 second timeout occurs.

9.6 VoLt

Description – The VoLt menu option allows the user to set the operating range over which the 0-5v output will span. The default setting is for the output to cover the full operating range of the transmitter e.g. 0v to equal –100°C and 5v to equal 20°C. However, it is possible to set a more focused span, such as 0v to equal –60°C and 5v to equal –20°C.

Operation – While '**VoLt**' is displayed press the '↵' key to enter the subroutine. The LCD now displays either '**Hi**' or '**Lo**'. Use the '↪↩' key to select the high or low range limit whichever is required, and then press the '↵' key.

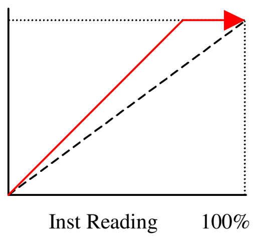
> **Note** - if the '▲' key is pressed instead of the '↵' key the DS5000 will return to the '**VoLt**' screen on the base level.

The LCD will now display the current High or Low range value. Use the '▲', '▼', '↪↩', & '↵' keys to enter the new value. Pressing the '↵' key confirms and **saves** the new range setting and returns to the '**Lo**' or '**Hi**' display. The other range limit can now be set by following the same process if required. Pressing the '▲' key returns to the '**VoLt'** display.

> **Note –** Once the enter key is pressed to set either the high or low range limit, that value is written to memory and will not revert to the previous value even if the 60 second timeout occurs.

9.7 ACAL

Description – The ACAL menu option allows the user to Auto Calibrate any DT45 transmitter using the DS5000. Although the process is controlled and driven from the DS5000, the Auto Cal values are stored and implemented in the transmitters, thus allowing complete interchange ability of transmitters. Before starting this procedure, ensure that the DT45 has been exposed to a known steady state moisture level for at least 10 minutes.



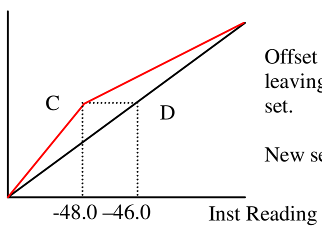
ACAL adjusts slope of curve.

New settings stored in sensor.

Operation – While '**ACAL**' is displayed press the '↵' key to enter the subroutine. If the DS5000 is set-up to require a security code, the LCD now displays '**codE**' for 2 seconds followed by '**0000**'. Use the '▲', '▼', '↪↩', & '↵' keys to enter the current ACAL security code. If no code is required or the correct code is entered the LCD changes to '**rEF**' followed 2 seconds later by '**0000**'. Use the '▲', '▼', '↪↩', & '↵' keys to enter the moisture level at which the Auto Calibration is being performed. When the '↵' key is pressed, the DS5000 performs the Auto Calibration process on the DT45, which takes approximately 5 seconds during which time '**CAL**' flash's on the LCD. The word 'SEt' is then displayed on the LCD until the '↵' key is pressed. The '↵' ke y implements the Auto Calibration results and exits the System Menu.

9.8 oFSt

Description – The oFSt menu option allows the user to superimpose an offset upon any DT45 transmitter using the DS5000. Although the process is controlled and driven from the DS5000, the offset values are stored and implemented in the transmitters, thus allowing complete interchange ability of transmitters.



Offset adjusts 1 point on the curve leaving upper and lower limits as set.

New setting stored in transmitter

Operation – While ‘**oFSt**’ is displayed press the ‘ ↵’ key to enter the subroutine. If the DS5000 is set-up to require a security code, the LCD now displays ‘**codE**’ for 2 seconds followed by ‘**0000**’. Use the ‘ ▲’, ‘ ▼’, ‘ ↪↩’, & ‘ ↵’ keys to enter the current oFSt security code. If no code is required or the correct code has been entered the LCD changes to ‘**crnt**’ (offset position) followed 2 seconds later by ‘**0000**’. Use the ‘ ▲’, ‘ ▼’, ‘ ↪↩’, & ‘ ↵’ keys to enter the value at which the offset is to be implemented. The LCD then changes to ‘**nu**’ (offset value) followed by ‘**0000**’. Use the ‘ ▲’, ‘ ▼’, ‘ ↪↩’, & ‘ ↵’ keys to enter the new value for the offset. The LCD changes to the word ‘**donE**’ and then exits the System Menu 5 seconds latter.

> **Note: to remove an offset, simply re-input the values in the reverse order.**

9.9 CodE

Description – The CodE menu option allows the user to alter the security passwords used to protect the SYS, ACAL and oFSt routines.

Operation – While ‘**CodE**’ is displayed press the ‘ ↵’ key to enter the subroutine. The LCD now displays ‘**SYS**’. Use the ‘ ↪↩’ key to select the security password to be changed, and then press the ‘↵’ key.

> **Note** - If the ‘▲’ key is pressed instead of the ‘ ↵’ key the DS5000 will return to the ‘ **CodE**’ screen on the base level.

The LCD displays ‘**OLd**’ for 2 seconds before displaying ‘**0000**’. The user is then required to enter the current security password. Use the ‘▲’, ‘ ▼’, ‘ ↪↩’, & ‘ ↵’ keys to enter the password. Pressing the ‘↵’ key triggers the DS5000 to compare the entered code with the stored code. If the two codes match, the LCD displays ‘**nu**’ for 2 seconds before displaying ‘**0000**’. Use the ‘ ▲’, ‘ ▼’, ‘ ↪↩’, & ‘ ↵’ keys to enter the new security password. The LCD then displays the word ‘**donE**’ to indicate that the new security password has been stored in memory. The screen then reverts to ‘**CodE**’ 5 seconds latter.

> **Note:** If the entered ‘old’ code is not the same as the stored code the user is sent back to the ‘ **CodE**’ screen.

9.10 InFo

Description – The InFo menu option is as an aid in fault finding as well as a means of displaying several key pieces of information with regard to the transmitter and DS5000.

Operation – While ‘**InFo**’ is displayed press the ‘ ↵’ key to enter the subroutine. The LCD will now display the software version number e.g. ‘**v0.18**’. Each press of the ‘↪↩’ key will display a new piece of information. Pressing the ‘▲’ key at any time will return to the base level. The information is displayed in the following table: -

9.10.1 **InFo-**rmation Details

LCD Display	Example	LED Display
Software version.	V0.18	Blank
Transmitter Serial Number - upper digits.	Sn20	S
Transmitter Serial Number – lower digits.	-207	S
Transmitter Lower Range.	-80.0	L
Transmitter Upper Range.	20.0	U
ACAL value.	0.1	A
ACAL point	4.7	r
Offset Implementation Point.	-52.0	P
Offset Value.	-40	o
If both offset values are the same, or 0, then there is no current offset.		
Current Engineering Units.	C	E
Alarm 1 trigger (Hi or Lo).	Hi	1
Alarm 1 value.	20.0	1
Alarm 2 trigger (Hi or Lo).	Lo	2
Alarm 2 value.	-20.0	2
Bell on / off.	On	b
Pressure Units.	BArg	Ξ
LP Pressure value.	0.0	ıı
SP Pressure value.	0.0	⊓
4-20mA Lo range.	-80.0	4
4-20mA Hi range.	20.0	·4
Voltage Lo range.	-80.0	v
Voltage Hi range.	20.0	·v

10 Normal Operation of the DS5000

In normal operation, the DS5000 will display the current value as received via RS485 from the connected DT45 transmitter. The value is updated once per second and is displayed in the currently selected engineering units, which is indicated by the LED.

If a pressure has been entered into the DS5000, the LED will alternate between the symbol for the currently selected engineering units and the '≡' icon. This indicates that the m oisture values displayed on the LCD have been pressure corrected.

The Alarm LED's (AL 1 & AL 2) will light whenever an alarm condition occurs and only turn off when the alarm condition clears. The DS5000 has an internal buzzer, which also sounds whenever an alarm condition occurs. The buzzer can be muted by pressing the '↵' key. The buzzer automatically shuts off whenever an alarm condition clears.

Remote signalling of an alarm condition is provided by two internal changeover relays that trigger at the same time as the LED's. These relays are none latching and automatic ally shutoff whenever the alarm condition clears.

It is possible during normal running to review the Alarm trigger points and the current transmitter temperature without interrupting the monitoring process. Whenever a review is activated, the LCD displays the requested value for 3 seconds before returning to the normal Dewpoint reading.

- To review the AL 1 trigger point press the '▲' key for 2 seconds.
- To review the AL 2 trigger point press the '▼' key for 2 seconds.
- To review the transmitter temperature, press the '↳⮌' key for 2 seconds.

11 Pressure Correction

When either °C or °F dewpoint units are selected, the display always showsthe dewpoint at the 'Line Pressure' entered in the 'Set -up' menu.

All calculations to other engineering units are made from the 'Sensor Pressure' entered in the 'Set-up' menu.

It is therefore critical that the correct pressures are entered in the 'Set-up' menu in order that the displayed values are correct.

11.1 Examples

- If a sensor is installed at atmospheric pressure and the instrument is required to display line pressure dewpoint at 8 Barg;
  LP (Line Pressure) should be entered as 8.0 and SP (Sensor Pressure) should be entered as 0.0.
- If a sensor is installed at line pressure (8.0Barg) and the instrument is required to display atmospheric pressure dewpoint;
  LP should be entered as 0.0 and SP should be entered as 8.0.
- If the instrument is required to display dewpoint at the installed sensor pressure then the LP and SP should be both the same and equal to the sensor pressure.
  At 8Barg line pressure, both LP and SP should be entered as 8.0.
- Where the instrument is required to display any other engineering unit, the LP value is irrelevant but the installed sensor pressure should be entered.

12 Monitoring the System

The system is designed to operate continuously, with a minimum amount of operator input.

It is, however, advisable to inspect the sample loop periodically to ensure that the required pressures and flows are being maintained.

While the sensor should give several years operation, it is advisable to have the calibration verified, from time to time, to ensure accurate operation of the system. Please refer to your local dealer for recalibration information.

The number and type of items employed in the sample loop will determine what, if any, other routine checks should be made. If, for instance, a filter is used, the filter element should be inspected periodically and changed when necessary.

The instrument should not require any routine maintenance but if any malfunction is suspected it is advisable to contact your local dealer.

Should it be necessary, at any time or for whatever reason, to change either the instrument or sensor, it should be noted that the components of the DS5000/DT45 system are completely interchangeable.

13 Faults/Errors

If the sensor is short-circuited the display will read '**Shrt**', the voltage output will drive to full scale, the current output will drive to 24mA and both alarms/relays will trip.

If the sensor is open-circuited, the display will read '**oPEn**', the voltage output will drive to full scale, the current output will drive to 23.5mA and both alarms/relays will trip.

If communication with the transmitter is lost for a minimum of 20 seconds, the display will read '**conS**', the voltage output will drive to full scale, the current output will drive to 23mA and both alarms/relays will trip.

If the sensor is wetted beyond its upper limit or the moisture reading is above the selected units upper limit, the display will read '**ovEr**', alternating with the upper display limit, or transmitter range, at 0.5Hz.

If the sensor is dried beyond its lower limit or the moisture reading is below the selected units lower limit, the display will read '**Undr**', alternating with the lower display limit, or transmitter range, at 0.5Hz.

> **Note:** When an alarm trips the internal buzzer is sounded and the associated relay also trips. Only the buzzer can be disabled in the system menu.

13.1 Other Error mesages

'**Err1**' = Alarm point set outside operating range of sensor
'**Err2**' = 4mA o/p setting is greater than 20mA o/p setting
'**Err3**' = 0v o/p setting is greater than the 5v o/p setting.
'**Err4**' = Offset greater that 2 0°C or equivalent in other Engineering Units.
'**Err5**' = Sensor has been Auto Calibrated beyond 50% of its original range. Return for calibration.

14 DS5000 Specification

Transmitter:	Compatible with the DT45 dewpoint transmitter. Autocal and Offset corrections stored in the transmitter.
Enclosure:	DIN Style, 144mm wide, 72mm high by 116mm deep.
PCB Layout:	General PSU PCB and Display PCB to fit the DIN enclosure.
Display:	Four characters, transmissive, backlit LCD display. Largest positive number 9999. Largest negative number –199.

Alarm & Range Limits:

	Upper Limit	Lower Limit
°C Dewpoint	20.0	-120.0
°F Dewpoint	68.0	-184.0
P(PPM)	9999	0.001
b(PPB)	9999	0.001
L(lb/MMSCF)	1000	0.001
g(g/m3)	15.0	0.001

Front Panel:	A membrane keyboard with four keys and four windows for the four character LCD, the single character seven segment LED and the two alarm LED's.
Pressure Correction:	Software pressure correction implemented.
Power Supplies:	Universal 90 – 250VAC 50/60hz or 12VDC.
Alarms:	Two single pole changeover contacts (NO/C/NC), rated at 10A at 240VAC. Alarm trip at set point with 0.1°C (or equivalent) hysteresis to eliminate relay chatter.
Audible Beeper:	Continuous sound when either Alarm 1 or Alarm 2 trip. Silenced when '↵' key pressed. Also sounds when faults or errors occur.
Analogue Outputs:	There are two linear outputs with separate terminals. Isolated 4-20mA and isolated 0–5v as standard. The span of the outputs can be set by software control. 0-1v and 0-100mv voltage outputs can be supplied factory set.
Temperature Range:	Electronics -10°C to +60°C Transmitter -10°C to +50°C
EMC:	Designed to meet the EMC and LVD directives.

Diagnostics:

Transmitter Open Circuit:	'**oPEn**'
Transmitter short Circuit:	'**Shrt**'
Comms Error:	'**conS**

15 Appendix A – Software Menu Map