D-CAL
CONFIGURATOR

How can we help you?

Technical Datasheets and IOM Instructions for all Delta Mobrey pressure and temperature measurement products are available from our website at www.delta-mobrey.com.

For Service and Repair enquiries, please contact the Sales Engineering Teams on +44 (0) 1252 729140 or email sales@delta-mobrey.com.

OPERATING MANUAL

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WARRANTY

We guarantee this instrument against faulty workmanship and material for a period of one year from the date of delivery. The company undertakes to repair, free of charge, ex-works any instrument found to be defective within the specified period provided the Instrument has been used within the specification in accordance with these instructions and has not been misused in any way. Detailed notice of such defects and satisfactory proof thereof must be given to the company immediately after the discovery and the goods have to be returned free of charge to the company, carefully packed and accompanied by a detailed failure report.

HEALTH AND SAFETY

To comply with health and safety requirements, any returned instrument must be clean and safe to handle and accompanied by a formal statement to that effect duly signed by an authorised officer of the user company. Any instrument returned without certification will be quarantined and no action will occur until cleared. We reserve the right to refuse to handle, and to return to the user, subject to transportation charge, any instrumentfor which a declaration of safety is not received.

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NOTE

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Commissioning and Set-up Examples

How to Trim the 4 to 20 mA current loop.
Objective:- To trim the current loop to match site standards.

From Monitor mode:-	the transmitter will display	{VIEW}
Press **[CHANGE]**		{ACCESS 1}
Press **[CHANGE]**		{ACCESS 2}
Press **[SELECT]**		{INPUT}
Press **[CHANGE]**		{OUTPUT}
A ⇨ Press **[SELECT]**		{FIXLOOP}
Press **[SELECT]**	Follow the instructions for FIXLOOP, set the loop to 4.00 mA. **CAUTION** the analogue output is now fixed and independent of the applied pressure.	
Press **[SELECT]**	Return to FIXLOOP	{FIXLOOP}
Press **[CHANGE]**		{TRIMLOOP}
Press **[SELECT]**		{TRIM 4 mA}
Press **[SELECT]**	Follow the instructions for trim 4 mA	
Press **[SELECT]**		{TRIM 4 mA}
Press **[CHANGE]**		{TRIM 20 mA}
Press **[CHANGE]**		{ESCAPE}
Press **[SELECT]**		{TRIMLOOP}
Press **[CHANGE]**		{ESCAPE}
Press **[CHANGE]**		{FIX LOOP}
Press **[SELECT]**	Follow the instructions for FIXLOOP, set the loop to 20.00 mA.	
Press **[SELECT]**	Return to FIXLOOP	{FIXLOOP}
Press **[CHANGE]**		{TRIMLOOP}
Press **[CHANGE]**		{TRIM 4 mA}
Press **[CHANGE]**		{TRIM 20 mA}
Press **[SELECT]**	Follow the instructions for trim 20 mA	
Press **[CHANGE]**		{TRIM 20 mA}
Press **[CHANGE]**		{ESCAPE}
Press **[SELECT]**		{TRIMLOOP}
Press **[CHANGE]**		{ESCAPE}
Press **[CHANGE]**		{FIX LOOP}
Press **[SELECT]**	Follow the instructions for FIXLOOP, set the loop to 0.00 mA and the loop will be released.	

Note 1 If the difference in analogue output to site standard is large, the above procedure may need to be repeated to correct the error. Restart the procedure from "A".
Note 2 The loop may also be released by command {RESET} in ACCESS1.
Note 3 On Version 5.00 and later, FIXLOOP times out after 20 minutes.

Commissioning and Set-up Examples

How to change the engineering units.

Objective:- Change the engineering units from the default, pascals, to Bar.

From Monitor mode:-		
Press **[CHANGE]**	the transmitter will display	{VIEW}
Press **[CHANGE]**		{ACCESS 1}
Press **[SELECT]**		{INPUT}
Press **[SELECT]**		{PV UNITS}
Press **[SELECT]**		{Pascal}

Press **[CHANGE]** The display will flash the next available unit, press change until, Bar is displayed, press and hold select for two seconds to save the new units. All engineering units will be displayed with the new selection.

How to set the range of a 0 to 10 Bar instrument.

Objective:- Re-range the transmitter 0 to 3 Bar, without reference to a pressure source

From Monitor mode:-		
Press **[CHANGE]**	the transmitter will display	{VIEW}
Press **[CHANGE]**		{ACCESS 1}
Press **[SELECT]**		{INPUT}
Press **[SELECT]**		{PV UNITS}
Press **[CHANGE]**		{RANGEHI}
Press **[SELECT]**		{10.000 BAR}

Press **[CHANGE]** The display will clear, the first character will flash.
The new URV can now be set to three bar, the value is entered in the selected engineering units.

Use the change and select keys to enter the value, select the sign first, (+), then repeatedly press change until the desired character is displayed, (3), select it, repeatedly press change until the decimal point character is shown, (o), select it, repeatedly press select until the last character is flashing, when select is pressed the whole display will flash, press and hold select for two seconds to save the new value.
The URV of the transmitter is now set to 3.0 Bar, the instrument will output 20 mA for an input pressure of 3.0 Bar.
If the instrument is re-ranged with reference to a pressure source, the digital display may need to be trimmed using TRIM URV, TRIM LRV to match a site pressure standard. This can improve the accuracy at large turndowns; the accuracy of the pressure source used for reference must be considered.

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We, Delta Mobrey Limited,
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as the manufacturer of the apparatus listed, declare under our sole responsibility that the products listed below

Pressure Transmitters **A - 2HT, 4 - 2HT, F - 2HT, R - 2HT**

to which this declaration relates are in conformity with the following standards or other normative documents

EN 50 082-2 : 1992
EN 50 081-1 : 1992

and thereby conform with the requirements of Council Directive 89/336
Authorised by R B Harrison, Managing Director

DOCUMENT CONVENTIONS

This manual uses the following typographical conventions to describe the functionality of the transmitter. The blind instrument has two buttons, marked ZERO and SPAN. The D-CAL has two buttons, marked SELECT (SAVE) and CHANGE

Convention	Description	Function
[**ZERO**] [**SPAN**]	Bold and bracketed denotes a single operation of a key. Press and hold for around two seconds	Used to set the LRV and URV of the blind transmitter
[**SELECT**] [**CHANGE**]	Denotes a single, short operation of a key on the local display unit	Used to navigate the menu system, and request a change to an entry.
[[**SELECT**]]	Bold and double bracketed Press and hold for around two seconds	The save function used to store a change to the EEprom The screen will respond with {SAVED}
{MENU}	The menu option bracketed, e.g. {RANGELO}	Used within this manual to show how a command or other message is displayed within the menu.

When the keys, or functions, are discussed within the text they will be referred to by their name in lower case, without brackets. The zero and span buttons are mounted on the upper board, while the select and change buttons are part of the display module.

{ACCESS 2}[SELECT]

Once select is pressed the state of the password is shown either enabled or disabled press [**CHANGE**] until the desired state is shown.

There are now two options :-

[**SELECT**] To abort and return to the {ACCESS 2} menu.
[[**SELECT**]] Used to save the new state.
When {SAVED} is displayed press [**SELECT**] to return to {ACCESS 2}.

Once the access level has been enabled the password can be checked or changed.

From {PASSWORD}{ACCESS 2} :-

[**SELECT**]{ENABLED}[**SELECT**]{2222}

The first character will be flashing, use the change and select keys to enter the password

number you require. When the last character is set the display will flash.

There are now two options :-

[**SELECT**] Press briefly to abort and return to the {ACCESS 1} menu.
[[**SELECT**]] Press and hold to save the new code.
When {SAVED} is displayed press [**SELECT**] to return to {ACCESS 1}.

DO NOT FORGET TO LOG YOUR NEW PASSWORD

DATE	SHIPPED			
ACCESS 1	1111			
ACCESS 2	2222			

{ACCESS 2}

READ THIS SECTION BEFORE ENABLING THE PASSWORD

{PASSWORD}[**SELECT**]

The password function controls access to the menu levels of the transmitter. It acts only on the local D_CAL configurator, but can be turned on or off both locally and remotely. It is assumed that where the transmitter forms part of an extended HART® system, that the system itself or local site disciplines will ensure that only authorised operatives gain access. If changes are made in a restricted menu, the transmitter will automatically abort to monitor mode after 5 minutes. The transmitter is shipped with the passwords set to 1111 and 2222 respectively, but not enabled. If the numbers are changed and not recorded there is no way access can be gained. If this happens Delta can supply a unique secondary ACCESS 2 code.

{ACCESS 1}[**SELECT**]

Once select is pressed the state of the password is shown either enabled or disabled. Press [**CHANGE**] until the desired state is shown.

There are now two options :-

[**SELECT**] Press briefly to abort and return to the {ACCESS 1} menu.
[[**SELECT**]] Press and hold to save the new state.
When {SAVED} is displayed press [**SELECT**] to return to {ACCESS 1}.

Once the access level has been enabled the password can be checked or changed.

From {PASSWORD}{ACCESS 1} :-

[**SELECT**]{ENABLED}[**SELECT**]{1111}
The first character will be flashing, use the change and select keys to enter the password number you require. When the last character is set the display will flash.

There are now two options :-
[**SELECT**] To abort and return to the {ACCESS 1} menu.
[[**SELECT**]] Used to save the new code.
When {SAVED} is displayed press [**SELECT**] to return to {ACCESS 1}.

DO NOT FORGET TO LOG YOUR NEW PASSWORD

DOCUMENT CONVENTIONS

When commands are described in this manual, a set format is followed. At the top of the page, the access level is shown, e.g. **{ACCESS2}**

What you see on the screen is shown in “curly” brackets, e.g. {RANGEHI}, followed by a short explanation of the commands functionality or special points to note.

You then press [SELECT], [CHANGE] or [[SELECT]] as required - see page 4.

The manual explains the edits or changes that can be made, and how to return to the menu .

If you get lost within the menu system the layout on page 12 - 13 gives a full over view.

Please note :- *After 5 minutes the display returns to monitor mode automatically.*

Display and Edit Functions

All commands and functions are displayed as eight characters for clarity. Where messages, descriptions or values with engineering units are shown that require more than eight characters, the display will scroll or toggle.

Once a menu options value is displayed and the change button pressed, edit mode is activated.

There are four forms of editing, used for different functions :-

1. Template, Used for {TRIMLOOP}
2. Scrolling, Used to enter values that are longer than the display {DESCRIPT}
3. Text, Used to edit the text strings and messages that fit on screen {TAG}
4. Choice, enable \ disable, Used for turning functions on and off {SHOWHART}

All of these edits used the change and select keys in the same way, change to cycle the digits to the one you want, select to move to the next character, when the display flashes [[**SELECT**]] to save, [**SELECT**] to abort.

LOCAL DISPLAY

PERFORMANCE SPECIFICATION :-

The local display / configurator is not connected via the signal loop, but accesses the micro processor directly. This allows the unit to display a digital representation of the measured
variables and settings without the inaccuracies or loop loading or an analogue meter.

Temperature Effect :- The local display can operate over the range -30 to +85, but at very low temperatures the display slows down to allow the characters to be displayed properly, this is controlled by the microcontroller.

Response Time :- This is dependent upon menu option and temperature but is typically less than 1 second.

RFI Effect :- The display is fully protected against RFI effects.

Switch Life :- 10,000,000 operations

PHYSICAL SPECIFICATION :-

The local display / configurator is connected to the top board using a 10 way IDC connector which carries the information and power to the unit. The case is constructed of 316 stainless steel and has a keyboard overlay and 'O' ring seal that gives it protection to IEC IP65 with the lid removed. The keyboard is resistant to most industrial solvents and has full EMI protection. If the overlay becomes damaged on site the overlay may be replaced in the field.

The display can be turned to any angle within the enclosure to suit the mounting position, this will not affet the accuracy or protection rating. When the display is fitted the lid has a clear glass window fitted, scratch resistant and impact resistant to seven joules.

Weight:- Add 200 grams (0.44 lb) to instrument.

{ACCESS 2}

To perform the next two steps the use of a suitably calibrated DMM is required. The loop current is monitored and entered into the transmitter, the unit then uses this as an offset to calibrate its output. Because the process is iterative trim 4 mA and trim 20 mA may have to be repeated if the error is excessive

L **CAUTION** Make sure that the loop is isolated or safe !!

{TRIMLOOP}[**SELECT**]{TRIM 4 mA}[**SELECT**]

This command will be rejected if FIXLOOP has not been set to 4.00 mA

An edit template is displayed, enter the reading from the DMM.

When change is pressed the first character starts to flash, change cycles the numerals while select moves to the next character. When the last numeral is reached the whole display flashes and you have two choices.

[**SELECT**] Aborts the edit and returns to {FIXLOOP}
[[**SELECT**]] Performs the [**SAVE**] function and resets the loop current.
The DMM should show the corrected reading.

{TRIMLOOP}[**SELECT**]{TRIM 20 mA}[**SELECT**]

This command will be rejected if FIXLOOP has not been set to 20.00 mA

An edit template is displayed, enter the reading from the DMM.

When change is pressed the first character starts to flash, change cycles the numerals while select moves to the next character. When the last numeral is reached the whole display flashes and you have two choices.

[**SELECT**] Aborts the edit and returns to {FIXLOOP}
[[**SELECT**]] Performs the [**SAVE**] function and sets the loop current.
The DMM should show the corrected reading.

The FIXLOOP and trim functions are used to remove any differences between calibration and site current standards. The electronics generates and monitors the output current continuously but variations in site standards may require the output gain and zero to be trimmed. The FIXLOOP command may also be used to calibrate other instruments and controllers within the loop, by controlling the current within the loop .

{FIXLOOP}[**SELECT**]

This command will fix the loop at any current from 3.8 mA to 22 mA.
Set the value to 0.00 to release control of the loop.

When change is pressed the first character starts to flash, change cycles the numerals while select moves to the next character. When the last numeral is reached the whole display flashes and you have two choices.

[**SELECT**]	Aborts the edit and returns to {FIXLOOP}
[[**SELECT**]]	Performs the [**SAVE**] function and sets the loop current.
L **CAUTION**	Make sure that the loop is isolated or safe !!

LOCAL CONFIGURATOR INSTALLATION & WIRING

L **CAUTION** Make sure that the loop is isolated or safe !!

The local configurator / display is connected to the transmitter with a length of ribbon cable which carries power, display drive and switch signals to the microprocessor. The cable is terminated in an IDC connector that fits into the header on the top connection board, the plug is keyed to ensure correct polarisation. PLEASE NOTE the transmitter should have its loop wiring fitted before the display is connected which will ensure the display cable is not damaged.

When the display is connected the assembly can be pushed into place, check that the 'O' ring is serviceable and apply light silicon grease if necessary. Engage the display and with firm pressure on the outside edge push the unit home until the display face is level with the top of the housing. **DO NOT** apply pressure to the clear window as you may damage the display.

Once the display unit is fitted the zero and span buttons on the top board are disabled, access to the zero and span options being made through the menu system :-

{ACCESS 2}, {INPUT},{ZERO KEY} or {SPAN KEY}

(see Section on ACCESS2 for details)

When necessary the unit may be removed by using the handle provided, with firm pressure and your thumb on the edge of the housing.

DO NOT ROTATE THE DISPLAY IN-SITU

If the display needs to be rotated for ease of viewing the display unit should be removed and then re-seated in its new position.

Commands and HART Numbers used by 2HT

(Only user-accessible commands are listed)

Number		Class	Local	Description
0	U	V		Read Unique Identifier 1
1	U	M		Read Primary Variable
2	U	M		Read PV Current and Percentage of Range
3	U	M		Read Dynamic Variables and PV Current
6	U			Write Polling Address
12	U	V		Read Message
13	U	V		Read Tag, Descriptor, Date
14	U	V		Read Primary Variable Sensor Information
15	U	V		Read Primary Variable Output Information
16	U	V		Read Final Assembly Number
17	U	1		Write Message
18	U	1		Write Tag, Descriptor, Date
34	C	1		Write Primary Variable Damping Value
35	C	1		Write Primary Variable Range Values
36	C	2		Set Primary Variable Upper Range Value
37	C	2		Set Primary Variable Lower Range Value
38	C	1		Reset Configuration Changed Flag
40	C	2		Enter / Exit Fixed PV Current Mode
41	C	1		Perform Transmitter Self Test
42	C	1		Perform Master Reset
43	C	2		Set Primary Variable Zero
44	C	1		Write Primary Variable Units
45	C	2		Trim Primary Variable Current DAC Zero
46	C	2		Trim Primary Variable Current DAC Gain
47	C	1		Write Primary Variable Transfer Function
48	C			Read Additional Status
53	C			Write Secondary Variable Units (Temperature)

COMMANDS **U** Universal **C** Common **D** Device Specific

LOCAL ACCESS (D-CAL) **M** Monitor **V** View **1** Access Level 1 **2** Access Level 2

{ACCESS 2}

With the local display fitted, access to the zero and span keys on the top circuit board is restricted, and their operation is disabled by the software. The two functions are now available through the menu structure. They may look similar to the trim functions but it must be remembered they change only the upper and lower range values, which represent the analogue output. The two keys do not modify the factory calibration.

{ZERO KEY}[**SELECT**]

This command is the same as pressing the zero key on the top board. The lower range value (LRV) is set to the applied pressure and is represented by 4 mA.

Before the value is saved, the desired pressure must be applied to the instrument, and allowed to settle.

{HIT SAVE} will be displayed, there are two choices :-

[**SELECT**] or [**CHANGE**] — To abort and return to the {ZERO KEY} menu.

[[**SELECT**]] — Used to store the new lower range value, {SAVED} will be displayed to show that the command is successful.

{SPAN KEY}[**SELECT**]

This command is the same as pressing the span key on the top board. The upper range value (URV) is set to the applied pressure and is represented by 20 mA.

Before the value is saved, the desired pressure must be applied to the instrument, and allowed to settle.

{HIT SAVE} will be displayed, there are two choices :-

[**SELECT**] or [**CHANGE**] — To abort and return to the {SPAN KEY} menu.

[[**SELECT**]] — Used to store new upper range value, {SAVED} will be displayed to show that the command is successful.

NB To give a reversed output, apply the higher pressure when the zero key is pressed and vice versa.

{ACCESS 2}

The (TRIMxxx) functions are used to trim the Lower and Upper Range Values of the analogue to digital converter (ADC) to an accurately generated, external pressure standard. This is used if the instrument is found to differ from the site standard, for whatever reason. The command can also be used to increase the measurement accuracy of a turned down instrument.

{TRIM LRV}[**SELECT**]

Apply a pressure equal to the LRV pressure (usually, but not necessarily zero!!) to the instrument, and allowed to settle. NOTE:- the accuracy of the reference pressure should be 3 - 5 times better than the instrument.

{HIT SAVE} will be displayed, there are two choices :-

[**SELECT**] or [**CHANGE**] To abort and return to the {TRIM LRV} menu

[[**SELECT**]] Press and hold for two seconds to store the ADC offset value, {SAVED} will be displayed to show that the command is successful.

{TRIM URV}[**SELECT**]

The URV may be trimmed to increase the accuracy of the transmitter when using large turndowns. Apply a pressure equal to the LRV pressure. NOTE:- the accuracy of the reference pressure should be 3 - 5 times better than the instrument.

{HIT SAVE} will be displayed, there are two choices :-

[**SELECT**] or[**CHANGE**] To abort and return to the {TRIM URV} menu.

[[**SELECT**]] Press and hold to store the ADC offset value, {SAVED} will be displayed to show that the command is successful.

Commands and HART Numbers used by 2HT

Number	Class	Local	Description
135	D	1	Restore Factory Defaults
148	D	V	View Trim settings
149	D	2	Set PV Trim Span
151	D	2	Set Password Access for D-CAL
152	D	V	View Model Number

COMMANDS **U** Universal **C** Common **D** Device Specific

LOCAL ACCESS (D-CAL) **M** Monitor **V** View **1** Access Level 1 **2** Access Level 2

HART Commands

These commands are not supported by the transmitter, but will be decoded when the SHOWHART command is enabled.

Number	Class	Description
33	C	Read Transmitter Variables
39	C	EEprom Control
50	C	Read Dynamic Variable Assignments
51	C	Write Dynamic Variables Assignments
52	C	Set Transmitter Variable Zero
54	C	Read Transmitter Variable Information
55	C	Write Transmitter Variable Damping Value
56	C	Write Transmitter Variable Sensor Serial Number
57	C	Read Unit Tag, Descriptor, Date
58	C	Write Unit Tag, Descriptor, Date
59	C	Write Number of response preambles
108	C	Write Burst Mode Command Number
109	C	Burst Mode Control
110	C	Read All Dynamic Variables

View This menu option is an unprotected level, most of the internal parameters can be viewed using this selection but no changes can be made. Intended for recording and logging instrument set-ups.

Access 1 This is a protected option; a password may be set if required to restrict access to the choices within this section. The passwords are set and enabled within {ACCESS 2}.This menu option contains information that can be viewed, edited and saved to re-configure the transmitter, using its built-in data as reference.

Access 2 This is a protected option; a password maybe set if required to restrict access to the choices within this section. This section contains the highest level of menu options, and consists of choices for commissioning, low level protection and setting of passwords. It also contains fundamental calibration and setting procedures which require reference to external standards.

Please Note :- When the transmitter is shipped from Delta the passwords are set to their default of {1111} and {2222}, if you edit and save, the new passwords become the default and stay resident even when loop power is removed.

DO NOT FORGET TO LOG YOUR PASSWORD.

If you become locked out a master password maybe issued by Delta but an administration cost may be charged at their discretion.

Passwords only apply to the D-CAL local configurator. It is assumed that access via a host computer or a hand-held configurator will be adequately controlled by the system itself or site access discipline.

{SHOWHART}[**SELECT**]

This command, when enabled displays all decoded incoming HART messages by their number on the display. It may be disabled or left enabled, the default is disabled. The transmitter will decode all messages that are on the HART bus, and will decide if it needs to reply to them. SHOWHART will display all messages, even if they are intended for another transmitter, this allows the digital integrity of the line to be checked.

The command numbers are displayed in monitor mode, and will overwrite the prime variable display, the numbers can be decoded using the command summary on page 58, this gives the command numbers available to the transmitter.

The state of the SHOWHART flag is shown, press [**CHANGE**] until the required state is shown.

There are now two options :-

[**SELECT**]	Press briefly to abort and return to the {SHOWHART} menu.
[[**SELECT**]]	Press and hold to save the new state.

{SELFTEST}[**SELECT**]

If you suspect the functionality of the transmitter, SELFTEST when passed will give a very high confidence level of the transmitters output, this is an extension of the tests that the unit performs on itself at all times.

The screen will blank, test the display, memory, etc. and if all tests pass the unit will respond {MEM OK}, if a test fails the results will be shown on the screen.

[**SELECT**] To return to the {SELFTEST} menu.

L **CAUTION** The transmitter will be off line for 2 seconds, and will respond to HART® host requests as busy.

{RESET}[**SELECT**]

This is a master reset of the transmitter, it is equivalent to cycling the power, a SELFTEST is performed. Please note that the analogue current is set to 4 mA at the beginning of the test.

When [**SELECT**] is pressed the reset function will begin.

{RESTORE}[**SELECT**]

The restore command is used to reset the analogue output calibration values which were established during factory calibration. Please note the URV and LRV, zero and span trims and analogue trims will be reset.

{HIT SAVE} will be displayed, there are two choices :-

[**SELECT**] or To abort and return to the {RESTORE} menu.

[**CHANGE**]
[[**SELECT**]] Press and hold to initiate the restore function, {SAVED} will be displayed...or
[**SELECT**] Press and release to return to the {RESTORE} menu.

CONFIGURATION USING THE D-CAL

The local D-CAL Configurator unit gives the operator a user friendly interface for configuration and commissioning. It uses an alphanumeric display so that engineering units and menu titles may be shown. Wherever possible the HART® functions have been placed in a logical position within this structure. The two buttons, change and select are used to navigate though the selections.

MONITOR MODE

When the unit is first turned on the default is monitor mode, the unit will display the Prime Variable, cycling between the value and the engineering units. Press the [SELECT] button to cycle through the other displays available.

Primary Variable

This shows the actual pressure (gauge, absolute or differential) that the unit is currently sensing. The default unit of measurement is the Pascal, from which all other engineering units are calculated. Each time the selected engineering units for pressure are changed, all values displayed from the menu system will use these selected units. Note that the displayed value covers the full range of permitted input pressure, irrespective of the “turndown” selected for the 4 to 20 mA output.

Loop Current

This displays the current within the control loop. If the loop has been fixed (see {FIXLOOP}), it will show the fixed value and not reflect the value of the input.

Temperature

This shows the temperature of the sensor. While it is used primarily for the compensation of the transmitter, it is useful for diagnostics and general information. It is <u>not</u> the temperature of the process but can give an indication depending upon installation practice.

Percentage

This is the selected <u>output</u> of the transmitter expressed as a percentage. When the square root function is selected for a flow application, this will therefore show the percentage of the selected flow range. Engineering units for flow are not available.

{SHOWHART}

If the command {SHOWHART} has been enabled under access level 1, then in monitor mode, the transmitter will also show any received HART® commands. The command is displayed as the command number and is automatically cleared after two seconds.

MONITOR and VIEW

Monitor mode is the default of the display, it shows prime variable, loop current and sensor temperature. Prime variable is always displayed, cycling between value and engineering units, this is to allow engineering units to be shown without scrolling the display. It is quite normal for the D-Cal unit to change its scroll and cycle speed aid clarity at lower temperatures.

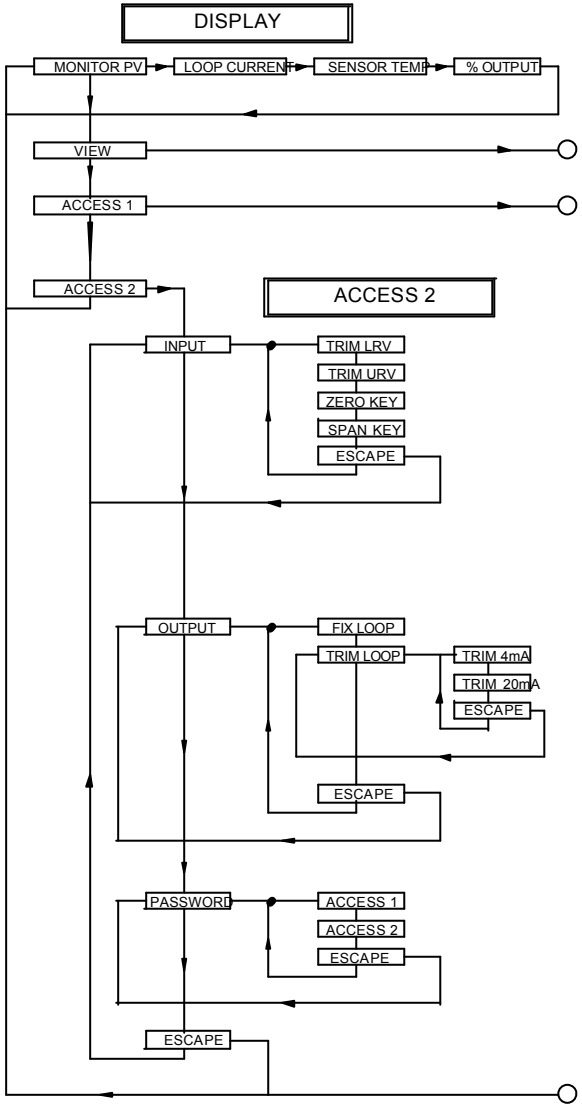
RESTRICTED ACCESS

To gain access to a restricted level the following steps should be performed.

{--> 0***} With '0' flashing.

Use the select and change keys to enter the code number. When the last digit is selected a decision is made, if the number is correct the menu level is entered, other wise the menu will abort to {ACCESS 1}

If the wrong number is entered access will be denied.



The access restrictions apply to local configuration only. It is assumed that remote access, via a portable HART® configurator on a host computer, is adequately access-protected.

{ACCESS 1}

{TAG}[**SELECT**]

An eight character alphanumeric field for identification e.g. {TANK6} {LEVEL9}

The tag is displayed on screen, there are two options :-

[**SELECT**] To abort displayed tag and return to the TRANSMTR menu.
[**CHANGE**] Used to edit the display. See page 5 ' Display and Edit '

{MESSAGE}[**SELECT**]

A 32 character alphanumeric field for any information set by site practice e.g..
{CHECKED BY SIMON 29 02 92} or {HIGH PRESSURE SERVICE}

The message is displayed on screen, there are two options :-

[**SELECT**] To abort displayed message and return to the TRANSMTR menu.
[**CHANGE**] Used to edit the display. See page 5 ' Display and Edit '

{DESCRIPT}[**SELECT**]

A 16 character alphanumeric field for additional identification of the transmitter
e.g.. {TANK 6} {LEVEL 9} {UNIT 27} etc.

The Description is displayed on screen, there are two options :-

[**SELECT**] To abort displayed message and return to the TRANSMTR menu.

{DATE}[**SELECT**]

The date may be the next calibration day, last re-zeroed, according to site practice.
The date is entered in the form DD MM YY

The information is sent digitally in the form MM DD YY.

The date is displayed on screen, there are two options :-

[**SELECT**] To abort displayed message and return to the TRANSMTR menu.
[**CHANGE**] Used to edit the display. See page 5 ' Display and Edit '

(Nb There is no Page 18)

{ACCESS 1}

{OUTPUT}[**SELECT**]

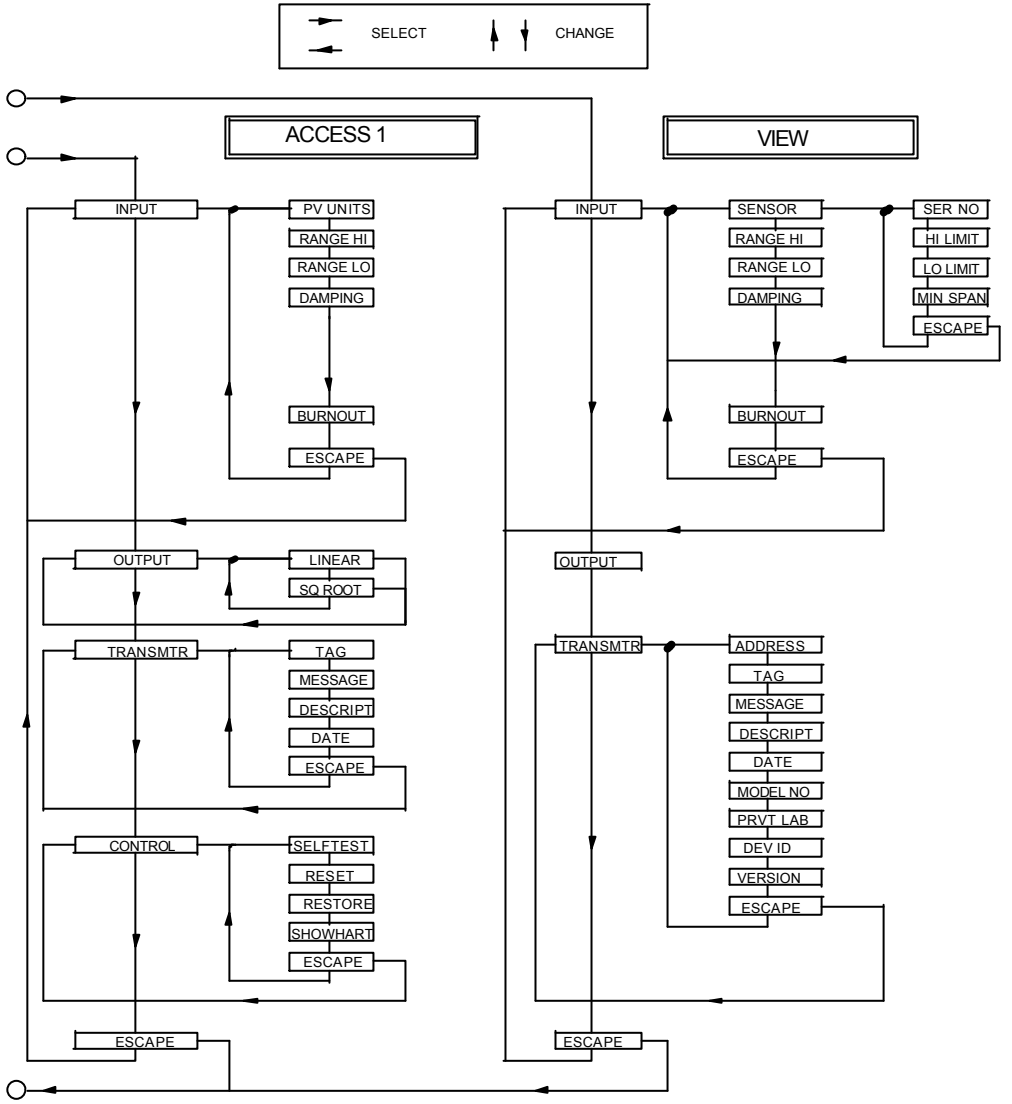
The transmitter's analogue output and percentage display may be linear or square root, selected by this function. The PV display of engineering units is linear at all times. There is no facility for displaying engineering units of flow. If this is required, then a separate Flow Computer should be used.

The output function is displayed; there are two options :-

[**SELECT**] To abort and return to {OUTPUT}.
[**CHANGE**] Used to edit the display.

{LINEAR} This is the default condition and provides a linear analogue output and percentage display with reference to applied pressure input.

{SQ ROOT} This applies square root extraction to the analogue output and percentage display with reference to applied pressure, often used for flow calculation. This is available on pressure and differential pressure units, as standard software is used for both.



Both Access 1 and Access 2 can be protected by passwords. Before they are enabled, it is recommended that you read the section on Passwords. The D-CAL unit will default to Monitor Mode if there are no keystrokes for five minutes.

{VIEW}

The view menu is not protected by a password, as no changes can be made from within this menu option. After five minutes it will return to the monitor mode.

{INPUT}	[**SELECT**]	Enter the input menu
{SENSOR}	[**SELECT**]	Enter the sensor menu
{SER NO}	[**SELECT**]	Show the sensor serial number, in decimal
{HILIMIT}	[**SELECT**]	Show the sensor URL in engineering units
{LOLIMIT}	[**SELECT**]	Show the sensor LRL in engineering units
{MINSPAN}	[**SELECT**]	Show the sensor's minimum available span, If this is exceeded when using turndowns greater than 20 to 1 an error will be reported.
{RANGEHI}	**[SELECT**]	Show, in engineering units, the transmitter URV corresponding to 20 mA
{RANGELO}	[**SELECT**]	Show, in engineering units, the sensor LRV corresponding to 4 mA.
{DAMPING}	[**SELECT**]	Show the damping value in seconds. This is applied to the analogue and digital output signals.
{BURNOUT}	[**SELECT**]	This shows which direction the analogue output will go in event of a fatal sensor failure.

Pressing {CHANGE} wil move down through the menu.

At the end of each sub-menu, select {ESCAPE} to return to the higher menu.

{INPUT} continued

{DAMPING}[**SELECT**]

The damping command is used to slow the rate of change of the output signal, it modifies both the analogue and digital signal.

The damping value is displayed in seconds, there are two option :-

[**SELECT**] To abort displayed tag and return to {DAMPING} menu.
[**CHANGE**] Used to edit the display.

Damping uses a fixed template and will accept values between 0 and 39 seconds.

{BURNOUT}

Burnout is used to sense a failure of the sensing element. It drives the analogue output either upscale or downscale depending upon its setting.

Once select is pressed the state of the burnout flag is shown either upscale or downscale. Press [**CHANGE**] until the desired state is shown.

There are now two options :-

[**SELECT**] To abort and return to the {BURNOUT} menu.
[[**SELECT**]] Press and hold to save the new state.

Pressing {CHANGE} wil move down through the menu.

At the end of each sub-menu, select {ESCAPE} to return to the higher menu.

(Nb There is no Page 18)

{OUTPUT}	[**SELECT**]	This shows the function that is applied to the analogue output. The options are {LINEAR} AND {SQ ROOT}
{TRANSMTR}	[**SELECT**]	Enter the Transmitter menu
{ADDRESS}	[**SELECT**]	Shows the polling address of the instrument, 0 for point to point, 1-15 for multi-drop. If the value is set from 1 - 15 the analogue value is set to 4 mA.
{TAG}	[**SELECT**]	Shows the tag, 8 characters.
{MESSAGE}	[**SELECT**]	Shows the message, 32 characters.
{DESCRIPT}	[**SELECT**]	Shows the description, 16 characters.
{DATE}	[**SELECT**]	Shows the date. When using the HART® format for remote communications the date is transmitted as MM DD YY format. On the display it is shown as DD MM YY
{PRVT LAB}	[**SELECT**]	This shows the distributors number if the instrument is being sold under a badging agreement, see HART® common tables
{DEV ID}	[**SELECT**]	This shows the device identification number in decimal, this is combined with the manufacturers id and device type
{VERSION}	[**SELECT**]	The software version, original manufacturer and copyright notice will be displayed.

{INPUT} [SELECT]

{PV UNITS}[**SELECT**]

Because the measured pressure is converted to a digital number the way the number is displayed can be scaled to represent different engineering units, this affects the digital and local display signals.

The prime variable (PV) units of measure are displayed, there are two choices :-

[**SELECT**] To abort and return to the {OUTPUT} menu.

[**CHANGE**] Used to change the units of measure. There are set choices of units dependent upon which output function is enabled.

LINEAR & SQUARE ROOT

{ InH20 }
{ InHG }
{ FtH20 }
{ mmH20 }
{ mmHG }
{ PSI }
{ Bar }
{ mBar
{ Gm/SQcm }
{ KG/SQcm }
{ PaScal }
{ KPaScal }
{Torr }
{ Atm }

Once the required units are displayed they can be selected and saved [[**SELECT**]]

or [**SELECT**] to abort to the {PV UNITS} menu.

Any change to the prime variable units will change all engineering units that are displayed, upper and lower range limits, upper and lower range values and alarms.
The display may need to scroll to display the longer engineering units.

{INPUT} continued

{RANGEHI}[**SELECT**]

This is the pressure represented by 20 mA and may be less than range low to achieve reverse action of the analogue output. This allows the analogue output of the transmitter to be re-ranged without using a reference. It also sets a value to which { TRIM URV } will be set under {ACCESS2}, below.

The URV is displayed followed by the engineering units there are two options :-

[**SELECT**] To abort displayed tag and return to {RANGEHI} menu.
[**CHANGE**] Used to edit the display.

The edit feature does not use a template because the values are entered in the current engineering units. The screen is blank with a flashing {+} sign, work along the display entering the value, use the character after {9} to depict a decimal point.

When the last character is reached [[**SELECT**]] will save the value and 20 mA will now represent this new pressure on the analogue loop.

{RANGELO}[**SELECT**]

This is the pressure represented by 4 mA and may be greater than range high to achieve reverse action of the analogue output. This allows the analogue output of the transmitter to be re-ranged without using a reference. It also sets a value to which { TRIM LRV } will be set under {ACCESS2}, below.

The display, options and edit features are the same as for RANGEHI.

This pressure will now be represented by 4 mA on the analogue loop.

Pressing {CHANGE} will move down through the menu.

At the end of each sub-menu, select {ESCAPE} to return to the higher menu.