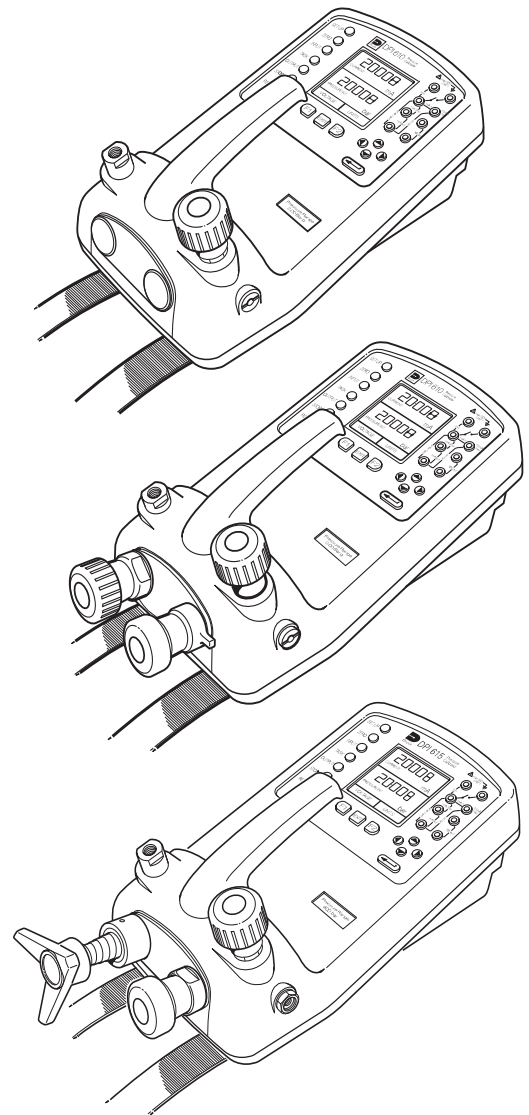


GE  
Sensing & Inspection Technologies

# Druck DPI 610/615

## Portable Pressure Calibrator Series

### User manual - K0415



## General

The versions of the DPI 610 and DPI 615 instruments are: pneumatic indicator, pneumatic calibrator, hydraulic calibrator and low pressure pneumatic calibrator. All instruments measure and display pneumatic and hydraulic pressure applied to the test port or to an externally connected pressure sensor. Pressure measurement can be absolute, gauge and sealed gauge and in ranges from 2.5 mbar to 700 bar (1.0 inH<sub>2</sub>O to 10000 psi).

The calibrator versions of this instrument contain pneumatic or hydraulic pressure generation components to produce pneumatic pressure ranges between -1 to 20 bar (-14.5 psi to 300 psi) and hydraulic pressure ranges up to 400 bar (6000 psi).

The electrical connections, on the front of the instrument, enable the instrument to measure  $\pm 50$  volts d.c. and  $\pm 55$  mA and produce 10 volts d.c. or 24 volts d.c. and a maximum of 24 mA. An integral sensor provides measurement of ambient temperature. Additional sensors (option B1) connect to an external connector and extend the pressure measurement range and include differential pressure measurement. The instrument has an RS232 connector to enable uploading of test data to a compatible documenting system. The DPI 615 has the ability to download, from a PC, pre-defined calibration and test routines. Six alkaline C size batteries or (option A) rechargeable batteries with a charger/adaptor, power the instrument.

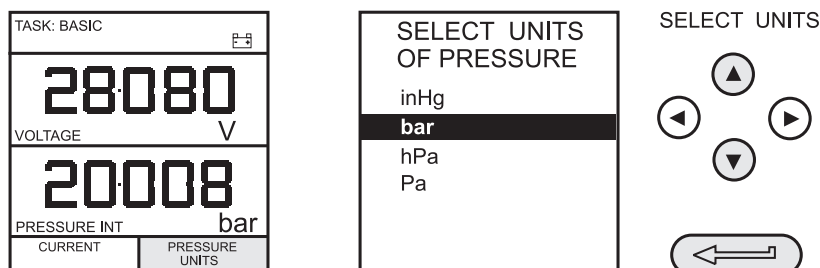
### Important Notice

Zinc-carbon and zinc-chloride cells should **NOT** be used in this instrument.  
Use only the battery types as shown in the table on page 7.

## Description of Procedures

In the procedures outlined in this user guide, hard (fixed function) and soft (variable function) key operations are shown in bold type (e.g.) **TASK** and **F1**. These statements mean press the **TASK** key and press the **F1** key. Soft key operations can be allocated to both the F1 and F2 keys. Where a specific soft function is referred to it is written in bold italics (e.g.) **PROCESS**.

This instrument has a number of operating modes that are described in a simplified form in the following sections. Diagrams accompanying the procedures give typical selection sequences and shaded controls indicate that this control key should be pressed in the appropriate sequence. Diagrams should be read from left to right, top to bottom where appropriate. A shaded display soft box indicates that the function key immediately below that soft box should be pressed (either **F1** for the left hand soft box or **F2** for the right).



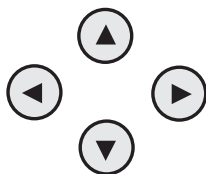
In the above diagram the following key sequence is indicated.

- Press the F2 key (the key immediately below the **PRESSURE UNITS** soft box).
- Use the **Up** and **Down** cursor keys (only) to select the required option. (If all keys shaded, use all these keys to select or enter data).
- Press the **ENTER** key.

## Using this guide

The following key symbols are used in the procedure diagrams that follow:

### SELECT VALUE



Shaded cursor keys indicate that a combination of these four keys, Up, Down, Left and Right should be used to (e.g.) enter an alpha numeric value or to select a function.



Indicates the **ENTER** key. Used to confirm an operation or a selection. Shading indicates key operation.



Exit key, used to clear current menu selection and return to next menu level above current level. Used as an escape key from current operation. Shading indicates key operation.

### RECALL



Hardkey (total 7). Legend beside key symbol indicates function. Shading indicates key operation.

## Maximum Instrument Ratings

The following table shows the maximum measurement input ratings of the instrument that should not be exceeded.

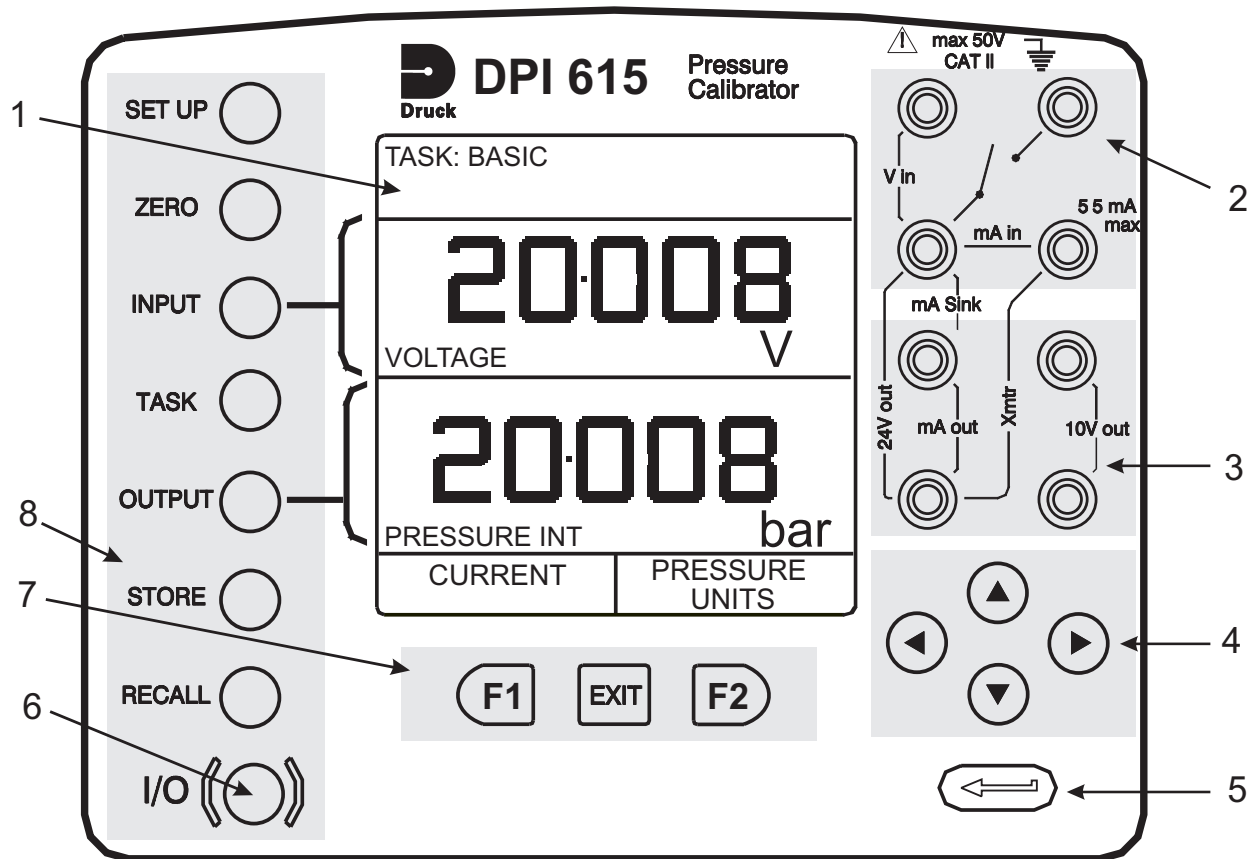
PRESSURE	120% FULL SCALE
VOLTAGE	50 V d.c.
CURRENT	55 mA d.c.

**Note 1:** The display flashes if the input pressure, voltage or current overrange.

**Note 2:** Max applied voltage for external loop supply = 30V dc (see page 8).

## OPERATOR CONTROLS (Figure 1 and 2)

These divide into two groups, the operator/display controls (Figure 1) and the pressure/vacuum generation components (Figure 2). The operator controls and a typical display, common to all instrument versions, is shown below.

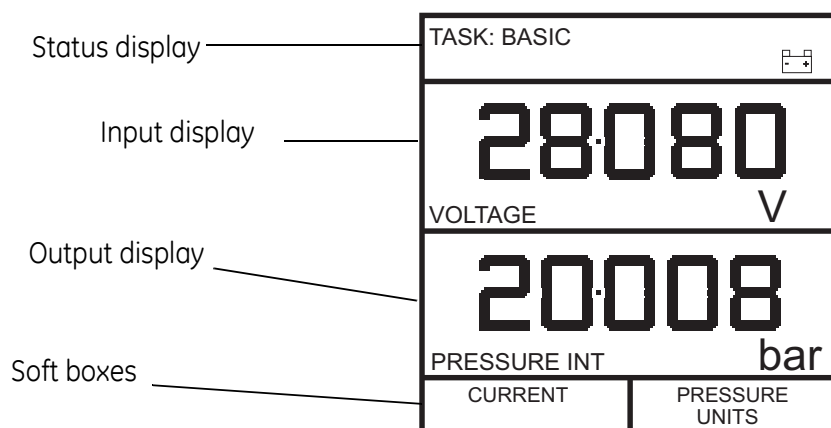


- |             |                            |                             |             |
|-------------|----------------------------|-----------------------------|-------------|
| 1 Display   | 2 Electrical Input Sockets | 3 Electrical Output Sockets | 4 Cursor    |
| 5 Enter Key | 6 On/Off Key               | 7 Function (soft) Keys      | 8 Hard Keys |

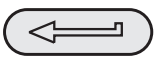
**Figure 1 - DPI 610/615 Key-pad**

## Display

The display section of the instrument basically divides into four distinct sections. The two main sections of the display are used to display a *input* and an *output*. The remaining sections show the status display area and define the soft key functions. A typical display is shown below:



## HARD KEY FUNCTIONS (Figure 1)

Key	Function	Page reference
I/O	This key is used to turn the instrument ON and OFF.	7
SETUP*	The <b>SETUP</b> key provides access to the instrument's general configuration parameters that are set up to certain default parameters on delivery.	37
ZERO	The <b>ZERO</b> key can be used to zero either the selected input or output display, if the display reading is within 5% of zero. Attempts to zero a larger offset result in an error message, <b>Zero too large</b> .	9
INPUT*	The <b>INPUT</b> key is used to select the input parameter to be displayed.	20, 21
TASK	The <b>TASK</b> key is used as a means of rapidly configuring the instrument for a number of different types of external device calibration. There are twenty task configurations available, eleven of which are pre-programmed and nine are user definable	10
OUTPUT*	The <b>OUTPUT</b> key is used to select output parameter to be displayed.	25-28
STORE*	Depending upon how the instrument's <b>STORE</b> mode is setup, this key is used either to store up to 20 display screens (in <b>SNAPSHOT</b> mode), or to manually log a screen in <b>DATALOG</b> mode.	30-36
RECALL*	This key is used to recall a previously stored screen to the display. Depending on the <b>STORE</b> mode set-up, operation of this key recalls either the snapshot of a previously stored screen or datalog file. In <b>STORE</b> mode, selection displays the last screen stored. By using the cursor keys, the operator can scroll either forward or back through memory locations.	30, 32-36
ENTER 	The <b>ENTER</b> key is used either to enter data (accept entered data), or, in conjunction with the soft keys, to accept a given selection.	2
EXIT	The <b>EXIT</b> key operates in conjunction with all the other hard and soft keys to exit from the current screen or menu level, to the level immediately preceding it. To quit completely from any menu level, press <b>EXIT</b> until the <b>MEASURE/SOURCE</b> screen is displayed.	2

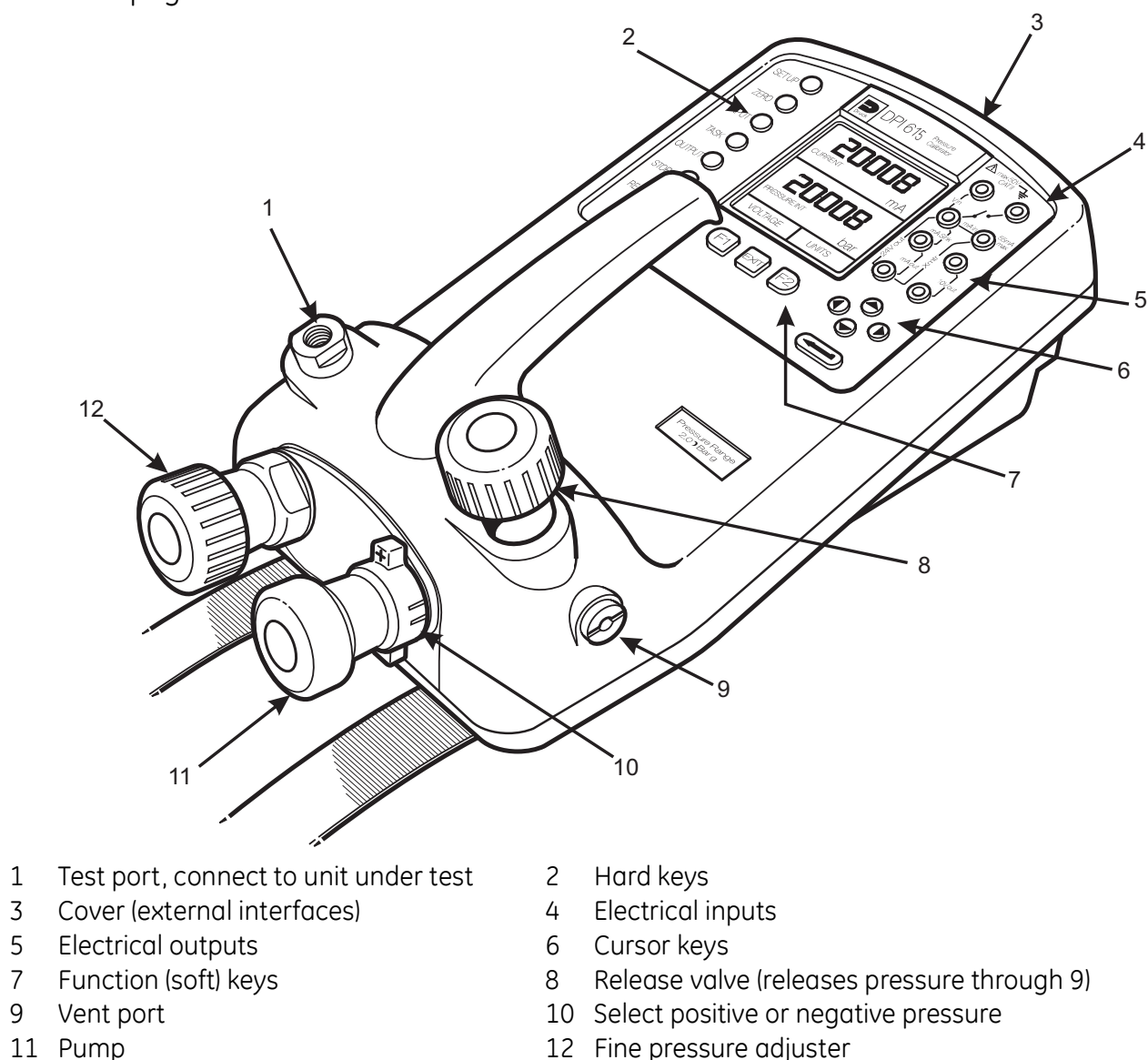
\* These key functions are not available in BASIC mode

## SOFT KEYS (Figure 1)

Three soft keys, designated **F1**, **EXIT** and **F2**, are situated immediately below the display as shown below. These keys have their function allocated by the instrument software which is indicated in the bottom of the display (Voltage for **F1** and Units for **F2** in this example). They are used to select menu (program) options and are fully described under the appropriate section headings.

## CURSOR KEYS (Figure 1)

The cursor keys consist of a block of four keys, designated **up ▲**, **down ▼**, **left ◀** and **right ▶**. In programs where options need to be selected from a list, (e.g.) the **TASK** selection program, the **up ▲** and **down ▼** cursor keys are used to highlight one of the options, from which it can be selected by the **ENTER** key. In **TASK** mode, where more than one page of options are provided, the **left ◀** and **right ▶** cursor keys will switch between pages.



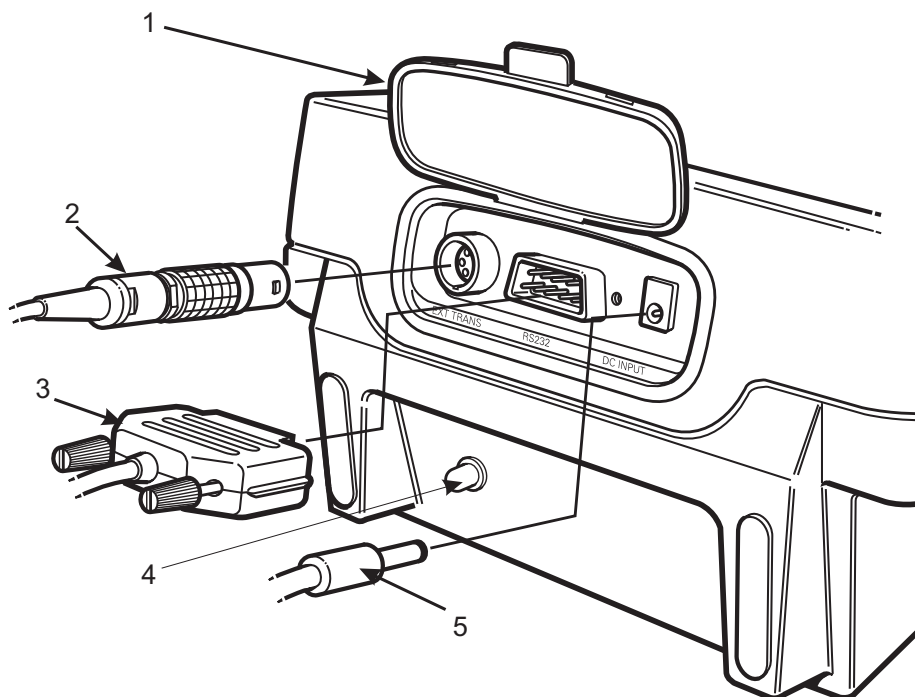
**Figure 2 - DPI 610/615 Calibrator Controls**

# INTRODUCTION

## Summary of Functions

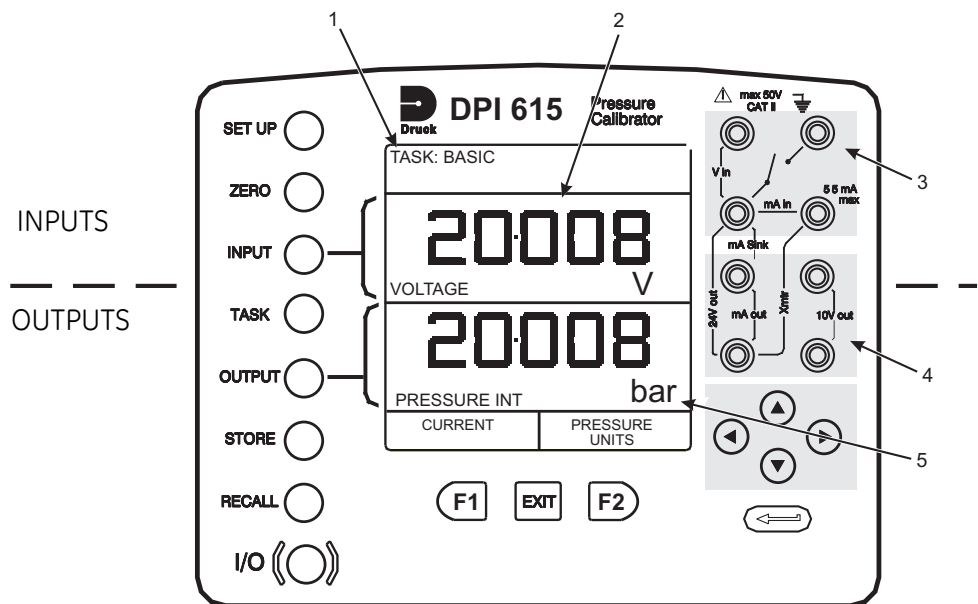
### ELECTRICAL CONNECTIONS

- 1 Cover, closed when not using connectors
- 2 External transducer
- 3 RS232 connector
- 4 Temperature sensor
- 5 DC power input



**Figure 3 - Electrical System Connections**

*Measurement inputs and Source outputs are made via the control panel sockets as shown below.*



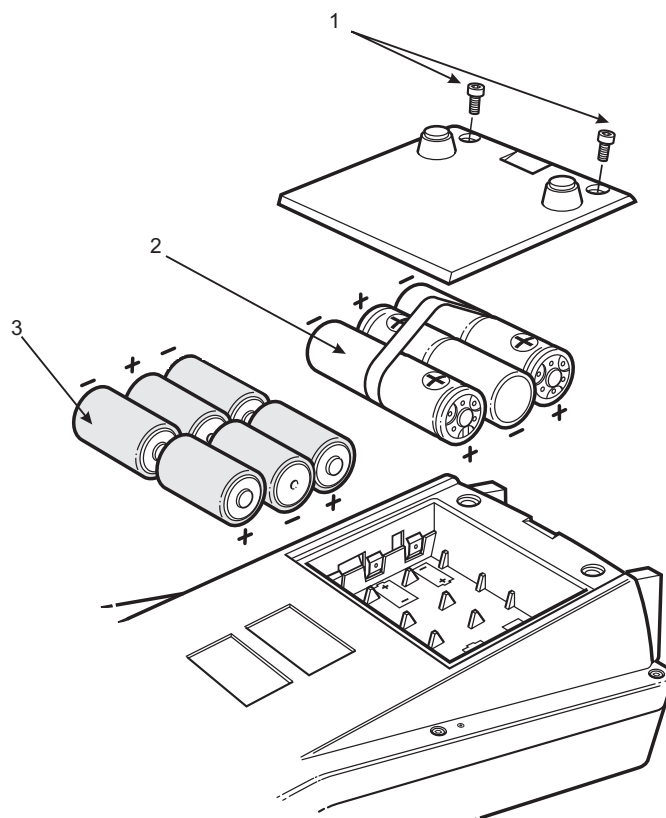
- |                             |                  |                            |
|-----------------------------|------------------|----------------------------|
| 1 Status display            | 2 Input display  | 3 Electrical input sockets |
| 4 Electrical output sockets | 5 Output display |                            |

**Figure 4 - Electrical Measurement Inputs/Outputs**

# Getting Started

## Fitting Batteries

- 1 Cover fixing screws.
- 2 Rechargeable NiCad pack Part no. 191-126
- 3 Six alkaline C-cells Type no. LR14.

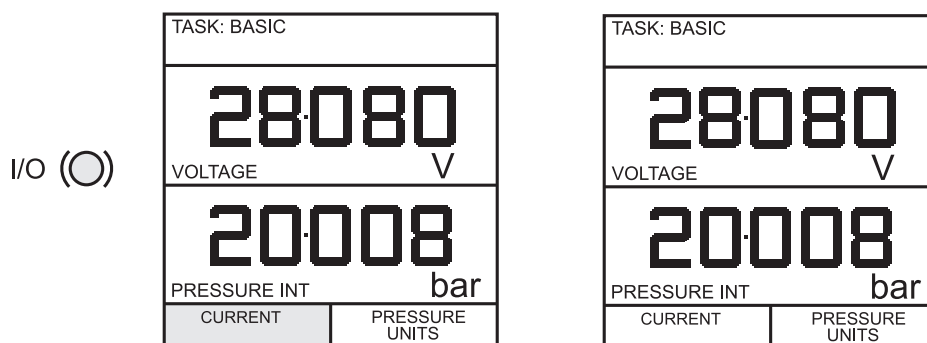


**Caution:** Old batteries can leak and cause corrosion. Never leave discharged batteries in the instrument.

**Note:** After fitting a rechargeable NiCad battery pack the display may show the battery low indication caused by the battery pack not being fully charged. Use the power adaptor/charger to fully charge the pack.

## Switching On

Press the **I/O** switch on the front panel and proceed as follows.



The first time the instrument powers up, it will be in **BASIC** mode with the main screen displaying voltage in the input display area and pressure in the output display area. To switch to **CURRENT** as input, press **F1** as shown. Similarly, **F1** to return to **VOLTAGE**.

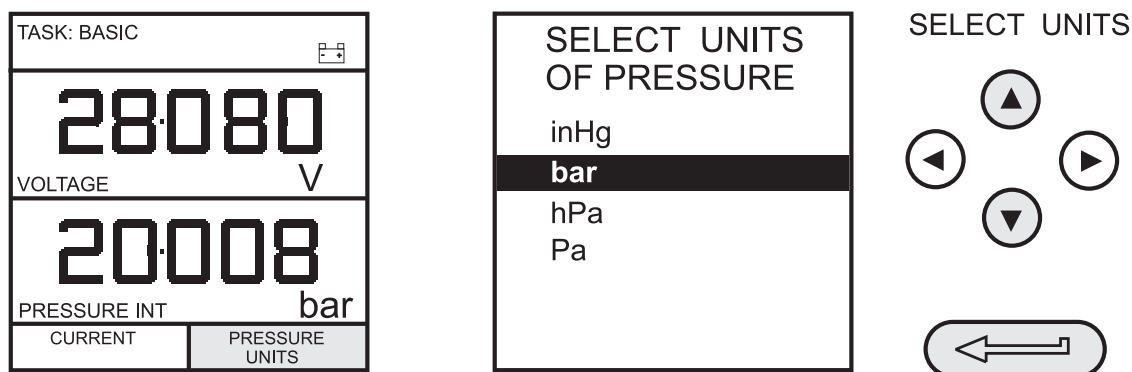
**Note:** No other keys are active in this mode and the instrument can only be reconfigured by pressing the **TASK** key and selecting another mode.



# Getting Started

## Change Pressure Units

To change the pressure units proceed as follows. If the four units displayed are not the units required, press **TASK** and select any task, other than **BASIC**, press **SETUP** and proceed as detailed on page 37. To return to **BASIC** mode, press **TASK** and select **BASIC**.

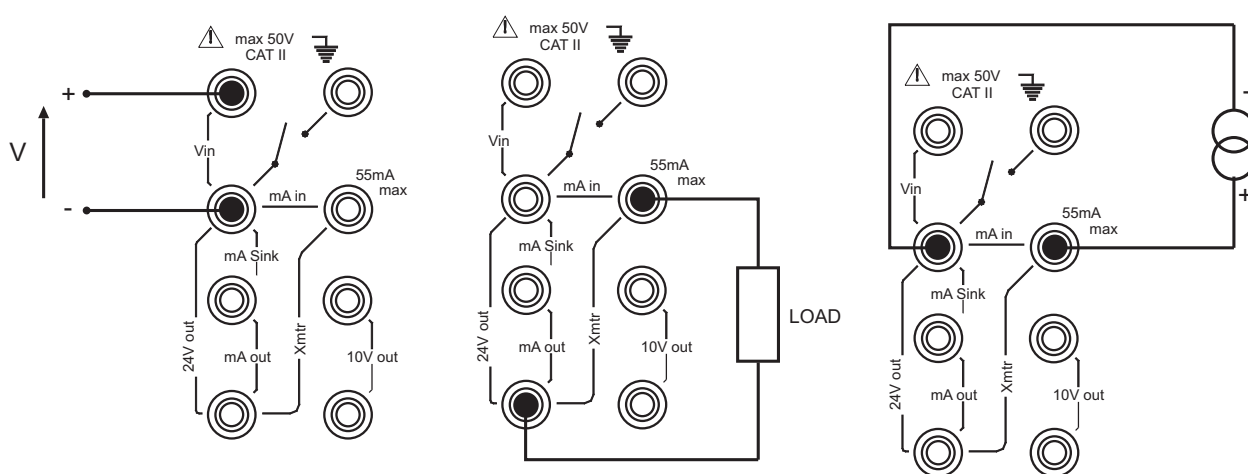


In **BASIC** mode, the instrument is configured to carry out basic Pressure to Voltage (**P** to **V**) or Pressure to Current (**P** to **I**) tests, a typical test procedure follows.

## Voltage and Current Measurement

Connect the electrical input sockets as follows for voltage and current measurements. Use the test leads provided and **DO NOT** push bare wires into the sockets.

**Note:** Maximum applied voltage = 50V dc., Maximum input current = 55mA dc

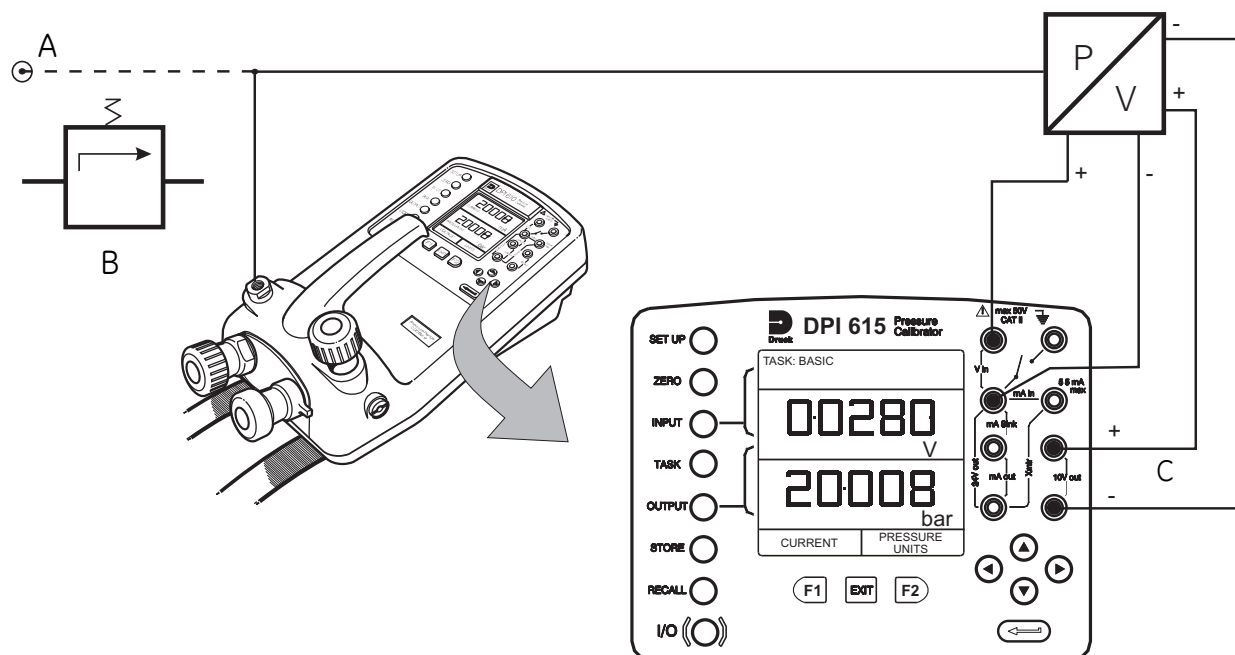


**Note:** Maximum applied voltage for external loop supply = 30V dc

# Getting Started

## Typical Calibration Set-up (Pressure to Voltage)

Connect a device under test to the instrument as shown below:



A - External pressure source (indicator instruments only)    B - Pressure regulator  
C - Excitation 10V

## General procedure

- Use the hand-pump to pressurize the system to the required level as indicated on the display. Allow the display to settle and screw the volume adjuster in or out as a fine adjustment to the required pressure. Record the input (e.g.) **Voltage**, reading at each applied pressure.

## Zero Display Reading

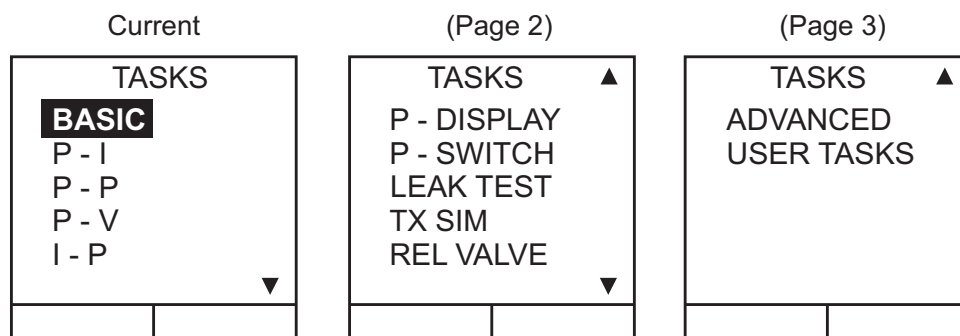
Both the input and output readings can be set to zero using the **ZERO** key and if the displayed reading is within 5% of zero. To zero either the **INPUT** or **OUTPUT** displays, proceed as follows:



## Task Selection

### TASK key

The TASK key is used to set-up the instrument for a number of specific types of test. There are two modes **BASIC** and **ADVANCED** and nine other specific types of test that automatically configure the instrument on selection from the **TASK** menu. The tasks available under the **TASK** menu are held on three pages shown below. To select a task from the menu, press the **TASK** key, position the cursor over the required task and press the **ENTER** key as shown below. Use the right/left cursor keys to switch between pages.

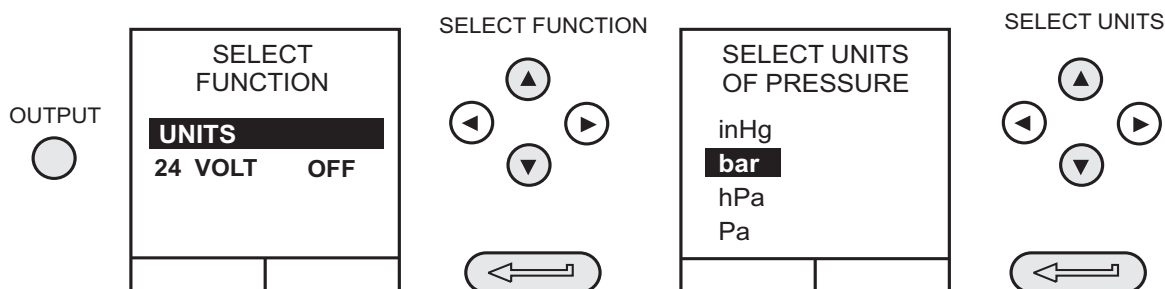


### Using Task Functions

Specific tasks are selected as shown above. The following diagrams show how to connect the unit under test (UUT) for each task selectable under the **TASK** menu.

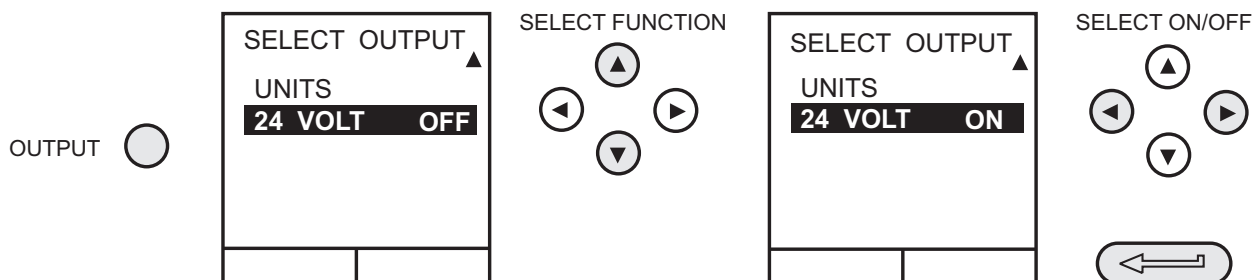
Input and output units, where applicable, can be selected by pressing either the **INPUT** or **OUTPUT** keys as shown below. The output key also provides the facility of turning the 24V output supply ON and OFF. When not in use, the 24V supply output should be turned OFF to conserve battery power.

### Set Units



**Note:** If the four units displayed are not the units required, press **SETUP**, select **SETTINGS** and refer to page 38.

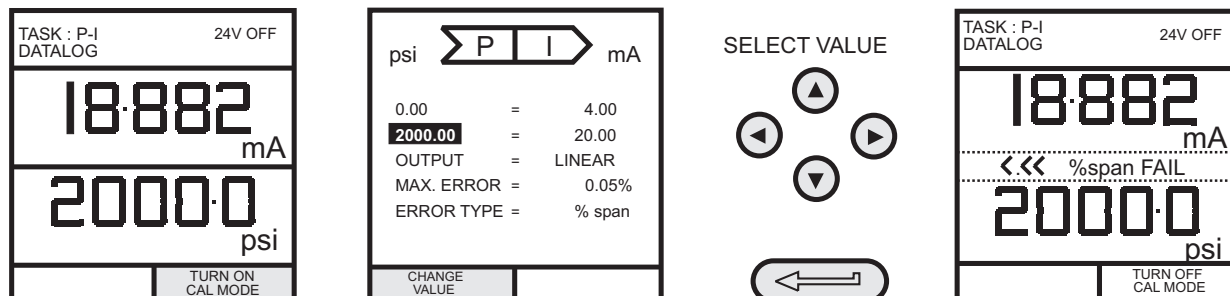
### Set 24 Volts



## Task Selection

### Cal mode (DPI 615 versions only)

Cal mode, which is available in tasks P-I, P-P, P-V, P-P, P-DISPLAY and P-SWITCH, provides a method of setting-up test parameters manually. Downloaded test procedures can also automatically set-up and turn on the Cal Mode function. The method of turning on and setting-up Cal Mode is shown below for a P-I task. The method is similar for all the other tasks available in Cal Mode.



Pressing the F1 key (TURN ON CAL MODE), provides the set-up screen for the CAL mode. Initially, the cursor is placed in the UUT SPAN field to allow the required span range to be entered. The corresponding values for the UUT output parameter (current) are then set, followed by the maximum error value and error type (% rdg or % span). When all test parameters have been set-up, the screen changes to display the input and output and the test results. The test result can only be displayed to within a range of  $\pm 9.99\%$ . If the test result is outside this range, either the left pointing (-ve error) or right pointing (+ve error) chevrons are displayed. Within this error band, the actual tolerance value is displayed. Test results can either be stored as snapshots or logged as datalog files, depending upon how the instrument has been set-up.

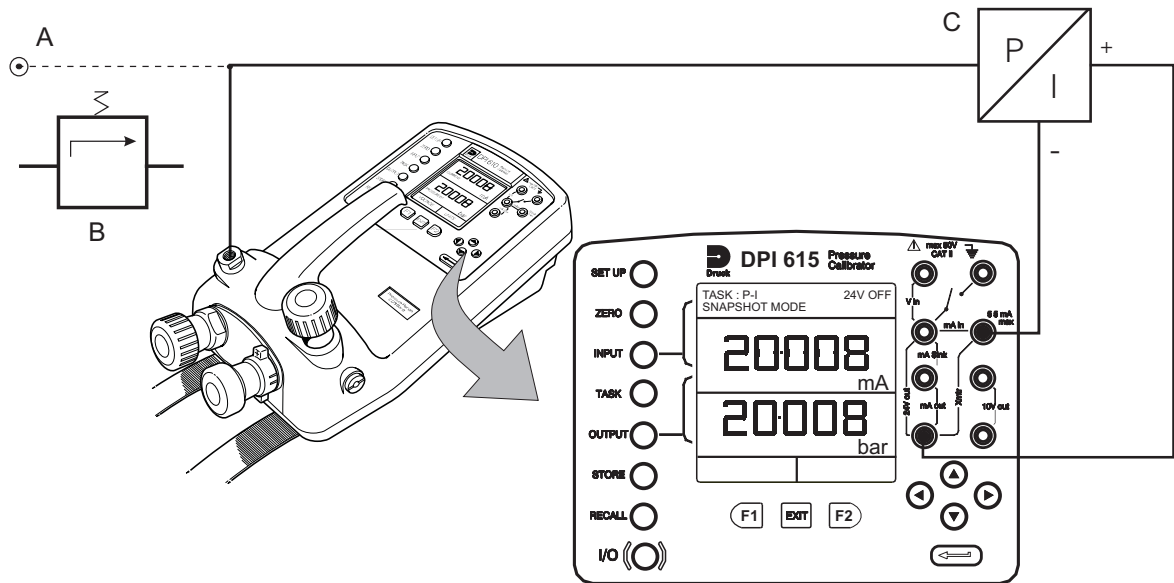
### Basic Mode (Task BASIC)

This instrument powers up in this mode the first time that it is used. To select **BASIC** from any other task, press the **TASK** key and select **BASIC** and press the **ENTER** key. **BASIC** mode is fully described in the **Getting Started**, section (see page 7).

# Taking Measurements

## Pressure Transmitter (P-I) Task

Select the P-I task from the task menu and connect the Unit Under Test (UUT) to the calibrator as shown below.



A - External pressure source (indicator instruments only)

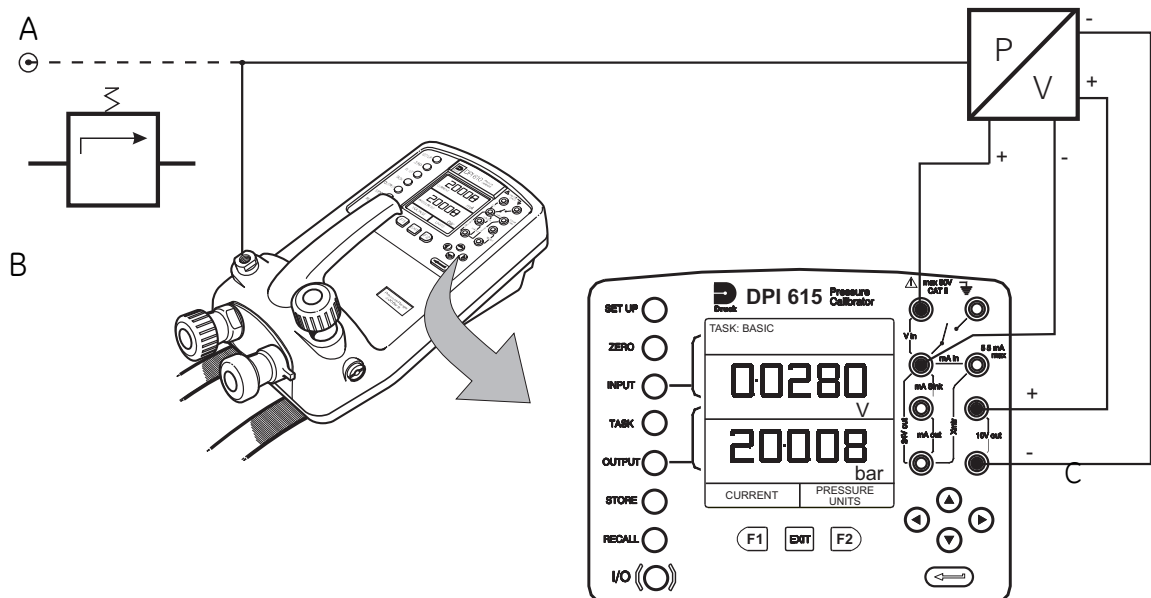
B - Pressure regulator

C - Pressure to current 24V device

- If required, select the output units as described on page 10.
- If applicable, turn on Cal Mode and set-up test parameters as detailed on page 11.

## Voltage Output Pressure Transmitter (P-V) Task

Select the P-V task from the task menu and connect the UUT to the calibrator as shown below. Voltage output transducers with a 10 V supply and outputs of  $\pm 10$  V can be calibrated using the 10V output sockets (supply) and the transducer output connected to a voltmeter (refer to Method on page 13 for a test procedure).



A - External pressure source (indicator instruments only)

B - Pressure regulator

C - Excitation 10V

- If required, select the output units as described on page 10.
- If applicable, turn on Cal Mode and set-up test parameters as detailed on page 11.

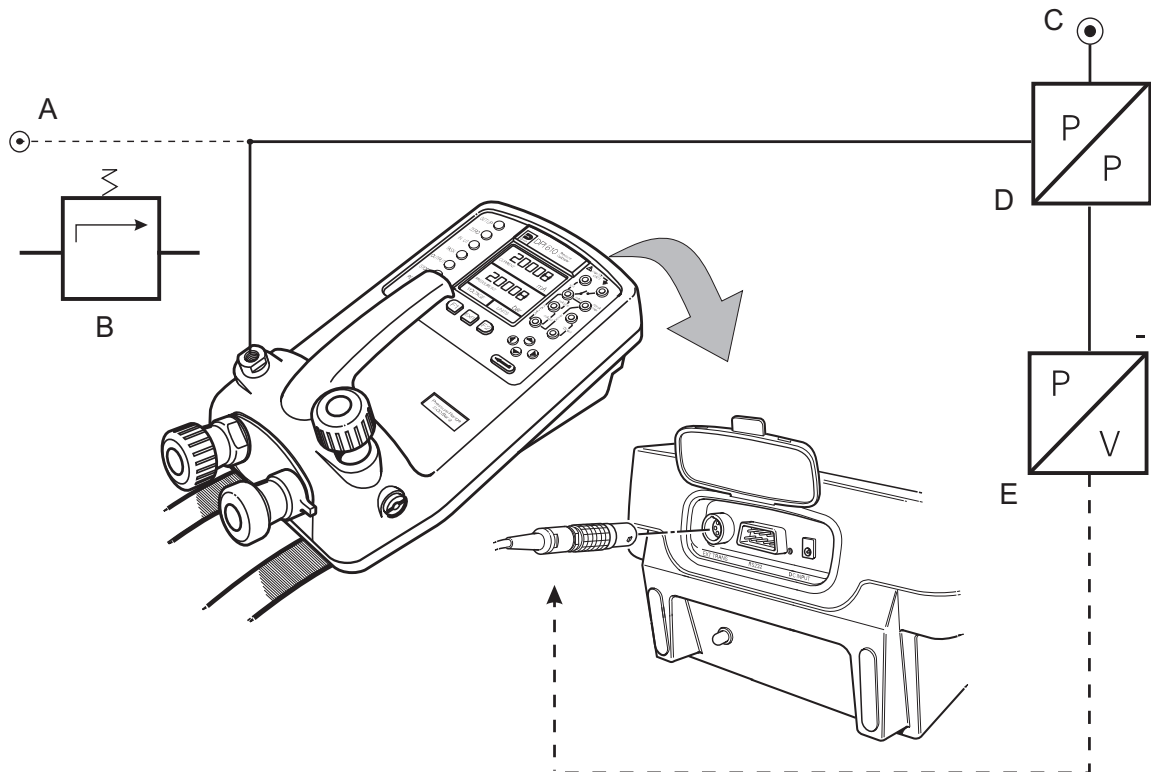
# Taking Measurements

## Pressure Converter (Pressure to Pressure) Task

Select the P-P task from the task menu and connect the UUT to the calibrator as shown below. Testing a converter requires one pressure to be applied to the unit under test (UUT) and another (converter output) to be measured. The additional measurement is provided by the external transducer option.

### Method

- Connect the UUT to the calibrator and plug the external transducer into the calibrator as shown below.



A - External pressure source (indicator instruments only)

B - Pressure regulator

D - Pressure to pressure device

C - External pressure supply

E - External transducer

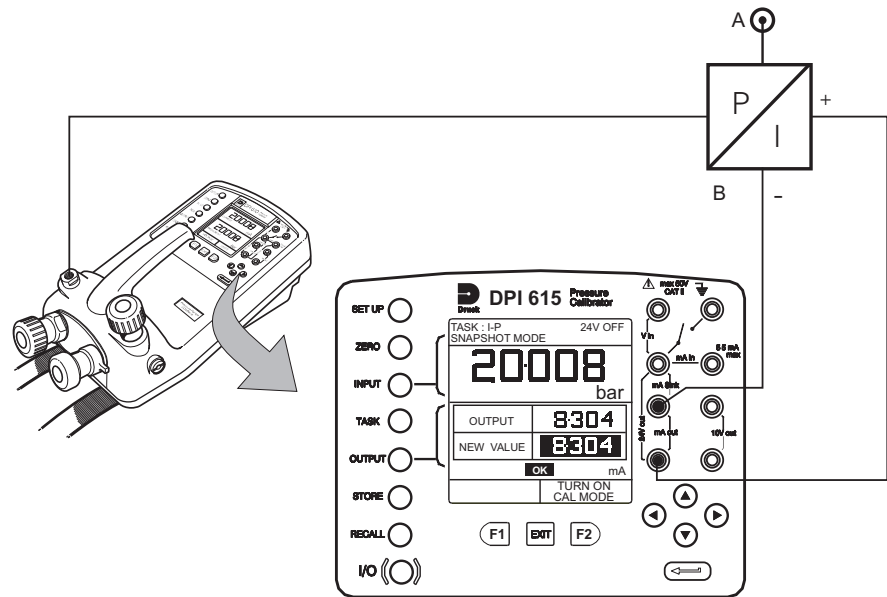
- Press the TASK key and select the P-P task. Providing the external transducer has been calibrated and its parameters stored in the calibrator, the display shows **External** pressure in the input window and calibrator **Output** pressure in the output window. If an error message "NO SENSOR OR CAL INVALID" is displayed, this indicates that the external transducer has not been entered and/or calibrated with the calibrator. Refer to page 45 for details of adding an external transducer. **If an external transducer change is made, switch the calibrator off and then on to load new transducer data.**

- If required, select the input and output units as described on page 10.
- If applicable, turn on Cal Mode and set-up test parameters as detailed on page 11.

**Note:** Match pressure ranges to give required accuracy and avoid overpressure. If external pressure is required as the output and internal pressure the input, use **ADVANCED** mode for this set-up.

# Taking Measurements

## Current to Pressure Converter (I-P) Task

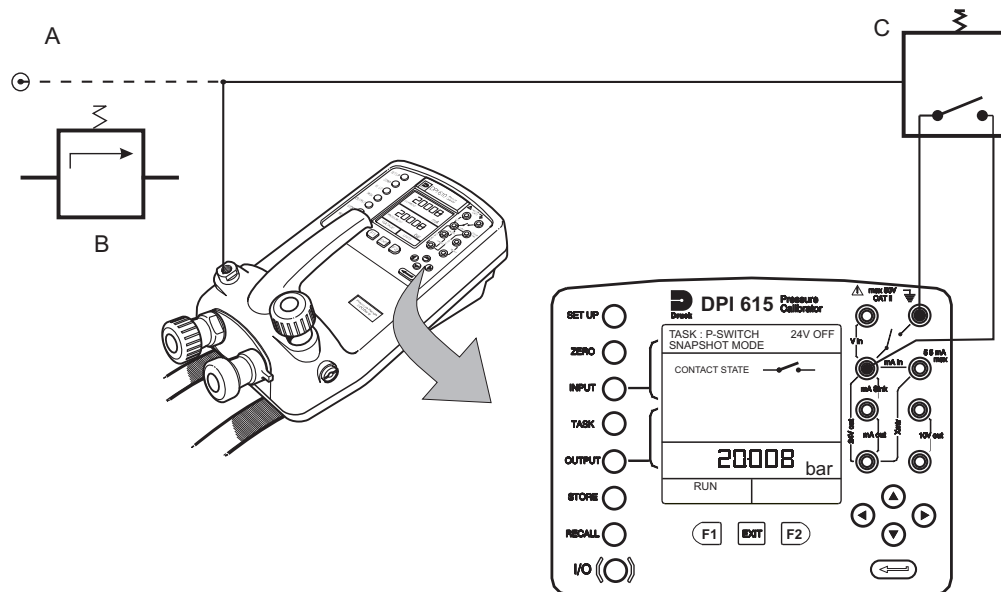


A - External pressure supply

B - Pressure to current device (24V)

- Use the **up** ▲ and **down** ▼ cursor keys to adjust the loop current to the required value. Alternatively, press **ENTER** and use cursor keys to enter a finite value. Cursor keys can then be used to nudge the output either up or down. If required, change pressure units with INPUT key.

## Pressure Switch Test (P-SWITCH) Task



A - External pressure source (indicator instruments only)

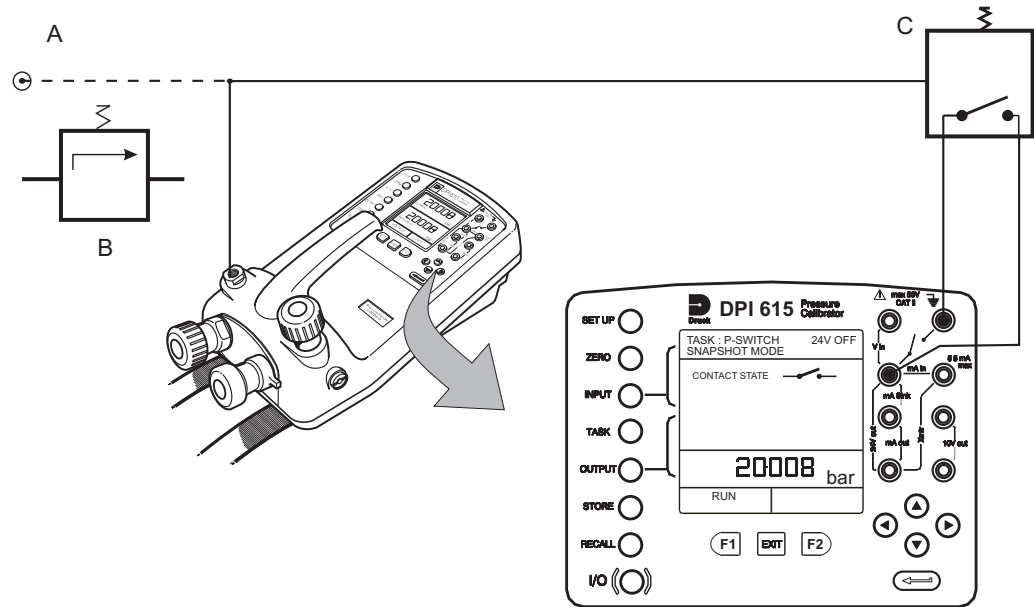
B - Pressure regulator

C - Pressure switch under test

- Contact state will be shown on display. When contacts close, buzzer sounds.
- To run switch test, close vent valve and press the **RUN** (F1) key.
- Using the hand-pump, increase the applied pressure to just below the switch operating point. Screw the volume adjuster in until the switch operates (the display then shows the operating pressure of the switch).
- Reduce pressure until the switch releases (indicated by the switch symbol). The display then shows the release pressure and the hysteresis value.

# Taking Measurements

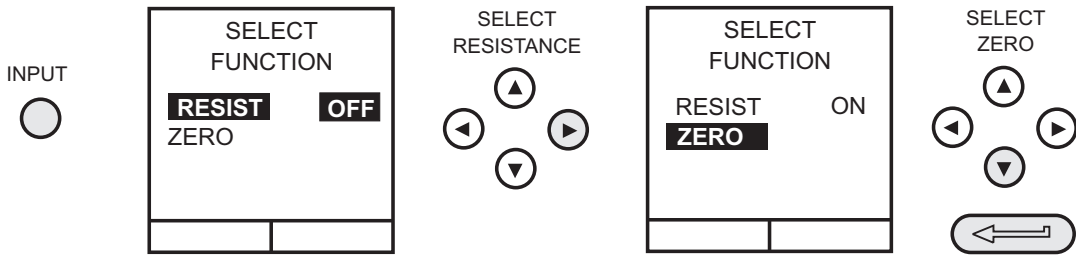
## Pressure Switch Testing with Contact Resistance Measurement



A - External pressure source (indicator instruments only) B - Pressure regulator

C - Pressure switch under test

To perform switch test with contact resistance measurement, select P-SWITCH and proceed as follows:



To ensure accurate measurements it is recommended that the zero procedure (that compensates for the resistance of the test leads) is carried out before performing this test.

**Note:** Allow sufficient time after contact closure for the resistance to stabilize.

Connect Vin +, SW + and mA in + together.

Connect switch test leads across switch symbol.

Open circuit test leads

Press ENTER to continue.

Now short test leads.

Press ENTER to continue.

Switch Resistance input now ready for use.

Open circuit test leads.

Press ENTER to continue.

TASK : P-SWITCH 24V OFF  
SNAPSHOT MODE

CONTACT STATE

20008 bar

RUN

The switch test is performed in the same way as the previous section, except that the contact resistance is measured and displayed with the results.

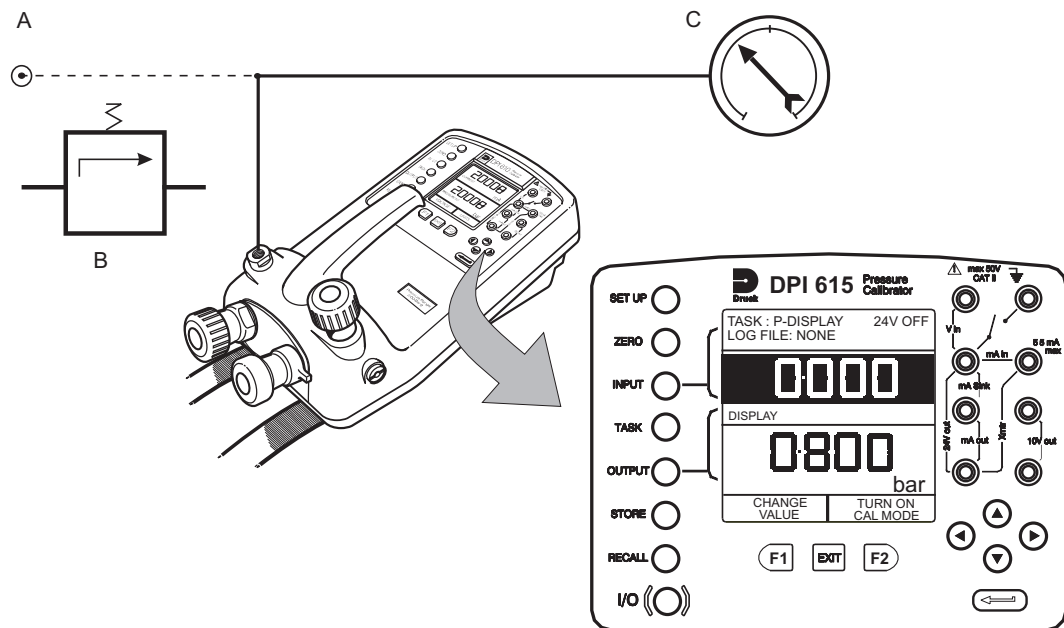
TASK: P-SWITCH		24V OFF
SNAPSHOT MODE		
CONTACT STATE		
CLOSED AT	15.060	bar
OPENED AT	14.059	bar
HYSTERESIS	1.001	bar
RESISTANCE	3	mΩ
8002		bar
RUN		



# Taking Measurements

## Pressure to Display (P - Display) Task

P-Display is a special application of Datalog. To use this mode, select Datalog from the Store Mode menu as detailed on page 37. Connect the UUT to the instrument as shown below and, if required, turn on and set-up Cal Mode (see page 11).

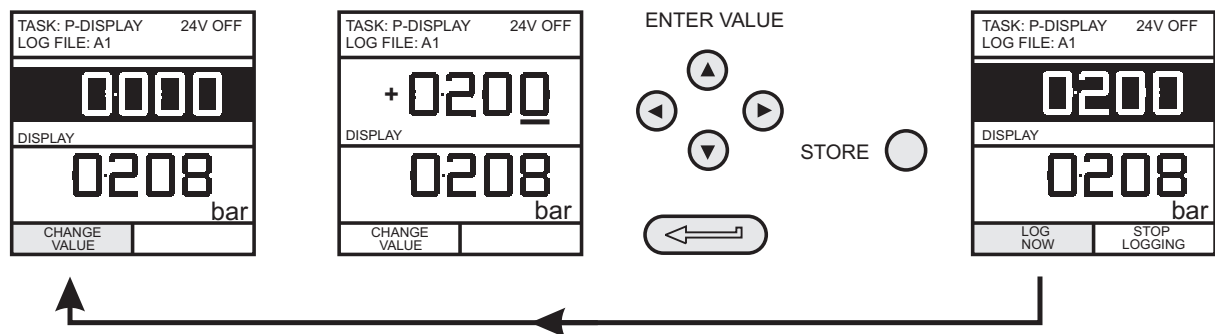


A - External pressure source (indicator instruments only)    B - Pressure regulator  
C - Dial gauge under test

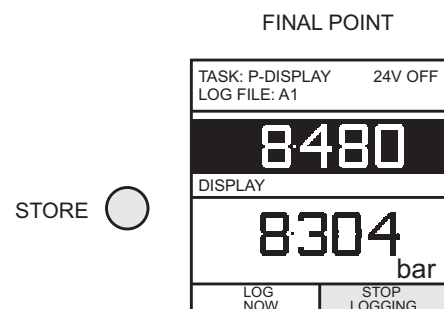
- Press **TASK** and select **P-DISPLAY**. If required, use **OUTPUT** key to change pressure units.
- Set-up a data log file as detailed on page 31.

**Note:** *TRIGGER* field, automatically set to **KEYPRESS**, cannot be changed.

- Apply a series of test pressures to the device under test. Enter displayed reading at each pressure and log each point:

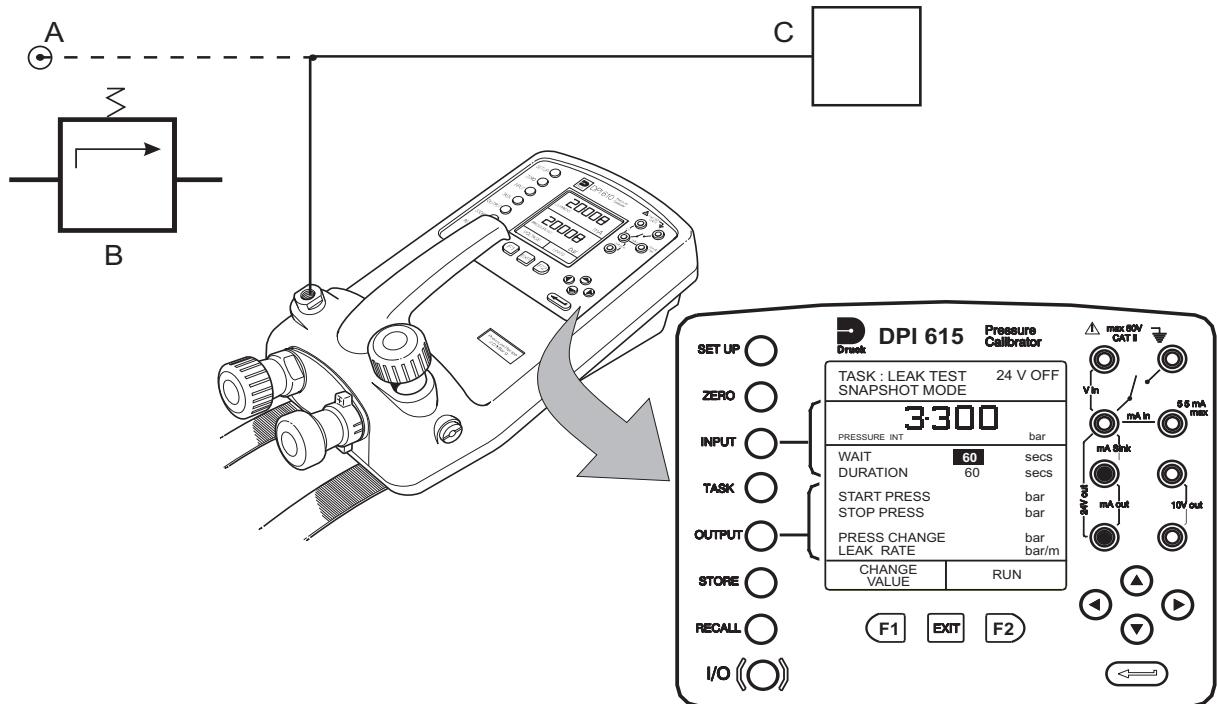


- After logging final test point, terminate as follows:



# Taking Measurements

## Leak Test (LEAK TEST) Task

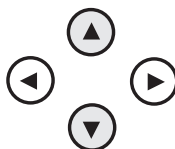


A - External pressure source (indicator instruments only)      B - Pressure regulator  
C - Unit/system under test

- If required, use the **INPUT** key to change pressure units.
- Set-up the leak test WAIT and DURATION times to the required values as shown below. Recommended minimum wait period - 3 minutes.

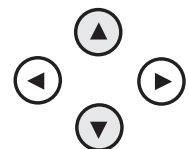
TASK : LEAK TEST SNAPSHOT MODE		24 V OFF
0.304		
PRESSURE INT bar		
WAIT	180	secs
DURATION	60	secs
START PRESS		bar
STOP PRESS		bar
PRESS CHANGE		bar
LEAK RATE		bar/m
CHANGE VALUE	RUN	

SET WAIT TIME



TASK : LEAK TEST SNAPSHOT MODE		24 V OFF
0.304		
PRESSURE INT bar		
WAIT	180	secs
DURATION	60	secs
START PRESS		bar
STOP PRESS		bar
PRESS CHANGE		bar
LEAK RATE		bar/m
CHANGE VALUE	RUN	

SET DURATION

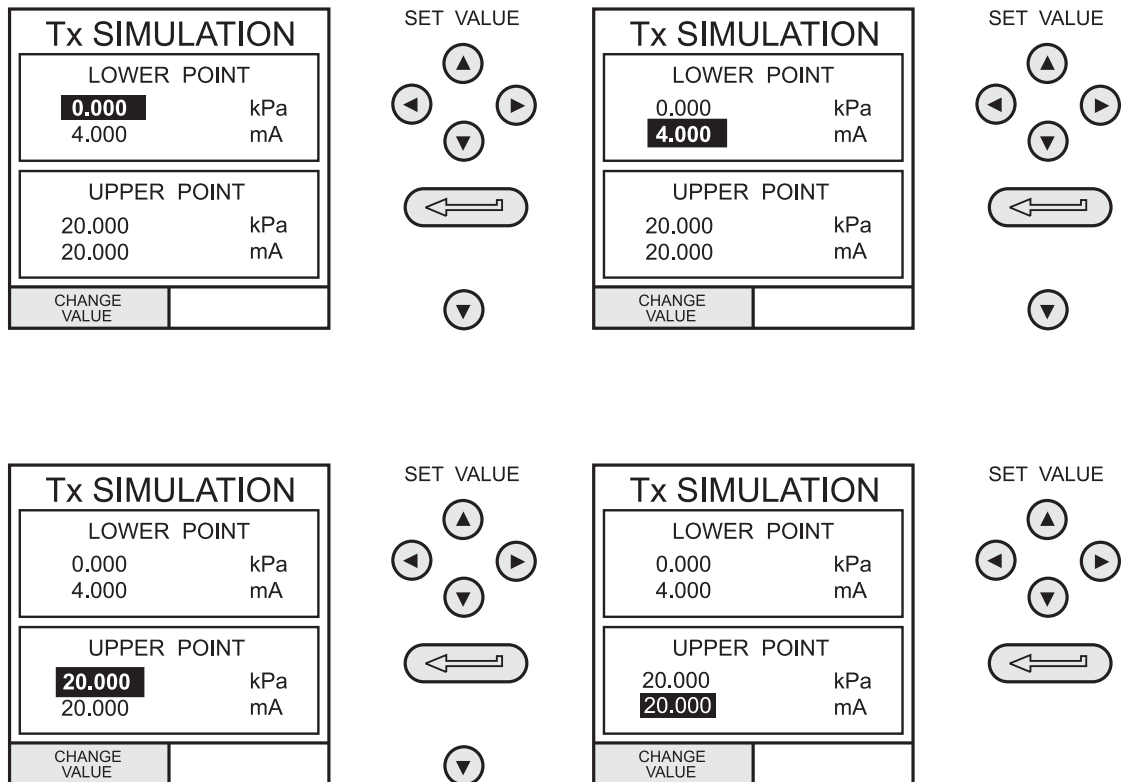


- Close the vent valve and pressurize the unit/system to the required **LEAK TEST** pressure.
- Press the **RUN (F2)** key to start the leak test. When completed, the beeper sounds and the leak test results are written to the display.

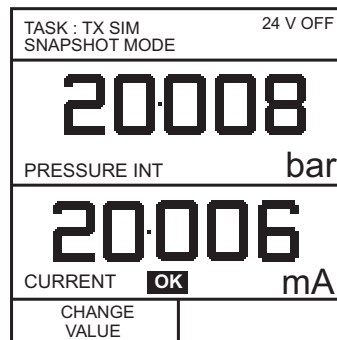
# Taking Measurements

## Transmitter Simulation (TX SIM) Task

Provides a current output proportional to the calibrator's measured output pressure (indicated pressure on indicator only version). Select task **TX SIM**. Press **EXIT** to skip set-up screen if parameters are correct.



On completion of **TX SIM** set-up, the display is configured as follows:



Set-up the output loop as detailed on page 25 and, if necessary, turn on the internal electrical supply.

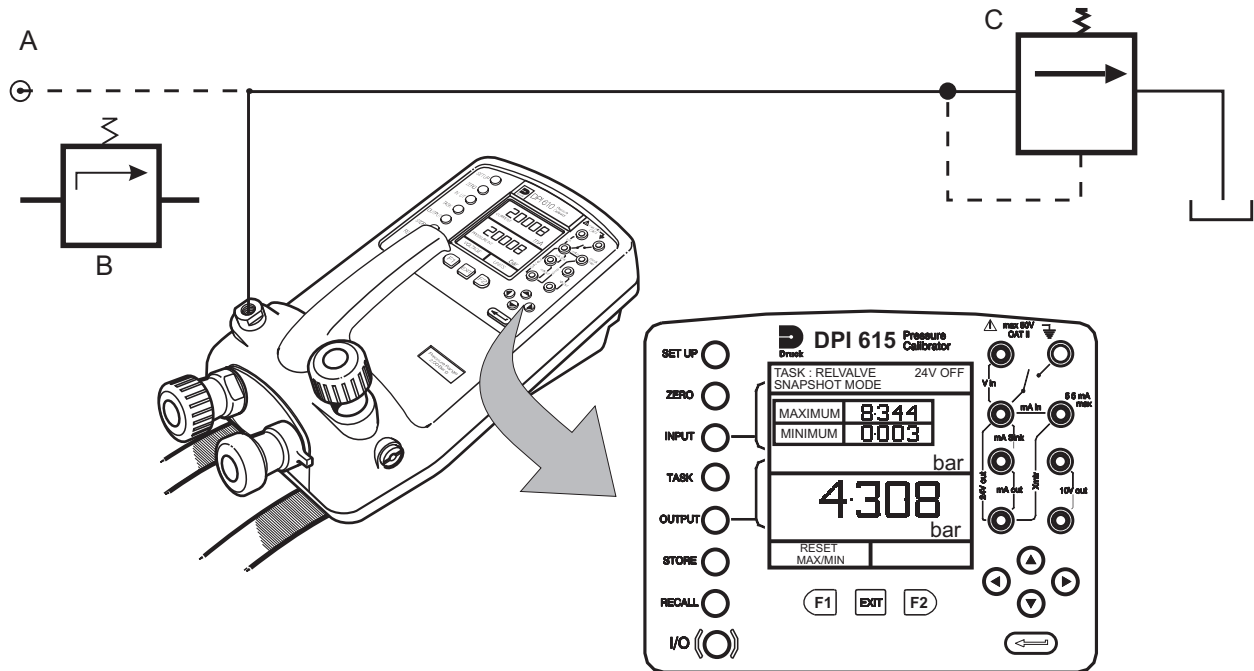
To subsequently change any of the **TX SIM** scaling parameters, press **CHANGE VALUE** (F1) to obtain the TX Simulation display.

To change the pressure units, press **INPUT** and select the required scale units. If the required scale units are not listed, press **SETUP**, select **SETTINGS** and proceed as detailed on page 38.

# Taking Measurements

## Relief Valve Test (REL VALVE) Task

To carry out a relief valve test, press **TASK** and select **REL VALVE**. Connect the output pressure port of the instrument to an external system as shown below:



A - External pressure source (indicator instruments only)    B - Pressure regulator

C - Relief valve under test

- To change the pressure units, if required, press **INPUT** and select the required units using the cursor keys.
- If necessary, turn on the 24 Volt internal supply by pressing **OUTPUT**, select **24 VOLT** and switch **ON** with the right cursor button and press **ENTER**.
- Close the vent valve and, using the hand-pump or external pressure supply, apply pressure to the relief valve under test.
- When the relief valve operates, the maximum recorded pressure indicates the operating point of the valve.

**Note:** The **STORE** key can be used for this purpose. Use right cursor key initially, followed by up/down keys to enter Snapshot text).

- Record the test results.
- Open vent valve to release test pressure.

**Note:** If using external pressure supply, isolate supply before opening the vent valve.

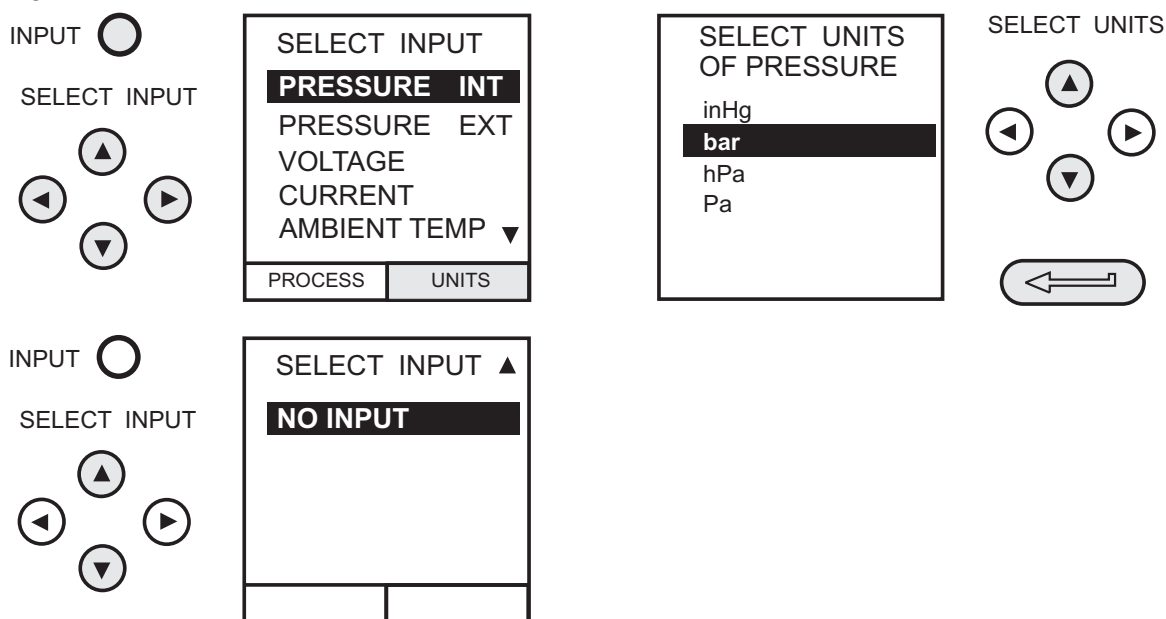
## General

Advanced task allows the user to configure the instrument to monitor one of a number of different input measurements and outputs (sources). Additionally, five process functions, Tare, Max/Min, Filter, Flow and % Span can be applied to the input functions.

## Select Input

To display an input channel, select **ADVANCED** task from the task menu. The display shows the list of the input selections and, if available, the **PROCESS** soft box (F1) and the **UNITS** soft box (F2).

The following procedure shows the method of input channel selection and the method of changing units:

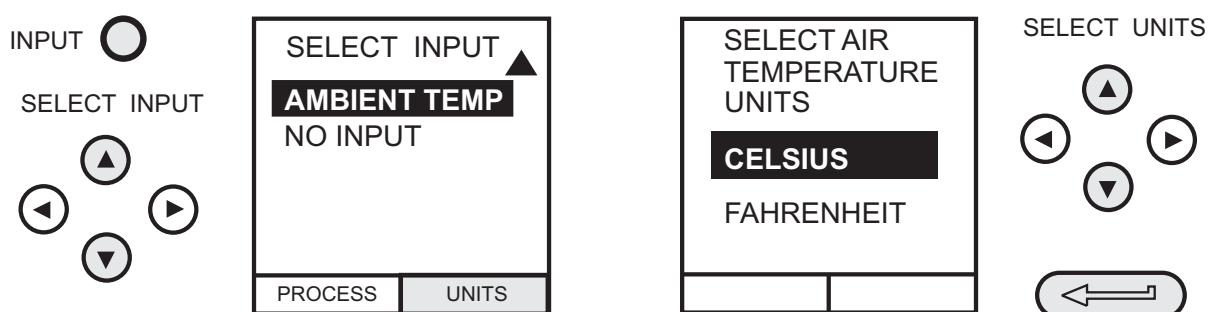


**Note:** Left/right arrow keys function as page up/down keys.

Refer to pages 21 to 24 for details of process functions.

## Ambient Temperature Measurement

To set-up the instrument to read ambient temperature, proceed as follows:



**Note:** Make sure the temperature reading has stabilized.

Process Functions

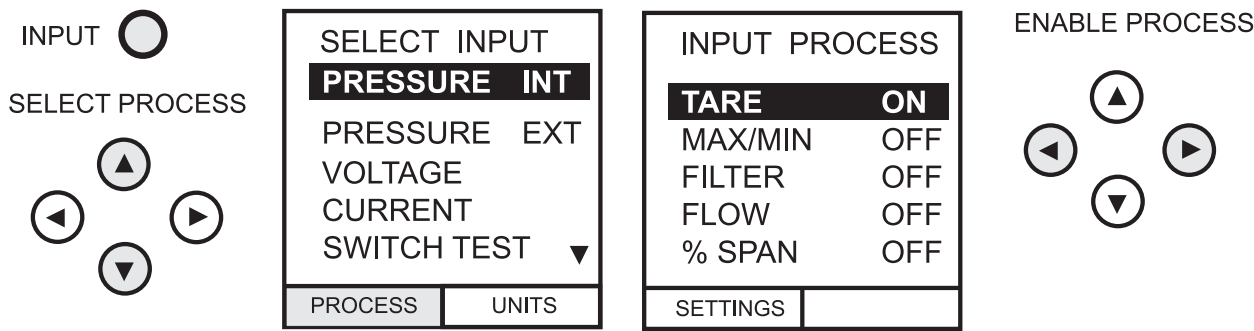
If required, the following process functions are available on the input display but **only** in **ADVANCED** task. If the instrument is in any other mode i.e. BASIC or any other task mode, the input and output displays must first be configured in **ADVANCED** task.

**Note:** *PROCESS functions are not available to the output channel.*

A summary of the process functions follows:

<b>Tare</b>	Allows either the current display value or a manually entered value to be tared off display parameter reading.
<b>Max/Min</b>	Displays running Max/Min and present display values simultaneously. Resettable via F1 key.
<b>Filter</b>	Applies low pass filter function to displayed parameter. Filter characteristics ( <i>Settling time and Band</i> ) are user programmable.
<b>Flow</b>	Applies square root function to displayed parameter.
<b>% Span</b>	Converts displayed parameter reading to a percentage of span. Span definable via the F1 key.

Following selection of **ADVANCED** from the task menu, press the **INPUT** key. Use the **up** ▲ or **down** ▼ cursor keys to select the required input. Press the **PROCESS** (F1) key and use the **left** ◀ or **right** ▶ cursor keys to enable the process on/off:



Press **ENTER** to switch the process ON with existing settings or F1 to change process settings (where applicable).

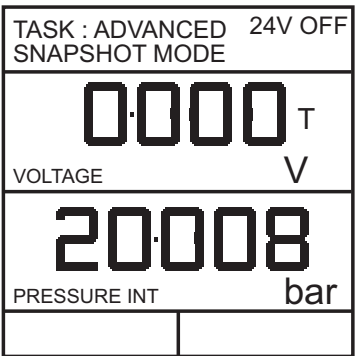
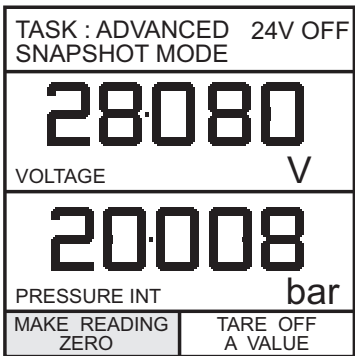
Tare Process Function

To set-up a Tare function, enable **TARE** from the process menu and press F1 to enter the Tare **SETTINGS** functions.

Disable **TARE** by entering process menu and turning the function **OFF**.

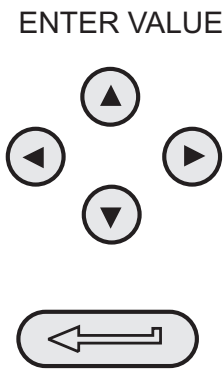
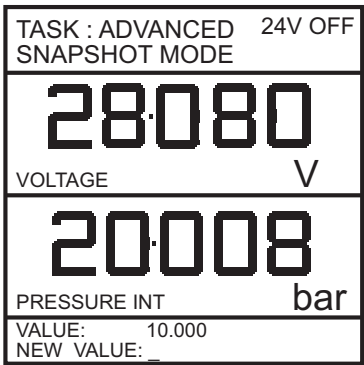
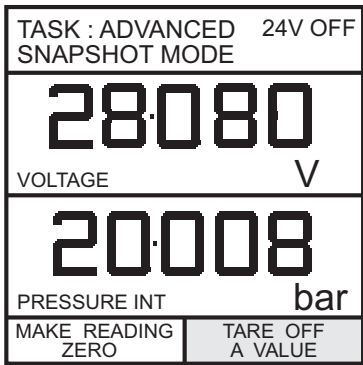
**Note:** Last TARE setting is retained and will be applied when function is next enabled.

**Tare Current Input Reading** To tare off the current display reading, proceed as follows:



**Tare Off An Entered Value** To tare off an entered value, proceed as follows:

**Note:** Display shows the last entered Tare value.



Max/Min Process Function

To set-up an input display to show max/min and present input reading, enable MAX/MIN from the process menu and press F1 (SETTINGS) to provide **RESET** function. The display now shows the max/min values as follows:

TASK : ADVANCED 24V OFF	
SNAPSHOT MODE	
MAXIMUM	8304
PRESENT	4.308
MINIMUM	0003
VOLTAGE V	
8.304	
PRESSURE INT bar	
RESET	
MAX/MIN	

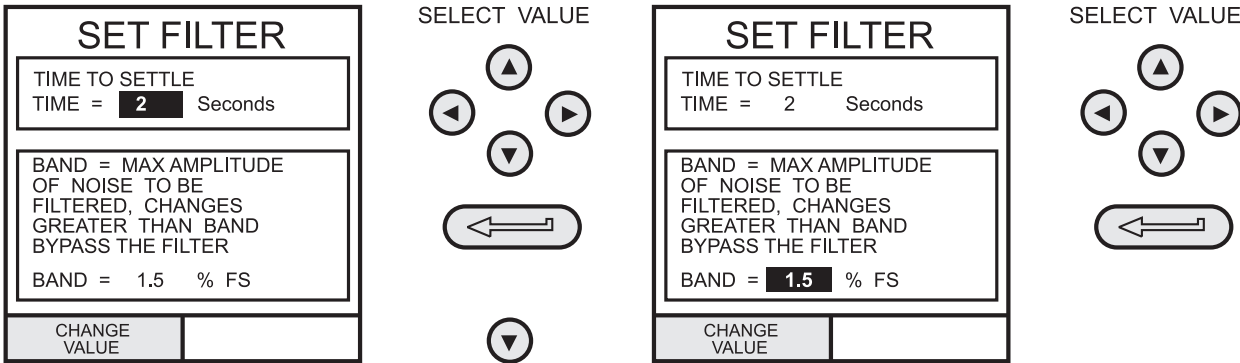
Reset Max/Min display at any time by pressing the F1 key.

To quit max/min, press **INPUT**, select **MAX/MIN** from process menu and switch the function off.

Filter Process Function

To apply the low pass filter to a selected input, enable **FILTER** from the process menu and press F1 (SETTINGS) to provide access to the filter parameters. Two settings are required, *Time to Settle* and *Band*.  
To examine the current filter settings and exit without change, press the **EXIT** key.

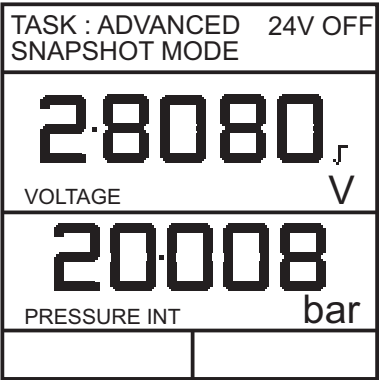
The set-up procedure is as follows:





Flow Function

To apply the flow function to a selected input, enable **FLOW** from the process menu and press **ENTER**. The square root symbol is displayed beside the input value to indicate that the **FLOW** function is active:



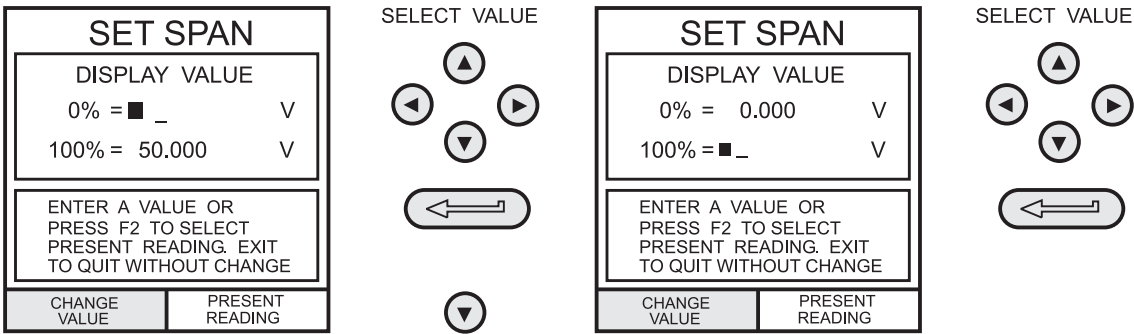
To cancel **FLOW**, press **INPUT** and turn function OFF at the process menu.

%Span

To convert a selected input display from a numerical value to a percentage of full-scale reading, enable **SPAN** from the process menu and press F1 (SETTINGS) to provide access to the span definition parameters. Two span definitions are required, **Zero** and **Full Scale**.

To leave span at current setting, press **EXIT**.

To define zero and full-scale settings, proceed as follows:



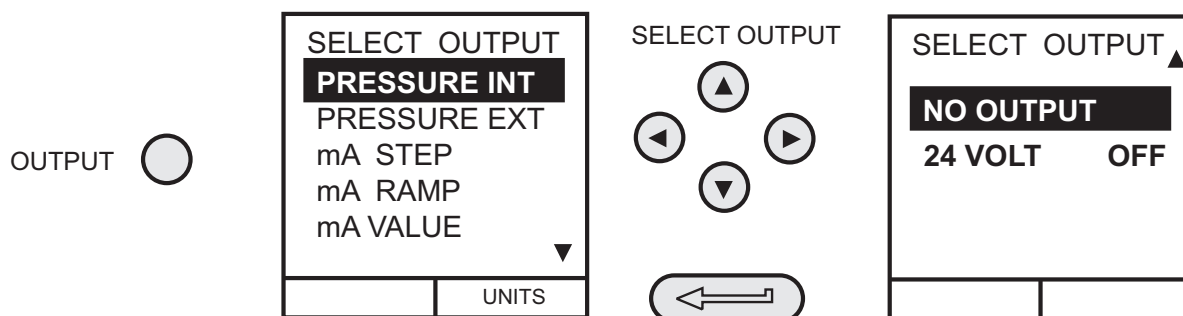
To cancel **%SPAN**, press **INPUT** and turn function OFF at the process menu.

## Select Output

To display an output channel, select **ADVANCED** mode from the task menu. The display shows the list of output selections and, if available, the **UNITS** soft box (F2).

The following procedure shows the method of output channel selection from two pages of options. The second page can be obtained directly from the first by pressing the **right**

► cursor key:



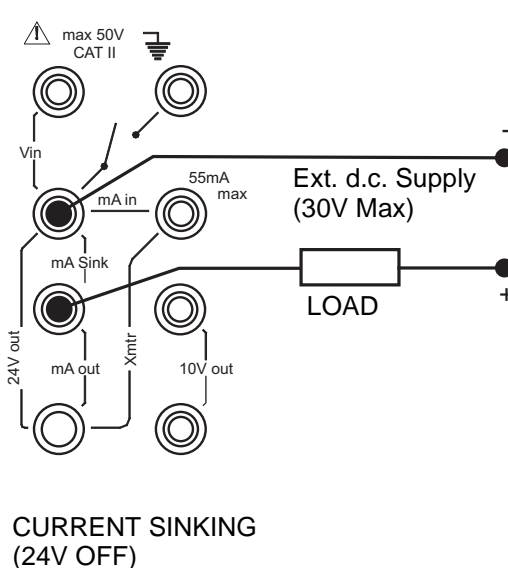
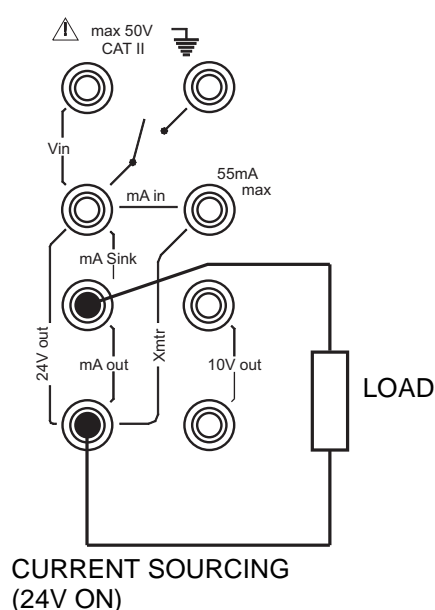
**Note:** Left ◀ and right ▶ keys function as page up/down keys.

To change the output units (*pressure channels only*), select the channel with the cursor keys and press F2 before pressing **ENTER**.

## Electrical Outputs (Loop Power)

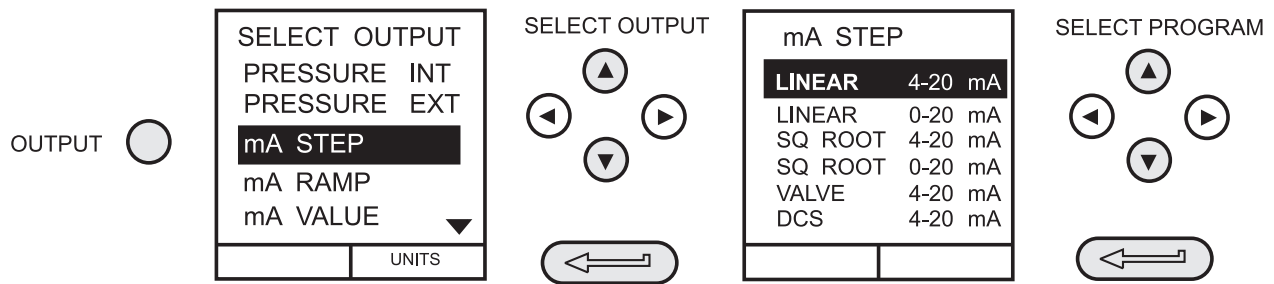
For all the electrical outputs, the output loop can be powered either by the instrument's internal 24V supply (sourcing) or alternatively, from an external supply (current sinking). To conserve battery power, the 24V internal supply should be switched off (even when not being used to power an external loop).

External connections to the front panel of the instrument are shown below for both sourcing and sinking applications:

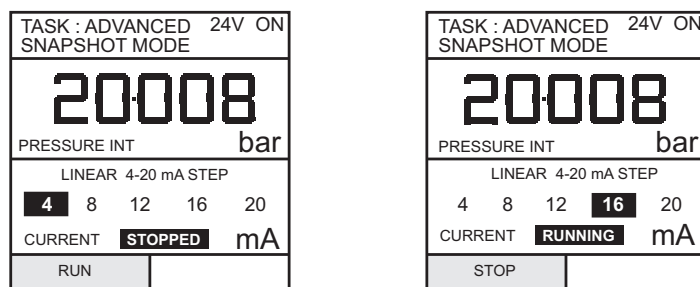


## mA Step

To select one of the electrical output programs, press the **OUTPUT** key and proceed as follows:



On selection of (e.g.) Linear, the output display window changes to show the selected program of output currents:

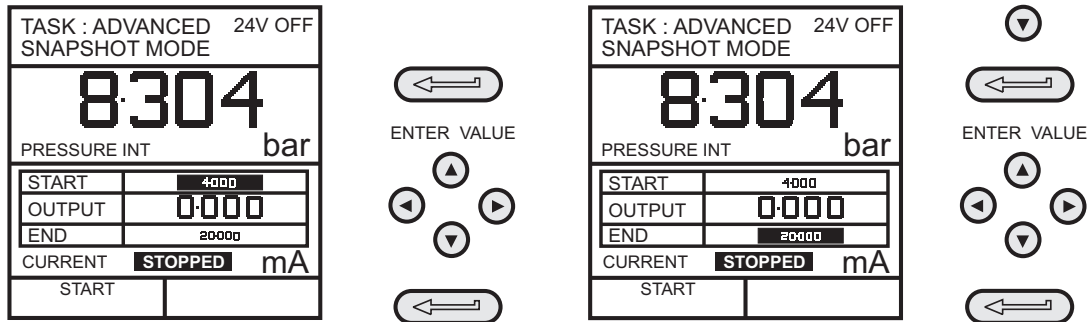


- For current sourcing applications, turn on the 24V supply as shown on page 28. For current sinking applications, connect an external supply as shown on page 25 and leave the 24V supply switched **OFF**.
- Press **RUN** (F1) to run program. A flashing status display **CHECK LOOP** indicates a fault in the external loop i.e. supply fault or open circuit.  
**Note:** The dwell time at each step is approximately 10 seconds.
- Press **STOP** (F1) when running to stop at any point. Press **RUN** (F1) to resume.

## mA Ramp

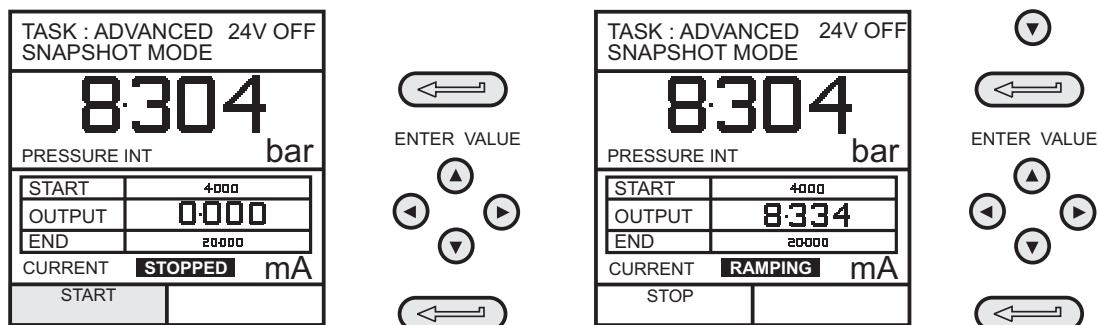
Press the **OUTPUT** key and select **mA RAMP** as shown previously in mA Step.

- Define ramp required by entering **START** and **END** current values as shown below:

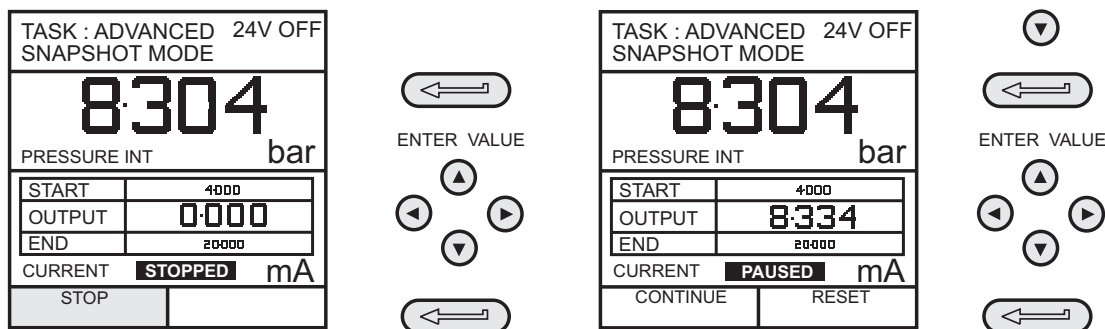


- For current sourcing applications, turn on the 24V supply as shown on page 28. For current sinking applications, connect an external supply as shown on page 25 and leave the 24V supply switched **OFF**.
- Press **START** (F1) to run the program. A status display **CHECK LOOP** indicates a fault in the external loop i.e. supply fault or open circuit.

**Note:** The ramp cycle (min to max or max to min), is approximately 60 seconds.

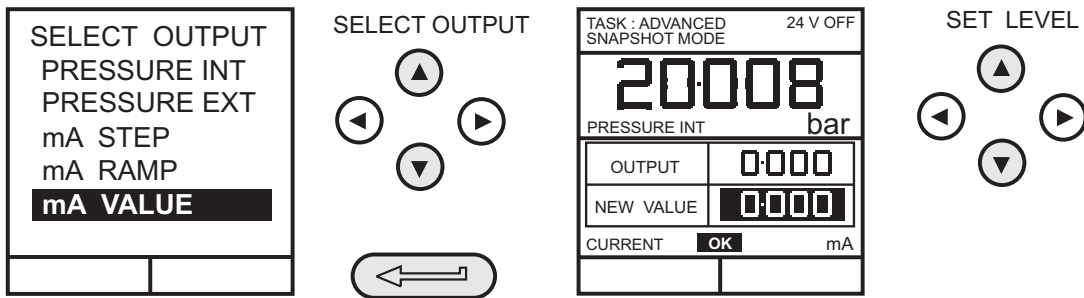


- Press **STOP** (F1) when running to stop at any point. Press **CONTINUE** (F1) to resume from point of pause or **RESET** (F2) to return to start point.



### mA Value

Press the **OUTPUT** key and select **mA VALUE** from the output menu. The procedure is shown below:

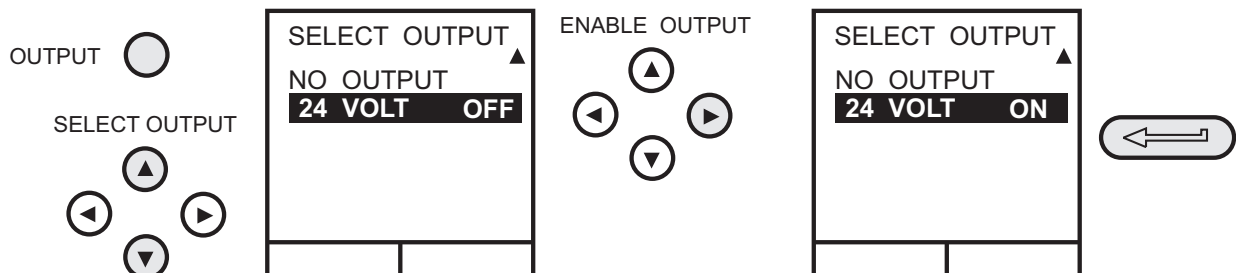


- For current sourcing applications, turn on the 24V supply as shown below. For current sinking applications, connect an external supply as shown on page 25 and leave the 24V supply switched OFF.
- Use **up** ▲ and **down** ▼ cursor keys to adjust output current level. While the loop is made, a status display indicates **OK**. A status display **CHECK LOOP** indicates a fault in the external loop i.e. supply fault or open circuit.

### 24 Volt

Press the **OUTPUT** key and select **24 VOLT** from the Output menu. The procedure is shown below:

**Note:** The 24V selection is located on the second page of output functions.

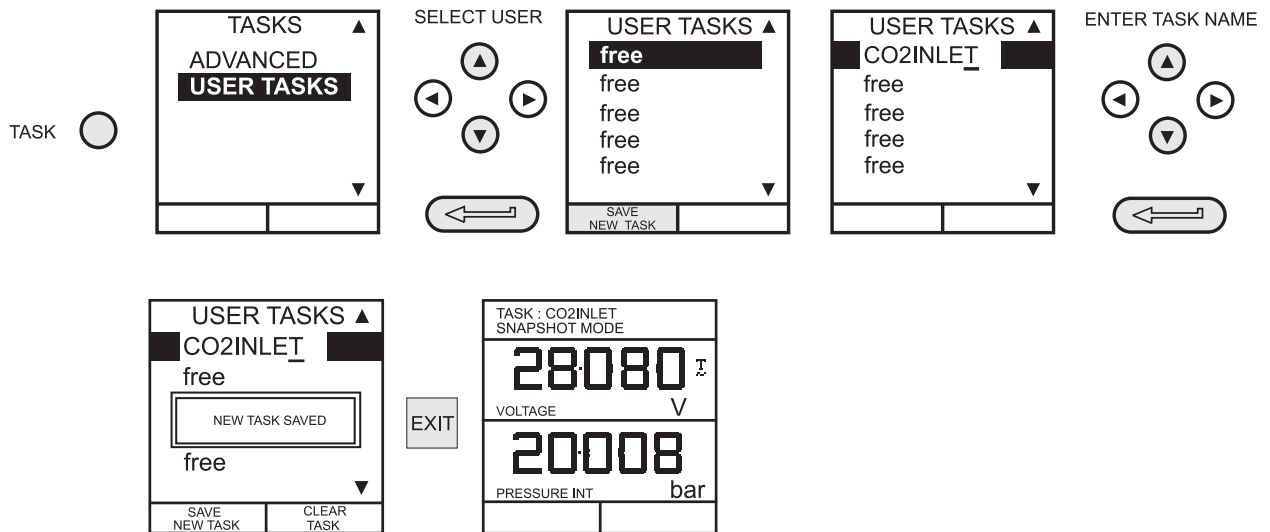


**Note:** To conserve battery power, keep the 24V supply switched off when not in use (even if the output is unloaded).

## Define New Task

To define a new task, proceed as follows.

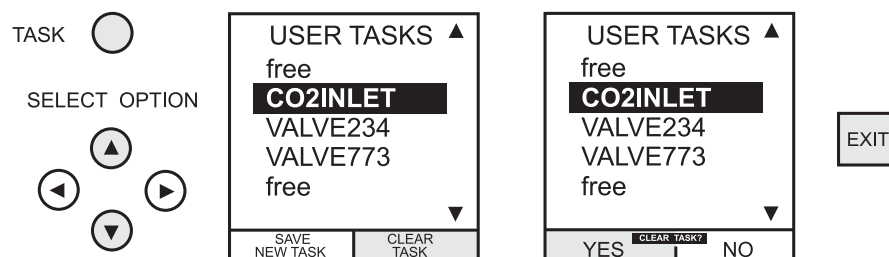
- Select **ADVANCED** from **TASKS** menu.
- Using the **INPUT** key, select the required input for the input display and set-up any process functions required.
- Using the **OUTPUT** key, select the required output for the output display.
- Press **TASK** and select **free**. Enter new task name as follows:



On completion of this procedure, the display reverts to newly set-up task as shown:

## Clear Task

To clear a user defined task, select **TASK** and proceed as follows:

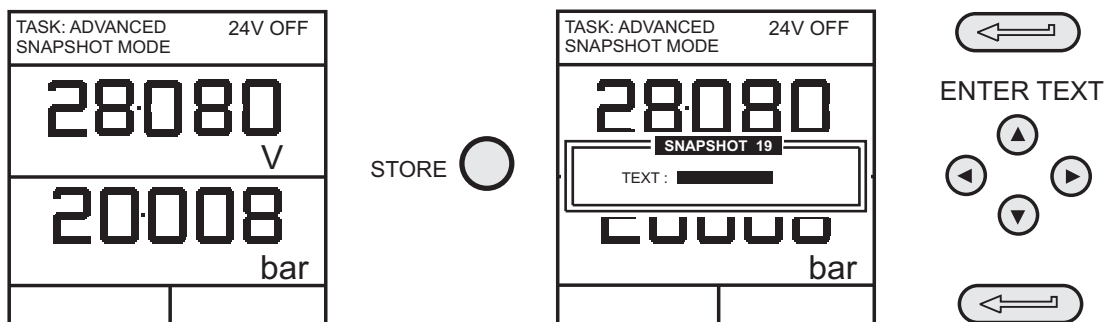


### Saving Display or Data Log

In Store Mode three memory operations can be set-up: **None**, **Snapshot** and **Data Log**. Refer to **Using Setup** for details.

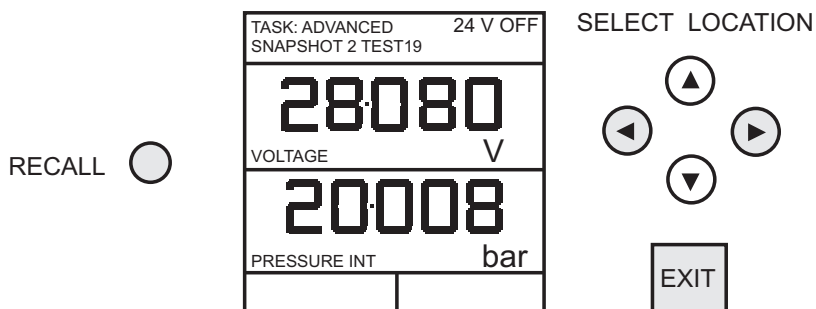
### Store Operations (Screen Snapshots)

To store any display (menu displays excepted), press the **STORE** key. This saves the current display to the next available location. Supporting text (10 characters) may be appended. Twenty memory locations are available on a cyclic buffer. When all 20 have been used, store operations overwrite existing locations, starting at *Location 1*.



### Recalling Stored Data (Screen Snapshots)

To recall a previously stored display, press the **RECALL** key. This recalls the last display saved. Press the **left** ◀ or **right** ▶ cursor keys to recall the previous or next locations respectively. To exit **RECALL**, press the **EXIT** key:



## Data Log Operations

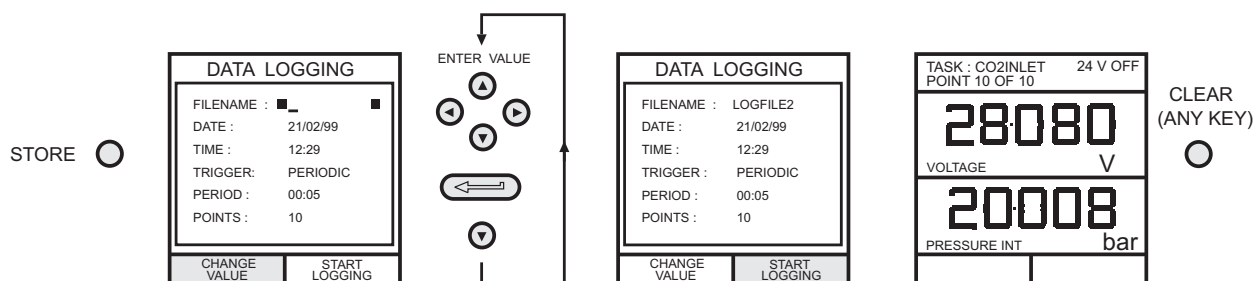
Data Log is a special application of store mode that enables the calibrator to either automatically log displays at preset time intervals or to manually log a display on operation of the **STORE** key. Logged data is written to a user specified file.

To set-up a Data Log file, proceed as follows:

- Select a task, other than **BASIC**. If using **ADVANCED**, set-up required output parameters.
- Use **SETUP** to select Data Log from the Store Mode Menu (see page 37).

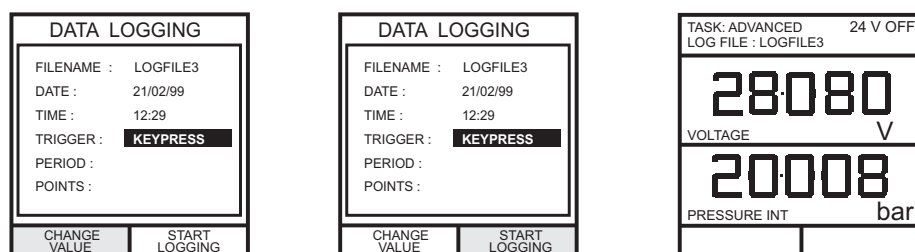
### Auto Log (Timer)

Press **STORE** and set up the Data Log file parameters as shown below. Use **CHANGE VALUE** (F1) followed by cursor keys to set field values. For Auto Log, set **TRIGGER** field to **PERIODIC**.

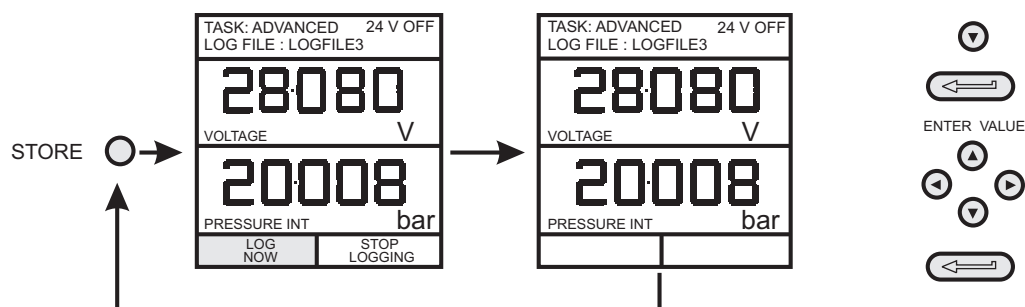


### Manual Logging

Enter the file details as shown above and select **KEYPRESS** for **TRIGGER** field. Screen reverts to displayed parameters showing set-up file as shown below:



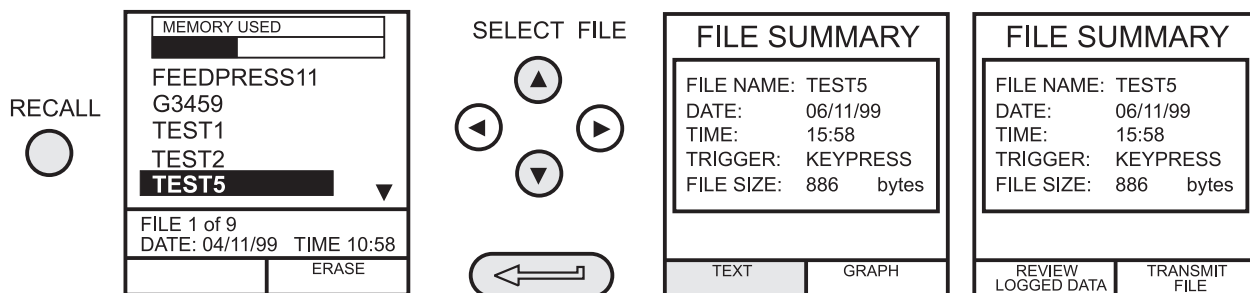
Use a combination of **STORE** and **LOG NOW** (F1) to log events as follows:



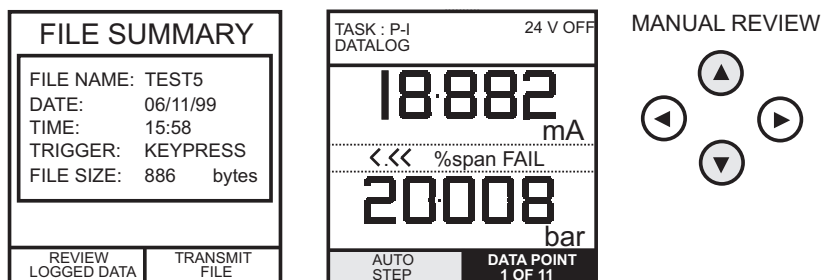


## Recall Data Log Files

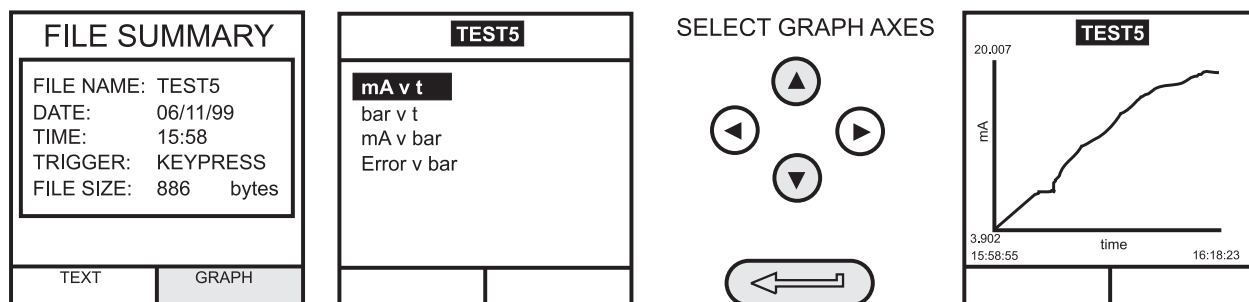
To recall a Data Log file to the display, ensure that **DATA LOG** is selected from the SETUP menu and proceed as follows:



Data Log files can be displayed either as text (stored screens) or in graphical form. To display as text, proceed as follows from the File Summary menu. Select Auto Step to automatically review each screen at 1 second intervals or use the **left** ◀ or **right** ▶ cursor keys to manually review.



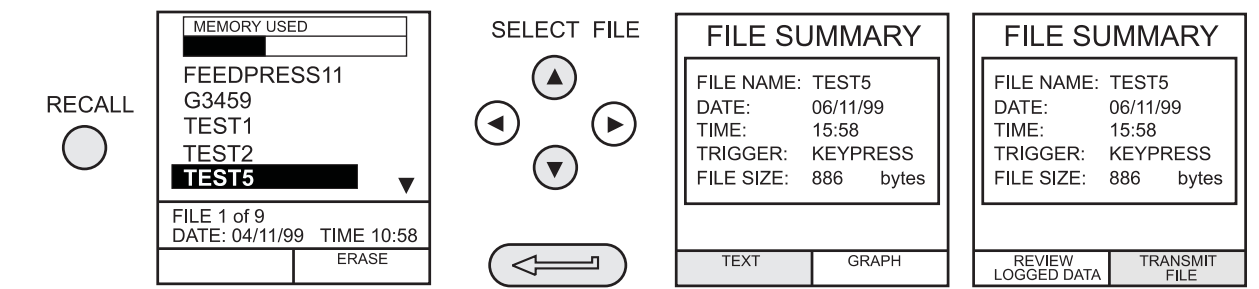
To display logged data in graphical form, on screen, proceed as follows from the File Summary menu:



Uploading Data Log Files

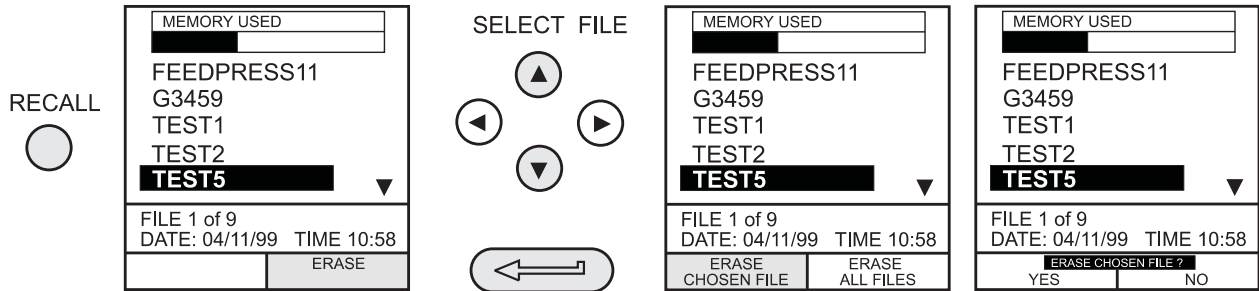
Connect the RS232 socket of the instrument to either the COM1 or COM2 port of the PC. Ensure that the RS232 parameters at the PC end match those of the instrument. The RS232 parameters of the instrument can be checked as detailed on page 39. Set-up a file on the PC to receive the data, (e.g.) in the *Windows® Terminal* program.

To upload a file, proceed as follows. Appendix 1 give details of a typical uploaded data log file.



Delete Data Log and Procedure Files

To delete a Data Log file, or a procedure file (DPI 615 only), proceed as follows. Alternatively, to delete all logged files simultaneously, select **ERASE ALL FILES** (F2) at the erase screen.



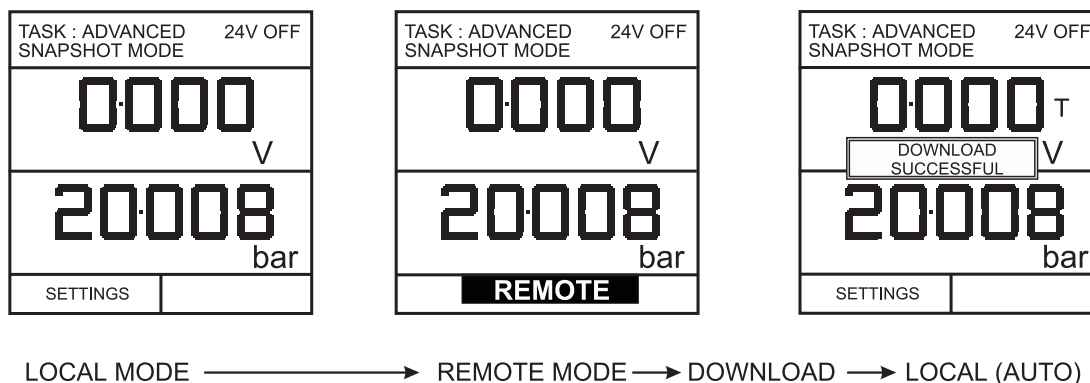
### Downloading Procedure Files (DPI 615 instruments only)

Complete test procedures may be downloaded from a PC to the DPI 615 instrument via the RS232 port. A procedure consists of a number of Druck Universal Command Interface (DUCI) commands that are usually assembled by a linking management software application (e.g.) **Druck Intecal**.

Before downloading a procedure, the instrument must be in the REMOTE mode. To place the instrument into REMOTE mode, proceed as follows:

- Connect the instrument's RS232 port to a free COM port on a PC.
- Ensure that the COMMS parameters of the PC match those of the instrument (refer to page 39).
- Ensure that the instrument is not already running a procedure. If it is, quit the procedure.
- Download the procedure. Procedures are stored in the Data Log directory.

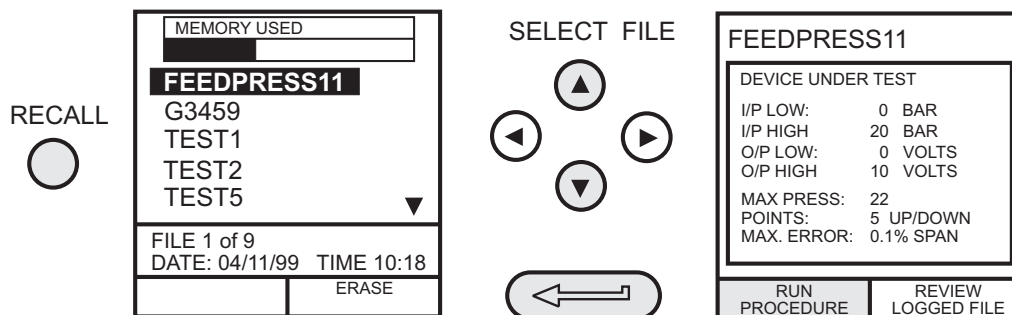
The following sequence shows a typical download sequence that starts with the instrument in LOCAL mode.



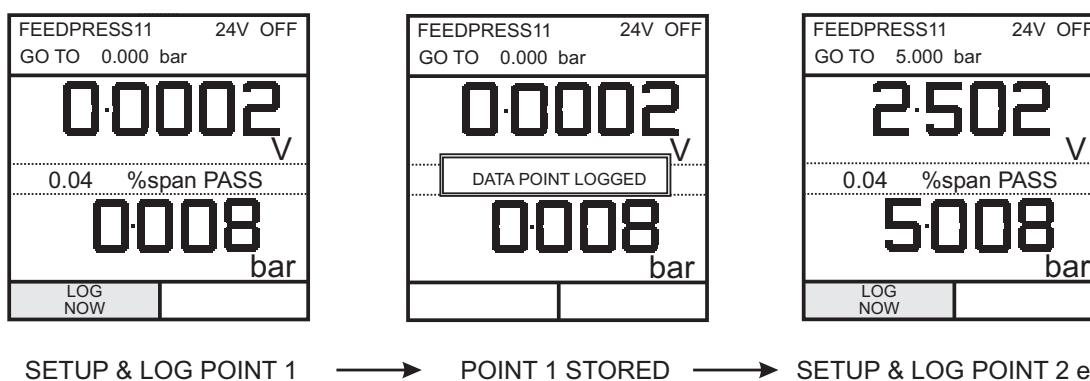
After the procedure file has been downloaded, the instrument is usually returned to the LOCAL mode by the last command in the procedure file. If the instrument remains in REMOTE mode, switch it OFF and ON to reset it.

## Running Procedure Files (DPI 615 instruments only)

To run a procedure, make sure the instrument is set to the Store mode, Data Log (see page 37), and proceed as follows:



After selecting F1, proceed by entering the User ID and Serial Number and then select F1 (Continue) and follow the on-screen procedural instructions:

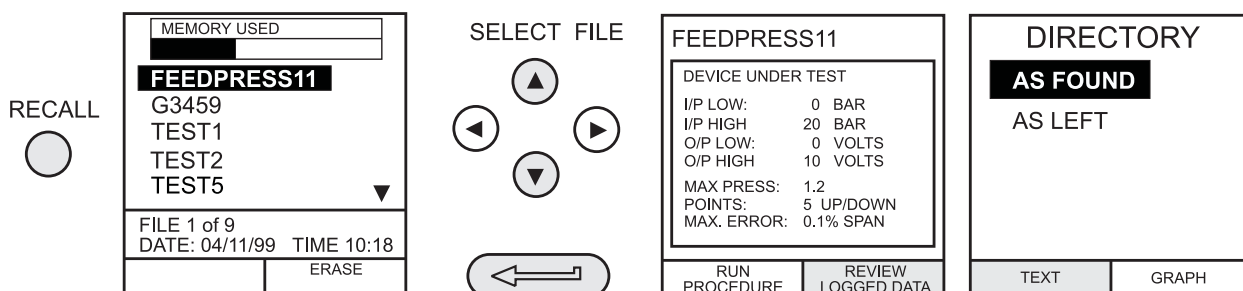


When the test procedure for a given UUT has been completed, the result of running the first test is stored as an AS FOUND file. This file cannot be overwritten. Any subsequent tests on the device are stored as an AS LEFT file that is overwritten each time the procedure on this device is run.

When recalling the results of a procedure, the choice of AS FOUND or AS LEFT is provided (refer to page 36).

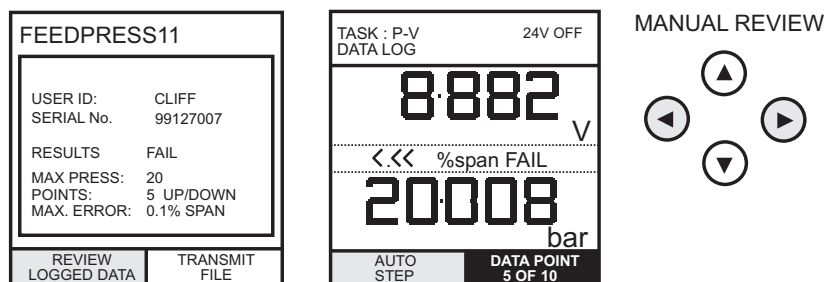
### Recalling Data Files (DPI 615 instruments only)

Data or results files generated by running procedures are stored in the instrument's Data Log directory. To recall a data file to the display, ensure that **DATA LOG** is selected from the SETUP menu and proceed as follows:



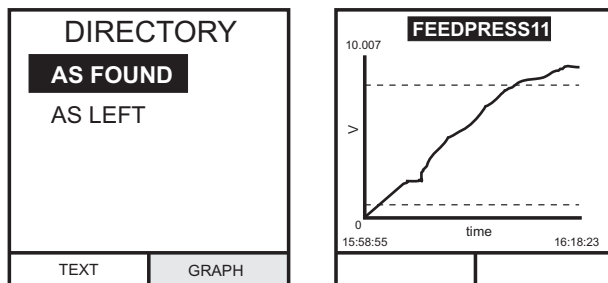
Use the cursor keys to select either the AS FOUND option or the AS LEFT option for display. AS FOUND is the result of the first run of a procedure and AS LEFT is the result of the last time the procedure was run.

Procedure data files can be displayed either as text (stored screens) or in graphical form. To display as text, select the **TEXT** option (F1) from the directory and proceed as follows from the File Summary menu. Select **AUTO STEP** (F1) to automatically review each screen at 1 second intervals or use the **left** ◀ or **right** ▶ cursor keys to manually review.



To transmit the selected logged data via the RS232 interface, connect the instrument to a free port on an external PC, ensure that the instrument's RS232 parameters match those of the PC.

To display logged data in graphical form, on screen, select **GRAPH** (F2) from the directory and proceed as follows:



# Using Set-up

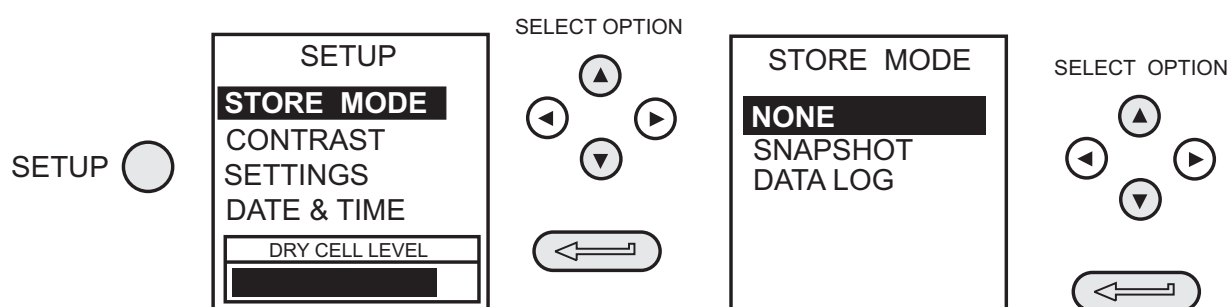
## General

**SETUP** mode is available in all modes except **BASIC** and permits the changing of the following instrument parameters.

- Store Mode - None, Snapshot, Data Log.
- Contrast.
- Settings - Units, Language, RS232 parameters, Powerdown and Calibration Routines (*Refer to page 43 for Calibration details*).
- Date and Time (Real Time Clock).
- Backlight Management - On, Off and Timed.

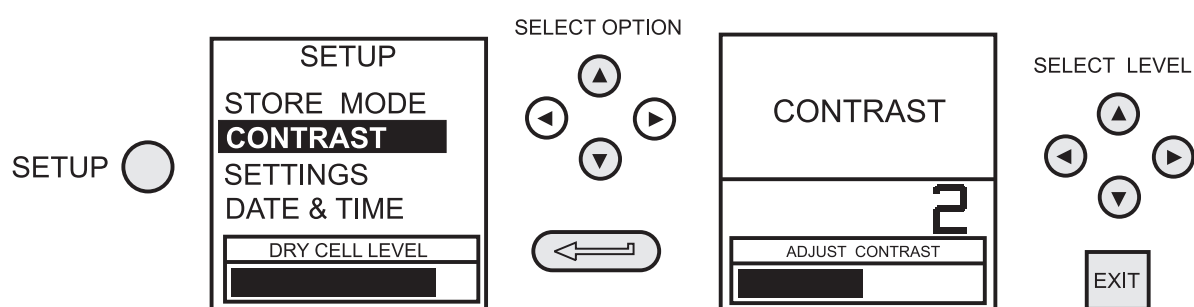
## Store Mode

Select **STORE MODE** from the Set-up menu and select required mode as follows:



## Contrast

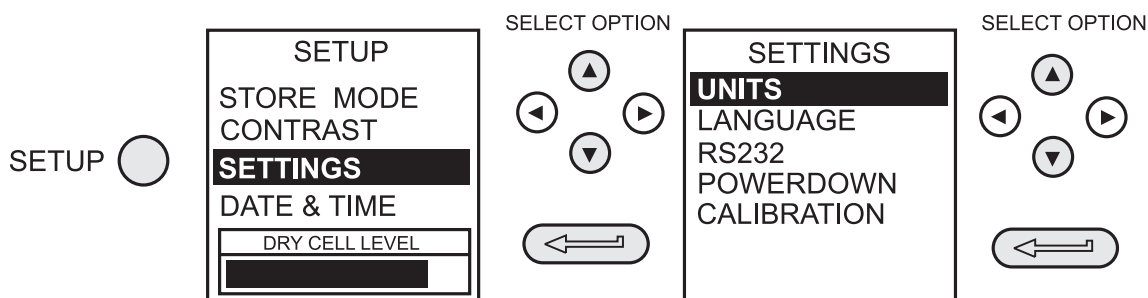
Select **CONTRAST** from the Set-up menu and proceed as follows:



## Using Set-up

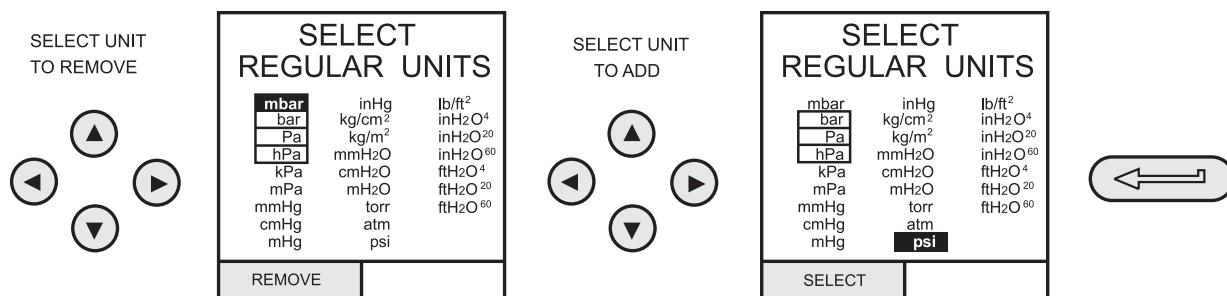
### Settings - Select Setup Option

To select one of the **SETTINGS** options from the set-up menu, proceed as follows:



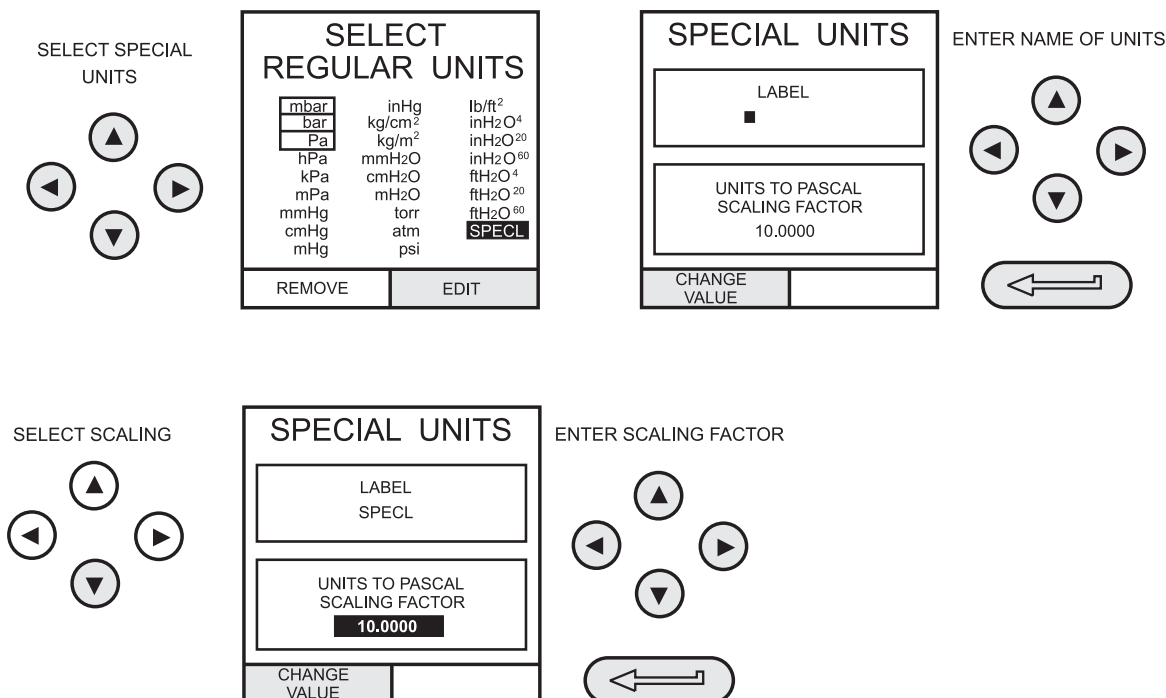
### Units

Select **UNITS** from the **SETTINGS** menu and proceed as follows:



### Define Special Units

Select **UNITS** from the **SETTINGS** menu and select **SPECIAL UNITS** and proceed as follows:



## Using Set-up

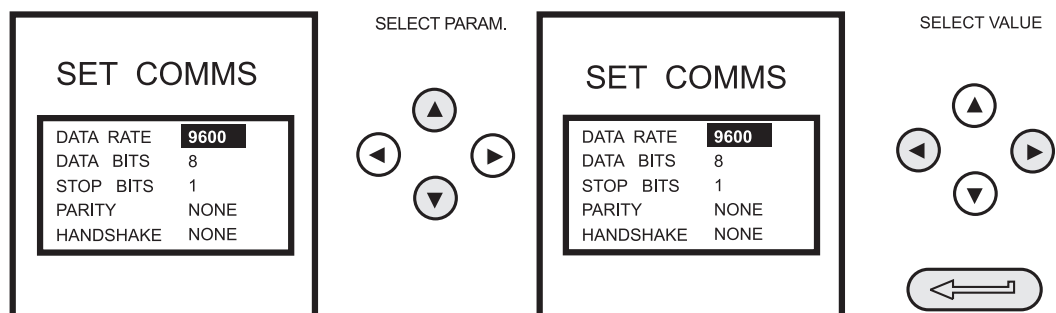
### Language

Select the **LANGUAGE** version required from the **SETTINGS** menu and proceed as follows:



### RS232

Select **RS232** from the **SETTINGS** Menu and proceed as follows:



### Notes:

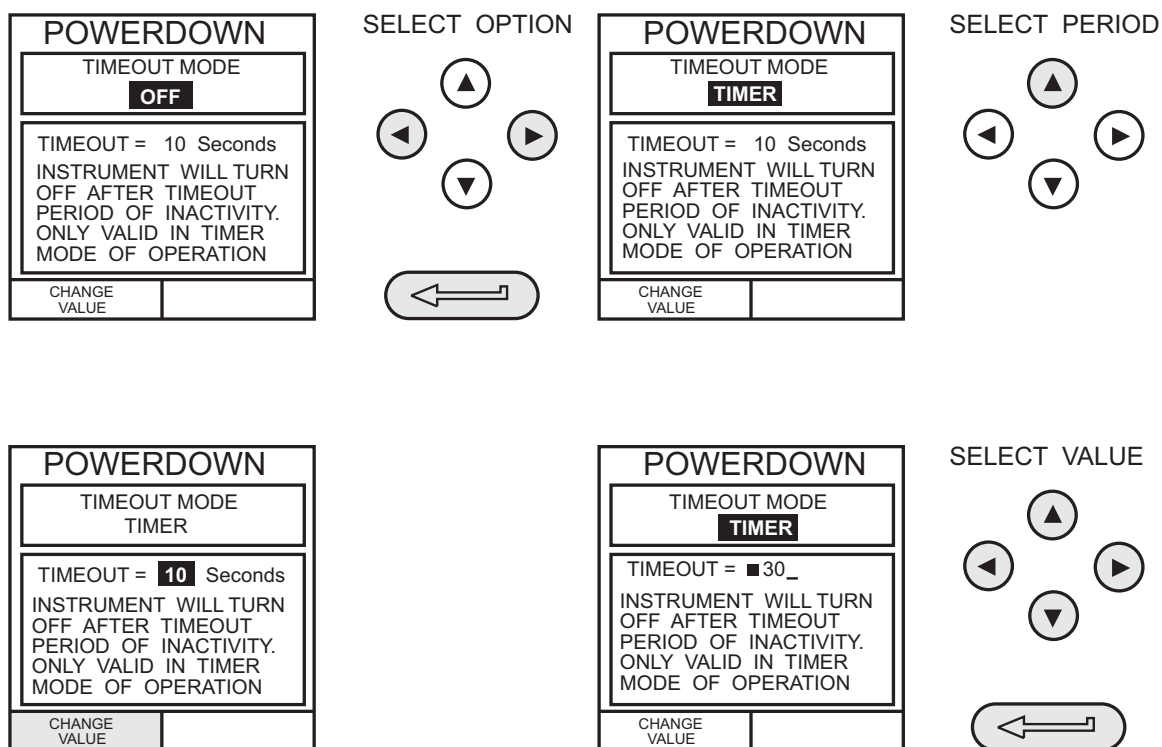
- *Communications default settings are shown above.*
- *If a communications problems occurs at a particular baud rate, change the baud rate on the instrument and PC to a lower rate.*



## Using Set-up

### Powerdown

Select **POWERDOWN** from the **SETTINGS** menu and proceed as follows:



If selected to **TIMER** mode, following a period of inactivity, the instrument automatically powers off after the preset **TIMER** period.

If selected **OFF**, auto power off is inhibited and once switched on, the instrument remains **ON** until it is manually switched **OFF**.

### Calibration

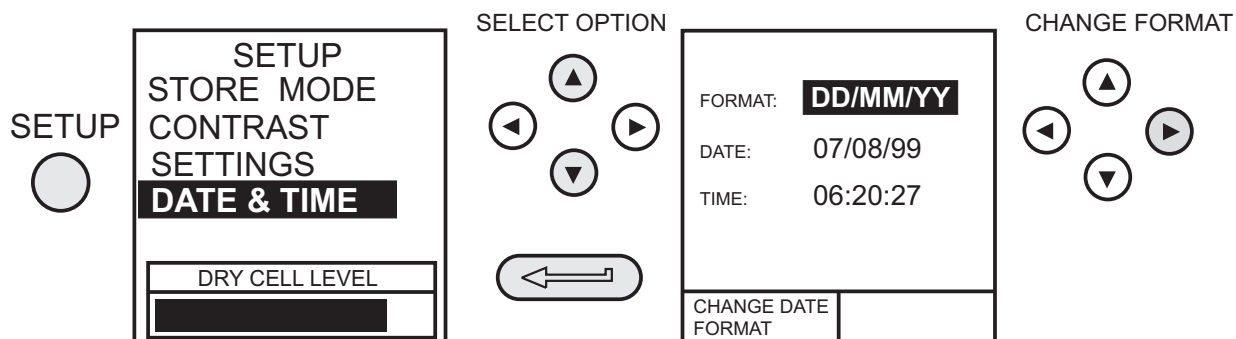
Refer to page 43 for a full description of the calibration procedures.

# Using Set-up

## Date and Time (Real Time Clock)

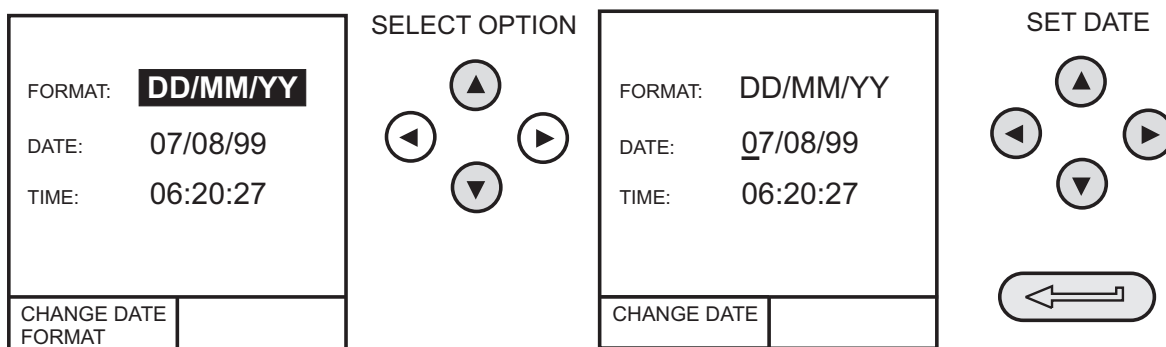
### Date Format

To set-up the real time clock, select **DATE & TIME** from the set-up menu and, using the ► key, set the required date format:



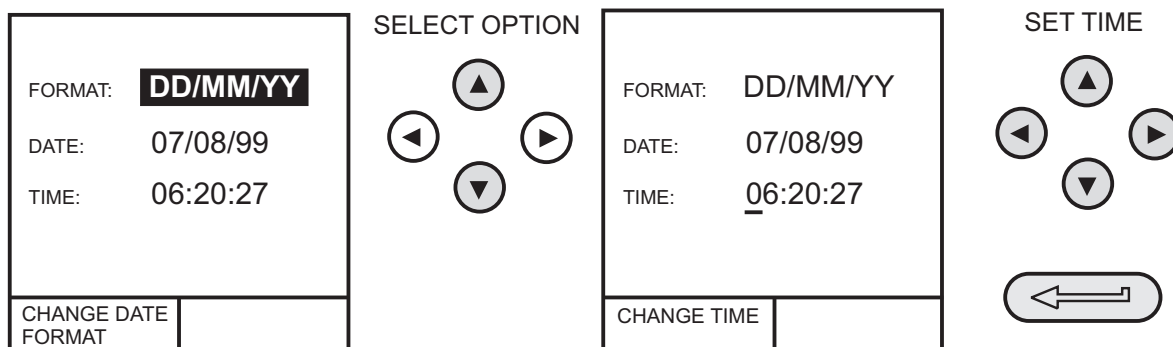
### Set Date

Select **DATE** from the **DATE & TIME** menu and, using the cursor keys, change the date as shown below. The **up** ▲ and **down** ▼ keys change the numerical value of the selected digit (indicated by the underline cursor) and the **left** ◀ and **right** ▶ keys select the required digit position.



### Set Time

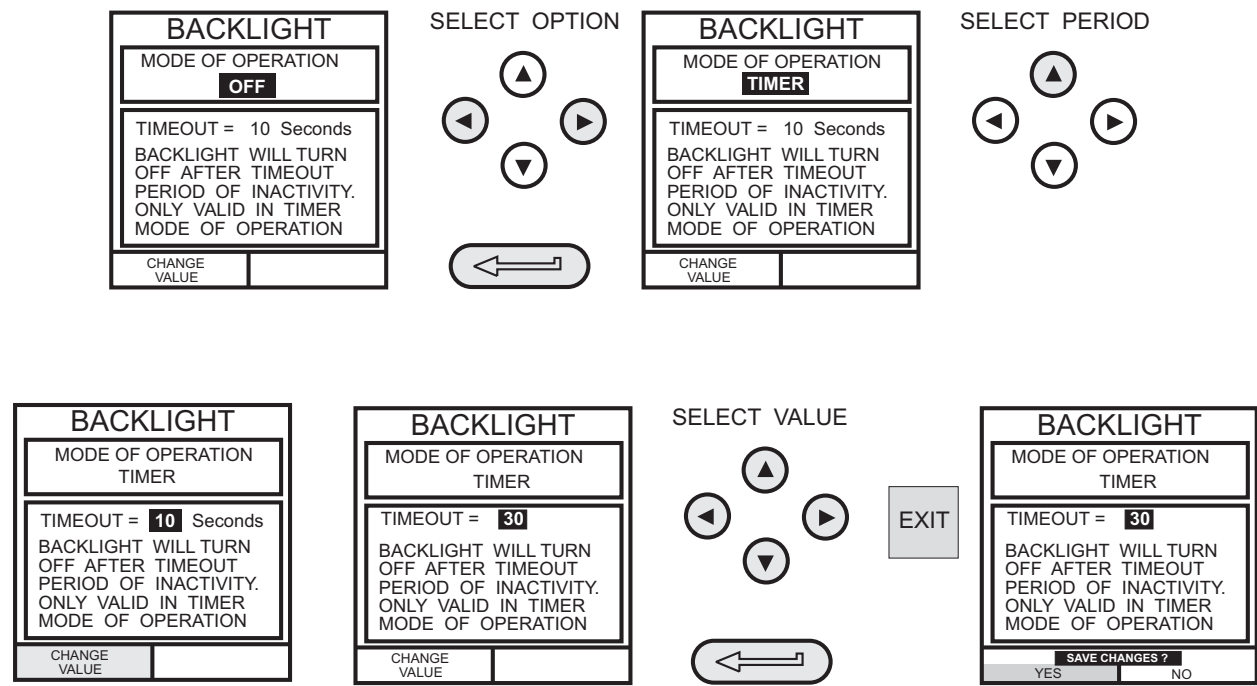
Select **TIME** from the **DATE & TIME** menu and, using the cursor keys, change the time as shown below. The **up** ▲ and **down** ▼ keys change the numerical value of the selected digit (indicated by the underline cursor) and the **left** ◀ and **right** ▶ keys select the required digit position.



# Using Set-up

## Backlight

Select **BACKLIGHT** from the set-up menu and proceed as follows:



If **TIMER** mode is selected, any key press switches on the backlight for the **TIMER** period.

If **ON** is selected, the backlight remains on permanently and, if **OFF** is selected, the backlight remains permanently off.