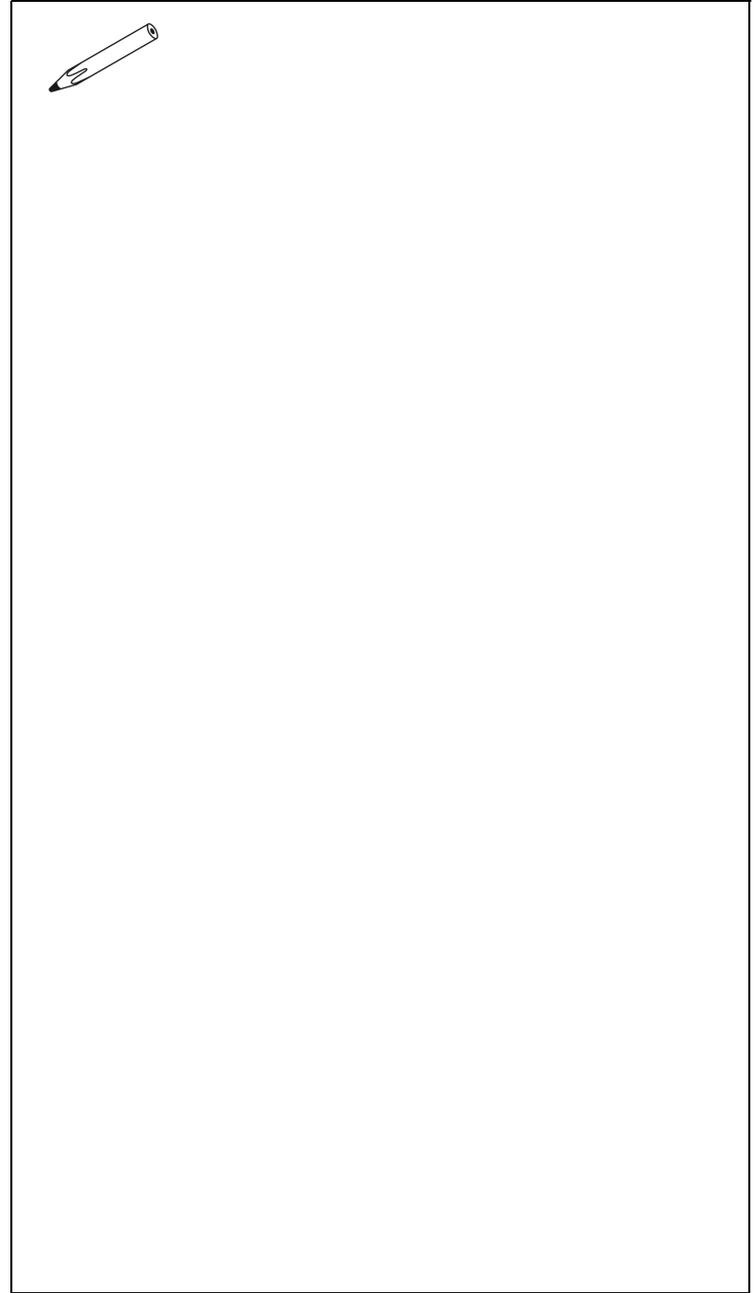


Druck DPI 821/822

Thermocouple calibrator and
Thermocouple loop calibrator

User manual - K346



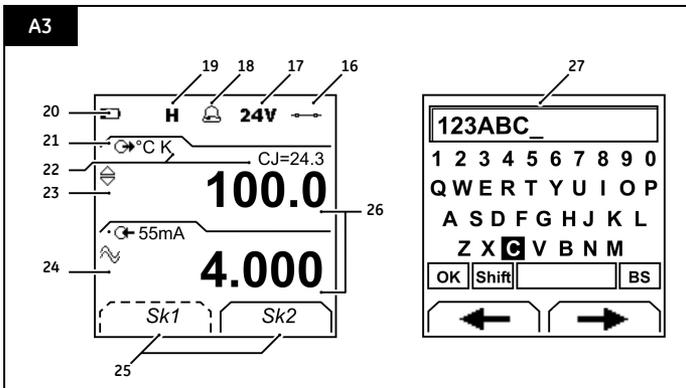
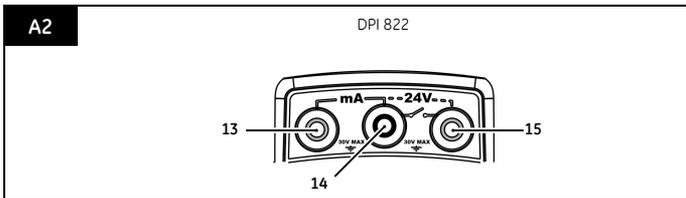
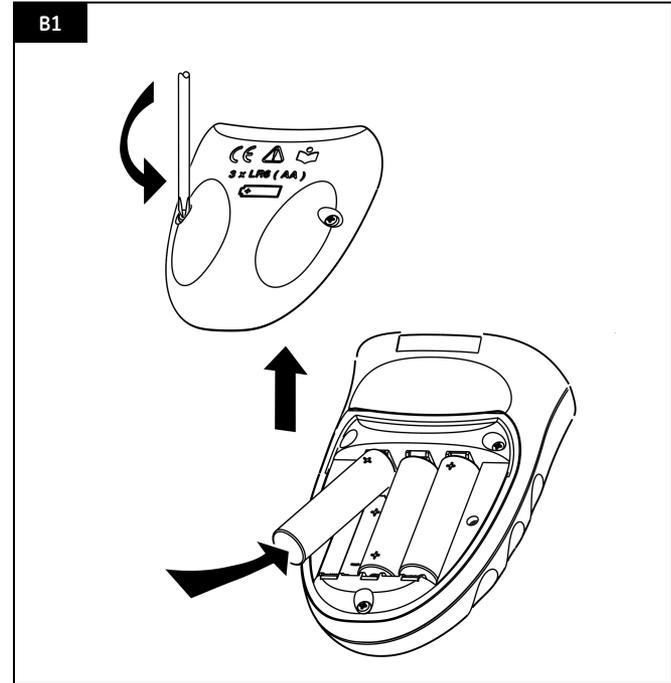
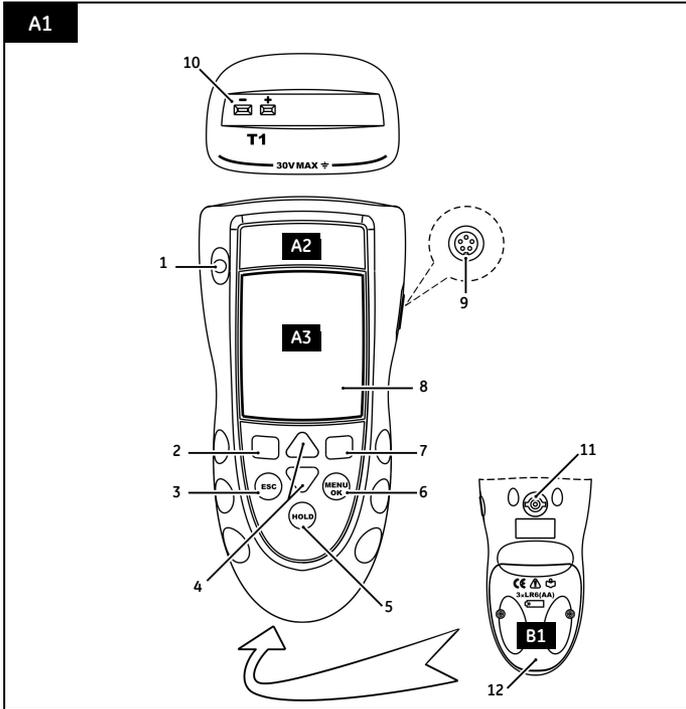


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Introduction

The DPI 821 Thermocouple Calibrator and DPI 822 Thermocouple Loop Calibrator are part of the Druck DPI 800 series of hand held instruments.

The DPI 800 series uses Intelligent Digital Output Sensor (IDOS) technology to give instant plug and play functionality with a range of Universal Measurement Modules (UMM). Example: the Universal Pressure Module (UPM).

The DPI 821/822 include these functions:

Function	DPI 821	DPI 822
Measure/simulate thermocouple temperature or mV	* Yes	
Cold Junction (CJ) compensation	Automatic/Manual	
Step/Ramp functions	Automatic/Manual	
Communications port	IDOS or RS232	
Language selection	Yes	
Measure pressure/Leak test	** External IDOS UPM	
** Snapshot	Up to 1000 displays with a date/time stamp	
Measure mA	No	0 - 55 mA
HART [®] resistor	No	Yes
V dc output	No	24 V
Switch test	No	Yes
Other functions	Hold, Maximum/Minimum/Average, Filter, Tare, Scaled values, Backlight, Alarm	

* Refer to "Specification data".

** Optional item

Safety

Before you use the instrument, make sure that you read and understand all the related data. This includes: all local safety procedures, the instructions for the UMM (if applicable), and this publication.

WARNING

- It is dangerous to ignore the specified limits for the instrument or to use the instrument when it is not in its normal condition. Use the applicable protection and obey all safety precautions.
- Do not use the instrument in locations with explosive gas, vapor or dust. There is a risk of an explosion.

Continued

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Trademarks

All product names are trademarks of their respective companies.

Safety (Continued)

- To prevent electrical shocks or damage to the instrument, do not connect more than 30V between the terminals, or between the terminals and the ground (earth).
- UPM only. To prevent a dangerous release of pressure, isolate and bleed the system before you disconnect a pressure connection.

Before you start an operation or procedure in this publication, make sure that you have the necessary skills (if necessary, with qualifications from an approved training establishment). Follow good engineering practice at all times.

Safety - Marks and symbols on the instrument

	Complies with European Union directives		Warning - refer to the manual
	Read the manual		Battery
	Ground (Earth)		ON/OFF
T1	Identifies the thermocouple connector		

To start

To start - Location of items **A1** - **A2**

Item	Description
1.	On or off button.
2.	Left-hand soft-key. Selects the function above it on the display (Item 25). Example: Edit
3.	ESC Moves back one menu level. Leaves a menu option. Cancels the changes to a value.
4.	Increases or decreases a value. Highlights a different item.
5.	HOLD Holds the data on the display. To continue, press the HOLD button again.
6.	MENU OK Shows the <i>Select Task</i> menu. Selects or accepts an item or value. Selects [✓] or cancels [] a selection.
7.	Right-hand soft-key. Selects the function above it on the display (Item 25). Example: Settings
8.	Display. Refer to A3
9.	SENSOR / PC Communications port. Use to connect a Universal Measurement Module (UMM) or a RS232 cable.
10.	Thermocouple connector. Refer to "Operation".
11.	Connection point for some of the optional accessories. Refer to the datasheet.
12.	Battery compartment. Refer to B1.
13., 14., 15.	DPI 822 only. Terminals to measure current, to supply 24V source, and to do switch tests.

To start - Items on the display **A3**

Item	Description
16.	= switch closed = switch open UPM only. Task indication for the leak test. <i>Refer to: Select Task (Table 2/3)</i>
17.	24V DPI 822 only. The loop power supply is on. <i>Refer to: Select Task (Table 2/3)</i>
18.	The measured value satisfies one of the alarm conditions. <i>Refer to: Settings (Table 4)</i>
19.	H The data on the display is on hold. To continue, press the HOLD button again.
20.	Shows the battery level: 0 ... 100%.
21.	= Input = Output = IDOS input <i>Refer to: Select Task (Table 2/3)</i>
22 ... 24.	The settings applied to the input or output.
22.	°C The units or a specified scale (x/y) - (Table 4/5).
K	The thermocouple type (K, J, T ...) - (Table 4/5).
CJ= ...	The cold junction temperature (Table 1)
23.	= Output operation (Table 5)
24.	= Filter = Maximum = Average (Table 4) = Tare = Minimum
25.	A soft-key function. To select an available function, press the soft-key below it. Example: = Move left = Move right
26.	The measured value or values applicable to the task selection.
27.	The <i>Edit</i> display to set up text labels (≤ 6 characters): <i>xy Scaling (Table 4).</i> OK = Accept the new text label Shift = Change the keys: 123ABC or _+abc = Add a space BS = Back space (Delete character)

To start - Prepare the instrument

Before you use the instrument for the first time:

- Make sure that there is no damage to the instrument, and that there are no missing items.
- Remove the plastic film that protects the display. Use the tag (D) in the top right-hand corner.
- Install the batteries (refer to B1). Then re-attach the cover.

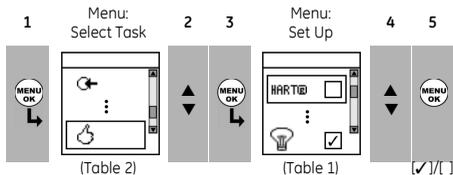
To start - Power on or off

To turn the instrument on or off, press \odot (A1 - item [1]). The instrument does a self test and then shows the applicable data.

When the power is off, the last set of configuration options stays in memory. Refer to "Maintenance".

To start - Set up the basic operation

Use the *Set Up* menu to set up the basic operation of the instrument.



If there is additional data for a menu option, select *Settings* (■ ■) to see the values that are set up. If necessary, adjust the values.

Table 1: (Part of table) Menu options - Set Up

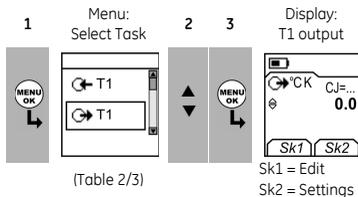
Options (If applicable)	Description
HARTID	DPI 822 only. To add a series resistor into the mA circuit. You can then use this instrument together with a HART® communicator to set up and calibrate HART® devices.
... Scale	To select the applicable international temperature scale: IPTS 68 or ITS 90.
CJ ...	To select the type of cold junction (CJ) compensation. <i>Automatic:</i> The instrument monitors the CJ temperature and applies the necessary CJ compensation. <i>Manual:</i> Measure the CJ temperature and set the applicable value. The instrument uses this value to apply the necessary CJ compensation. <i>Additional data (Manual):</i> Select Settings (■ ■)
	To select and set up the backlight facility + timer. <i>Additional data:</i> Select Settings (■ ■)
O/I	To select and set up the power off facility + timer. <i>Additional data:</i> Select Settings (■ ■)
	To show the battery level (%).
	To set the display contrast (%). ▲ Increases %, ▼ decreases %

Table 1: (Part of table) Menu options - Set Up

Options (If applicable)	Description
	To set the time + date. The calibration facility uses the date to give service and calibration messages.
	To set the language option.
	To calibrate the instrument. <i>Additional data:</i> Refer to "Calibration".
	To select and show the applicable status data. (Software Build, Calibration Due date, Serial Number, IDOS Information).

To start - Select a task (Measure and/or simulate)

When the instrument is set up (Table 1), use the *Select Task* menu to select the applicable task.



In Table 2/3, IDOS is a Universal Measurement Module (UMM). If you attach a UMM to the communications port (A1 - item [9]), the *Select Task* menu shows the applicable IDOS options.

Table 2: Menu options - Select Task

Options (If applicable)	Description
T1 or mV	An input measurement task: T1 - Measure thermocouple temperature OR mV - Measure thermocouple mV.
T1 or mV	An output task: T1 - Simulate thermocouple temperature OR mV - Simulate thermocouple mV.
	DPI 822 only. A mA measurement task.
	DPI 822 only. A mA measurement task + the loop power supply is on.
	DPI 822 only. A switch test.
	UMM only. An IDOS measurement task.
	UPM only. A leak test.
	To set up the way the instrument works. <i>Additional data:</i> Refer to: Set Up (Table 1).

Table 3 shows all the one and two function operations that are available. If you attach a UMM, you can only use the options that include IDOS.

Table 3: Permitted 1 and 2 function operations

Function					
	(1)	(1)	(1)	(1)	(1)
mA	(1) x	(2)	x	(2)	(2)
mA(24V)	(1) x	(2)	x	(2)	(2)
	x	x	x	(2)	(2)
	x	x	x	x	(2)
IDOS	(1)	(2)	(2)	(2)	x

= DPI 822 only

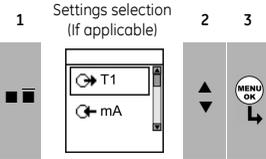
To start - Set up the settings

When the task is set up (Table 2/3), use the *Settings* menu to adjust the input and/or output operation.

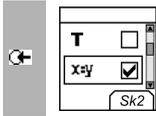
Display: Task
T1 + mA



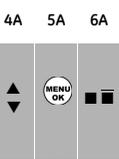
Sk1 = Start/Stop
Sk2 = Settings



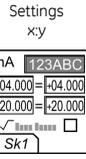
Menu:
Settings



(Table 4)

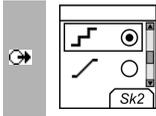


[✓]/[]



Sk1 = Edit

Menu:
Settings



(Table 5)



[●]/[]

If there is additional data for a menu option, select *Settings* to see the values that are set up. If necessary, adjust the values. Refer to "Edit functions".

Table 4: Menu options - Settings (Input)

Options (if applicable)	Description
... Units	To select the temperature units (°C or °F). <i>UPM only</i> = "Pressure Units" if you select an IDOS task (Table 2/3). Select one of the fixed units of measurement (psi, mbar ...).
... type	To select an applicable thermocouple type (K, J, T ...)
	To include maximum, minimum and average values for the measurement task.
T	To select and set up a tare value for the measurement task (a specified value or the reading on the display). The instrument subtracts a positive tare value, and adds a negative tare value. <i>Additional data:</i> Select Settings
x:y	To select and set up a scale of values: One local scale for each measurement task (Maximum: 5). <i>Additional data (Example 1/2):</i> Select Settings
	To select and set up the filter values to give a smoother output for the measurement task: $\frac{+}{-}$ Band as a % of full scale (FS). The filter compares each new value with the previous value. If the new value is outside the band, it is not filtered. Low pass filter time constant in seconds. Increase the value to increase damping factor. <i>Additional data:</i> Select Settings
	To select and set up the alarm values for the measurement task (maximum and minimum). <i>Additional data:</i> Select Settings
0.0	<i>UPM only.</i> Gage sensors or sensors with differential operation. A zero correction that makes the instrument read zero at local pressure.
	Leak Test only. To set an applicable period for the leak test (Hours:Minutes:Seconds).

To start - Edit functions

Example 1) Set up a label for x:y Scaling = %.

Settings xy 1 Edit 2 Edit 3

mA 123ABC
+04.000 = +04.000
+20.000 = +20.000
Sk1

Sk1 = Edit

A3 - item [27]

Edit ... Edit 4 5

A3 - item [27]

Example 2) Set up values for x:y Scaling = 0 to 100%.

Settings xy 1 Settings xy 2 Edit 3 4

mA %
+04.000 = +04.000
+20.000 = +20.000
Sk1

Sk1 = Edit

✓ = Flow scaling (mA, pressure only)

Table 5: (Part of table) Menu options - Settings (Output)

Options (If applicable)	Description
... Units	To select the temperature units (°C or °F).
... type	To select an applicable thermocouple type (K, J, T ...)
	To select and set up a value for the "Nudge" output. Example: 10°C increments. <i>Additional data: Select Settings </i>
	To select and set up values for the "Span Check" output. Example output cycle: This cycle repeats automatically. <i>Additional data (Table 6): Select Settings </i>

Table 5: (Part of table) Menu options - Settings (Output)

Options (If applicable)	Description
	To select and set up values for the "% Step" output. Example output cycle: Auto Repeat - Optional <i>Additional data (Table 6): Select Settings </i>
	To select and set up values for the "Defined Step" output. Example output cycle: Auto Repeat - Optional <i>Additional data (Table 6): Select Settings </i>
	To select and set up values for the "Ramp" output. Example output cycle: Auto Repeat - Optional <i>Additional data (Table 6): Select Settings </i>

Table 6: Additional data for Settings (Output):

Item	Value
Span Check	
Low (0%)	Set the 0% value.
High (100%)	Set the 100% value.
Dwell (d)	Set the period (Hours:Minutes:Seconds) between each change in value.
% Step	Low (0%), High (100%), Dwell (d): As above.
Step Size (s)	Set the change in value for each step as a percentage of the full-scale range (High - Low).
... %	
Defined Step	Low (0%), High (100%), Dwell (d): As above.
Step Size (s)	Set the change in value for each step as a temperature or mV value.
Ramp	Low (0%), High (100%), Dwell (d): As above.
Travel (t)	Set the period (Hours:Minutes:Seconds) to go from the Low (0%) value to the High (100%) value.
Auto Repeat	If applicable, select this item to repeat a cycle continuously.

Operation

This section gives examples of how to connect and use the instrument. Before you start:

- Read and understand the "Safety" section.
- Do not use a damaged instrument.

Operation - Thermocouple connections

Attach the thermocouple wires to the applicable thermocouple mini-connector (Figure 1). The wider blade is the negative.

Then attach the connector to the instrument.

Operation - Communications port connections

Use the communications port (A1 - item [9]) to attach an IDOS Universal Measurement Module (UMM).

When you attach the cable from a UMM (Figure 7/8), the instrument automatically changes the menus to give you all the applicable options (Table 2/3).

Operation - Measure thermocouple values

To measure the temperature or mV values of a thermocouple:

1. Connect the instrument (Figure 1) and, if necessary, adjust the *Set Up* (Table 1).
2. Select a *T1* or *mV* input task from *Select Task* (Table 2/3) and, if necessary, adjust the *Settings* (Table 4).

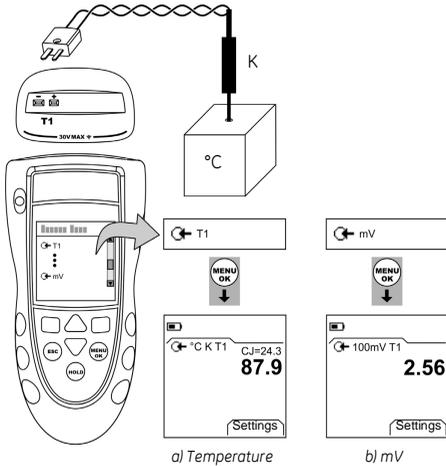


Figure 1: Example configuration - To measure the temperature or mV values of a thermocouple

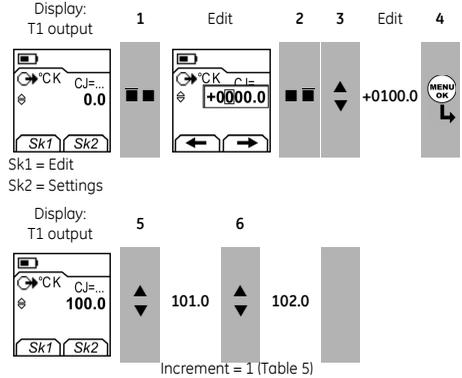
Operation - Change the output values

When the output operation is set up (Table 5), use one of these procedures to change the output values:

Table 7: Procedures to change the output

Output	Procedure
	Select <i>Edit</i> (■ ■) and/or use the ▲ ▼ buttons. See the example below.
	Select <i>Start/Stop</i> (■ ■) or use the ▲ ▼ buttons to make the step changes manually.
	Select <i>Start/Stop</i> (■ ■).

Example procedure ("Nudge" output):



Operation - Simulate thermocouple values

To simulate the temperature or mV values of a thermocouple:

1. Connect the instrument (Figure 2) and, if necessary, adjust the Set Up (Table 1).
2. Select the T1 or mV output task from Select Task (Table 2/3) and, if necessary, adjust the Settings (Table 5).
3. Supply the output values to the system (Table 7).

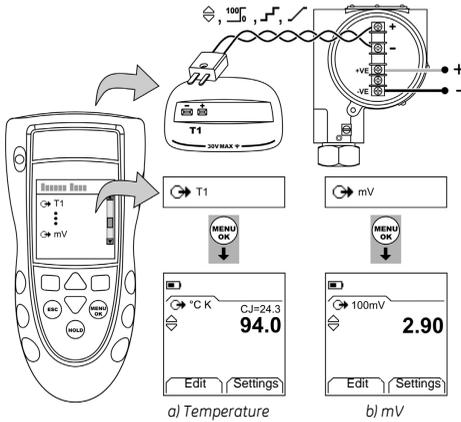


Figure 2: Example configuration - To simulate the temperature or mV values of a thermocouple

Operation - Transmitter calibration

DPI 822 only. To calibrate a transmitter:

1. Connect the instrument (Figure 3/4) and, if necessary, adjust the Set Up (Table 1).
2. Select the applicable calibration task from Select Task (Table 2/3) and, if necessary, adjust the Settings (Table 4/5).
3. Supply the output values to the system (Table 7).

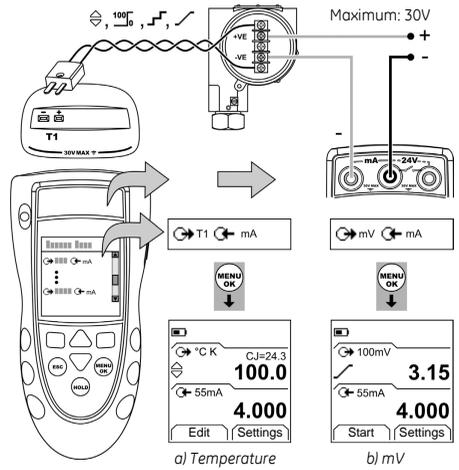


Figure 3: Example configuration - Transmitter calibration with external loop power

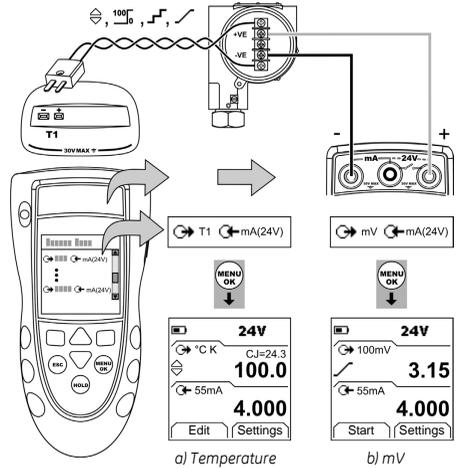


Figure 4: Example configuration - Transmitter calibration with internal loop power

Operation - mA measurements

DPI 822 only. To measure a current:

1. Connect the instrument (Figure 5) and, if necessary, adjust the *Set Up* (Table 1).
2. Select the applicable mA input task from *Select Task* (Table 2/3) and, if necessary, adjust the *Settings* (Table 4).

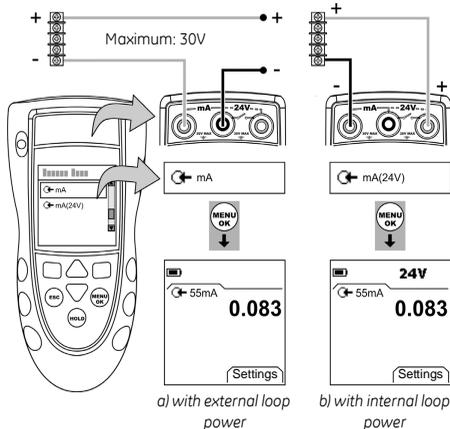


Figure 5: Example configuration - mA measurement

Operation - Switch test

DPI 822 only. To do tests on a thermocouple switch:

1. Connect the instrument (Figure 6) and, if necessary, adjust the *Set Up* (Table 1).
2. Select the applicable switch test from *Select Task* (Table 2/3) and, if necessary, adjust the *Settings* (Table 5). The display shows the switch condition (open or closed) in the top right-hand corner.
3. Supply the output values to the system (Table 7).

• Example - "Nudge" output.

- a. Use *Edit* (■ ■) to set a value less than the switch value.
- b. Use the ▲ ▼ buttons to change the value in small increments.

• Example - "Ramp" output.

- a. Set "High" and "Low" values that are applicable to the switch value (Table 6). Then, to get an accurate switch value, set a long "Travel" period.
 - b. Use *Start/Stop* (■ ■) to start and stop the "Ramp" cycle.
4. If necessary, supply the output values in the opposite direction until the switch changes condition again. The display shows the applicable values to open and close the switch.
5. To do the test again, press **ESC** to reset the values.

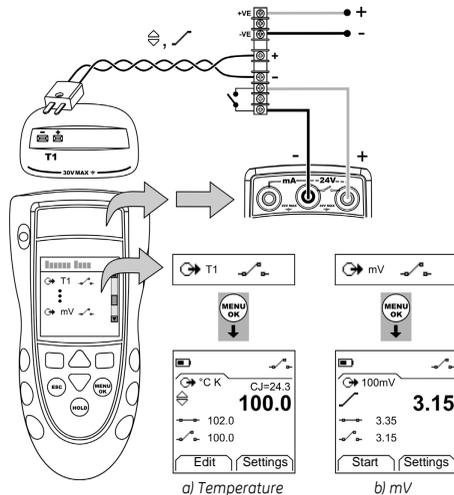


Figure 6: Example configuration - Switch test

Operation - UPM Pressure measurements

Read all the instructions supplied with the UPM and then use the specified procedures to connect it (Figure 7/8).

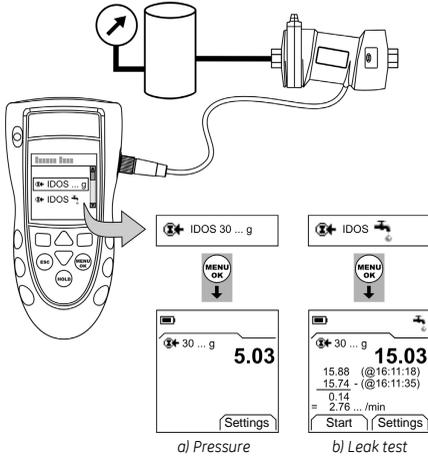


Figure 7: Example configuration - Pressure measurement with a UPM

When the connections are complete, make the necessary IDOS selections (Table 2/3).

If you re-attach a UPM, the instrument uses the same measurement units that you used before. The instrument keeps a record for the last 10 modules.

UPM - Measure the pressure

To measure the pressure (Figure 7):

1. Select the applicable pressure task from *Select Task* (Table 2/3) and, if necessary, adjust the *Set Up* (Table 1), and the *Settings* (Table 4/5).
2. If necessary, do a zero correction (Table 4).

To measure pressure with another operation (Figure 8), use the same procedure.

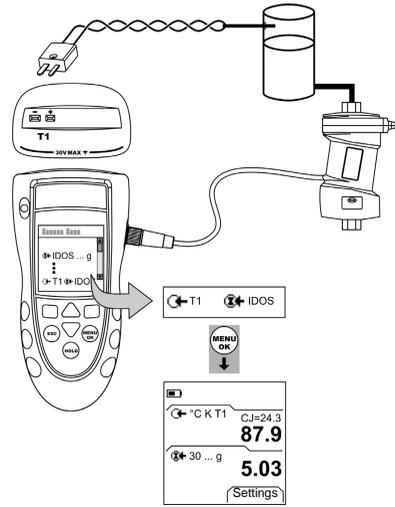


Figure 8: Example configuration - To measure pressure and temperature

UPM - Leak test

To do a leak test on a pressure system (Figure 7):

1. Select an applicable leak test from *Select Task* (Table 2/3) and, if necessary, adjust the *Set Up* (Table 1), and the *Settings* (Table 4).
2. Set the period for the leak test (Table 4).
3. If necessary, do a zero correction (Table 4).
4. To start the leak test, select *Start* (■ ■). When the test is finished, the instrument calculates the leak rate in the applicable units/minute.

Operation - Error indications

If the display shows <<<< or >>>> :

- Make sure that the range is correct.
- Make sure that all the related equipment and connections are serviceable.

Maintenance

This section gives procedures to maintain the unit in a good condition. Return the instrument to the supplier for all repairs.

Maintenance – Clean the unit

Clean the case with a moist, lint-free cloth and a weak detergent. Do not use solvents or abrasive materials.

Maintenance – Replace the batteries **B1**

To replace the batteries, refer to B1. Then re-attach the cover.

Make sure that the time and date are correct. The calibration facility uses the date to give service and calibration messages.

All the other configuration options stay in memory.

Calibration

Note: GE can provide a calibration service that is traceable to international standards.

We recommend that you return the instrument to the manufacturer or an approved service agent for calibration.

If you use an alternative calibration facility, make sure that it uses these standards.

Calibration - Before you start

To do an accurate calibration, you must have:

- the calibration equipment specified in Table 8.
- a stable temperature environment: $70 \pm 2^\circ\text{F}$ ($21 \pm 1^\circ\text{C}$)

Table 8: Calibration equipment

Function	Calibration equipment
mV	mV calibrator. Accuracy: Refer to Table 10.
CJ	– Standard RTD probe Accuracy: 50 mK for 23 ... 82.4°F (-5 ... 28°C) – Digital thermometer Accuracy: 10 mK
Pressure	UPM only. Refer to the user manual for the IDOS UPM.
mA	mA calibrator. Accuracy: Refer to Table 11.

Before you start the calibration, make sure that the time and date on the instrument are correct (Table 1).

Selection sequence:

► Select Task (Table 2) ► Set Up (Table 1) ► Calibration ►.

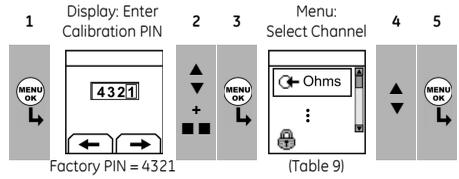


Table 9: Calibration options

Options	Description
mV	To calibrate the input mV.
mV	To calibrate the output mV
CJ...	To calibrate the cold junction channel.
IDOS ...	UMM only. To calibrate the specified IDOS UMM. Refer to the user manual for the IDOS UMM.
mA	DPI 822 only. To calibrate the mA input.
	Calibration Due: To set the date of the next calibration for the instrument. After the specified calibration date, there is a warning message. There is a selection box to stop the warning.
	To change the calibration PIN (Personal Identification Number).

When you select a channel, the display shows the applicable instructions to complete the calibration.

When the calibration is complete, select **Calibration Due** and set the new calibration date for the instrument.

Calibration - Procedures (mV input or output)

1. Connect the instrument to the calibration equipment:
 - mV input = Figure 1
 - mV output = Figure 2
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Use the calibration menu (Table 9) to do the calibration:
 - mV input = three-point calibration (-FS, Zero and +FS).
 - mV output = two-point calibration (Zero and +FS).

The display shows the applicable instructions to complete the calibration.

- To make sure that the calibration is correct, select the applicable mV input or output task (Table 2) and apply the necessary values:
 - mV input: -10, -5, 0 (short circuit)
Then mV: 5, 10, 20, 50, 100
 - mV output: -10, -5, 0, 5, 10, 20, 50, 100
- Make sure that the error is in the specified limits (Table 10).

Table 10: mV input or output error limits

Input or output (mV)	Calibrator error (mV)		Permitted DPI 821/822 error (mV)	
	↺ mV	↻ mV	↺ mV	↻ mV
±10	0.0005	0.00018	0.010	0.010
±5	0.0004	0.00011	0.009	0.009
0	-	0.00005	0.008	0.008
20	0.0006	0.00030	0.011	0.011
50	0.0008	0.00068	0.016	0.016
100	0.0012	0.00130	0.024	0.024

Calibration - Procedures (CJ input)

- Connect the instrument to the calibration equipment (Figure 1).
- Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
- Use the calibration menu (Table 9) to do a one-point calibration (+FS). The display shows the applicable instructions to complete the calibration.
- To make sure that the calibration is correct, select the applicable T1 input task (Table 2).
- Make sure that the DPI 821/822 gives a probe temperature that agrees with the temperature on the digital thermometer $\pm 0.2^{\circ}\text{F}$ (0.1°C).

Calibration - Procedures (mA input)

- DPI 822 only. Connect the instrument to the calibration equipment (Figure 5).
- Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
- Use the calibration menu (Table 9) to do a two-point calibration (-FS, Zero and +FS). The display shows the applicable instructions to complete the calibration.

- To make sure that the calibration is correct, select the applicable mA input task (Table 2) and apply these values:
 - mA: -55, -40, -24, -18, -12, -6, 0 (short circuit)
Then mA: 0, 6, 12, 18, 24, 40, 55.
- Make sure that the error is in the specified limits (Table 11).

Table 11: mA input error limits

Applied mA	Calibrator error (mA)	Permitted DPI 821/822 error (mA)
±55	0.0022	0.005
±40	0.0018	0.004
±24	0.0014	0.003
±18	0.0004	0.003
±12	0.0003	0.002
±6	0.0002	0.002
0 (Short circuit)	-	0.001

Calibration - Procedures (IDOS UMM)

Refer to the user manual for the IDOS UMM.

When the calibration is complete, the instrument automatically sets a new calibration date in the UMM.

Specification data

All accuracy statements are for one year.

Specification - General

Languages	English [Default]
Operating temperature	14 ... 122°F (-10 ... 50°C)
Storage temperature	-4 ... 158°F (-20 ... 70°C)
Humidity	0 to 90% without condensation (Def Stan 66-31, 8.6 cat III)
Shock/Vibration	BS EN 61010:2001; Def Stan 66-31, 8.4 cat III
EMC	BS EN 61326-1:1998 + A2:2001
Safety	Electrical - BS EN 61010:2001; CE Marked
Size (L: W: H)	7.1 x 3.3 x 2.0 in (180 x 85 x 50 mm)
Weight	14 oz (400 g)
Power supply	3 x AA alkaline batteries
Duration (Measure)	T1, mV: ≈ 70 hours mA: ≈ 25 hours mA: ≈ 11 hours (24 V Source at 12 mA)
Duration (Supply)	T1, mV: ≈ 70 hours

Specification - Temperature ranges

Thermocouple type	Standard	Range °F	Range °C	Accuracy °F *	Accuracy °C *
K	IEC 584	-454 ... -328	-270 ... -200	3.6	2.0
K	IEC 584	-328 ... 2498	-200 ... 1370	1.1	0.6
J	IEC 584	-346 ... 2192	-210 ... 1200	0.9	0.5
T	IEC 584	-454 ... -292	-270 ... -180	2.5	1.4
T	IEC 584	-292 ... -94	-180 ... -70	0.9	0.5
T	IEC 584	-94 ... 752	-70 ... 400	0.6	0.3
B	IEC 584	122 ... 932	50 ... 500	7.2	4.0
B	IEC 584	932 ... 2192	500 ... 1200	3.6	2.0
B	IEC 584	2192 ... 3308	1200 ... 1820	1.8	1.0
R	IEC 584	-58 ... 32	-50 ... 0	5.4	3.0
R	IEC 584	32 ... 572	0 ... 300	3.6	2.0
R	IEC 584	572 ... 3216	300 ... 1769	1.8	1.0
S	IEC 584	-58 ... 32	-50 ... 0	4.5	2.5
S	IEC 584	32 ... 212	0 ... 100	3.4	1.9
S	IEC 584	212 ... 3216	100 ... 1769	2.5	1.4
E	IEC 584	-454 ... -238	-270 ... -150	1.6	0.9
E	IEC 584	-238 ... 1832	-150 ... 1000	0.7	0.4
N	IEC 584	-454 ... -4	-270 ... -20	1.8	1.0
N	IEC 584	-4 ... 2372	-20 ... 1300	1.1	0.6
L	DIN 43710	-328 ... 1652	-200 ... 900	0.6	0.3
U	DIN 43710	-328 ... 212	-200 ... 100	0.9	0.5
U	DIN 43710	212 ... 1112	100 ... 600	0.6	0.3
C		32 ... 2732	0 ... 1500	1.8	1.0
C		2732 ... 3632	1500 ... 2000	2.5	1.4
C		3632 ... 4208	2000 ... 2320	3.4	1.9
D		32 ... 3092	0 ... 1700	1.8	1.0
D		3092 ... 3992	1700 ... 2200	2.9	1.6
D		3992 ... 4523	2200 ... 2495	6.5	3.6

*Cold Junction (CJ) error (Maximum):

Range 50° ... 86°F (10 ... 30°C) = 0.4°F (0.2°C)

Add 0.01° CJ error / ° ambient temperature change for ranges: 14 ... 50°F, 86 ... 122°F
(-10 ... 10°C, 30 ... 50°C)

Specification - mV range

Range (mV)	Impedance
-10 ... 100	< 0.2 Ω

Specification - Electrical connectors (A2)

Range (Measure)	0 to ±55 mA
Accuracy	0.02% of reading + 3 counts
Temperature coefficient 14 ... 50°F, 86 ... 122°F (-10 ... 10°C, 30 ... 50°C)	0.0011% FS / °F (0.002% FS / °C)
Switch detection	Open and closed. 2 mA current.
Loop power output	24 V ± 10%
HART® resistor	250 Ω (menu selection)
Connectors (A2)	Three 0.16 in (4 mm) sockets

Customer Service

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