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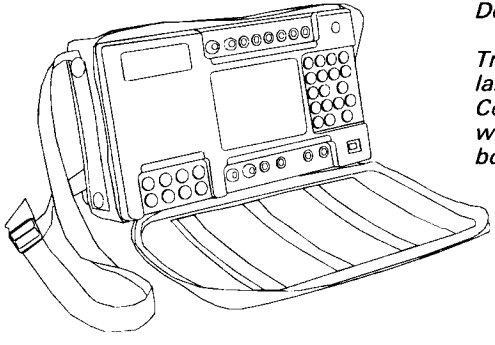
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1

Model TRX-II
Multi-Calibrator



Dear customer,

Translations in German and French language will soon be available. Contact your local sales point if you wish to receive a complete finished book at no charge.

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Introduction

The TRX-II calibrator

The Multi-Calibrator model TRX-II has been designed for testing and calibration of process instrumentation and portable test equipment. The unit provides data to comply with the ISO 9002 requirements for calibration. The TRX-II can be used to measure and source analogue and digital signals often used in an industrial environment. It can also be used to simulate a wide variety of temperature sensors. Measurement and source/ simulation functions can be operated and read simultaneously.

Pressure Measurements and Calibrations

A range of pressure sensors is optionally available for pressure measurements and calibration.

Automatic Calibration

To automate calibration routines and to store calibration data the unit has been provided with a memory card slot. For the same purpose the unit has a RS 232 cable connector to interface directly with a Personal Computer. To perform automatic calibration, in the field or in the workshop, the TRX-II is supported by Druck's Linkpak-W software. The software package and Memory Cards are optionally available from your local Druck Sales Office or Distributor.

Standard Accessories

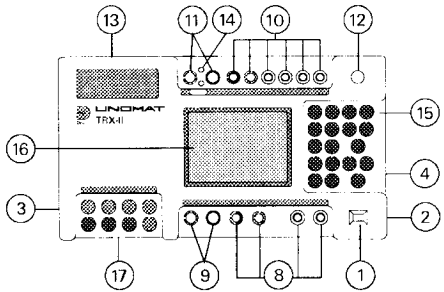
The standard TRX-II Calibrator is packed together with the following parts:

- Operating Manual
- Test leads (5x)
- Carrying Case
- Alkaline Batteries LR14 or C (4x)
- Spare fuses 400 mA (3x)
- Calibration certificate

Optional Accessories

- Line Adaptor/Charger 230 V #13603/230
- Line Adaptor/Charger 115 V #13603/115
- Pressure Sensors
- Linkpak-W software and memory cards

Parts Identification



1 **POWER switch**
Switch to put the calibrator "ON" and "OFF".

2 **EXT. POWER MEASURE Connector for external power source.**
Only suitable for optional line adaptor/charger # 13603.

3 **Battery compartment cover**
Release screws to get access to batteries.

4 **Battery selector switch**
To select Alkaline or Rechargeable batteries.

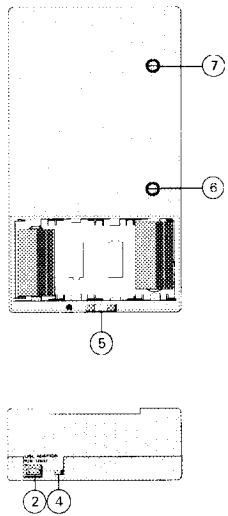
■ **IMPORTANT:** *Switch position must comply with installed battery type.*

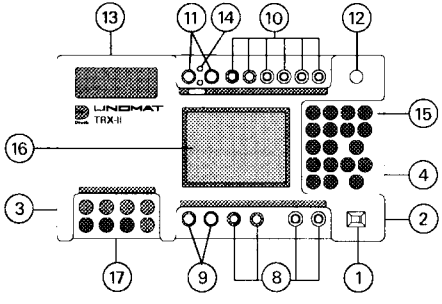
5 **Spare fuse**
For replacement of a blown fuse.

6 **Fuse mA, Fuse holder**
Protects the milliamps measurement circuit.

7 **Fuse ohms, Fuse holder**
Protects the ohms/RTD measurement circuit.

8 **Source terminals for 4 mm plugs**
Suitable for standard test leads.





9 **Source terminals for wire leads and 4 mm plugs**
Suitable for compensation wire leads and standard test leads.

10 **Measure terminals for 4 mm plugs**
Suitable for standard supplied test leads.

11 **Measure terminals for wire leads and 4 mm plugs**
Suitable for compensation wire leads and standard test leads.

12 **RS 232 Connector**
To interface directly with Personal Computers.
[Use is optional with Linkpak-W software]

13 **Memory card slot (PCMCIA type 1 and 2)**
To interface indirectly with Personal Computers.
[Use is optional with Linkpak-W software]

14 **Auxilary Connectors**
For use with pressure sensors.
[Do not make any other connections to these terminals]

15 **Keypad numeric**
Contains numeric and operating keys.

16 **Display**

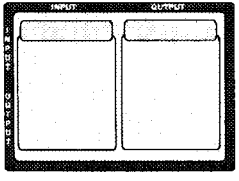
17 **Keypad**
Contains keys dedicated for datastorage.

Screens to work with

The TRX-II has four types of screen display to work with:

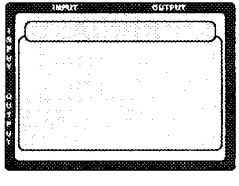
- **Menu Selection Screen**

Offers selection of choices. Move cursor with arrow keys to your choice.



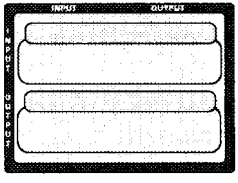
- **Set-up Screen**

Move cursor with arrow keys to fill in the blanks.



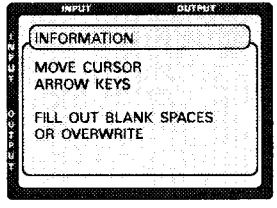
- **Working Screen**

Displays readings of measured and generated values. Source or simulated temperatures are set with the numerical keypad or can be ramped up and down in different ways.



- **Help Screen**

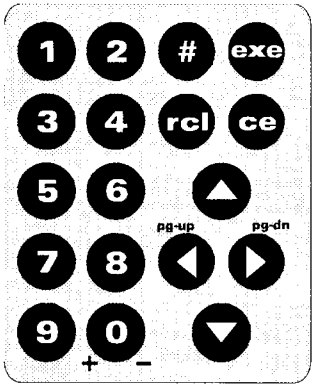
Your guide available in many operational situations. Press INFO to call a Help screen.



NOTE: *After switching the calibrator on, the screen will show:*

- **Battery type**
- **Battery voltage**
- **TRX-II Serial No**
- **EPROM versions installed**
- **DATE / TIME**
- **Days left to next calibration**

Keys to work with



• The EXE key

Pressing this key will execute choices or source level adjustments.

• The CE key

Press to cancel your previous key operation or to correct a typing error.

• The NUMERICAL keypad

Used to dial source levels or simulated temperatures. Also used to fill out levels and time settings for special functions.

• The ARROW keys

Moves the cursor position and ramps source levels up or down.

• The # key

Used in combination with other keys for special functions. Press # first and hold, while pressing the next key:

 # + Numerical key 1-9
Stores keypad operations (Keystroking).

 # + CE
Resets the calibrator.

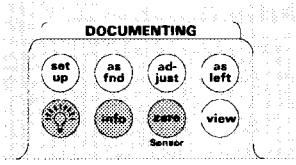
 # + EXE
Opens set-up menu.
Opens signal converter set-up screen.

• The RCL key + Numerical key 1-9

Recalls stored keypad operations (Keystroking). Press RCL first and hold, while pressing the next key.

• The 0 key

Changes the sign when display reads all zeros.



• The zero key
To reset the pressure sensor reading at zero. To reset counter/totalizer function to zero.

• The INFO key
Give additional information at various menus. Calls the Help screen.

• The Light key
Press the light key to switch the back light ON or OFF.

Only with Software option

• The Set-up key
To access the recording set-up.

• The As Fnd key
To start As Found calibration procedure.

• The Adjust key
To start adjust procedure.

• The As Left key
To start As Left calibration procedure.

• The View key
To view recorded calibration results.

Functional Modes

- **Reading measure signals only**

Leave the cursor at NONE in the source menu and select the desired measure function.

- **Reading source signals only**

Leave the cursor at NONE in the measure menu and select the desired source function.

- **Simultaneous reading of measure and source signals**

Select desired measure and source functions. Menu selections for both measure and source functions are made after each other. When you have finished all selections for one function, the menu for the other function will prompt you to proceed.

Power Sources

Power from internal batteries

Internal power is obtained from 4x 1.5 V Alkaline batteries or 4x 1.2V Rechargeable batteries, Model R14, Baby or C size.

- **Installation of the batteries**

Switch the calibrator off before you install new batteries. Release both mounting screws of the battery compartment cover. Open the compartment and place the new batteries in position as indicated in the compartment. Check for clean poles and contact plates before you replace the batteries.

- **Use of Alkaline batteries (supplied as standard)**

The calibrator is supplied with one set of 4 Alkaline batteries. Check that the Battery Selector Switch is in the "Alkaline" position before replacing the batteries. Battery switch position will be confirmed on the screen during start-up of the calibrator. Replace batteries when the screen shows the battery symbol.

■ ***IMPORTANT:***

- Be sure that batteries are inserted so that they are placed correctly with respect to the (+) and (-) indications in the battery compartment. If the batteries are not inserted correctly, they may leak and damage the calibrator.
- Do not mix old and new batteries, or batteries of different types (such as carbon and alkaline.)
- If the calibrator is not to be used for a long period of time, take out the batteries.
- Remove and dispose of worn-out batteries.
- Never attempt to recharge or short-circuit the batteries.

Changing from Alkaline to Rechargeable batteries

Remove the Alkaline batteries. Slide the switch to the "Ni-Cd" position. Install 4 rechargeable batteries (purchased locally). Battery switch position will be confirmed on the screen during start-up of the calibrator. Recharge batteries when the screen shows the battery symbol.

■ ***WARNING:*** *Never place Alkaline or other non-rechargeable batteries after you have changed the switch position to "Ni-Cd".*

Recharging

Use the Line Adaptor/Charger # 13603 only; other equipment may cause damage to the calibrator. Check the indicated Line Voltage and turn the charger switch on. Connect the appropriate Adaptor/Charger plugs to the line and to the calibrator.
As adaptor and charger functions are fully independent from each other, the calibrator can be used while charging.

Recharging time from complete discharge to fully charge is 14 hours. You may charge for periods longer than 14 hours. Note that at lower ambient temperatures the capacity of Ni-Cd batteries is significantly lower. If the batteries do not reach their normal capacity after a 14 hours charging period, cycle complete discharging and charging for at least 2 times.

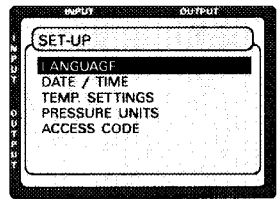
If batteries remain weak they should be replaced. No particular brand of Ni-Cd is recommended although cells rated at 2.0 Ah have preference over general available 1.8 Ah cells.

Operating from 115 V or 230 V line voltage (50 or 60 Hz)

Use the Line Adaptor/Charger # 13603 only; other equipment may cause damage to the calibrator. Check the indicated line voltage. Connect the appropriate Line Adaptor/Charger plugs to the line and to the calibrator.

Language Setting

The TRX-II has multilingual software. The factory setting is ENGLISH.



Setting the Language

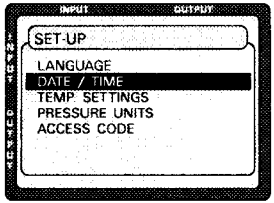
Leave the cursor at NONE at the measure and source menu and press # and EXE keys simultaneously to open the Set-up menu. Select LANGUAGE and press EXE . Select required language and press EXE. Press CE to leave the set-up menu.

Date and Time Settings

The TRX-II has been equipped with an internal clock:

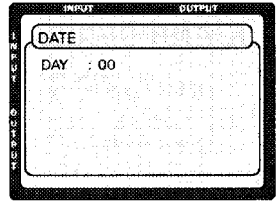
- to record Date and Time on the memory card when using Linkpak-W;
- to indicate how many days are left before last calibration expires.

The clock has been factory set to Central Europe time at the date of calibration.



Setting the clock to your local time

Leave the cursor at NONE at the measure and source menu and press the # and EXE keys simultaneously to open the set-up menu.
Select DATE/TIME. Press EXE again.
Select DATE and enter new date.
Press EXE to accept new date. Press CE to leave the set-up menu. Repeat the above for time settings.

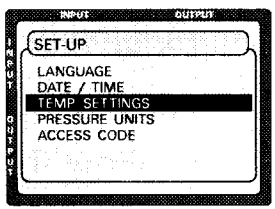


Temperature readings

Temperature simulations and measurements can be shown in either degrees Celsius or degrees Fahrenheit. Factory setting is Celsius. Readings are based on either IPTS 68 or ITS 90 temperature scales.
Factory setting is IPTS 68.

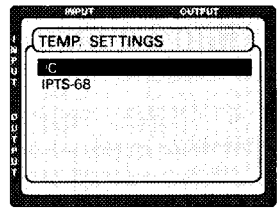
Changing the temperature unit

Leave the cursor at NONE at the measure and source menu and press the # and EXE keys simultaneously to open the set-up menu. Select TEMP. SETTINGS and press EXE.



- **Temp. settings**

Select °C and press EXE to change from °C to °F or vice versa. Press CE to leave the set-up menu.



Changing the temperature scale

Leave the cursor at NONE at the measure and source menu and press the # and EXE keys simultaneously to open the set-up menu.

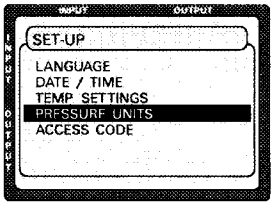
Select TEMP. SETTINGS and press EXE. Select IPTS 68 and press EXE to change from IPTS 68 to ITS 90 or vice versa. Press CE to leave the set-up menu.

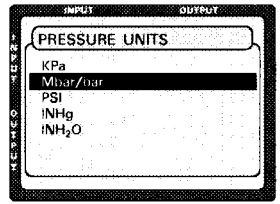
Pressure units setting

Pressure readings can be shown in different pressure units. The selection can be made via the Set-up menu.

Changing the pressure unit

Leave the cursor at NONE at the measure and source menu and press # and EXE keys simultaneously to open the set-up menu.
Select PRESSURE UNITS and press EXE. Select one of the 11 different pressure units and press EXE to change. Press CE to leave the set-up menu.





■ ***NOTE:*** *The reference temperature for inH_2O or mH_2O automatically changes according to the defined temp. setting °C or °F. °C refers to watertemperature at 4°C and °F to 68°F.*

Access code settings

The ACCESS CODE is programmable by the customer. The following menus are protected by this code;

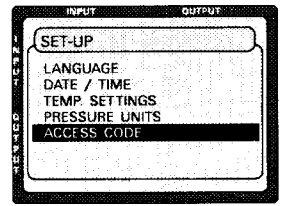
- ACCESS CODE
- Calibration menu (Electrical)
- Add pressure sensors
- Delete pressure sensors
- Calibration pressure sensors

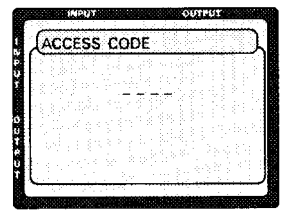
0000 as code is considered as no existing ACCESS CODE. 9410 is standard factory setting.

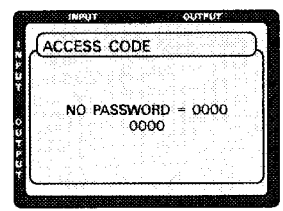
Changing the ACCESS CODE

Leave the cursor at NONE at the measure and source menu and press # and EXE simultaneously to open the set-up menu. Select ACCESS CODE and press EXE.
Type in ACCESS CODE and press EXE to confirm. You are now in mode where you can change the code. If applicable the new code can be typed in and confirmed by EXE.

■ ***NOTE:*** *Registration of the ACCESS CODE is essential.*

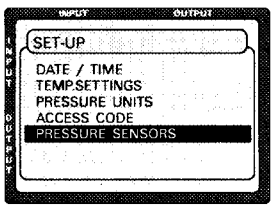






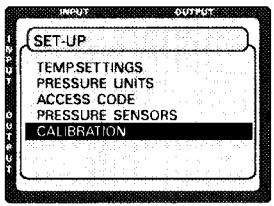
Pressure sensors

Leave the cursor at NONE at the measure and source menu and press # and EXE simultaneously to open the set-up menu. Select PRESSURE SENSORS and press EXE. Select VIEW, ADD, DELETE or CALIBRATION and press EXE to enter. Only VIEW is not protected by ACCESS CODE. Pressure sensors for the TRX-II are supplied with all required data.



Calibration

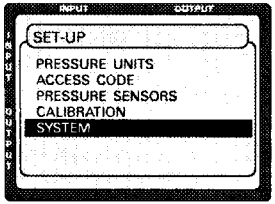
This menu enables the user to calibrate and adjust the TRX-II. At the end of this manual a special chapter is describing the recalibration routine. CALIBRATION menu is ACCESS CODE protected.



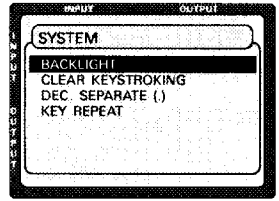
System setting

Setting the backlight automatic mode

Leave the cursor at NONE at the measure and source menu and press the # and EXE keys simultaneously to open the set-up menu.
Select SYSTEM and press EXE.

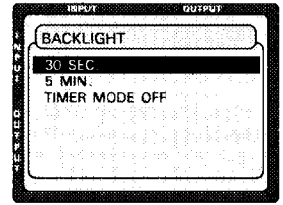


Select BACKLIGHT and press EXE.
Select required time or backlight timer MODE OFF and press EXE. Press CE to leave the set-up screen.



Backlight on/off operation

Press the Light key to switch the backlight on. When e.g. 30 seconds is selected the light will remain ON for maximum 30 seconds. Each keypad operation will postpone shut-off for another 30 seconds time period. Timer Mode Off enables manual operation of the backlight.

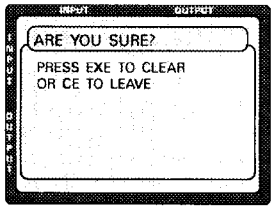


■ ***NOTE:*** *It is recommended to select 30 seconds to save batteries if the unit is mainly used in the field.*

Clear keystroking

Leave the cursor at NONE at the measure and source menu and press the # and EXE keys simultaneously to open the set-up menu.

Select CLEAR KEYSTROKING and press EXE. EXE will clean the KEYSTROKE memory. Press CE to leave the set-up menu.



DEC. SEPARATE

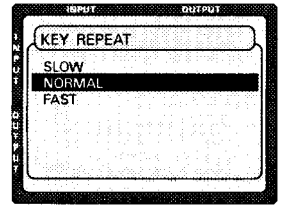
Leave the cursor at NONE at the measure and source menu and press the # and EXE keys simultaneously to open the set-up menu.

Select DEC.SEPARATE and press EXE to change the settings from . to , or vice versa. Press CE to leave the set-up menu.

KEY REPEAT

Leave the cursor at NONE at the measure and source menu and press # and EXE keys simultaneously to open the set-up menu.

Select KEY REPEAT and press EXE. KEY REPEAT stands for key response time. Select SLOW, NORMAL or FAST and press EXE to confirm. Press CE to leave the set-up menu.



Keystroking

Keystroking is a solution to eliminate time consuming keypad operations for functions you frequently use. It can store 9 different sequences of keypad operations. Recalling a sequence will put you right back into the function as stored. You can recall a sequence from any operational situation.

Storing a keypad operation sequence

Perform all keypad operations for the function you want to "keystroke" up to working screen. Press # and hold while pressing the numerical key under which you want to store the sequence. To store a new function under a "used" key, repeat above procedure to overwrite the old function.

Recalling a keypad operation sequence

Press RCL and hold, while pressing the appropriate numerical key.

To clear all keystroke memories, press # and EXE to open the set-up menu. Select SYSTEM and press EXE. Select CLEAR KEYSTROKE MEMORY and press EXE again. Press CE to leave the set-up menu.

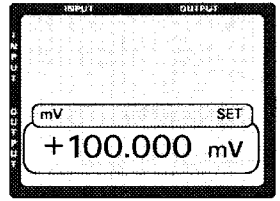
Sourcing of electrical signals

Menu selections

Select a source range and select DIRECT from the menu. It puts you right in the source mode. For other modes read section "Special Source Functions". The lower part of the screen shows the window for source functions. Here, you can read the source level labelled with either SET or OUT.

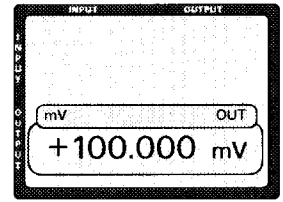
Set mode

In the SET mode you change the source reading without changing the actual source at the terminals. Once you press EXE, the source will change to the new setting.



Source mode

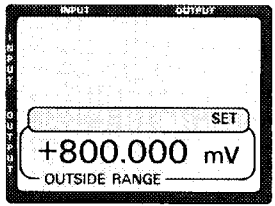
In the SOURCE mode you change both the source reading and the actual source at the terminals. Entering a new value through the numerical keypad brings you back into the SET mode.



Changing the source level

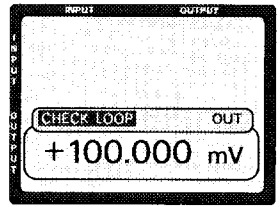
Use the ▲ and ▼ keys to ramp the source signal manually. Holding the key down will gradually accelerate the adjustment speed.

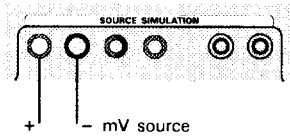
Enter a new source value through the numerical keypad and press EXE to activate the signal at the source terminals. Entered values outside the range will prompt the message OUTSIDE RANGE.



Millivolts

Go to millivolts in the DIRECT mode to source any signal between -10 mV and 100 mV. Adjustments are made with 1 microvolt resolution. If the adjusted source level can not be maintained the screen will prompt the warning CHECK LOOP.

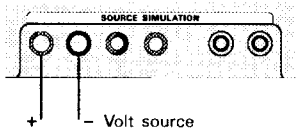




■ ***NOTE:*** *'Terminal to test lead' junctions may create e.m.f. microvolts causing an offset in the actual source signal.*

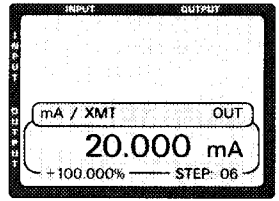
Volts

Go to Volts in the DIRECT mode to source any signal between zero and 12 Volts. Adjustments are made with 100 microvolts. If the adjusted source level can not be maintained the screen will prompt the warning CHECK LOOP.

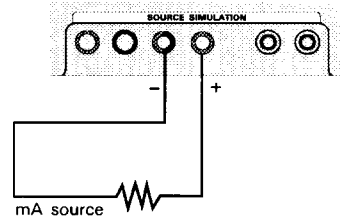


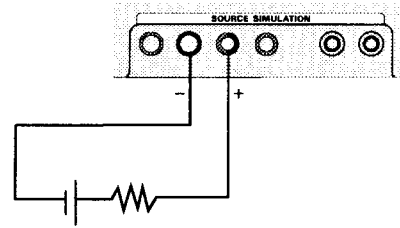
Milliamps/XMT

Use mA terminals to source a current into a resistor (active mode). Use XMT terminals to simulate a 2-wire transmitter (passive mode). Go to milliamps in the DIRECT mode to source any signal between 0 and 24 mA. Adjustments are made with 1 microamps resolution. If the adjusted source level can not be maintained the screen will prompt the warning CHECK LOOP. To source fixed 0, 4, 8, 12, 16 and 20 mA levels, press ▶ key to change to fixed steps.

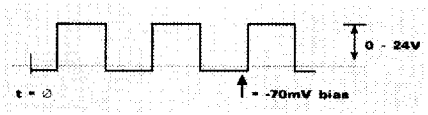


Use ▲ and ▼ keys to adjust the source current. Press ◀ key to return to normal source mode.

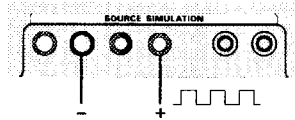




Frequency source modes



Frequencies are symmetrical square wave and -70 mV zero based.
Frequency is set by the ▲ and ▼ keys or numerical keypad.
Amplitude can be adjusted with the ◀ and ▶ keys between 0 and 24 Volts.
Resolution is 0.1 Volt and amplitude is default set to 5.0 Volts.
With frequency set at 0 Hz this function becomes available as a voltage adjustable and regulated DC supply. Frequency source can take loads up to 34 mA at 24 Volts maximum.



■ Frequency source ■ range 0-100 Hz

Go to frequency DIRECT mode to source any frequency signal between zero and 100 Hz. Adjustments are made with 0.01 Hz resolution.

■ Frequency source ■ range 0-20 kHz

Go to frequency DIRECT mode to source any frequency signal between zero and 20.000 Hz. Adjustments are made with 1 Hz resolution.

■ Pulse source range ■ 0-6000 P./Min.

Same as 0-100 Hz but reads in Pulses/Minute.

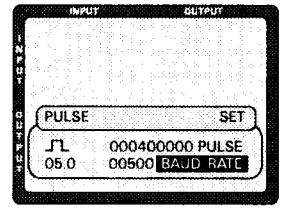
■ Pulse source range ■ 0 - 99 999 P./Hour

Same as 0-100 Hz but reads in Pulses/Hour.

Counter

Pulse source, preset number 999 999 999 max.

Go to the pulse PRESET mode and set the amplitude. Press EXE to proceed to the working screen.
Use the ▲ and ▼ keys to move the cursor from upper to lower line and vice versa. Fill out the number of pulses to be transmitted as well as the Baud rate (max. 20 000 pulses/seconds). Press EXE to start the pulse transmission.

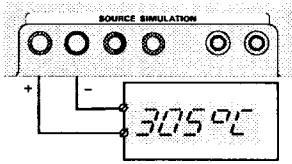


To simulate a thermocouple

Go through the thermocouple menu and make the selections as required. Select the DIRECT mode to simulate any temperature within the range of the chosen thermocouple type. Adjustment resolution is 0.1 degree.

Using compensation wires

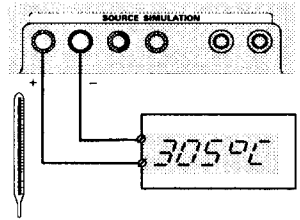
It is strongly recommended to use compensation wires for thermocouple simulations and measurements. Insert the compensation wire lead ends into the wire holes as indicated. Turn hand tight each terminal screw to fix the wires and make the proper connections at the instrument side. Make sure that you use the right type of wires and that polarities are not accidentally reversed. Select INTERNAL to compensate the cold junction microvolts automatically.



Compensation wires

Using the standard test leads (copper wires)

Turn hand tight the terminal screws before plugging the test leads in. Compensation in this case is required to offset the cold junction compensation microvolts generated by the instrument under calibration. For this we need to measure the temperature at the instrument terminals. Instrument terminal temperatures can be measured by either a hand held thermometer or a remote temperature probe.



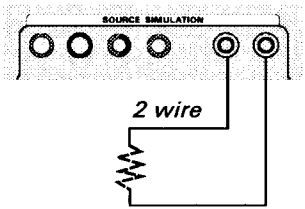
Copper test leads

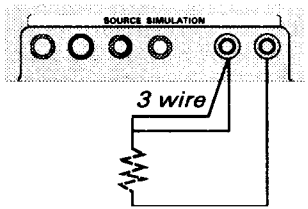
- **Hand held thermometer (not supplied by Druck)**

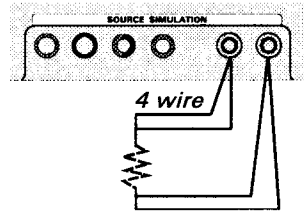
Read the thermometer while holding it close to the instrument terminals. Select MANUAL and open the screen to fill out the obtained reading. Press EXE to enter. Note that in this mode temperature changes at the instrument terminals can easily create calibration errors.

To simulate a RTD or Resistor

The excitation current to source a resistance should be between 0.18 and 5 mA. Excitation currents may be intermittent as with some smart temperature transmitters.







RTD Simulation

Go through the RTD menu and make the selections as required. Select DIRECT mode to simulate any temperature within the range of the chosen RTD type. Adjustment resolution is 0.1 or 0.01 degree depending on RTD type. See specifications for details.

Resistances representing temperatures are really simulated across the two terminals as shown. Connecting a third or a fourth wire adapts the simulation to 3 or 4 wire inputs.

Resistor Simulation

Go through the OHM menu and select either the 0-400 or the 0-2000 Ohms range and enter the DIRECT mode. Adjustment resolution is respectively 0.01 Ohms and 0.1 Ohms.

To measure pressure

The TRX-II pressure sensor option has been designed to calibrate pressure instruments in conjunction with the TRX-II multi-calibrator.
The pressure sensor is powered from the TRX-II calibrator. It allows pressure instrument calibrations with ranges from
- -15 psi up to 10.000 psi
- (-1 bar up to 700 bar).

Pressure Connectors

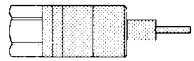
All sensors have female pressure connection and adaptors to get to 1/4" male connection.

The pressure medium may be any compatible gas or liquid.
See specifications for wetted parts.
Take care that no liquid is spilled on the TRX-II calibrator.

Sensor ranges

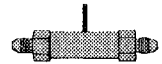
The following ranges are available:

Pressure ranges: gauge or absolute



0 -	1	psi	/	70	mbar
0 -	2	psi	/	140	mbar
0 -	3	psi	/	200	mbar
0 -	5	psi	/	350	mbar
0 -	10	psi	/	700	mbar
0 -	15	psi	/	1	bar
0 -	20	psi	/	1.4	bar
0 -	30	psi	/	2	bar
0 -	50	psi	/	3.5	bar
0 -	75	psi	/	5	bar
0 -	100	psi	/	7	bar
0 -	150	psi	/	10	bar
0 -	200	psi	/	14	bar
0 -	300	psi	/	20	bar
0 -	450	psi	/	30	bar
0 -	500	psi	/	35	bar
0 -	600	psi	/	40	bar
0 -	1000	psi	/	70	bar
0 -	1750	psi	/	120	bar
0 -	2000	psi	/	135	bar
0 -	2300	psi	/	160	bar
0 -	3000	psi	/	200	bar
0 -	5000	psi	/	350	bar
0 -	6000	psi	/	400	bar
0 -	7000	psi	/	500	bar
0 -	10000	psi	/	700	bar

Pressure range: differential



0 -	5	psi	/	350	mbar
0 -	10	psi	/	700	mbar
0 -	15	psi	/	1	bar
0 -	30	psi	/	1.5	bar
0 -	45	psi	/	2	bar
0 -	50	psi	/	3.5	bar
0 -	75	psi	/	5	bar
0 -	100	psi	/	7	bar
0 -	150	psi	/	10	bar
0 -	220	psi	/	15	bar
0 -	300	psi	/	20	bar
0 -	500	psi	/	35	bar

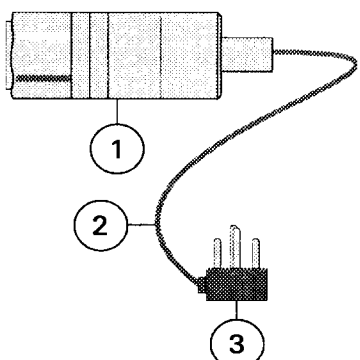
COMMENTS
Maximum line pressure 35 bar
Differential ranges uni-directional use only

- ***NOTE 1:*** *All gauge ranges up to 200 psi are compound ranges.*
- ***NOTE 2:*** *Absolute ranges up to 1000 psi (70 bar)*

Pressure Sensor Identification

1. Sensor
2. Cable 1,5 meter
3. Fixed connector for TRX-II
4. Adaptors

All sensors carry s/n pressure range in psi/bar.



Preparation

After connecting the pressure sensor the TRX-II must be switched on. Because of the polarized pinning the connector can only be plugged-in in one way. Make sure that the thermocouple wire fixation screws are tightened and the connector has been plugged-in completely.

To change the pressure unit.
See "Pressure Units settings".

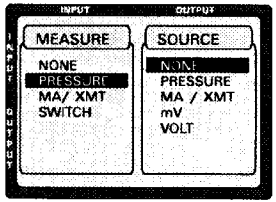
Operating the TRX-II with Pressure Sensor

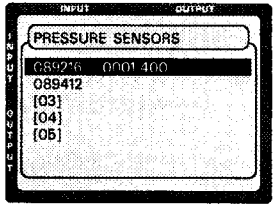
General

Important notes:

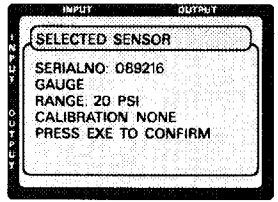
1. To reset each pressure sensor reading at zero, press zero key.
2. Make sure that tubing or hose is used within manufacturers pressure and temperature limits.
3. For pressures over 10 bars (145 psi) use a special small inner diameter hose to limit the fluid flow and expansion in case a connection starts leaking.
4. Do not use the plastic tubing connector for pressures over 10 bar (145 psi)
5. To prevent damage to the sensor, applied pressure should not exceed the specified containment pressure.
6. Make sure that the connector and sensor materials are compatible with the fluid.
7. To avoid leakage and excessive force on the sensor, use sealing tape and two (2) wrenches.
8. Perform calibration in accordance to your company standard procedures. Read the Linkpak-W operating manual to record AS FOUND and AS LEFT calibration data on a *PCMCIA card*.

Plug in connector into the TRX-II. Switch the TRX-II calibrator on after you have made the proper preparations. Select PRESSURE in the measure menu and NONE in the source menu.



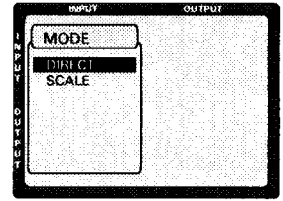


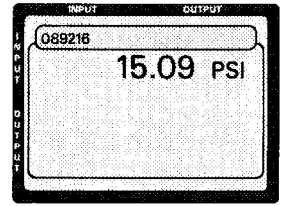
Select the connected sensor from the available sensors with the ▲ and ▼ key, and press EXE. Press CE to leave menu.



The next menu gives you all the details of the selected sensor. This information should be checked with the sensor information on the connector. If both sets of information do not match, proceeding may cause serious problems. In case of mismatching press CE to leave. In case of matching information press EXE to confirm. Choose DIRECT or SCALE to open the working screen.

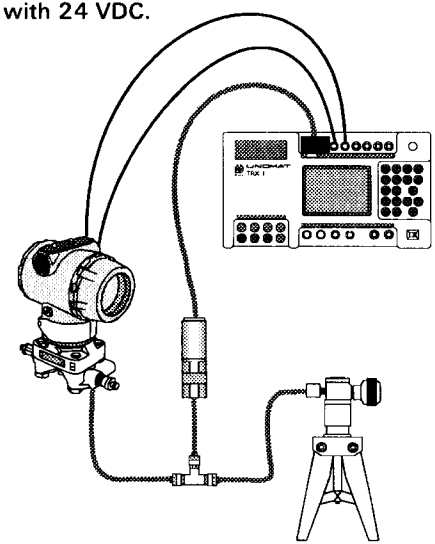
The working screen shows the pressure measurement.
Also during working mode the serial number of the connected sensor is shown in the display.





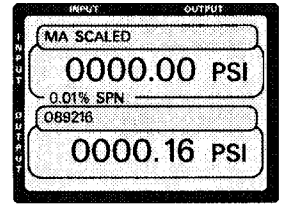
Instrument Calibrations

2-Wire transmitter; calibrator powered
Make a calibration hook-up as indicated. Switch the TRX-II calibrator on to power the transmitter with 24 VDC.



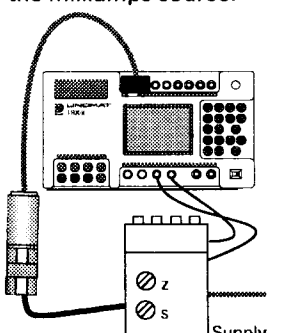
Select PRESSURE in the source menu and mA/XMT in the measure menu. Select the appropriate SENSOR in the source menu to read your calibration pressure. Select DIRECT in the measure menu if you want to read mA. Select CAL if you want to read the transmitter source scaled in pressure units. Fill out the transmitter span and select if the error between transmitter MEASURE and SOURCE has to be displayed as a % of reading or as a % of span. Press EXE to open the working screen. Use the ▶ key to prompt the pressure to pump for 25% calibration points. Press the ▼ and ▲ keys to step through these points.

The upper screen shows the milliamps signal converted into pressure units. It also shows the error in percentage of the transmitter span in smaller digits.



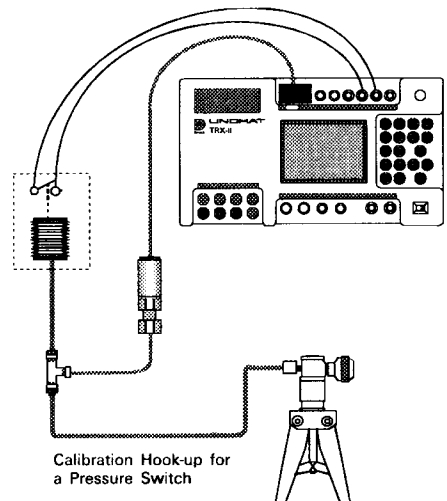
I/P Convertor

Make a calibration hook-up as indicated and switch the calibrator on. Select PRESSURE in the measure menu and mA/XMT in the source menu. Select the applicable sensor and the desired milliamps source mode to open the working screen. Read the chapter "Sourcing of Electrical Signals" on how to adjust the milliamps source.



Pressure Switch

Make a calibration hook-up as indicated and switch the calibrator on. Select SWITCH in the measure menu and PRESSURE in the source menu. Select the applicable sensor to open the working screen. Press # to unlock the switch display. Increase or decrease the calibration pressure. The switch reading tracks the source reading until the switch position changes. This change will immediately "freeze" the switch (upper) reading indicating the actual switch setting. Press # to unlock the switch reading. The switch reading will track the source reading again. Make sure that contacts are potential free.



Calibration Hook-up for a Pressure Switch

Special Source Functions

Step Mode

In the step mode the TRX-II can generate preset source levels in four different ways;

- **Free programmable, Select PROGR**

Number of steps (2 to 10) and levels are free programmable.

- **10% Divisions, Select 10%**

Free programmable span is automatically divided in 10 steps of 10% each.

- **20% Divisions, Select 20%**

Free programmable span is automatically divided in 5 steps of 20% each.

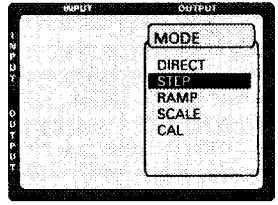
- **25% Divisions, Select 25%**

Free programmable span is automatically divided in 4 steps of 25% each.

Stepping through the fixed levels can either be performed manually or automatically.

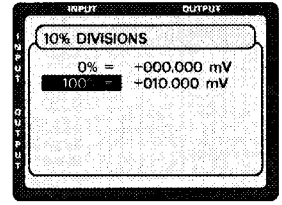
Setting up programmable steps

Select STEP and PROGR from the menu and press EXE. Select the desired number of steps and press EXE again. Set the source level for each step. Scroll the step numbers with the ▲ and ▼ keys to change or enter new levels. Press EXE when ready. The step mode working screen is shown.



Setting up 10%, 20% or 25% division steps

Select STEP and 10%, 20% or 25% from the menu and press EXE. Set the desired 100% span and press EXE again. The step mode working screen is shown.

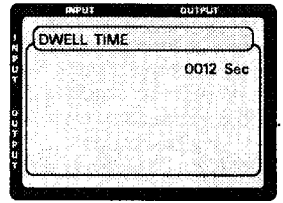


To source fixed steps manually

Initially the TRX-II sources the preset value of step number 1 or 0%.
Press the ▲ key to source the next step. Press the ▼ key to source the previous step.
Press ▶ key to switch to the DIRECT mode to allow fine adjustments with the ▲ and ▼ keys. Press ◀ to return to the MANUAL mode.

To source fixed steps automatically

To switch from MANUAL to AUTO press the numerical key with the first digit of the timer setting you want. This will open the screen to dial the dwell timer setting in seconds. The dwell timer sets the time that a source level is maintained before it changes to the next step. Press EXE to start the automatic stepping.
Press ▲ or ▼ to return to the MANUAL mode



Special Source Functions

Automatic Ramp Mode

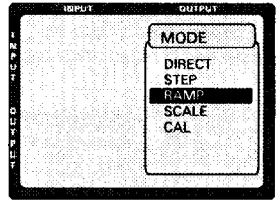
Ramp Mode

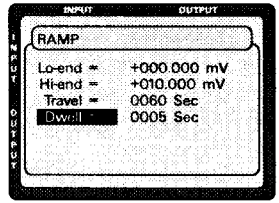
The TRX-II can generate automatically a time linear increasing or decreasing source signal. Signal limits are free to set within any of the available source ranges. Time scales can be set between 1 and 9999 seconds.

■ **NOTE:** *The automatic ramp mode cannot be used together with sourcing 0- 100 Hz or sourcing P./MIN and P/HOUR.*

Setting up the ramp mode

Select RAMP and fill out the set up screen. The high-end value sets the maximum source. The low-end value sets the minimum source. Fill out the desired travel and dwell time in seconds and press EXE.





To start/stop a 'one shot' ramp

Press ▲ to start a one shot ramp for signal increase and press ▼ to start this ramp for signal decrease.
Press ◀ and ▶ simultaneously to 'freeze' the ramp action.
To restart press ▲ or ▼. Press CE to cancel the ramping operation.

To start/stop ramp cycling

Press ▲ and ▼ direct after each other to start a continuous up and down ramp cycling with dwelling at the high and low ends. The first arrow key hit determines the take-off direction.
Press ◀ and ▶ simultaneously to 'freeze' the ramp action.
To restart press ▲ or ▼. Press CE to cancel the ramping operation.

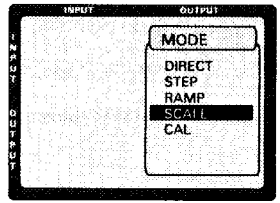
Scaled Readings

Except in temperature measure ranges all readings can be presented in a number of 5 digits and a sign. This number could represent an engineering unit like gallons/hour, revolutions/minute or any other relationship. This facility is available on both measurement and source functions. The original signal reading is still displayed in smaller sized digits.

Setting up scaled readings (linear relationship)

Select SCALE to open the set up screen. Fill out the high- and low-limits for the span (preset at 4 and 20 mA in the milliamp ranges). Fill out both scale ends for the new scale. Press EXE to show the working screen.

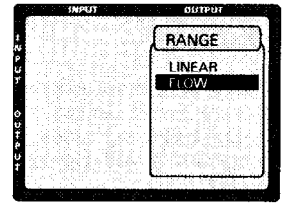
■ **NOTE:** *Scaling in lower ranges only when auto ranging.*



Setting up scaled readings (flow relationship)

Only available on the mA ranges. Select SCALE and FLOW to open the set-up screen. High- and low-limits for the span are preset at 4 and 20 mA. Change span if necessary. Fill out both scale ends for the new scale. Press EXE to show the working screen.

■ **NOTE:** *Readings are flow related when simulating or reading dP-transmitters measuring across an orifice plate.*



Source in scaled readings

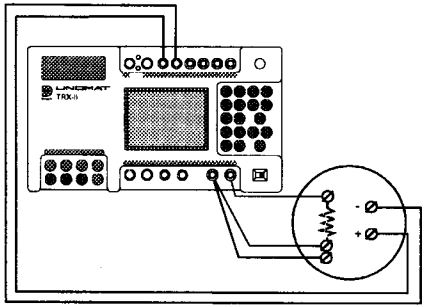
Dial directly in scaled readings to SET a related source signal as set-up. Press EXE to actually source the signal. The ▲ and ▼ key functions are available for fine adjustment of the source.

Measurements in scaled readings

Measurements are directly displayed in scaled readings (engineering units).

Transmitter calibration

In this function transmitter source and measure readings are both scaled in engineering units for quick comparison. Transmitter may be a linearized, non-linearized, 4-20 or 0-20 mA model for thermocouples or RTD's.

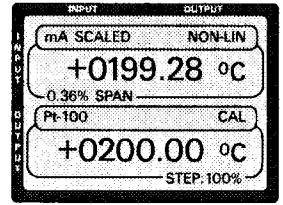


Setting up a calibration

Leave the cursor at NONE in the measure menu and select the desired source function. Go through the menu and make the selections as required. In the mode screen, select CAL to calibrate a transmitter. Proceed to select all transmitter characteristics.

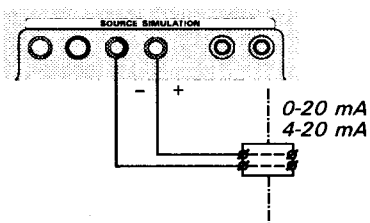
To check or calibrate a transmitter

All normal keypad functions are available to change the source. Use the ▶ key to change to fixed steps. Use ▲ and ▼ keys to step through 0%, 25%, 50%, 75% and 100% of the span as set-up. Press ◀ to return to the normal keypad functions. An ideal transmitter will show equal readings. The difference of both readings is expressed in % of the transmitter span or reading and is shown in the upper window in small size digits.



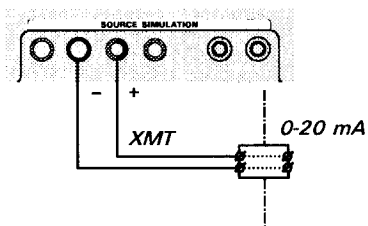
Temperature transmitter simulation

User can dial a temperature in degrees to source a 4-20 mA or 0-20 mA signal. This signal can be used to simulate transmitters at control system measure terminals. The simulated transmitter may be linearized or non-linearized. Function is available for all types of temperature sensors supplied as standard in the TRX-II.



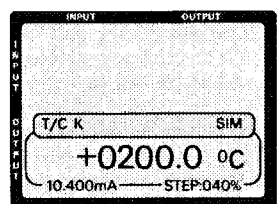
Setting up a simulation

Select SIM and proceed to select all appropriate transmitter characteristics. Ignore the CJ compensation menu. Fill out the transmitter span and press EXE to open the working screen.



To simulate a transmitter

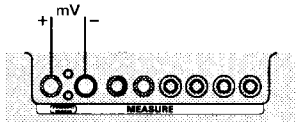
All normal keypad functions are available to change the (mA) source. Use the ▶ key to move to fixed steps. Use ▲ and ▼ keys to step through 0%, 25%, 50%, 75% and 100% of the span as set-up. Press ◀ to return to the normal keypad functions. Next to the simulated temperature the lower window shows the TRX-II source milliamps in small size digits.



To measure electrical signals

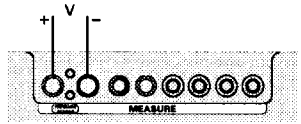
Millivolts

Select mV and DIRECT in the measure menu and press EXE to open the working screen. The upper window in the working screen indicates the measured millivolts reading.
The range is 0-600 mV split into two (auto)ranges of 0 to 100.000 mV and 100.01 to 600.00 mV.
Read section "Scaled Readings" to use the SCALE option.



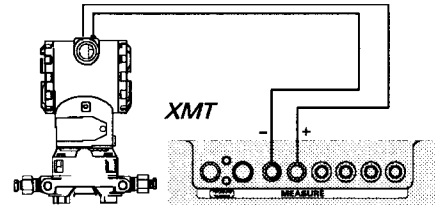
Volts

Select VOLTS and DIRECT in the measure menu and press EXE to open the working screen. The upper window in the working screen indicates the measured Volts reading.
The range is 0-60 Volts split into two (auto)ranges of 0 to 6.0000 Volts and 6.001 to 60.000 Volts.
Read section "Scaled Readings" to use the SCALE option.



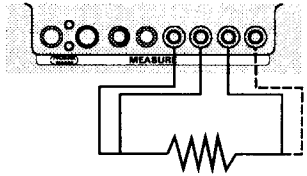
Milliamps/XMT

Select mA and DIRECT in the measure menu and press EXE to open the working screen. The upper window in the working screen indicates the measured milliamps reading.
The percentage of 4-20 mA is indicated in small size digits to facilitate easy alarm switch adjustments. The range is 0-52.000 mA. Read section "Scaled Readings" to use the option for FLOW and LINEAR scaling.



Ohms

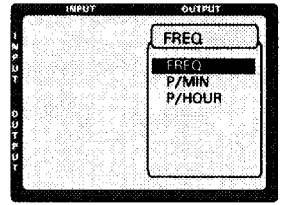
Select OHMS and DIRECT in the measure menu and press EXE to open the working screen. The upper window in the working screen indicates the measured Ohms reading. The range is 0-2000 Ohms split into two (auto)ranges of 0.01 to 400.00 Ohms and 400.0 to 2000.0 Ohms. The excitation current is 0,9 mA.
Wiring can be 2, 3 or 4 wire.
The 4 wire method is a true measurement of voltage drop across the unknown resistance at a constant excitation current. Read section "Scaled Readings" to use the SCALE option.



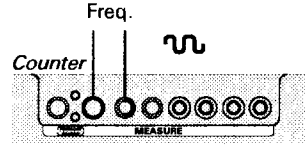
Frequency

Select FREQ in the measure menu and enter a trigger level between 10 mV and 5.0 Volts. Press EXE to open the working screen. The upper window of the working screen indicates the measured frequency reading.
The range is 0-20.000 Hz split into three (auto)ranges of 0-655 Hz, 655-1310 Hz and 1310-20.000 Hz.

Press # and ◀ simultaneously to increase the trigger level.
Press # and ▶ simultaneously to decrease the trigger level.
Read section "Scaled Readings" to use the SCALE option.



Pulse Counter Mode



There are two different modes available:

- Counts the pulses received in one minute
- Counts the pulses received in one hour

Select FREQ. in the measure menu and press EXE.
Select P/MIN. of P/HOUR and press EXE. Enter a trigger level between 10 mV and 5.0 Volts and press EXE to open the working screen. The upper window of the working screen indicates the counted number of pulses.

Press # and ◀ simultaneously to increase the trigger level.
Press # and ▶ simultaneously to decrease the trigger level.

Zero will reset the screen.

Counter

Select COUNTER in the measure menu and press EXE. Enter a trigger level between 10 mV and 5.0 Volts and press EXE to open the working screen

Press # and ◀ simultaneously to increase the trigger level.
Press # and ▶ simultaneously to decrease the trigger level.

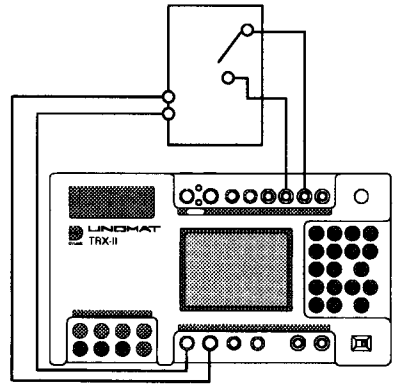
Zero will reset the screen.

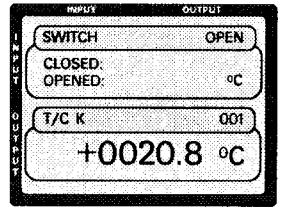
■ ***NOTE:*** *The pulse counter starts on the first (positive) rising edge.*

Switch position change

Connect the switch as indicated.
Select SWITCH in the measure menu.
Generate or simulate the appropriate source signal from the TRX-II to activate the switch.
The measure (upper) reading tracks the source (lower) reading until the switch position changes. This change will immediately "freeze" the measure reading indicating the actual switch setting.
Press the # button to reset.
The measure reading will track the source reading again.

Make sure that NO or NC contacts are potential free.





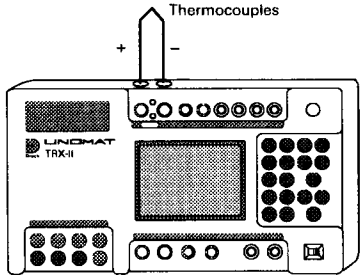
Circuit continuity tester

To check wiring continuity use the RTD measure terminals identified with SWITCH. If NONE has been selected in the source menu and SWITCH has been selected in the measure menu, press EXE to enter the continuity check mode. Closing the test loop will activate the built-in buzzer to prove that the wiring loop has a resistance of 2200 Ohms or less. Press INFO to calculate switch resistance.

To measure temperatures

With thermocouples

Go through the thermocouple measure menu and make the selections as required. Press EXE to open the working screen; the measurement reading is shown in the upper window. Resolution is 0.1 degrees for most thermocoupletypes.
For Cold Junction compensation considerations and different wiring methods read section "To simulate thermocouples" in this book.

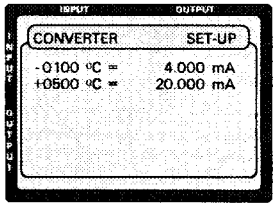


With RTD's

Go through the RTD measure menu and make the selections as required. Press EXE to open the working screen; the measurement reading is shown in the upper window. Resolution is 0.1 or 0.01 degree depending on selected RTD type. The excitation current is 0.9 mA. Wiring can be 2, 3 or 4 wire. The 4 wire method is a true measurement of voltage drop across the unknown resistance at a constant excitation current.

Programmable signal converter

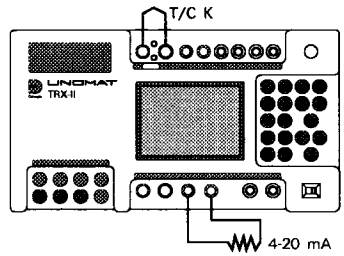
With this unique feature any measure signal can be converted into any on the TRX-II available source signals with full galvanic isolation. Zero and span settings for both measure and source are fully programmable.



Setting up a signal converter

Make all measure and source selections as you would do when you use measure and source functions separately in the DIRECT source mode. When the normal working screen is displayed press # and EXE to open the set-up screen for filling out the measure and source span. Press EXE again to proceed to the signal converter working screen. Actual measure and source signals are now displayed.

■ ***NOTE:*** *The signal converter function can not be used in pulse counting modes.*



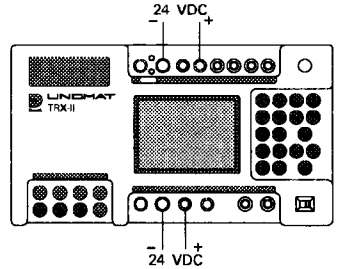
User Power supplies

Power supplies available for the user are designed to power transmitters, control and transduce wheatstone bridges. The following power supplies are available at the terminals as indicated:

24 VDC fixed, combined with the mA measure terminals, current limited at 32 mA.

OR

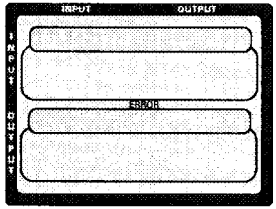
24 VDC fixed, combined with the mA source terminals, current limited at 32 mA.



Ce Remarks

The TRX-II prompts "ERROR" or "CHECK LOOP" whenever the functionality is influenced by electromagnetic disturbances. The results obtained during this state are unreliable.

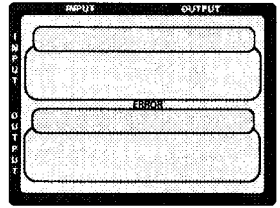
Error message while measuring



The TRX-II is protected against failures by fast transient / burst. It restarts itself whenever this situation occurs and returns to the main screen.

In this way a save state of operation can be assumed.

Error message while sourcing



Recalibration

Recalibration of the TRX-II

Leave the cursor at NONE in the MEASURE and SOURCE menu and press the # and EXE keys simultaneously to open the set-up menu. Select CALIBRATION and press EXE. Fill out the access code and press EXE to open the calibration menu.
The access code is programmable and works as a barrier to prevent accidental access to TRX-II calibration ranges.

The calibration menu shows all relevant ranges to calibrate. Each range can be recalibrated independent of any other range. Only the cold junction compensation system is influenced by millivolts recalibration. Select the ranges to be calibrated and press EXE. Follow the instructions on the next screens. Fill out the calibration readings and press EXE to confirm or to return to the calibration menu. Select another range to continue recalibration or press CE to leave the calibration menu.

Cold Junction Compensation Calibration

To recalibrate or check the cold junction measurement system for both measure and source, use an electronic thermometer with a maximum error of ±0.07°C (0.13°F). Remove the compensation wire fixation screws from the T/C terminals. Insert the thermometer probe in the appropriate T/C terminal hole and make sure a good thermal contact is made down at the bottom of the terminal. Take measurements samples of both terminals and calculate the average temperature. Enter this temperature to recalibrate. Do not use thermal conductivity gel as this cannot easily be removed from the terminal.

NOTES:

1. Calibration standards should have a valid calibration certification and should be at least 3 times more accurate than the published accuracies for the TRX-II for each range.
2. As derived from electrical parameters, temperature sensor ranges do not require any individual recalibration.
3. Be sure that you use the test leads, as standard supplied with the TRX-II or other low e.m.f. test leads.
4. The TRX-II should be powered from the on board batteries during recalibration.
5. Recalibration must be carried out at reference ambient temperature and humidity. TRX-II must be exposed to this condition for at least 2 hours before the actual recalibration starts.
6. Recalibrate mV ranges before starting recalibration of the Cold Junction Compensation system.
7. When accessing the calibration menu the temperature unit is set to °C and the temperature scale is set to IPTS 68.
8. Calibration is recommended between 12 and 14 months.

Installation of a new pressure sensor

To add a new sensor specific data must be entered in the TRX-II memory. This is to correct the sensor linearity and hysterisis in the TRX-II calibrator.

Each new sensor is delivered with the following data;

- Serial No.
- Range in mBar
- Correction factor # A (C1)
- Correction factor # B (C2)
- Correction factor # C (C3)
- Correction factor # D (C4)

- *Correction factor # A (C1) negative
- *Correction factor # B (C2) negative
- *Correction factor # C (C3) negative
- *Correction factor # D (C4) negative

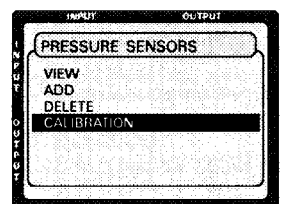
** Only for compound ranges.*

Plug the connector in the calibrator and switch the unit on. Leave the cursor at NONE at the measure and source menu and press # and EXE simultaneously to open the set-up menu. Select PRESSURE SENSORS and press EXE. Select ADD and press EXE. Select free memory spot and press EXE. The menu will lead you through the different screens to be filled in. The required data is sent standard with every pressure sensor from the factory.

Before you can enter the new sensor data, the TRX-II screen shows you the data text lines as it is. Press CE to leave the installation setup or press EXE to change the actual data by filling out each line. After you have entered the new data in the EEPROM the screen will return to the sensor selection menu. To verify the new entered data, select the applicable sensor again and press EXE. Press CE to leave the installation menu.

Calibration of a new sensor

The calibration procedure should always be done after adding a new sensor. The CALIBRATION menu is part of the pressure sensor menu. The menu driven software leads the operator through the procedure which requires actual pressures to be applied.



Sensor recalibration

To recalibrate a sensor you need a sufficient accurate pressure calibrator. Accuracy should be 3 times better as it is for the 100% range of the sensor. In general a dead weight tester is recommended.

Calibration is performed at zero, 50% and full span only. Best straight line fit is established by the polynomial factors as entered during installation.

Plug the sensor in the calibrator and switch the unit on. Wait 15 minutes to allow the unit to stabilize. Press # and EXE simultaneously to open the setup menu. Select PRESSURE SENSORS and press EXE. Select CALIBRATION and press EXE. Select the applicable sensor and press EXE.

Expose the sensor to atmospheric pressure and press EXE again to perform the zero calibration.
Apply the pressure for full range calibration.
Dial on the TRX-II the total weight stacked on the tester or the standard pressure calibrator reading.
Press EXE again. Do the same for half range calibration.

Verify the pressure reading on your next screen.

Press EXE to open the calibration date screen. Fill out the calibration date questions and press EXE. Verify the dateand press EXE again to return to the sensor selection menu. Press CE to leave the calibration mode.

Cleaning the pressure chamber

Use a water hand soap solution or a compatible solvent and flush the pressure chamber. Do not use needles or other mechanical tools as you may damage the isolation diaphragms.

Fault finding procedures

Opening and closing the calibrator housing

Remove the batteries and disconnect the unit from other equipement.

Take the four T/C wire screws out and release all visible philips screws at the back and inside the battery compartment. Lift gently the housing upper half off and put it aside.

To close the calibrator housing in reverse order the following must be considered:

1. Put the three printed circuit board spacers in place. Upper hand and lower hand spacers have brass wire guide tubes; make sure they fit into the mV terminals correctly.

2. Check the "battery type" selector switch position before turning the unit on.

Fault finding procedures

When the TRX-II does not work properly or does not work at all, it is recommended to return the unit to one of the Druck Service Centres or to your local distributor after you have checked the following;

Most of the problems with portable instruments are related to power supply defects, blown fuses or displaced connectors.

The unit does not work at all.

1. When normally line powered, change to battery operation to check the line adaptor.

2. When normally battery powered, check the contact springs for corrosion and spring force.

3. Check total battery voltage with a voltmeter. Alkaline should read around 6 Volts and NiCd's should read around 5 Volts when new or fully charged.

4. Open the TRX-II as described in the previous paragraph and check whether the PCB interconnecting plugs are still in position.

5. **The unit does not measure milliamps.**
   Check the fuse accessible from the back. Replace fuse only by p/n 13119 or littelfuse No. 217.400

6. **The unit does not measure Ohms or RTD's**
   Check the fuse accessible from the back. Replace fuse only by p/n 13119 or littelfuse No.217.400

Most other fault symptoms are not logically related to just one possible defect.

When you have spare printed circuit boards available, you could replace board by board to find the faulty board.

Note that a board replacement requires a recalibration. Note that this procedure may also create a problem in a new healthy board by specific defects in an original board.

The following boards are accommodated in the TRX-II:

- Power supply board p/n 25112
- Processor board p/n 25111
- Measure board p/n 25113
- Source board p/n 25114

■ ***IMPORTANT:*** *Always place the EMI shielding back at the orginal position.*

Spare parts list

	Part No.
Power board	Assy 201
Processor board	Assy 200
Measure board	Assy 202
Source board	Assy 203
LCD display	22500
Board spacers (3X)	25234
T/C terminal screws (4X)	25301
5x Test leads, 5x clips	Assy 206
Operating Manual	25506
Line adaptor/charger 115 VAC	13603/115
Line adaptor/charger 230 VAC	13603/230
Battery compartment cover	25232
Set of battery contact springs	13013/16
LCD display window	25125
Set of fuses (10X)	13119
Fuse holder	13118
Carrying case	24030
Lithium cell	13183

Pressure sensors (optional)

Gauge:					Part:
0 -	1	psi /	70	mbar	#800
0 -	2	psi /	140	mbar	#801
0 -	3	psi /	200	mbar	#802
0 -	5	psi /	350	mbar	#803
0 -	10	psi /	700	mbar	#804
0 -	15	psi /	1	bar	#805
0 -	20	psi /	1.4	bar	#806
0 -	30	psi /	2	bar	#807
0 -	50	psi /	3.5	bar	#809
0 -	75	psi /	5	bar	#810
0 -	100	psi /	7	bar	#811
0 -	150	psi /	10	bar	#812
0 -	200	psi /	14	bar	#813
0 -	300	psi /	20	bar	#814
0 -	450	psi /	30	bar	#815
0 -	500	psi /	35	bar	#816
0 -	600	psi /	40	bar	#817
0 -	1000	psi /	70	bar	#818
0 -	1750	psi /	120	bar	#819
0 -	2000	psi /	135	bar	#820
0 -	2300	psi /	160	bar	#821
0 -	3000	psi /	200	bar	#822
0 -	5000	psi /	350	bar	#823
0 -	6000	psi /	400	bar	#824
0 -	7000	psi /	500	bar	#825
0 -	10000	psi /	700	bar	#826

Absolute:					Part:
0 -	1	psi /	70	mbar	#850
0 -	2	psi /	140	mbar	#851
0 -	3	psi /	200	mbar	#852
0 -	5	psi /	350	mbar	#853
0 -	10	psi /	700	mbar	#854
0 -	15	psi /	1	bar	#855
0 -	20	psi /	1.4	bar	#856
0 -	30	psi /	2	bar	#857
0 -	50	psi /	3.5	bar	#859
0 -	75	psi /	5	bar	#860
0 -	100	psi /	7	bar	#861
0 -	150	psi /	10	bar	#862
0 -	200	psi /	14	bar	#863
0 -	300	psi /	20	bar	#864
0 -	450	psi /	30	bar	#865
0 -	500	psi /	35	bar	#866
0 -	600	psi /	40	bar	#867
0 -	1000	psi /	70	bar	#868

Differential:					Part:
0 -	5	psi /	350	mbar	#900
0 -	10	psi /	700	mbar	#901
0 -	15	psi /	1	bar	#902
0 -	30	psi /	1.5	bar	#903
0 -	45	psi /	2	bar	#904
0 -	50	psi /	3.5	bar	#905
0 -	75	psi /	5	bar	#906
0 -	100	psi /	7	bar	#907
0 -	150	psi /	10	bar	#908
0 -	220	psi /	15	bar	#909
0 -	300	psi /	20	bar	#910
0 -	500	psi /	35	bar	#911

COMMENTS

Maximum line pressure 35 bar

Differential ranges uni-directional use only

Blanc page

Electrical functions	Range	Resolution	Accuracy	Remarks
Measure DC voltage	0 ... 100 mV	0.001 mV	0.02% Rdg. + 0.01% Range	R - measure > 20 MΩ
Measure DC voltage auto.ranging	0 ... 600 mV	0.01 mV	0.025% Rdg. + 0.005% Range	R - measure > 20 MΩ
Measure DC voltage	0 ... 6 V	0.0001 V	0.025% Rdg. + 0.005% Range	R - measure > 1 MΩ
Measure DC voltage auto.ranging	6 V ... 60 V	0.001 V	0.05% Rdg. + 0.005% Range	R - measure > 1 MΩ
Source DC voltage	-10 mV ... 100 mV	0.001 mV	0.01% Rdg. + 0.005% Range	R - source < 0.2 Ω
Source DC voltage	0 ...12 V	0.0001 V	0.01% Rdg. + 0.005% Range	R - source < 0.2 Ω
Measure DC current	0 ...52 mA	0.001 mA	0.01% Rdg. + 0.01% Range	R - measure 2,5 Ω fused
Source DC current	0 ... 24 mA	0.001 mA	0.01% Rdg. + 0.02% Range	R - max. 900 Ω
Source 2-wire XMT	4 ... 24 mA	0.001 mA	0.01% Rdg. + 0.02% Range	V - max. 56 V
Measure resistance	0 ... 400 Ω	0.01 Ω	0.005% Rdg. + 0.02% Range	at 0.9 mA excitation
Measure resistance auto.ranging	400 W ... 2000 Ω	0.1 Ω	0.02% Rdg. + 0.015% Range	at 0.9 mA excitation
Source resistance	0 ... 400 Ω	0.01 Ω	0.005% Rdg. + 0.02% Range	at 1 mA excitation
Source resistance	400 W ... 2000 Ω	0.1 Ω	0.02% Rdg. + 0.015% Range	at 1 mA excitation
Measure frequency	0 .. 655 Hz	0.01 Hz	0.006% Rdg.	R - measure > 300 kΩ
auto.ranging	655 Hz ... 1310 Hz	0.1 Hz	0.1 Hz	R - measure > 300 kΩ
auto.ranging	1310 Hz ... 20.000 Hz	1 Hz	1 Hz	R - measure > 300 kΩ
Totalizing counter	0 ... 10^8 -1	1count	Infinite	R - measure > 300 kΩ
Counts/minute	0 ... 6 x 10^5	1c/min	1 c/min	R - measure > 300 kΩ
Counts/hour	0 ... 10^7 - 1	1 c/h	1 c/h	R - measure > 300 kΩ
Pulse source preset	0 ... 10^8 - 1	1count	Infinite	0 - 24 V / 34 mA max.
Pulse sourcing	0 ... 100 Hz	0.01 Hz	0.01 Hz	0 - 24 V / 34 mA max.
Pulse sourcing	0 ... 6000 p/min	1p/min	1 p/min	0 - 24 V / 34 mA max.
Pulse sourcing	0 ... 20.000 Hz	1 Hz	1 Hz	0 - 24 V / 34 mA max.
Pulse sourcing	0 ... 99.999 p/hour	1p/hour	36 p/hour	0 - 24 V / 34 mA max.

Temperature functions			Range		Resolution		Accuracy Measure & Source	
RTD's								
Pt50	(385)	IEC 751	(-200 ... 850) °C	(-328 ... 1562) °F	0.03 °C	0.06 °F	0.5 °C	0.9 °F
Pt100	(385)	IEC 751	(-200 ... 850) °C	(-328 ... 1562) °F	0.03 °C	0.06 °F	0.3 °C	0.6 °F
Pt200	(385)	IEC 751	(-200 ... 850) °C	(-328 ... 1562) °F	0.1 °C	0.2 °F	0.6 °C	1.1 °F
Pt500	(385)	IEC 751	(-200 ... 850) °C	(-328 ... 1562) °F	0.1 °C	0.2 °F	0.4 °C	0.8 °F
Pt1000	(385)	IEC 751	(-200 ... 400) °C	(-328 ... 752) °F	0.1 °C	0.2 °F	0.2 °C	0.4 °F
D-100	(392)	JIS 1604-1989	(-200 ... 510) °C	(-328 ... 950) °F	0.03 °C	0.06 °F	0.3 °C	0.6 °F
D-100	(392)	JIS 1604-1981	(510 ... 630) °C	(950 ... 1166) °F	0.03 °C	0.06 °F	0.3 °C	0.6 °F
Ni100		DIN 43760	(-60 ... 250) °C	(-76 ... 482) °F	0.3 °C	0.6 °F	0.2 °C	0.4 °F
Ni120		MINCO 7 - 120	(-80 ... 260) °C	(-112 ... 500) °F	0.3 °C	0.6 °F	0.2 °C	0.4 °F
Cu10		MINCO 16 - 9	(-200 ... 260) °C	(-328 ... 500) °F	0.3 °C	0.6 °F	2 °C	4 °F

Temperature functions		Range		Resolution		Accuracy			
						Measure		Source	
Thermocouples									
K	IEC 584	(-250 ... -200) °C	(-418 ... -328) °F	0.2 °C	0.4 °F	2 °C	4 °F	1 °C	2 °F
K	IEC 584	(-200 ... 1370) °C	(-328 ... 2498) °F	0.1 °C	0.2 °F	0.6 °C	1.1 °F	0.3 °C	0.6 °F
J	IEC 584	(-210 ... 1200) °C	(-346 ... 2192) °F	0.1 °C	0.2 °F	0.5 °C	0.9 °F	0.3 °C	0.6 °F
T	IEC 584	(-250 ... -180) °C	(-418 ... -292) °F	0.1 °C	0.2 °F	1.4 °C	2.6 °F	0.7 °C	1.4 °F
T	IEC 584	(-180 ... -70) °C	(-292 ... -94) °F	0.2 °C	0.4 °F	0.5 °C	0.9 °F	0.3 °C	0.6 °F
T	IEC 584	(-70 ... 400) °C	(-94 ... 752) °F	0.1 °C	0.2 °F	0.3 °C	0.6 °F	0.2 °C	0.4 °F
B	IEC 584	(250 ... 500) °C	(482 ... 932) °F	0.3 °C	0.6 °F	4 °C	8 °F	2 °C	4 °F
B	IEC 584	(500 ... 1200) °C	(932 ... 2192) °F	0.2 °C	0.4 °F	2 °C	4 °F	1 °C	2 °F
B	IEC 584	(1200 ... 1820) °C	(2192 ... 3308) °F	0.1 °C	0.2 °F	1 °C	2 °F	0.6 °C	1.1 °F
R	IEC 584	(-50 ... 0) °C	(-58 ... 32) °F	0.2 °C	0.4 °F	3 °C	6 °F	1.5 °C	2.7 °F
R	IEC 584	(0 ... 300) °C	(32 ... 572) °F	0.2 °C	0.4 °F	2 °C	4 °F	1 °C	2 °F
R	IEC 584	(300 ... 1768) °C	(572 ... 3214) °F	0.1 °C	0.2 °F	1 °C	2 °F	0.6 °C	1.1 °F
S	IEC 584	(-50 ... 0) °C	(-58 ... 32) °F	0.2 °C	0.4 °F	2.5 °C	4.5 °F	1.3 °C	2.4 °F
S	IEC 584	(0 ... 100) °C	(32 ... 212) °F	0.2 °C	0.4 °F	1.9 °C	3.5 °F	1 °C	2 °F
S	IEC 584	(100 ... 1768) °C	(212 ... 3214) °F	0.1 °C	0.2 °F	1.4 °C	2.6 °F	0.7 °C	1.3 °F
E	IEC 584	(-250 ... -150) °C	(-418 ... -238) °F	0.1 °C	0.2 °F	0.9 °C	1.7 °F	0.4 °C	0.8 °F
E	IEC 584	(-150 ... 1000) °C	(-238 ... 1832) °F	0.1 °C	0.2 °F	0.4 °C	0.8 °F	0.2 °C	0.4 °F
N	IEC 584	(-200 ... -20) °C	(-328 ... -4) °F	0.2 °C	0.4 °F	1 °C	2 °F	0.5 °C	1 °F
N	IEC 584	(-20 ... 1300) °C	(-4 ... 2372) °F	0.1 °C	0.2 °F	0.6 °C	1.1 °F	0.3 °C	0.6 °F
L	DIN 43710	(-200 ... 900) °C	(-328 ... 1652) °F	0.1 °C	0.2 °F	0.3 °C	0.3 °F	0.2 °C	0.4 °F
U	DIN 43710	(-200 ... -100) °C	(-328 ... -148) °F	0.1 °C	0.2 °F	0.5 °C	0.9 °F	0.3 °C	0.6 °F
U	DIN 43710	(-100 ... 600) °C	(-148 ... 1112) °F	0.1 °C	0.2 °F	0.3 °C	0.6 °F	0.2 °C	0.4 °F
C		(0 ... 1500) °C	(32 ... 2732) °F	0.1 °C	0.2 °F	1 °C	2 °F	0.5 °C	1 °F
C		(1500 ... 2000) °C	(2732 ... 3632) °F	0.1 °C	0.2 °F	1.4 °C	2.6 °F	0.7 °C	1.3 °F
C		(2000 ... 2320) °C	(3632 ... 4208) °F	0.2 °C	0.4 °F	1.9 °C	3.5 °F	1 °C	2 °F
D		(0 ... 1700) °C	(32 ... 3092) °F	0.1 °C	0.2 °F	1 °C	2 °F	0.5 °C	1 °F
D		(1700 ... 2200) °C	(3092 ... 3992) °F	0.1 °C	0.2 °F	1.6 °C	2.9 °F	0.8 °C	1.5 °F
D		(2200 ... 2495) °C	(3992 ... 4523) °F	0.2 °C	0.4 °F	3.6 °C	6.5 °F	1.8 °C	3.3 °F

Special functions	1	**Steps;** 10 programmable, 10%, 20%, 25% div. stepping by key or adj. timer
	2	**Ramp;** programmable travel time for up/down and dwell
	3	**Scaling;** in 5 digits and sign on all electrical ranges
	4	**Temp. XMT cal.;** both measure and source readings in temp. units. Cal.function extended for all output functions
	5	**Temp. XMT sim.;** mA source reads in temperature units
	6	**Signal converter;** any measure into any source, fully isolated
Note:		Thermocouple accuracies do not include cold junction compensation errors
Reference		22 °C ±1, RH 45% ±15
Accuracies		1 year for 17 °C to 27 °C; outside these limits 0.0005% / °C typical on mV
Cold Junction error		±0.4 °C (0.8 °F) max. in transient ±0.2 °C (0.4 °F) max. when steady
Resolution error		Included in range error
Long term drift after 1 year		0.005% / year or 1000 hours operating
Cold Junction modes		Internal, Manual, External
Temperature scale		Selectable IPTS 68 or ITS 90
Operating temp.		-10 °C to 50 °C (14 °F to 122 °F)
Storage temp.		-20 °C to 70 °C (- 4 °F to 158 °F)
Relative humidity		0 - 90% non-condensing
Electrical protection		50 V, 30 sec. max. Ohms source to mV-ground terminal; 5 V max.
Readings		Multilinguale. Temp. °C or °F

Batteries (LR14 or C)		4x 1.5 V alkaline or 1.2 V NiCd
Battery life		Alkaline; 10 hours at 20 °C (68 °F) Ni-Cd; 8 hours at 20 °C (68 °F)
Battery life	12 mA sourcing	Alkaline; 5.5 hours at 20 °C (68 °F)
	12 mA sourcing	Ni-Cd; 5 hours at 20 °C (68 °F)
Low battery warning		Shows a battery symbol
Line power		With optional adaptor 115 - or 230 VAC
Recharge NiCd's		With optional adaptor 115 - or 230 VAC
User terminals		Gold plated, standard 4 mm plugs
T/C comp.wire terminals		Screw fixable, 2 mm diameter max.
Protection		IP 53
Size		210 x 120 x 50 mm without case (8.4 x 4.8 x 2 inch)
Carrying case		Cordura
Weight		1.2 kg (2.7 lbs) with batteries
Keystroking		9 operation sequences storage
Contact change detect.		Reading freezes on open or close
Switch resistance		Switch resistance measurement during switch test.
PCMCIA station		PCMCIA card type 1 or 2
Detect. level freq.in		Adjustable; 10 mV to 5.0 V
Pulse source level		Adjustable; 0 - 24 V, 0.1 V resolution, 2% accuracy
Pulse source form		Symmetrical square, zero based - 70 mV
Pulse source speed		Adjustable in Hz or Baud rate
LCD display		Full graphic, with contrast control and backlight timer
Ohms simulation		0.18 to 5.0 mA excitation current either polarity
Ohms input terminals		2, 3 or 4 wire automatic mode select. True 4 - wire system

Specifications subject to change without notice

Pressure sensors (optional)

Gauge:

0 -	1	psi /	70	mbar
0 -	2	psi /	140	mbar
0 -	3	psi /	200	mbar
0 -	5	psi /	350	mbar
0 -	10	psi /	700	mbar
0 -	15	psi /	1	bar
0 -	20	psi /	1.4	bar
0 -	30	psi /	2	bar
0 -	50	psi /	3.5	bar
0 -	75	psi /	5	bar
0 -	100	psi /	7	bar
0 -	150	psi /	10	bar
0 -	200	psi /	14	bar
0 -	300	psi /	20	bar
0 -	450	psi /	30	bar
0 -	500	psi /	35	bar
0 -	600	psi /	40	bar
0 -	1000	psi /	70	bar
0 -	1750	psi /	120	bar
0 -	2000	psi /	135	bar
0 -	2300	psi /	160	bar
0 -	3000	psi /	200	bar
0 -	5000	psi /	350	bar
0 -	6000	psi /	400	bar
0 -	7000	psi /	500	bar
0 -	10000	psi /	700	bar

Absolute:

0 -	1	psi /	70	mbar
0 -	2	psi /	140	mbar
0 -	3	psi /	200	mbar
0 -	5	psi /	350	mbar
0 -	10	psi /	700	mbar
0 -	15	psi /	1	bar
0 -	20	psi /	1.4	bar
0 -	30	psi /	2	bar
0 -	50	psi /	3.5	bar
0 -	75	psi /	5	bar
0 -	100	psi /	7	bar
0 -	150	psi /	10	bar
0 -	200	psi /	14	bar
0 -	300	psi /	20	bar
0 -	450	psi /	30	bar
0 -	500	psi /	35	bar
0 -	600	psi /	40	bar
0 -	1000	psi /	70	bar

Differential:

0 -	5	psi /	350	mbar
0 -	10	psi /	700	mbar
0 -	15	psi /	1	bar
0 -	30	psi /	1.5	bar
0 -	45	psi /	2	bar
0 -	50	psi /	3.5	bar
0 -	75	psi /	5	bar
0 -	100	psi /	7	bar
0 -	150	psi /	10	bar
0 -	220	psi /	15	bar
0 -	300	psi /	20	bar
0 -	500	psi /	35	bar

COMMENTS

Maximum line pressure 35 bar

Differential ranges uni-directional use only

Specifications

Reference	Horizontal positioned sensor(s) 22 °C ±1 (72 °F ±2), RH 45% ±15
Calibration	Traceable to National Standards
Temperature effects	< 0.006% / °C (0.003% / °F) average span error < 0.01% / °C (0.005% / °F) average zero error
Compensated temperature range	0 to 40 °C (32 to 104°F)
Zero error compensation	Manual reset on TRX-II calibrator
Overpressure	2x pressure range up to 140 bar (2000 psi) max.
Pressure containment	3x pressure range up to 200 bar (2900 psi) max.
Recalibration	Recommended for each 12 to 14 month
Warm uptime	15 minutes for rated accuracies
Operating temperature range	- 10 °C to 40 °C (-14 °F to 104 °F)
Relative Humidity	0-90% non-condensing
User terminals (electrical)	Gold plated for standard 4 mm plugs
Interconnecting plugs	Gold plated 2 mm and 4 mm plugs
Protection	IP 53
Size	70 x 25 mm (2.8 x 1 inch)
Pressure readings (selectable)	kPa, mbar, psi, inHg, inH_2O, mmH_2O' mmHg and Kgf/cm^2
Selectable TRX-II source readings	Pressure sensor + all standard TRX-II source functions
Selectable TRX-II measure readings	Pressure Milliamps Switch

Specifications subject to change without notice

Protocol for RS232 System Integration

Serial port settings

Bauds:	9600
Parity:	none
Bits:	8
Stop:	1
Hardware handshake:	none

Traceability and calibration reports

Traceability

Enclosed with each TRX-II there is a Certificate of Calibration. It declares the traceability to the Netherlands Measurement Institute (NMI).

Calibration reports

Full reports with calibration on zero and 4 pressure points are available as an option. Reports may be issued by a traceable testing laboratory or a NKO laboratory (Netherlands Calibration Services).

NOTE:

1. NKO is one of the signatories of the WECC (Western European Calibration Cooperation), Multilateral Agreement on the equivalence of calibration certificates issued by accredited laboratories. The other signatories of this Multilateral Agreement are: BNM (France), DKD (Federal Republic of Germany), MSF (Finland), NAMAS (United Kingdom), SCS (Switzerland), SIT (Italy), SMO (Sweden), STP (Denmark).

2. The Netherlands Measurements Institute is equivalent to the National Institute of Standards and Technology(NIST).

Warranty & Liability

Warranty & Liability

Our equipment is warranted against defective material and workmanship for a period of 18 months from date of shipment. Claims under warranty can be made by returning the equipment prepaid to our factory. The equipment will be replaced, repaired or adjusted at our option. The liability of UNOMAT is restricted to that given under our warranty. No responsability is accepted for damage, loss or other expense incurred through sale or use of our equipment. Under no condition shall UNOMAT be liable for any special, incidental or consequential damage.

■ ***NOTE:*** *Units with defects caused by battery electrolyte from leaking batteries are definitely excluded for repair or replacement under warranty.*

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