

# UNIVERSAL MULTI-CHANNEL MEASURING DEVICE - **CANYSE 801**



## USER MANUAL



Document version 1.1.0

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## 1. INTRODUCTION

Thank you for purchasing of our product and hence you for your trust. To be satisfied with this product and that it will operate without problems, please carefully read and follow this user manual.

CANYSE 801 is an universal multi-channel measuring device, which combines the features of various specialized measuring devices:

- Sensor signal transducer
- Meter of different physical quantities (temperature, humidity, force, displacement, pressure, ...)
- Precision multimeter for voltage, current and resistance
- Data logger
- Portable calibrator for voltage and current

### Fields of application:

- R&D departments
- Testing
- Production and Quality Assurance
- Maintenance and servicing
- Measuring laboratories
- Monitoring of environmental parameters

### Key features:

- 3.5 "colour LCD touch screen
- 8 measuring channels
- Measuring ranges from  $\pm 4\text{mV}$  to 2.5V
- High resolution and accuracy of measurements
- High immunity to interference
- 4 independently adjustable precision voltage sources 0.1V to 3V
- 4 independently adjustable precision current sources 100 $\mu\text{A}$  to 20mA
- 2 independently adjustable power supplies 5V to 13.5V for external devices
- Conversion of the measured voltage to engineering units with 3rd degree polynomial
- Arithmetic operations between channels
- Fully adjustable display data format
- Data storage on SD memory card
- Adjustable period of storage of the data, from 1 second to 24 hours
- No special software is required for the settings and data transfer to PC
- Recording of data in the format "csv", display and processing in Excel
- Copy data to the PC via USB
- Battery powered (Lilon rechargeable battery) or power adapter
- Robust industrial housing for hand-held or desktop use

## 2. SECURITY

- ! Carefully read instruction, before you connect device!
- ! This device is not universal multimeter, therefore take care, when you connect external voltage sources, not to exceed input voltage limits!
- ! Do not expose device to direct sunlight for extended periods of time!
- ! Use device in declared temperature operating range!
- ! Do not clean device with aggressive chemicals or detergents!
- ! Maintenance and repair can be performed only by qualified and authorized service personnel!
- ! For battery charging and connecting with other devices, use only original power adapter and cables!
- ! Handle with care! Mechanical stress (drop, punch) may also cause deterioration of the accuracy of the device, besides mechanical damage!

## 3. TECHNICAL DATA

### Operating conditions:

Temperature range: -20 °C to + 50 °C  
 Humidity: 10% to 95% (non-condensing)  
 Mechanical protection: IP40

### Measuring inputs:

Number of channels: 8 single ended or 4 differential or combination of both  
 Input resistance: >10GΩ  
 Input voltage range\*: -0.3V.....+3.3V  
 Overvoltage protection: max. ±30V  
 AD conversion: 17bit  
 Noise limit: <1 μV  
 Sampling speed: 160ms/channel

\*...Input voltage referenced to common potential point of device (- pin of Power supply)

Input setting	Measuring range	Accuracy (22°C±2°C)	Temperature coefficient
Single ended	2.5V	±(100μV + 0.005% reading)	±10ppm /°C
Differential	±4mV, ±9mV, ±19mV, ±39mV	±(4μV + 0.01% reading)	±5ppm/°C
Differential	±78mV, ±156mV, ±312mV, ±1.25V	±(0.005% range + 0.01% reading)	±5ppm/°C

### Excitation voltage (Uexc):

Voltage range: 0.1V to 3.0V  
 Step of setting: 0.1V  
 Accuracy: ±(100μV + 0.01% of set voltage)  
 Temperature coefficient: ±10ppm /°C  
 Maximal load current: 20mA  
 Load current influence: 30μV/mA (typ) , 150μV/mA (max)

**Excitation current (I<sub>exc</sub>):**

Current range:	0.1mA to 20mA
Step of setting (0.1mA to 2mA):	0.1mA
Step of setting (3mA to 20mA):	1mA
Accuracy (0.1mA to 2mA):	±(100nA + 0.01% of set current)
Accuracy (3mA to 20mA):	±(1µA + 0.01% of set current)
Temperature coefficient:	±15ppm /°C
Minimal supply voltage:	1V
Maximal supply voltage:	15V

**Sensor power supply:**

Number of channels:	2
Voltage range:	5.0V to 13.5V
Accuracy:	±0.25V
Maximal output power:	700mW

**Internal supply:**

Type:	Lilon battery 3.7V 2600mAh
Autonomy:	min. 8hrs
Autonomy in sleep mode:	up to 10 days
Battery charging (adapter):	1A, cca. 3h to 90%
Battery charging (USB):	500mA, cca. 6h to 90%

**External power supply:**

Power adaptor:	5V ±0.25V; min 1A
USB:	5V ±0.25V; 100mA/500mA

**In order to achieve declared accuracy, device must be switched on prior to its use for at least 15 minutes!**

**Recommended calibration interval is 1 year!**

**4. PURPOSE OF USE**

Device allows direct connection of majority of sensors, which need DC excitation voltage or current and all types of probes with voltage and current outputs. It contains all the necessary current and voltage sources for excitation and power supply for different sensors and probes. Data are displayed and stored in real engineering units.

Device contains overvoltage and overcurrent protection, which protect device from damage caused by wrong wiring or wrong parameter setting. Device is totally protected, if we use only internal excitation and power supply sources. Therefore care is necessary, not to exceed declare limits, when external voltage sources are connected. In this case, use of isolation amplifiers is recommended. They will galvanically isolate device inputs from external voltage. Isolation amplifiers are available as an accessory of CANYSE.

For device configuration and transfer and visualization of data, no custom software or application is needed.

## 5. GENERAL DESCRIPTION

### 5.1. Connectors

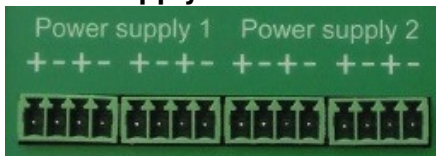
Connectors on back side of device:



- **USB** enables transfer of files between device and PC, battery charging or permanent operation on external power supply.
- **External power supply** enables fast battery charging when device is connected to power adaptor (5V, 1A) or permanent operation on external power supply.
- **Service input** enables diagnostics and device calibration for authorized service personnel.

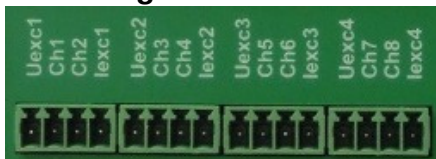
Connectors on front side of device:

- **Power supply block**



2 independent power sources enable connection of 8 external probes or other devices.



- **Measuring block**




There are 4 input connectors available, each containing 1 current source, 1 voltage source and 2 input channels. Input channels can be configured as 2 independent single ended channels or one differential channel.

### 5.2. Keypad

There are 3 buttons on front side:

-  **Save data.** When you press this button, all data which are active on display, will be saved in data log file. Data logging must be activated first.
-  **Exit to main menu / Backlight.** When you press this button, you can return directly to main window (measurement display) from any other menu window. Pressing this button in main window, you can switch on and off display backlight. When you

switch backlight off, power consumption is reduced by 50%, thus prolonging time until battery charging.




-  **ON/OFF** Pressing this button shortly, it will turn device on. Device is turned off, when you keep button pressed for 3 seconds.

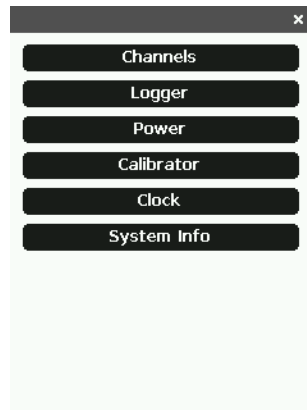
### 5.3. Display






Channel	Value	Unit
ch0	3.212346	V
ch1	3.212346	V
ch2	3.212346	V
ch3	3.212346	V
ch4	3.212346	V
ch5	3.212346	V
ch6	3.212346	V
ch7	3.212346	V

On display, you can see measurement data (8 lines), current time and level of battery charge. Display has touch-screen interface. There are following icons on display:

-  **Open configuration file** Pressing this icon, menu window is opened, where you can select configuration file, where complete configurations of device are stored. Configuration includes display format, channel configuration and power supply configuration for all channels.
-  **Save configuration file.** Pressing this icon, menu window is opened, where you can select or enter file name, in which current device configuration will be stored. Data can be stored in existing file ("Select") or in new file ("New"). File name can be maximal 8 characters long.
-  **Settings.** Pressing this icon, You will enter "Settings" menu



-  **Display refresh** Pressing this icon, display will be instantly refreshed with latest measurement data.
-  **Sleep mode data logging** Pressing this icon, device will go to sleep mode-data logging. Device will be awaked according to "Save interval" setting. After measuring and data saving is done, device will go back to sleep. Device is permanently awaked, by pressing ON/OFF button. Data logging is stopped.
-  **On line data logging** Pressing this icon, device starts to log data according to "Save interval" setting. Icon graphics is changed to recording symbol. In this state, device still displays all the data on display, but entering to "Settings" menu is not

possible. Device returns to normal state (end of data logging) when icon is pressed again.

#### 5.4. Indicators

There are 4 LED indicators located above display.






From left to right indicators represent:

- **Device active.** In normal operation indicator is blinking in 1 second interval.
- **Battery charging.** Battery is being charged as long as indicator is on.
- **External supply.** There is external power supply connected (power adaptor or USB)
- **USB.** Device is connected to PC over USB connection.

### 6. DISPLAY FORMAT SETTINGS

There are 8 lines on display, where measurement values can be displayed (see chapter "Display"). Format of display can be configured for every line. We can enter to configuration menu by pressing on display line, which we want to configure. Following window is opened:

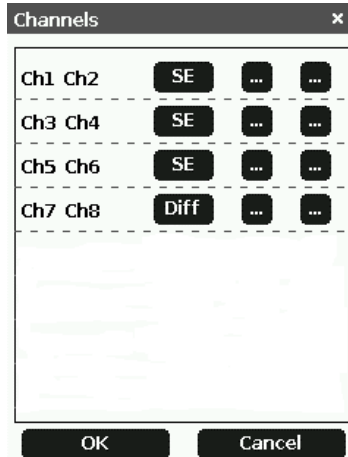


- **Enabled/Disabled** Enables or disables display of values and data logging of this data line
- **Text** By pressing the icon  we enter text entry menu, where channel name can be entered. Text can contain any alphanumeric character. Maximal character length is 4.
- **Mask** By pressing the icon  decimal separator position can be changed. 0 to 6 decimal places can be set. Number of places in front of decimal separator is adjusted automatically.
- **Unit** By pressing the icon  we enter text entry menu, where engineering unit can be entered. Maximal character length is 3.
- **Channel/Function** We can choose between single channel data or calculated number between 2 channels.
- **Channel selection.** We can choose measuring channel which will be displayed. If we choose option "Function", we can choose also arithmetical operation which will be performed between channels. Function CJC (cold junction compensation) is special case, when we perform temperature measurement with thermocouple. In this case second button is used for thermocouple type selection instead of channel selection.




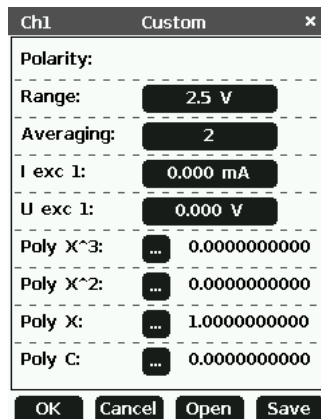
## 7. MEASURING CHANNELS CONFIGURATION (CHANNELS)

We can enter menu for measuring channels configuration from menu “Settings”, by pressing the button “Channels”. Following window is opened:



Channels 1 to 8 are displayed in pairs in 4 lines. For every channel pair, we can select configuration SE or Diff. If we choose SE (Single Ended), we have 2 independent channels and measurement can be performed only on input range 2,5V. If we choose Diff (Differential), we measure differential voltage between both channels. All input ranges are available.

By pressing  we enter menu for individual channel configuration:



In header line we have channel number, name of configuration file (or “custom” if there is no file selected) and x icon for closing the window. If we touch configuration file name, then description of configuration is displayed.

Settings can be confirmed with “OK” button or cancelled with “Cancel” button.

- **Polarity** This setting is available only for “Diff” configuration. Measurement polarity can be reversed.

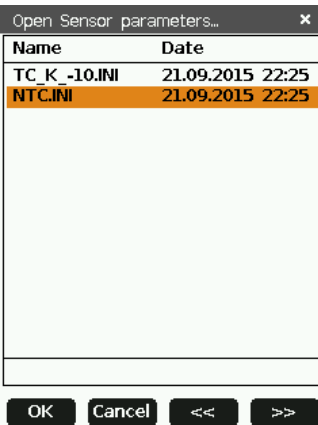
- **Range** This setting is available only for “Diff” configuration.

By pressing right side of the button, range is increased and by pressing left side of the button, range is decreased (between  $\pm 4\text{mV}$  and  $\pm 1.25\text{V}$ ). By choosing suitable measuring range resolution and accuracy of measurement is optimized. Resolution of

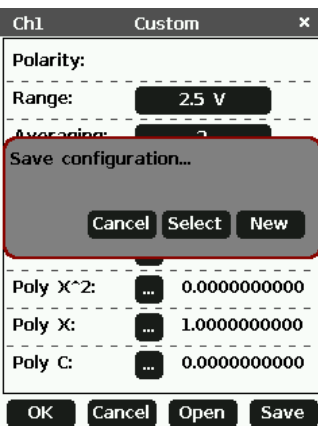
measurement is  $\pm 16\text{bit}$  but it is limited by noise level ( $1\mu\text{V}$ ). For information about accuracy on individual measuring ranges check chapter “Technical data”.

- **Averaging** By pressing right side of the button averaging is increased and by pressing left side of the button, averaging is decreased. Setting range is 1 to 8. By averaging measuring results, we can decrease noise and interference influence on measurement result, thus improving stability of reading. For majority of cases, setting 1 is sufficient, because measurement method itself, reduces interference and noise to minimum level. Increased averaging will slow down refresh rate and increase power consumption in sleep mode. It can be also cause for limitation in “Save interval” setting (described in chapter 8).
- **Iexc (Excitation current)** By pressing right side of the button current is increased and by pressing left side of the button, current is decreased. Range of setting is  $100\mu\text{A}$  to  $20\text{mA}$ .

- **Uexc (Excitation voltage)** By pressing right side of the button voltage is increased and by pressing left side of the button, voltage is decreased. Range of setting is 0,100V to 3,000V.
- **Poly (Polynomial coefficients)** Measured voltage in volts (V) can be linearized and calculated to engineering units with 3<sup>rd</sup> order polynomial function. Coefficients can be calculated with Excel.



By pressing the button “Open” we enter menu for configuration file selection. Settings for one measuring channel are saved in file. In text line at the bottom of the screen, we can see file (sensor) description.




By pressing the button “Save” we enter menu for saving parameters to configuration file. We can save parameters into existing file (Select) or we create new file (New).

If we choose new file, then we have to enter sensor description first and after that file name. File name can be maximal 8 characters long and file description can be maximal 25 characters long.

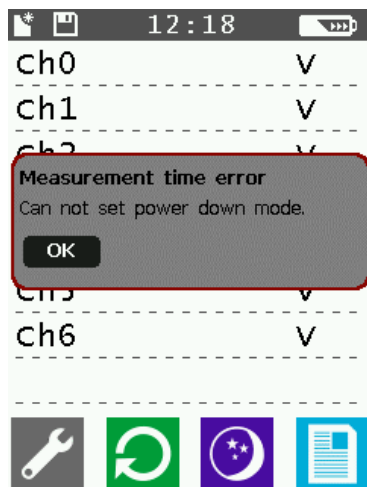
**All settings become valid after exiting to “Settings” menu with “OK” button!**

## 8. DATA LOGGING (LOGGER)

We can enter to data logging configuration from menu “Settings”, by pressing the button “Logger”. Following window is opened:

- **Logging file** By pressing the icon , menu is opened, where file name is entered. File name can be maximal 8 characters long!
- **Save interval** By pressing right side of the button time is increased and by pressing left side of the button, time is decreased. Time can be set from 1 second to 24 hours.
- **Startup delay** After power is applied to sensors, some time is needed for output value to stabilize. With startup delay we can set time between power up and start of measurement. This parameter is active only when device is in sleep mode data logging. By pressing right side of the button time is increased and by pressing left side of the button, time is decreased. Time can be set from 50 ms to 200 ms.

- **Decimal separator** We can choose between coma (,) and point (.). Separator is used for display and for logging file.
- **Date format** Different date formats can be chosen for logging file.
- **Date/Time column** We can choose if date and time in logging file are written in one common column or in two separated columns.



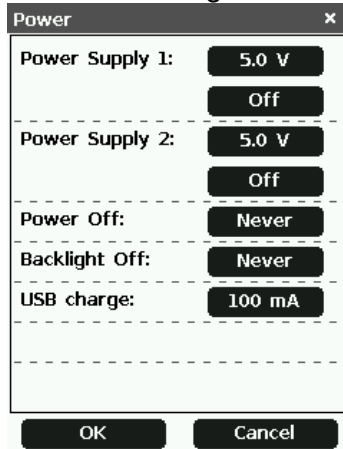
There are some limitation, which have to be considered, when save interval is set to 1, 5 or 10 seconds. Device needs approximately 160 ms to perform measurement on one channel. Combined time for measurement on all selected channels depends on number of active (selected) channels and on set averaging. At worst case (8 active channels with set averaging ratio of 8), conversion time is  $8 \cdot 8 \cdot 0.16 = 10.3$  seconds. If set save interval is shorter than time needed to perform all the measurements, device cannot be set to power down (sleep) data logging. Device displays warning: **“Measurement time error: Cannot set power down mode”**. Device can still record data in On-line logging mode.

Battery capacity is sufficient for at least 7 days of data logging in Sleep data logging mode, if set “Save interval” is at least 1 minute or more. If set “Save interval” is shorter, battery will also

last less. Actual battery life depends on number of active channels, averaging and power consumption of connected sensors and probes.

## 9. POWER SUPPLY SETTING

We can enter to Power supply configuration from menu “Settings”, by pressing the button “Power”. Following window is opened:



- **Power Supply** By pressing right side of the button voltage is increased and by pressing left side of the button, voltage is decreased. Voltage can be set from 5.0V to 13.5V. Power can be switched on or off with On/Off button.

- **Power Off** We can set time for automatic power off of the device. Device will power off only in case if user is not active (no button is pressed). By pressing right side of the button, time is increased and by pressing left side of the button, time is decreased. Time can be set from 1 minute to 60 minutes. This option can be disabled by choosing “Never”.

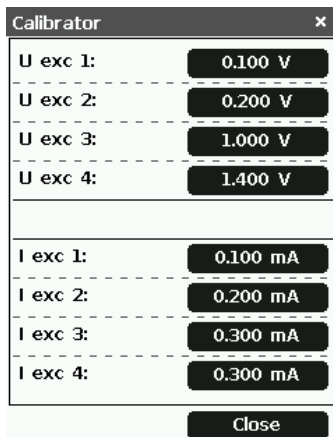
- **Backlight Off** We can set time for automatic backlight off of the device. Backlight will be switched off only in case if user is not active (no button is pressed). By pressing right side of the button, time is increased and by pressing left side of the button, time is decreased. Time can be set from 10 seconds to 10 minutes. This option can be disabled by choosing “Never”.

button, time is decreased. Time can be set from 10 seconds to 10 minutes. This option can be disabled by choosing “Never”.

- **USB charge** We can choose between 100mA and 500mA. Setting depends on power capabilities of Your USB port. Effective charging of the battery is assured only with option 500mA. If USB port of your computer can not deliver 500mA of current, there will be problems with USB connectivity. In that case selection of 100mA is a must. This setting is valid only when device is turned on. When device is turned off, charging is automatically set to 500mA.

## 10. CALIBRATION OF OTHER DEVICES

Excitation voltages and currents can be used for calibration of other devices. To simplify use, all the settings can be done in one calibration menu. We can calibrate several devices simultaneously. We can enter calibration from menu “Settings”, by pressing the button “Calibrator”. Following window is opened:



All the excitation currents and voltages can be set independently. By pressing right side of the button, value is increased and by pressing left side of the button, value is decreased. All the settings are valid immediately and there is no need to exit the menu for confirmation. Set values are not saved! After we exit calibration menu, old values are active, like prior the entrance in menu!

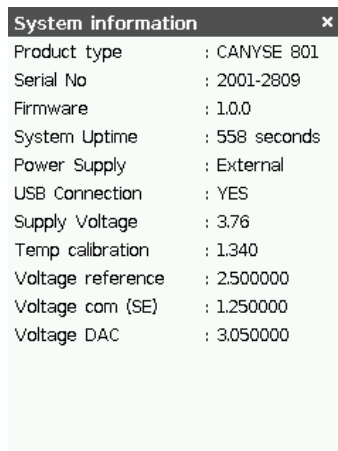
## 11. CLOCK SETTING

Real time clock can be set in menu “Clock”. Following window is opened:



On the top of the window, current date and time is displayed. All the time values can be set by pressing buttons + and -. Set values became active when button “Set Time” is pressed. Seconds are always set to 00, when this button is pressed.

## 12. SYSTEM INFORMATION



In menu “System Info”, we can get basic information about device setting and current operation mode and values.

## 13. USE OF EXCITATION VOLTAGE ( $U_{exc}$ )

Excitation voltages are generated with high precision 16 bit digital to analogue converter. All voltages are referenced to common potential point of device (- pin on Power supply connector). All outputs are protected against overload. Maximal allowed load current is 20mA. Load current influences accuracy of set voltage (see technical specification section). At light loads, there is normally no need to compensate that influence. If we want to compensate load current influence, thus improving accuracy, we need to connect actual load (sensor,..) and measure actual voltage. Measured voltage should be taken into account for polynomial coefficients calculation.

## 14. USE OF EXCITATION CURRENT ( $I_{exc}$ )

Excitation currents are generated with high precision 16 bit digital to analogue converter and voltage to current converter. Current sink is used, therefore also voltage source is needed. Sensor or other device, which needs current excitation, has to be connected to voltage source on one side ( $U_{exc}$  or Power supply) and to  $I_{exc}$  on the other side.

All the voltage drops in current loop (load, current sink, wires,...) have to be considered when we set source voltage. On the other hand, maximal allowed input voltage of device must not be exceeded. Current sink needs at least 1V for its own operation.

In general for most of the bridge sensors 3V voltage is suitable and 2V is enough for common resistive sensors.

When we use excitation current for calibration of other devices input impedance of this devices has to be considered. Some instruments for 20mA current loops have input impedance of 500  $\Omega$ . In that case, supply voltage of 12V or more has to be used.

Excitation current sources can be paralleled. Currents are summed, leading to maximum current of 80mA. In this case load cannot be connected to  $U_{exc}$  (as it has 20mA current limit), but we have to use "Power supply" output.

## 15. VOLTAGE AND CURRENT MEASURING

For **current** measuring, we need shunt resistor, which is connected to device input. Value of shunt resistor depends on measured current. Power dissipation (heating) also has to be considered. Shunt resistor can be connected as differential or single ended input. Current measuring is therefore converted to normal voltage measuring.

**Voltage** can be measured in differential or single ended mode. For voltages which exceed declared input range, voltage divider has to be used.

**Also when using differential inputs, one point of measured system has to be referenced to device common potential point (- pin on "Power supply" connector)!**

**When we measure voltage on more than one channel, special care has to be taken, not to exceed maximal allowed common mode voltage!**

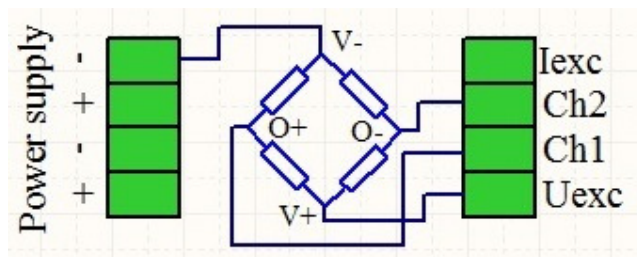
## 16. SENSORS AND PROBES

When you connect sensors or probes to device, always consider producers recommendations and technical data. Below is description of some typical wiring for main types of sensors and probes.

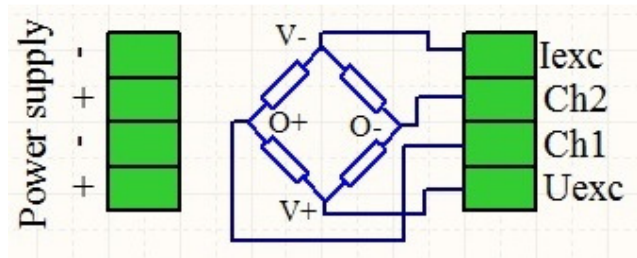
Where both inputs are used (Ch1 and Ch2), channels have to be set to differential mode (Diff) and where only one input is used channel has to be set to single ended mode (SE).

## 16.1. Bridge sensors

### VOLTAGE EXCITATION

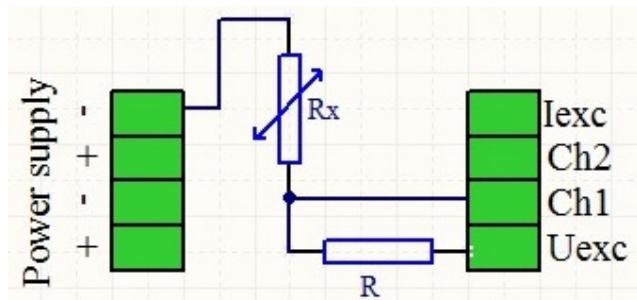


### CURRENT EXCITATION

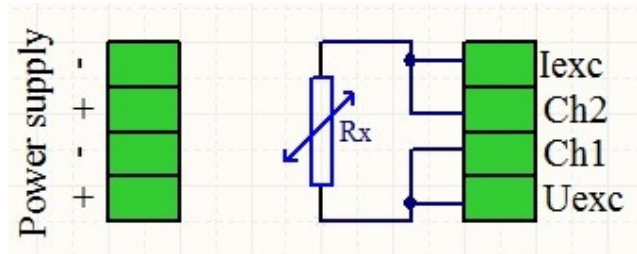


## 16.2. Resistive sensors

### VOLTAGE EXCITATION

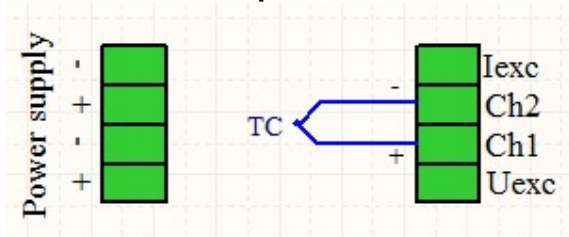


### CURRENT EXCITATION



This wiring can be used in general for resistance measurement. Measuring range depends on set excitation current ( $I_{exc}$ ) and input range. It can be from  $200\text{m}\Omega$  ( $I_{exc}=20\text{mA}$ , Range= $4\text{mV}$ ) to  $12.5\text{K}\Omega$  ( $I_{exc}=100\mu\text{A}$ , Range= $1.25\text{V}$ ).

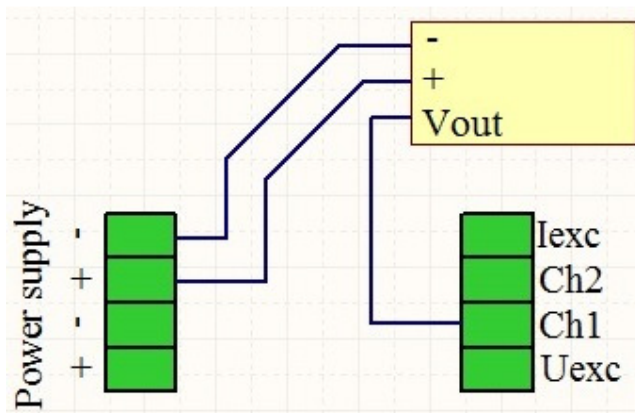
### 16.3. Thermocouples



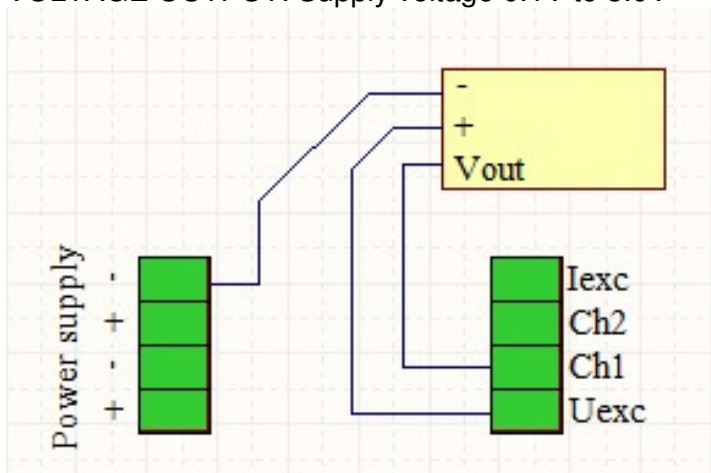
For measuring of absolute temperature function CJC (cold junction compensation) has to be selected in display format setting menu (Chapter 6)!

### 16.4. Probes

VOLTAGE OUTPUT: Supply voltage 5.0V to 13.5V

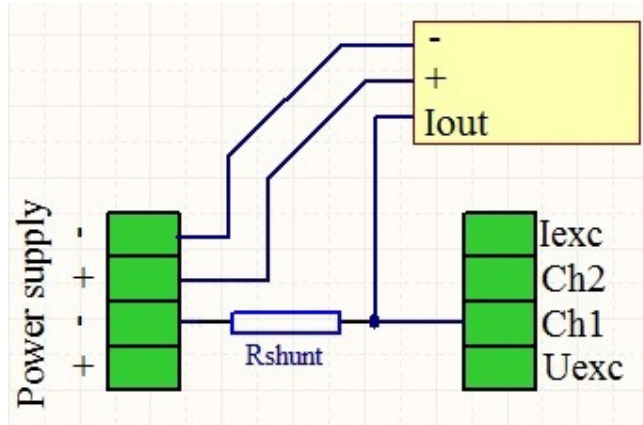


VOLTAGE OUTPUT: Supply voltage 0.1V to 3.0V

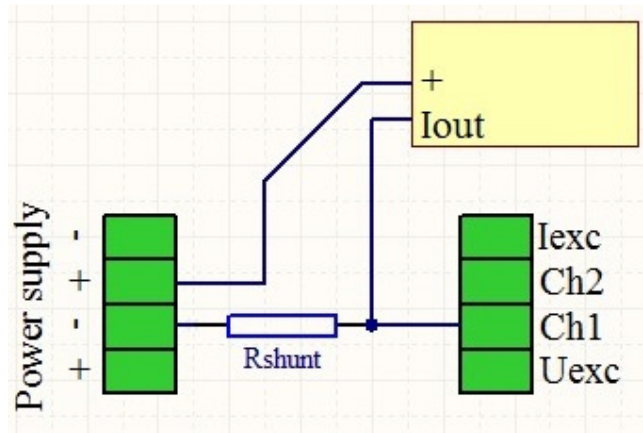




## CURRENT OUTPUT



## TWO WIRE CURRENT LOOPS



## 17. DEVICE SETUP IN PRACTICE

Device has some configuration files (\*.cfg) already factory loaded. Also some channel setup files (\*.ini) for most used sensors (TC, Pt-100, Pt-1000,..) are already loaded. This settings can be also used as templates for your custom settings. All Your custom configurations can be saved for later use. If you find device configuration too complicated, you can contact our technical support. We will prepare configuration files, according to your specifications and you will simply copy those files to device over USB port.

When you want to prepare new configuration or to use new sensor, you should proceed by following steps:

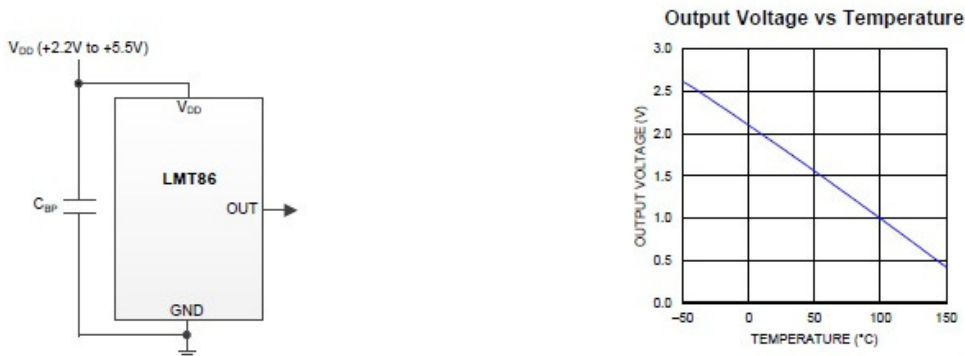
- Check sensor technical data sheet (wiring, supply voltage, supply current, input/output characteristic)
- Choose input channel and wiring (chapter 16)
- Set display format (chapter 6)
- Set measuring channel (chapter 7)
- Set power supply (chapter 9)
- Connect and test sensor

You must always follow technical data for sensor. You can use Excel spreadsheet for polynomial coefficient calculations.

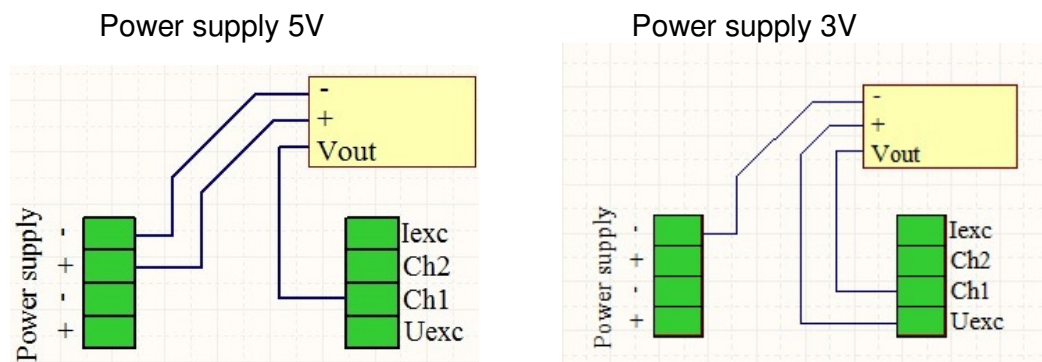
Below some examples:

### 17.1. TEMPERATURE MEASUREMENT WITH SENSOR LMT-86

In datasheet you can find information about wiring, power supply and output characteristics:



Sensor will be wired as probe with voltage output (Chapter 16.4)



We can supply sensor from excitation voltage “Uexc” (3V) or “Power supply” (5V). Maximal output voltage is 2,5V, therefore sensor output can be connected directly to device input. Input channel should be set to single ended (SE).

To calculate polynomial coefficients, we need data about sensor output characteristics:

Table 1. LMT86 and LMT86-Q1 Transfer Table

TEMP (°C)	V <sub>OUT</sub> (mV)	TEMP (°C)	V <sub>OUT</sub> (mV)	TEMP (°C)	V <sub>OUT</sub> (mV)	TEMP (°C)	V <sub>OUT</sub> (mV)	TEMP (°C)	V <sub>OUT</sub> (mV)
-52	2616	+10	2207	30	1777	70	1335	110	893
-49	2607	-9	2197	31	1766	71	1324	111	872
-48	2598	-8	2186	32	1756	72	1313	112	860
-47	2589	-7	2175	33	1745	73	1301	113	849
-46	2580	-6	2164	34	1734	74	1290	114	837
-45	2571	-5	2154	35	1723	75	1279	115	826
-44	2562	-4	2143	36	1712	76	1268	116	814
-43	2553	-3	2132	37	1701	77	1257	117	803
-42	2543	-2	2122	38	1690	78	1245	118	791
-41	2533	-1	2111	39	1679	79	1234	119	780
-40	2522	0	2100	40	1668	80	1223	120	769
-39	2512	1	2099	41	1657	81	1212	121	757
-38	2501	2	2079	42	1646	82	1201	122	745
-37	2491	3	2068	43	1635	83	1189	123	734
-36	2481	4	2057	44	1624	84	1178	124	722
-35	2470	5	2047	45	1613	85	1167	125	711
-34	2460	6	2036	46	1602	86	1156	126	699
-33	2449	7	2025	47	1591	87	1144	127	688

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Product Folder Links: LMT86 LMT86-Q1

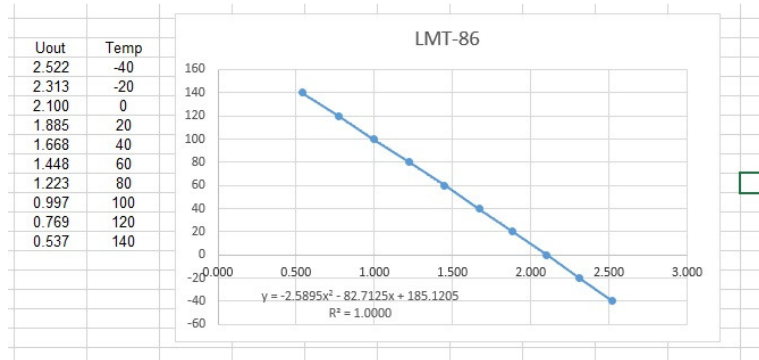
TEXAS INSTRUMENTS LMT86, LMT86-Q1  
www.ti.com EN5169C—MARCH 2013—REVISED OCTOBER 2015

Feature Description (continued)

Table 1. LMT86 and LMT86-Q1 Transfer Table (continued)

TEMP (°C)	V <sub>OUT</sub> (mV)	TEMP (°C)	V <sub>OUT</sub> (mV)	TEMP (°C)	V <sub>OUT</sub> (mV)	TEMP (°C)	V <sub>OUT</sub> (mV)	TEMP (°C)	V <sub>OUT</sub> (mV)
-32	2439	8	2014	48	1580	88	1133	128	676
-31	2429	9	2004	49	1569	89	1122	129	665
-30	2418	10	1993	50	1558	90	1110	130	653
-29	2408	11	1982	51	1547	91	1099	131	642
-28	2397	12	1971	52	1536	92	1088	132	630
-27	2387	13	1961	53	1525	93	1076	133	618
-26	2376	14	1950	54	1514	94	1065	134	607
-25	2366	15	1939	55	1503	95	1054	135	595
-24	2355	16	1928	56	1492	96	1042	136	584
-23	2345	17	1918	57	1481	97	1031	137	572
-22	2334	18	1907	58	1470	98	1020	138	560
-21	2324	19	1896	59	1459	99	1008	139	549
-20	2313	20	1885	60	1448	100	997	140	537
-19	2302	21	1874	61	1436	101	986	141	525
-18	2292	22	1864	62	1425	102	974	142	514
-17	2281	23	1853	63	1414	103	963	143	502
-16	2271	24	1842	64	1403	104	951	144	490
-15	2260	25	1831	65	1391	105	940	145	479
-14	2250	26	1820	66	1380	106	929	146	467
-13	2239	27	1810	67	1369	107	917	147	455
-12	2228	28	1799	68	1358	108	906	148	443
-11	2218	29	1788	69	1346	109	895	149	432
								150	420

Let's transfer some of the numbers from table to Excel spreadsheet and add trend line:



We can choose trend line as polynomial of 2<sup>nd</sup> order. If characteristics would be more nonlinear polynomial of 3<sup>rd</sup> order would be better choice. Excel will calculate polynomial coefficients which we enter in channel configuration menu: Poly X3 = 0 Poly X2 = -2.5895 Poly X = -82.7125 Poly C = 185.1205  
As channel is set to SE, Range=2,5V.  
Now we can set also power supply for sensor: If we decided to use 3V power supply, we set Uexc=3.0V. If we decided to use 5V, we go to menu "Power" and set "Power supply = 5,0V ON".

## 17.2. PRESSURE MEASUREMENT WITH CURRENT OUTPUT PROBE

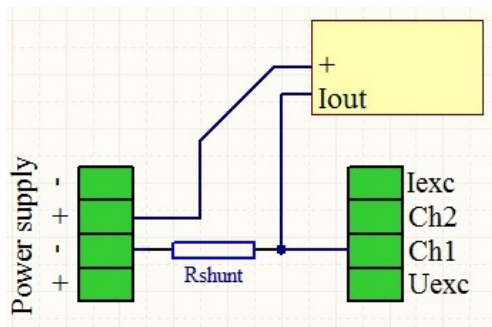
Probe has following technical specification:

Supply voltage: 9V...24V

Output: 4...20mA

Measuring range: 0...10Bar

Probe has only 2 wires (2 wire current loop), therefore we connect it according to schematic 16.4. (Two wire current loops)



Now we need also shunt resistor, which will transform current to voltage. We should choose resistor, which will cause voltage drop under 2,5V, which is maximal input range of device. Normally we would choose 100Ω resistor. **Resistor accuracy will directly influence measurement accuracy!** Voltage on resistor will be:

$$0\text{Bar} = 4\text{mA} \cdot 100\ \Omega = 0.4\text{V}$$

$$10\text{Bar} = 20\text{mA} \cdot 100\ \Omega = 2.0\text{V}$$

As probe has linear characteristics, we can easily

calculate coefficients:

$$\text{Poly X} = (10\text{Bar} - 0\text{Bar}) / (2.0\text{V} - 0.4\text{V}) = 6.25$$

$$\text{Poly C} = -6.25 \cdot 0.4\text{V} = -2.5\text{V}$$

Input channel is set to SE, input range 2,5V. No excitation current or voltage is needed:  $I_{exc}=0$  in  $U_{exc}=0$ .

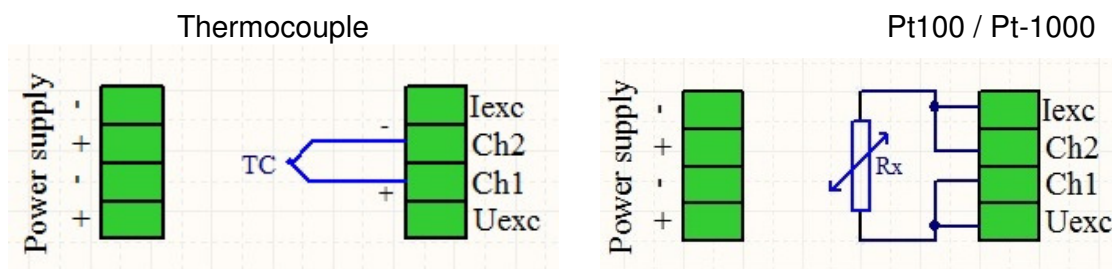
Now we set also power supply. In menu "Power" we set "Power supply = 9,0V ON". We can set also higher voltage, but lower voltage will mean also lower power consumption – battery will last longer.

## 17.3. TEMPERATURE MEASUREMENT WITH THERMOCOUPLE OR Pt-100/Pt-1000 SENSOR

There are already loaded configuration files for use of this sensors. You can use TEMP.cfg as template for configuration of complete device or \*.ini files for individual input channels. We have 2 or 3 configuration files for each thermocouple type. Every file covers specific temperature range. Files are marked with "LO" (low temperatures under 0°C), "MED" (medium temperatures, normally from -50°C to 400°C) or "HI" (high temperatures over 300°C). Exact temperature range for each file is displayed in status line, when you click on the file.

**For measuring of absolute temperature function CJC (cold junction compensation) has to be selected in display format setting menu (Chapter 6)!**

Sensors are connected according to wiring diagrams:



## 18. FILE TRANSFER TO COMPUTER

Data and configuration files can be transferred to or from device over USB port. Device should be turned on and connected to computer with USB cable. Light indicator for external power supply and battery charging is turned on. When device detects USB connection following message is displayed: *“Enable mass storage device?”*. We choose option *“Yes”*. If we want only to charge battery, then option *“No”* should be chosen.

Device then attempts to connect with computer (message *“USB initializing”*). When device is successfully connected to computer, message is displayed: *“Mass storage device enabled”* and USB light indicator turns on.

On Your computer, you will see new Mass storage device, where you can find files:

- Stored measuring data (\*.csv)
- File Errorlog.txt, where history of error events is stored
- Documents (User manual, technical data,..) in folder DOC
- Configuration files in folder CFG

All the files can be transferred from and to device.

**Be careful not to delete factory loaded configuration files!**

## 19. EXTERNAL POWER SUPPLY AND BATTERY CHARGING

Battery can be recharged in 2 ways:

- With power adaptor
- Over USB port

Level of battery charge is indicated with battery icon on top right corner of display. You can also find exact battery voltage in *“System info”* window (*“Supply voltage”*). Totally charged battery has voltage 4.1V to 4.2V and discharged below 3.5V. When battery voltage falls below safe operation level, device will be automatically switched off. This event is recorded in file Errorlog.txt.

Battery can be charged when device is turned off or when it is turned on. If device is turned on, then charging is slower as part of the energy is used for device power supply.

When external power source is connected, green (3<sup>rd</sup> from left) and red (2<sup>nd</sup> from left) indicators are turned on. Green indicator means that external power is present and that it is

within required voltage limits. Red indicator means that battery is charging. Battery is fully charged, when red indicator turns off.

**Device can be normally used when it is connected to external power source. You can left device connected to external power source also when battery is fully charged.**

**Charging and power supply is possible also from “power bank” battery packs, which have USB connector.**

## 20. WEEE directive



**For private households:** Information on Disposal for Users of WEEE  
 This symbol on the product and / or accompanying documents means that used electrical and electronic equipment (WEEE) should not be mixed with general household waste. For proper treatment, recovery and recycling, please take this product to designated collection points where it will be accepted free of charge. Alternatively, in some countries, you may be able to return your products to your local retailer upon purchase of an equivalent new product. Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling. Please contact your local authority for further details of your nearest designated collection point. Penalties may be applicable for incorrect disposal of this waste, in accordance with you national legislation.

**For professional users in the European Union:** If you wish to discard electrical and electronic equipment (EEE), please contact your dealer or supplier for further information.

**For disposal in countries outside of the European Union:** This symbol is only valid in the European Union (EU). If you wish to discard this product please contact your local authorities or dealer and ask for the correct method of disposal.

## 21. EC declaration of conformity

We hereby declare, that device CANYSE® 801 fulfils demands of EMC directive 2004/108/EC.

Standards:

EN 61000-4-2

EN 61000-4-3

EN 55022 class B