USER'S MANUAL
MPCV015 series
signal conditioning
with analogue outputs

☎ +39 011 9664616

ME6004_04
07/13

INDEX

1.0 AT A GLANCE

MPCV015's converter is a transmitter with 1500V triple galvanic isolation. Configuration of any available input or analog output is made through the RS232 serial input and dip switch.

1.1 AVAILABLE MODELS

MODEL	SCALE
MPCV015 03	4÷20mA, 0÷20mA, 0÷10V, potentiometer , J, K, S, T, PT100 r, PT100 e
MPCV015 04	180Vdc
MPCV015 05	Strain gauge
MPCV015 06	Potentiometer
MPCV015 07	Frequency
MPCV015 08	4÷20mA, 0÷20mA, 0÷10V
MPCV015 09	J, K, S, T, PT100 r, PT100 e
MPCV015 10	T
MPCV015 11	4÷20mA, 0÷20mA, 0÷10V, potentiometer , J, K, S, T, PT100 r, PT100 e and strain gauge
MPCV015 12	1Vac
MPCV015 13	200mAdc

1.2 TECNICHAL FEATURES

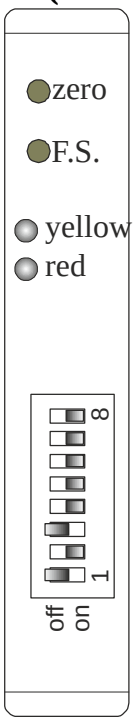
Table 1

Thermometer Input	thermoresistance 2or 3 wire PT100: **Ptr: -**40.0÷200,0 °C**,** **PtE**: 0÷800 °C thermocouple: **Fe/CO (J):** 0÷600 °C, **Cr/Al (K):** 0÷1200 °C, **Pt/Pt-10%Rh (S):** 0÷1710 °C, **CU/CO(T):** 0÷390 °C
Analog inputs	0÷10 V - 0÷ 20 mA - 4÷20 mA – potentiometer - strain gauge
Digital Inputs	Frequency 0÷5KHz
Current Input Impedance	5 Ω
Voltage Input Impedance	1MΩ
Allowed Potentiometer	da 500Ω a 50KΩ
Transducer Supply Voltage	16Vdc, 20mA
Strain gauge and Potentiometer Supply Voltage	10Vdc 40mA
Accuracy	Better than 0.5% F.S.
Supply Voltage	10,5÷30 Vdc; 15÷26Vac

Analog Output	0÷10V - 0÷ 20 mA - 4÷20 mA
Max Impedance for Current Output	300 Ω
Max Impedance for Voltage Output	1 KΩ
Max supplied voltage	10 V
Max supplied current	20 mA
Resolution	12 bit
Conv/sec	20

1.3 COMMAND AND CONNECTION DESCRIPTION

COMMAND PANEL DESCRIPTION (ANALOGUE OUTPUT VERSION)



Yellow Led:

Blinking: shows HI (overrange) and LO (underrange),
One flash: shows data storage for 0 and full scale set up by front keys.
Fixed on: wrong dip switch scale

Red Led:

Power good

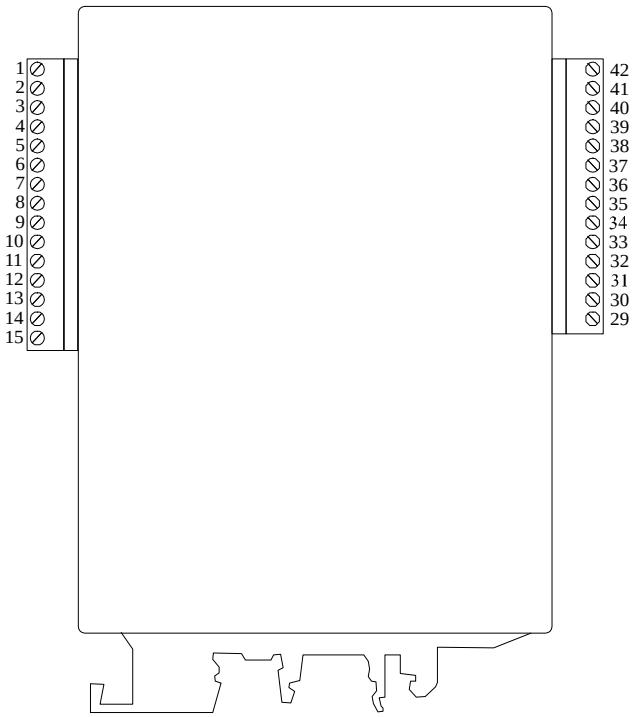
Dip switch position	Description
Dip switch 8	Type of selection: on = dip switch set up, off = PC setup
Dip switch 7	Free
Dip switch 6	Input selection
Dip switch 5	Input selection
Dip switch 4	Input selection
Dip switch 3	Input selection
Dip switch 2	Input selection

HI indication can appear in the following situations:

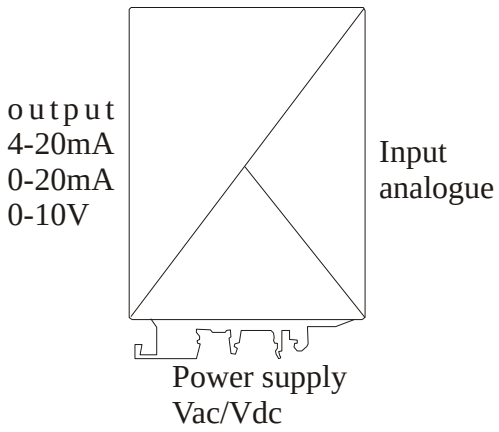
1. Thermomenter input open or connected in the opposite way (LO)
2. analog input > (HI) or < (LO) of 2% full scale. The only exception to this rule is represented by the 4÷20mA input: a current lessen than 3mA is considered to be LO.

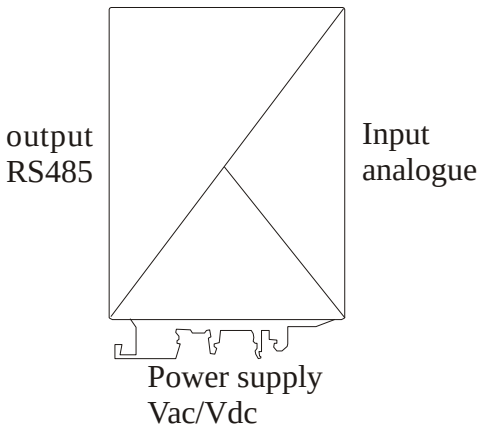
In the HI condition or “open circuit probe” the analog output generates the value set as FSO while in the LO condition it generates always 0V or 0mA (also for 4÷20mA output).
The HI condition, “open circuit probe” or LO is indicated by the blinking yellow led and by an error code available as readout on the serial line.

CONNECTOR DESCRIPTION



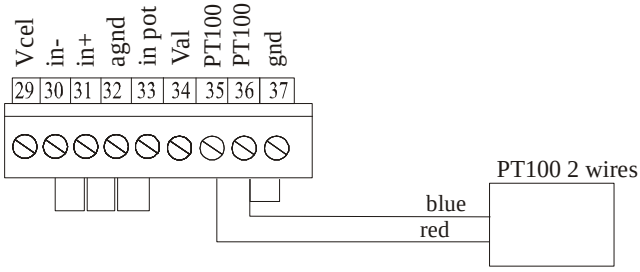
Terminals 1,2 e 3: RS232 programming input
Terminals 5, 6 e 7: RS485
Terminals 8: gnd, analog output
Terminals 9: out V, analog output
Terminals 10: out I, analog output
Terminals 13, 15: device supply voltage
Terminal 29: potentiometer or strain gauge supply voltage (+10V)
Terminal 30, 31: strain gauge input
Terminal 32: analog ground
Terminal 33: potentiometer input
Terminal 34: transducer supply voltage (+17V)
Terminal 35: PT100
Terminal 36: PT100, in+ for TC, 0-10V, 0-20mA, 4-20mA
Terminal 37: 3° wire PT100, in- for TC, 0-10V, 0-20mA, 4-20mA
Terminals 40, 41 e 42: frequency input



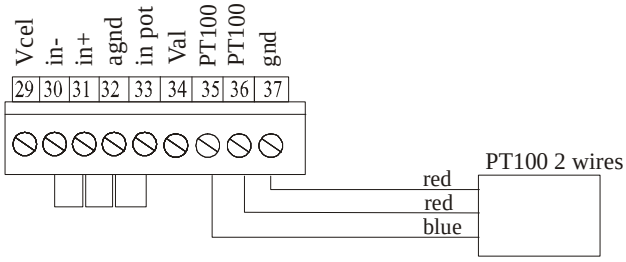


PT100 CONNECTIONS

2 Wire Thermoresistance



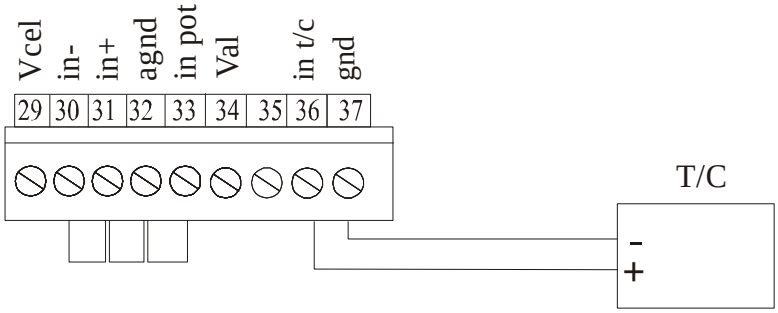
3 Wire Thermoresistance



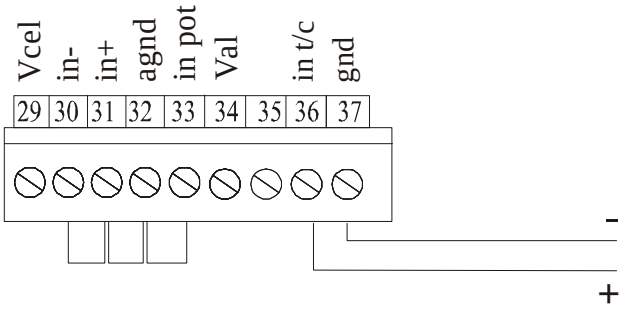
For Thermoresistance connection pay attention to the line resistance if too high it can cause measurement errors (Rmax 5Ω on 3 wire PT100). Use the same type of wire for the three connections. When using a shielded cable, only one end of the shield must be connected to ground.

TERMOCOUPLE CONNECTIONS

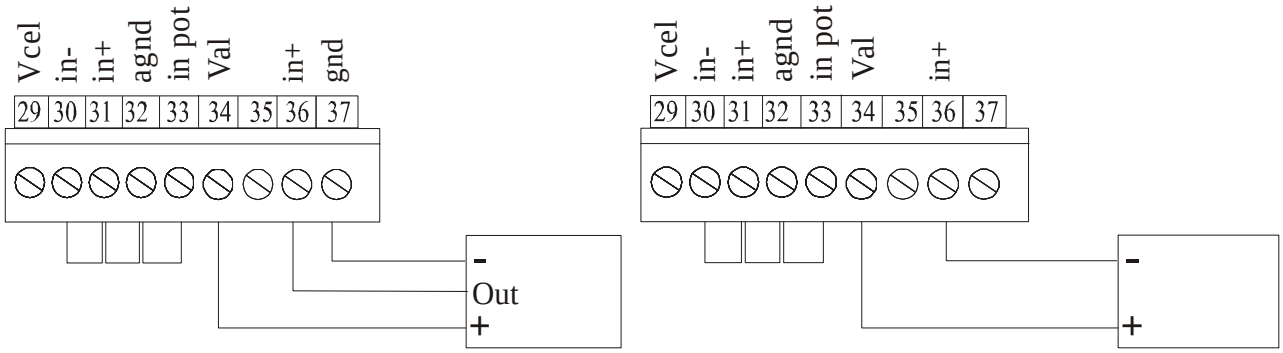
The thermocouples must be isolated from ground. Use only compensated cable in accordance with the kind of probe used. When using a shielded cable, only one end of the shield must be connected to ground.



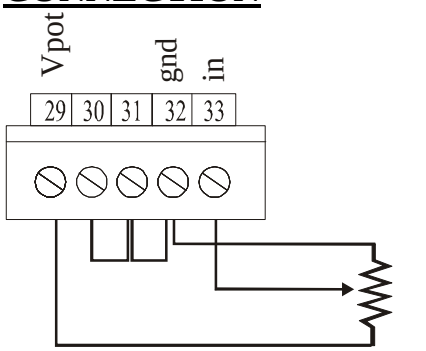
current/voltage input CONNECTIONS



current/voltage input CONNECTIONS with supply voltage for external TRANSDUCER

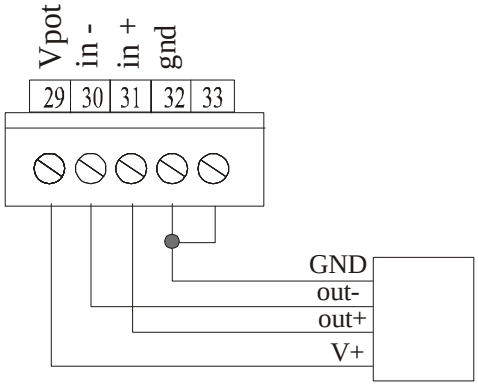


potentiometer input CONNECTION

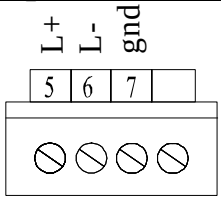


500ohm ÷ 50Kohm

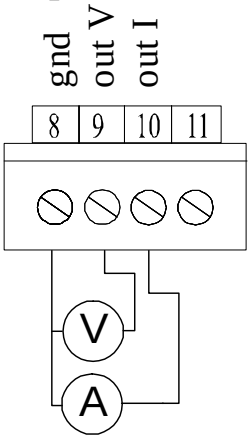
strain gauge input CONNECTION



serial output CONNECTION



analog output CONNECTION



2.0 INSTALLATION NOTE

1. Copy the connection schemes on pages 6, 7,8 and 9.
2. dip switch instrument set up (see paragraph)
3. Instrument setup is made by the application software (see the related paragraph).

2.1 INSTRUMETN SET UP BY DIP SWITCH

Set dip switch 8 “on” (to set up by dip switch).
Set dip switch 1 “on” for 0÷20mA output.
Set dip switch 1 “off” for 4÷20mA output.
Set the desired input scale according to MPCV015 model and according to the following table. A wrong scale set the yellow led on: in this case correct the dip switch position and power again the instrument.

To trim resistive input and strain gauge input see the next paragraph.

Dip switch 6	Dip switch 5	Dip switch 4	Dip switch 3	Dip switch 2	Input
off	off	off	off	off	0÷10V
off	off	off	off	on	0÷20mA
off	off	off	on	off	4÷20mA
off	off	off	on	on	Potentiometer
off	off	on	off	off	J
off	off	on	off	on	K
off	off	on	on	off	S
off	off	on	on	on	T
off	on	off	off	off	PT100 r
off	on	off	off	on	PT100 e
off	on	off	on	off	Strain gauge
off	on	off	on	on	Frequency

Output 0÷10V	Output 0÷20mA	Output 4÷20mA	Input
Input: 0÷10V; output: 0÷10V	Input: 0÷10V; output: 0÷20mA	Input: 0÷10V; output: 4÷20mA	0÷10V
Input: 0÷20mA; output: 0÷10V	Input: 0÷20mA; output: 0÷20mA	Input: 0÷20mA; output: 4÷20mA	0÷20mA
Input: 4÷20mA; output: 0÷10V	Input: 4÷20mA; output: 0÷20mA	Input: 4÷20mA; output: 4÷20mA	4÷20mA
Input: 0÷FS; output: 0÷10V	Input: 0÷FS; output: 0÷20mA	Input: 0÷FS; output: 4÷20mA	Potentiometer
Input: 0÷600°C; output: 0÷10V	Input: 0÷600°C; output: 0÷20mA	Input: 0÷600°C; output: 4÷20mA	J
Input:0÷1200°C; output: 0÷10V	Input: 0÷1200°C; output: 0÷20mA	Input: 0÷1200°C; output: 4÷20mA	K
Input: 0÷1710°C; output: 0÷10V	Input: 0÷1710°C; output: 0÷20mA	Input: 0÷1710°C; output: 4÷20mA	S
Input: 0÷390°C; output: 0÷10V	Input: 0÷390°C; output: 0÷20mA	Input: 0÷390°C; output: 4÷20mA	T
Input: -40.0÷200.0°C; output: 0÷10V	Input:-40.0÷200.0°C; output: 0÷20mA	Input:-40.0÷200.0°C; output: 4÷20mA	PT100 r
Input: 0÷800°C; output: 0÷10V	Input: 0÷800°C; output: 0÷20mA	Input: 0÷800°C; output: 4÷20mA	PT100 e
Input: 0÷FS; output: 0÷10V	Input: 0÷FS; output: 0÷20mA	Input: 0÷FS; output: 4÷20mA	Strain gauge
Input: 0÷5KHz; output: 0÷10V	Input: 0÷5KHz; output: 0÷20mA	Input: 0÷5KHz; output: 4÷20mA	Frequenza

Resistive input and strain gauge input can be trimmed on field in the dip switch version of the instrument.

2.2.1 POTENTIOMETER INPUT TRIM

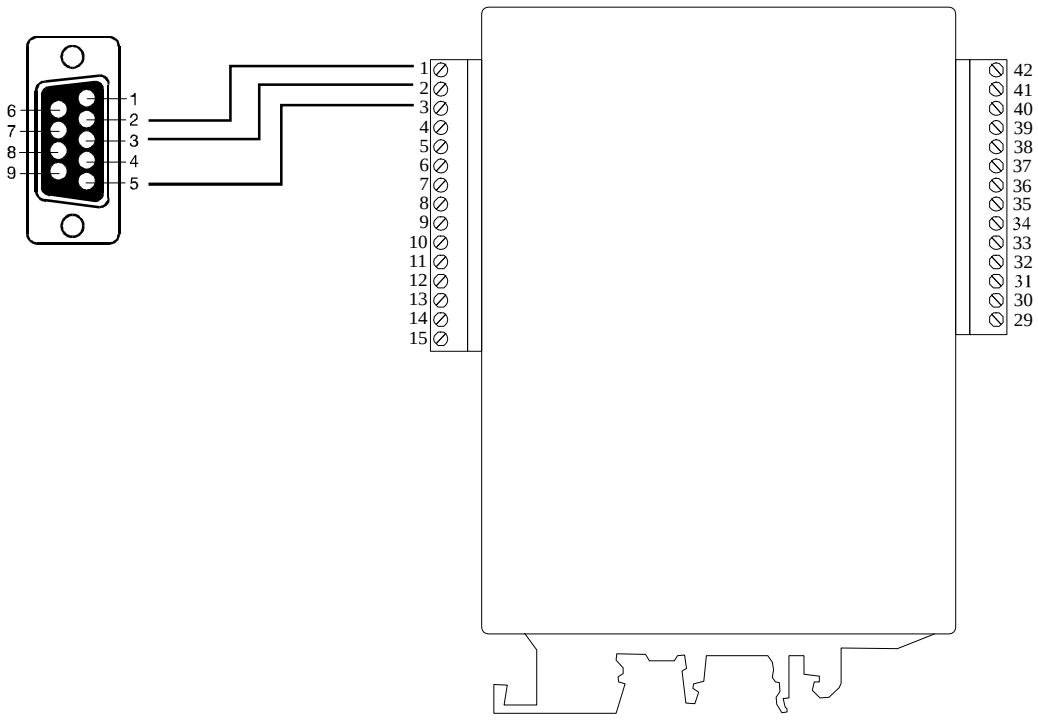
Connect the instrument and set up the dip switches fot potentiometer input and desired output. Place the potentiometer in the zero position and press the zero key for 3 seconds until the yellow led flashes, then position the potentiometer in the full scale position and press the FS key for 3 seconds until the yellow led flashes. The instrument is trimmed.

2.2.2 STRAIN GAUGE INPUT TRIM

Connect the instrument and set up the dip switches fot potentiometer input and desired output. With the strain gauge with no load press the zero key for 3 seconds until the yellow led flashes, then load the cell and press the FS key for 3 seconds until the yellow led flashes. The instrument is trimmed.

2.2 INSTRUMENT SETUP BY APPLICATION SOFTWARE

Set all the dip switch to “off” (for PC interface).
Set up the connection between the instrument and the RS232 port of the host pc.



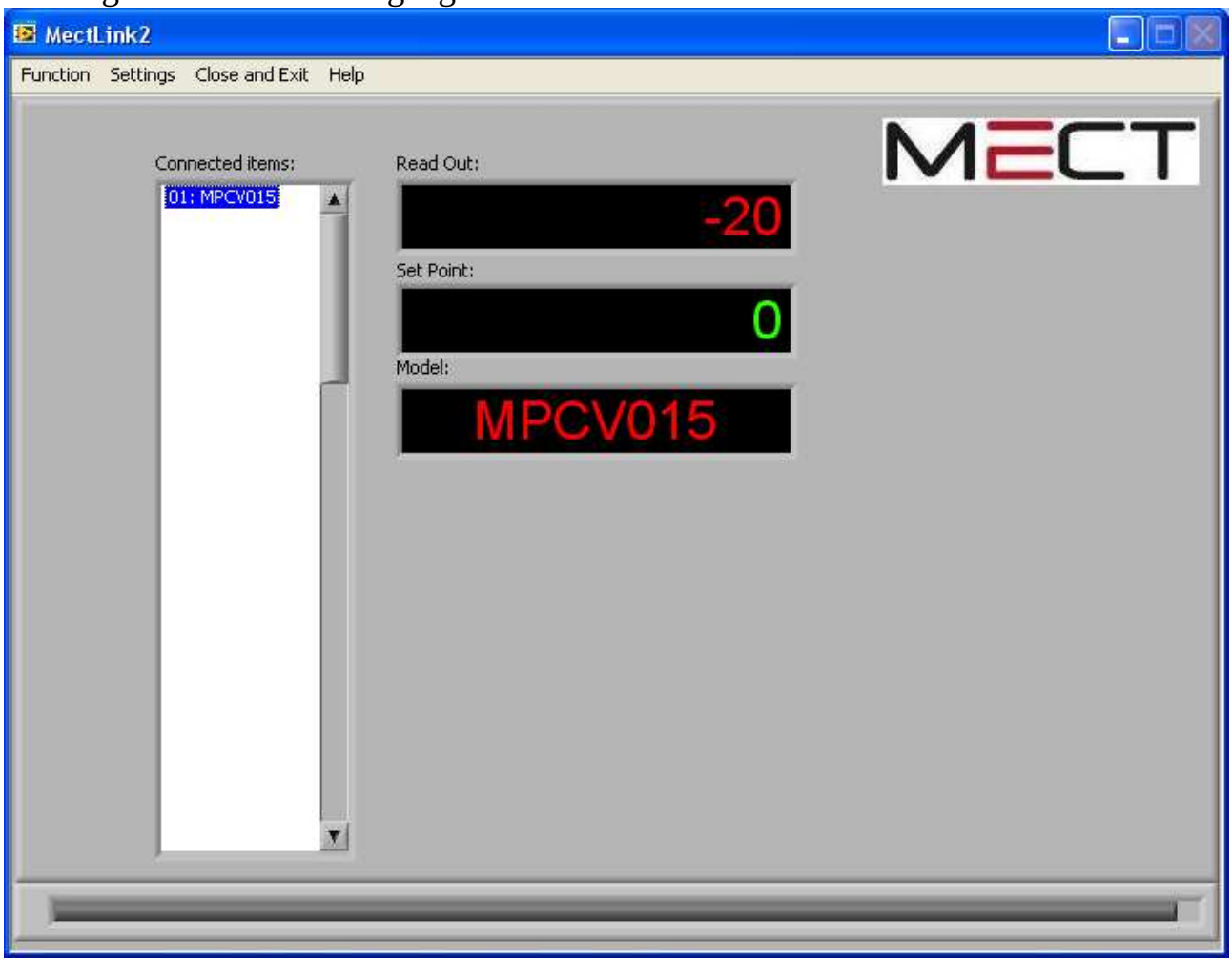
Execute the application software that allows the input and output selection (mect_link2 version 4.x).
Insert the CDROm in your host pc and launch the program: My Installer/volume/Setup.exe.
Follow the instruction provided on the screen and make a restart of your host pc if requested.
After the pc reboot copy the folder “mectsoft” with all its content in C:\
Start the application from Start\Programs\MectLink relx

Note:
It’s mandatory to copy the “Mectsoft” folder in the C:\ directory. The Mectsoft folder contains some “.ini” file that are necessary to the Mectlink application. If the connected instrument is not displayed on the screen check connections, power supply and settings for the COM port (the COM port settings can be changed from the “Settings” menu option “COM Port Selection”)

3.0 COMMUNICATION BETWEEN DEVICE AND MECT LINK2

After starting the application on your pc the page shown below will be displayed.
To start the communication with the MPCV015 device select from menu “Function” the item “Scan”. On the left side of the screen the connected device (MPCV015)

should appear. Select the device and select the required language by clicking the "Settings" menu item "Language ".

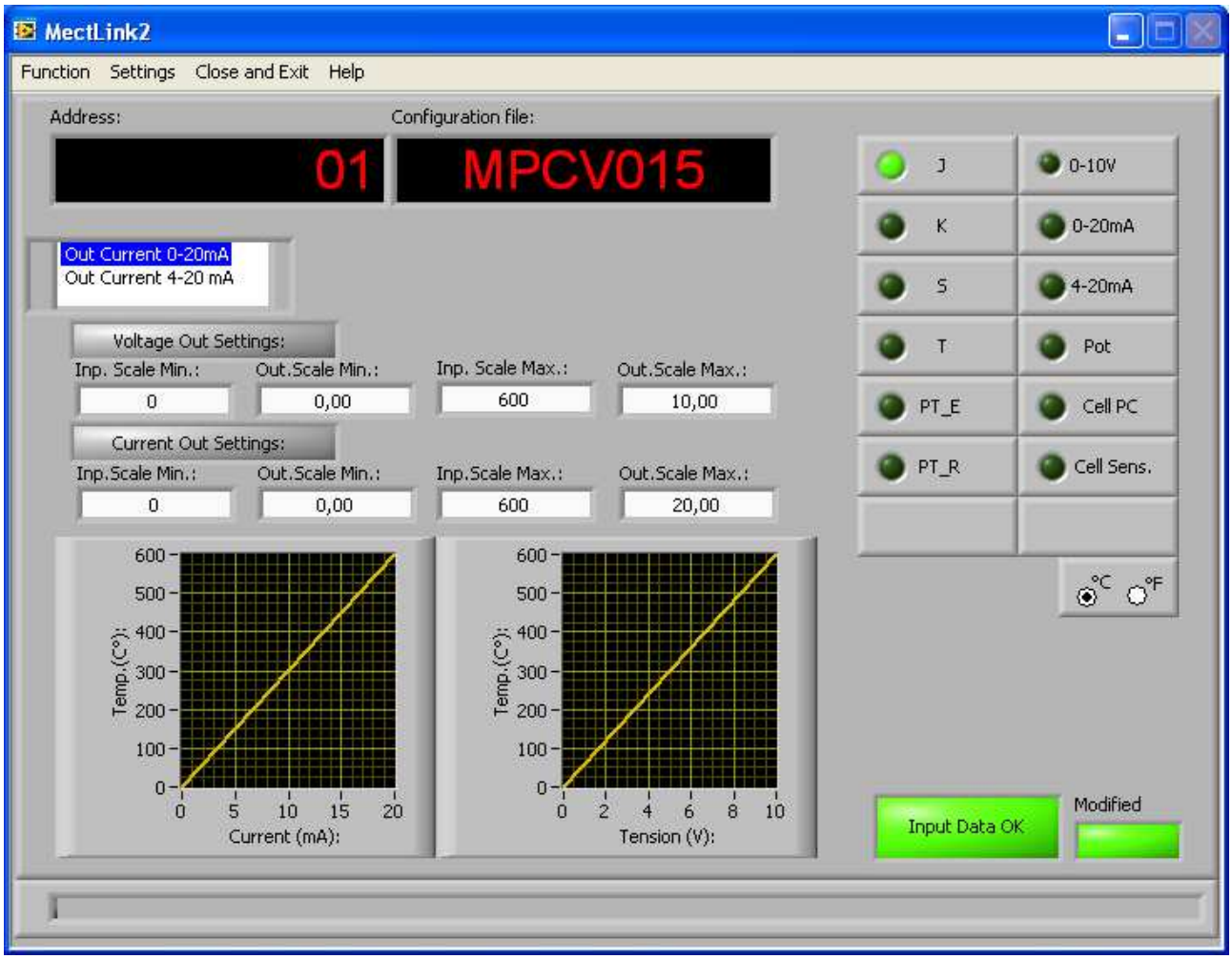


3.1 THERMOMETRIC INPUT SCALE CALIBRATION

Once you have chosen the connected device, you can access the related parameters by clicking on "Function" item "Read".
To select the thermometric input click on the LED for the desired scale. Select the required scale (J, K, S, T, PT_E, PT_R), the unit of measure (° C or ° F) and enter the minimum and maximum input and output values according to your needs.
The available analog outputs are two: a voltage output and a current one (the current output can be 0÷20mA or 4÷20mA selectable from a dropdown menu). The windows that appear under the “Voltage Out Settings" line is referred to the output voltage while under the "Current Out Settings" line you’ll find the windows for the current output.
The user can set the following parameters: Inp. Scale Min, Out. Scale Min, Inp. Scale Max and Out.Scale Max.
The “Inp. Scale Min.” is related to the minimum allowed output value (Out. Scale Min.) while “Inp. Scale Max.” represents the point related to the maximum output (Out. Scale Max.) .

When the data setting is modified the led “Modified” is on. If the data set used is wrong (for example same max and min values), the error is signalled by a red led light on (Input Data not OK). To verify your input select form menu “Function” the item “Scan”: the correct read value is represented in the window “Read Out”.

Note:
After editing the set up data, to use the new settings, click on "Function" item "Send" and wait untill the device scan is completed as shown by the scan bar displayed at the bottom of the screen. The scan saves both the setting parameters and scale even if leaving the MectLink2 environment. On the right side, the screen will display only the inputs available for the connected device.
The picture below showes all available input types.



3.2 ANALOG INPUT SCALE CALIBRATION

Once you have chosen the connected device, you can access the related parameters by clicking on "Function" item "Read".
To select the analog input click on the LED for the desired scale.
Select the required scale (0-10V, 0-20mA, 4-20mA) and enter the minimum and maximum input and output values according to your needs.
The available analog outputs are two: a voltage output and a current one (the current output can be 0÷20mA or 4÷20mA selectable from a dropdown menu).
The windows that appear under the “Voltage Out Settings" line is referred to the output voltage while under the "Current Out Settings" line you’ll find the windows for the current output.
The user can set the following parameters: Inp. Scale Min, Out. Scale Min, Inp. Scale Max and Out.Scale Max.
The “Inp. Scale Min.” is related to the minimum allowed output value (Out. Scale Min.) while “Inp. Scale Max.” represents the point related to the maximum output (Out. Scale Max.).

When the data setting is modified the led “Modified” is on. If the data set used is wrong (for example same max and min values), the error is signalled by a red led light on (Input Data not OK). To verify your input select form menu “Function” the item “Scan”: the correct read value is represented in the window “Read Out”.

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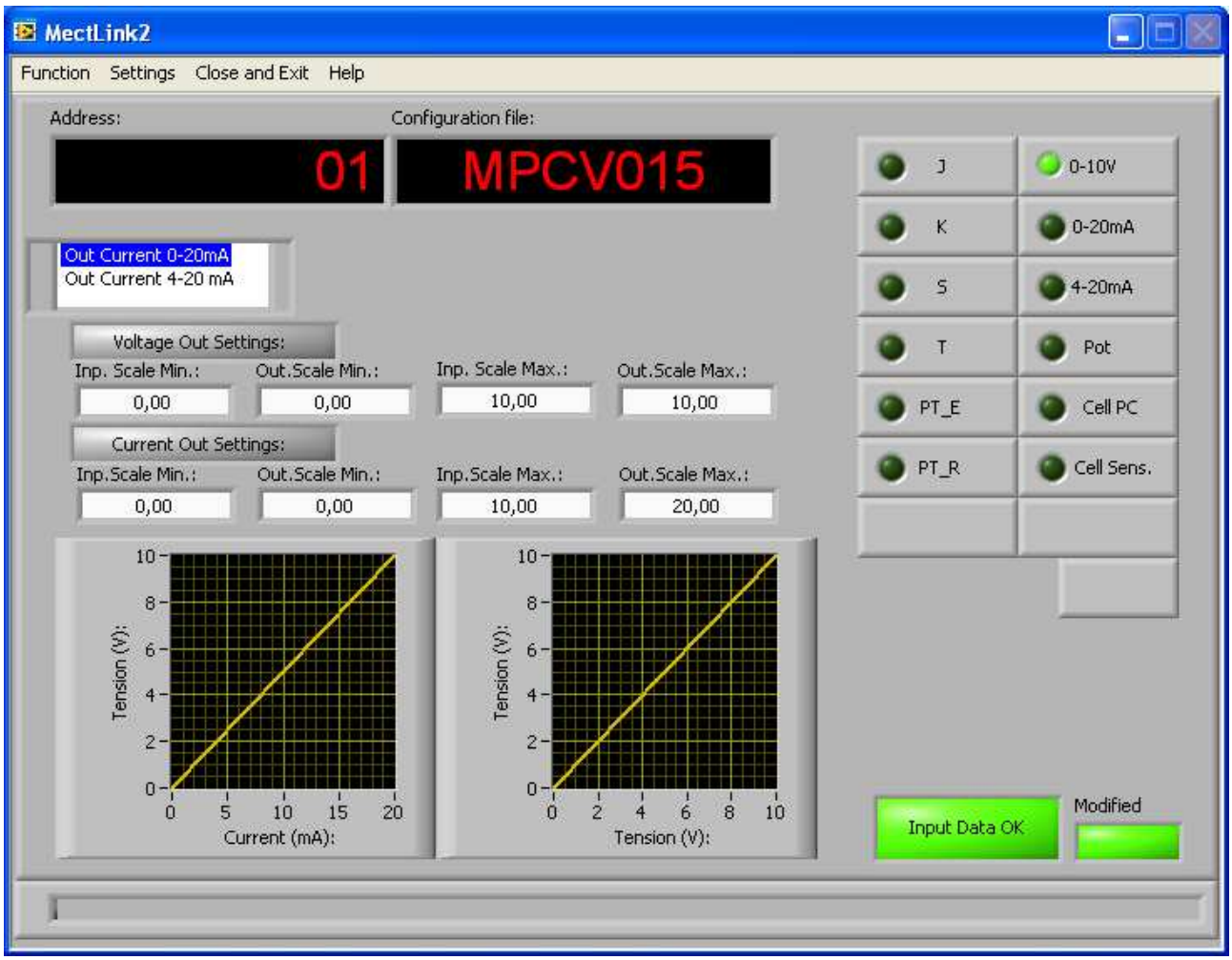


3.3 POTENTIOMETER INPUT CALIBRATION

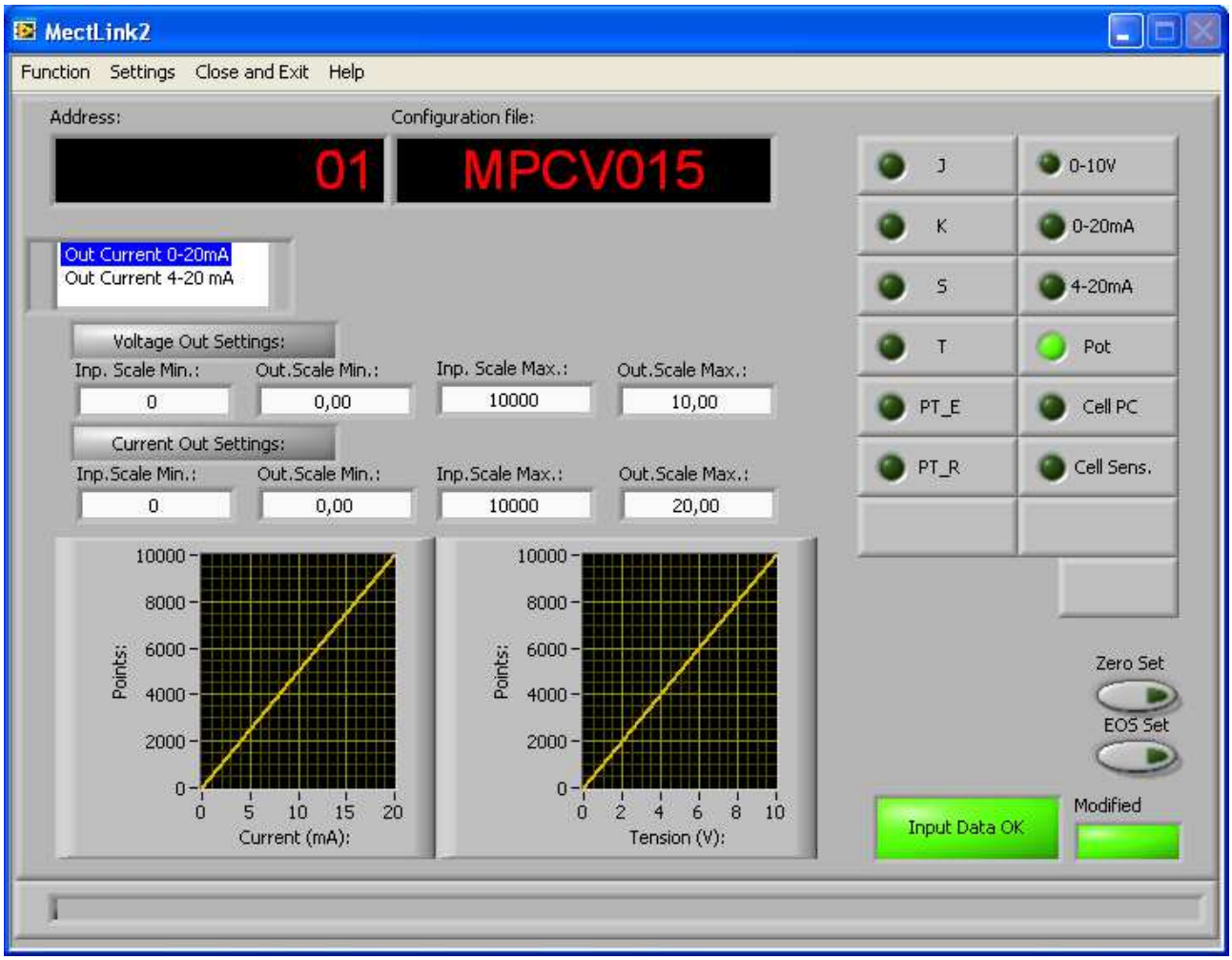
Once you have chosen the connected device, you can access the related parameters by clicking on "Funtion" item "Read".
To select the potentiometer input click on the LED for the desired scale (Pot) and enter the minimum and maximum input and output values according to your needs.
The potentiometr is ideally divided into 10000 points and the calibration can bepratical or theoretical (see the related paragraph). The analog output available to the user are two: a voltage output and a current one (the current output can be 0÷20mA or 4÷20mA selectable from a dropdown menu).
The windows that appear under the “Voltage Out Settings" line is referred to the output voltage while under the "Current Out Settings" line you’ll find the windows for the current output.
The user can set the following parameters: Inp. Scale Min, Out. Scale Min, Inp. Scale Max and Out.Scale Max.
The “Inp. Scale Min.” is related to the minimum allowed output value (Out. Scale Min.) while “Inp. Scale Max.” represents the point related to the maximum output (Out. Scale Max.) .

When the data setting is modified the led “Modified” is on. If the data set used is wrong (for example same max and min values), the error is signalled by a red led light on (Input Data not OK).

Note:

After editing the set up data, to use the new settings, click on "Function" item "Send" and wait untill the device scan is completed as shown by the scan bar displayed at the bottom of the screen. The scan saves both the setting parameters and scale even if leaving the MectLink2 environment. On the right side, the screen will display only the inputs available for the connected device.

The picture below showes all available input types.



3.3.1 THEORETICAL CALIBRATION EXAMPLE

- Verify the implementation for the following calibration. Suppose to connect a 10 round potentiometer and to set the readout as:
  2.5 rounds output 0V
  8 rounds output 10V

To calculate the data to be programmed into the instrument we do the following considerations. The potentiometer is hypothetically divided into 10,000 points and this number must be linked proportionally to the mechanical condition of the transducer under test. In our example:

$$\frac{10 \text{ rounds}}{10000 \text{ points}} = \frac{2.5 \text{ rounds}}{X \text{ points}} \; ; \; X = \frac{2.5 * 10000}{10} = 2500 \text{ (Inp. Scale Min.)}$$

$$\frac{10 \text{ rounds}}{10000 \text{ points}} = \frac{8 \text{ rounds}}{X \text{ points}} \; ; \; X = \frac{8 * 10000}{10} = 8000 \text{ (Inp. Scale Max.)}$$

Hence for current application the instrument will be programmed as described below:
Inp. Scale Min. = 2500
Out. Scale Min.= 0.00V
Inp. Scale Max. = 8000
Out. Scale Max.= 10.00V

To verify your input select form menu “Function” the item “Scan”: the correct read value is represented in the window “Read Out”.

3.3.2 PRACTICAL CALIBRATION EXAMPLE

In this section we consider an application that does not allow a precise calculation of the potentiometer variation, but we must rely upon empirical evidence. Suppose to connect the potentiometer to the instrument and to identify in the transducer race two precise points which we call "point A" and "B". The calibration of the system requires the following information:

POINT A = 4 mA
POINT B = 20mA

Set the potentiometric transducer in the position corresponding to point A, click the " Zero Set " and select in the "Function" menu the item "Send". Place the transducer in the position corresponding to point B and click the "EOS Set" button and select from menu "Function" the item "Send".

The parameter set up is automatically displayed for " Inp. Scale Min." and " Inp. Scale Max" fields while you should fill " Out. Scale Min. " and " Out. Scale Max. " fields with the desired parameters output.
To save the parameters select in "Function" the item "Send. "
To check the input select in the menu "Function" the item "Scan" and view in the "Read Out" field the correct value.

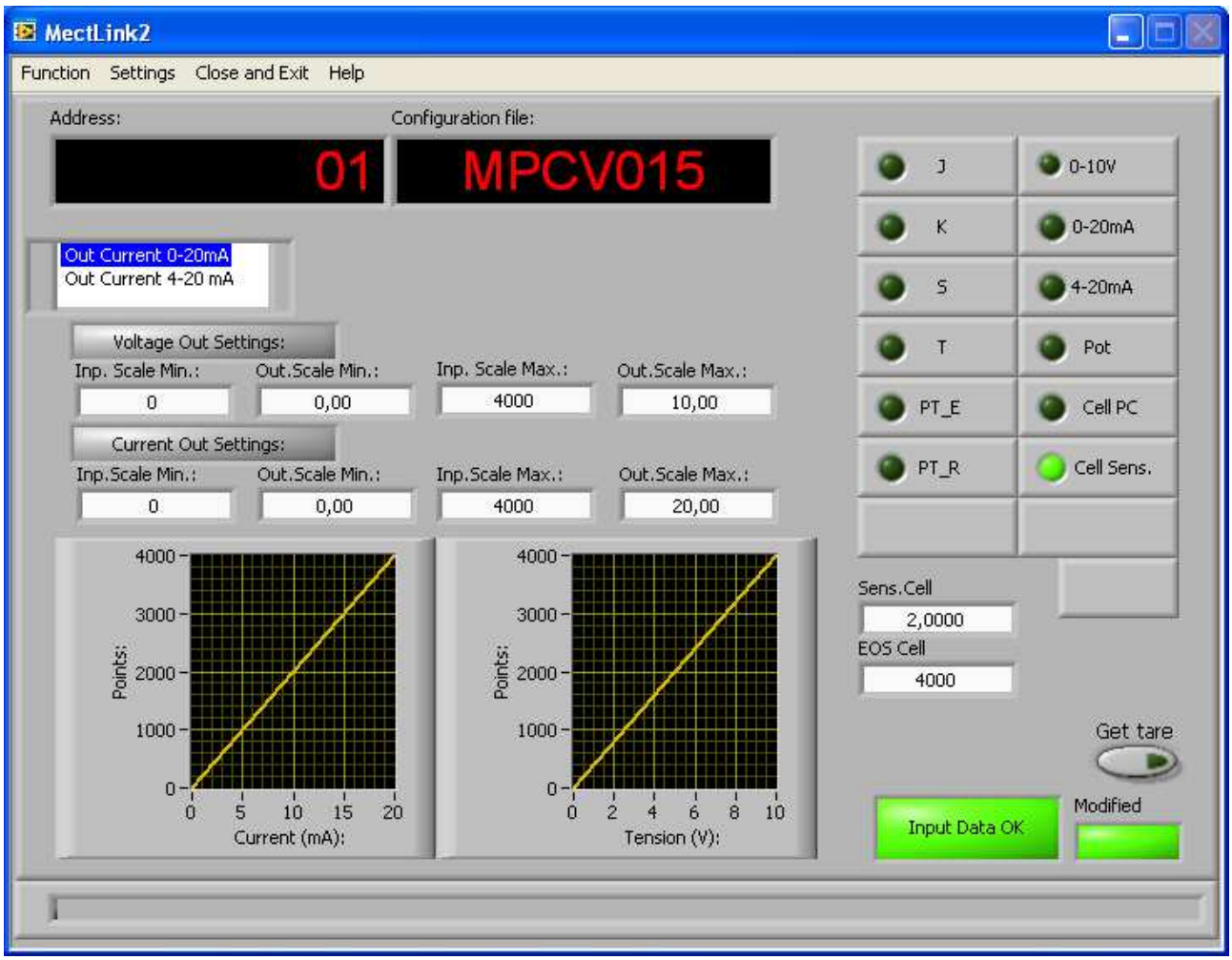
3.4 STRAIN GAUGE INPUT CALIBRATION

Once you have chosen the connected device, you can access the related parameters by clicking on "Function" item "Read".
To select the strain gauge input click on the LED for the desired scale (Cell PC or Cell Sens.) and enter the minimum and maximum input and output values according to your needs.
The strain gauge scale is ideally divided into 4000 points. Use the maximum resolution without decimal points. The MPCV015 strain gauge input can be programmed for sensitivity adjustment or sample weight (see the related section).

The available analog outputs are two: a voltage output and a current one (the current output can be 0÷20mA or 4÷20mA selectable from a dropdown menu).
The windows that appear under the "Voltage Out Settings" line is referred to the output voltage while under the "Current Out Settings" line you'll find the windows for the current output.
The user can set the following parameters: Inp. Scale Min, Out. Scale Min, Inp. Scale Max and Out.Scale Max.
The "Inp. Scale Min." is related to the minimum allowed output value (Out. Scale Min.) while "Inp. Scale Max." represents the point related to the maximum output (Out. Scale Max.) .

When the data setting is modified the led "Modified" is on. If the data set used is wrong (for example same max and min values), the error is signalled by a red led light on (Input Data not OK).

Note:
After editing the set up data, to use the new settings, click on "Function" item "Send" and wait untill the device scan is completed as shown by the scan bar displayed at the bottom of the screen. The scan saves both the setting parameters and scale even if leaving the MectLink2 environment. On the right side, the screen will display only the inputs available for the connected device.
The picture below showes all available input types.



3.4.1 Sensistivity based calibration.

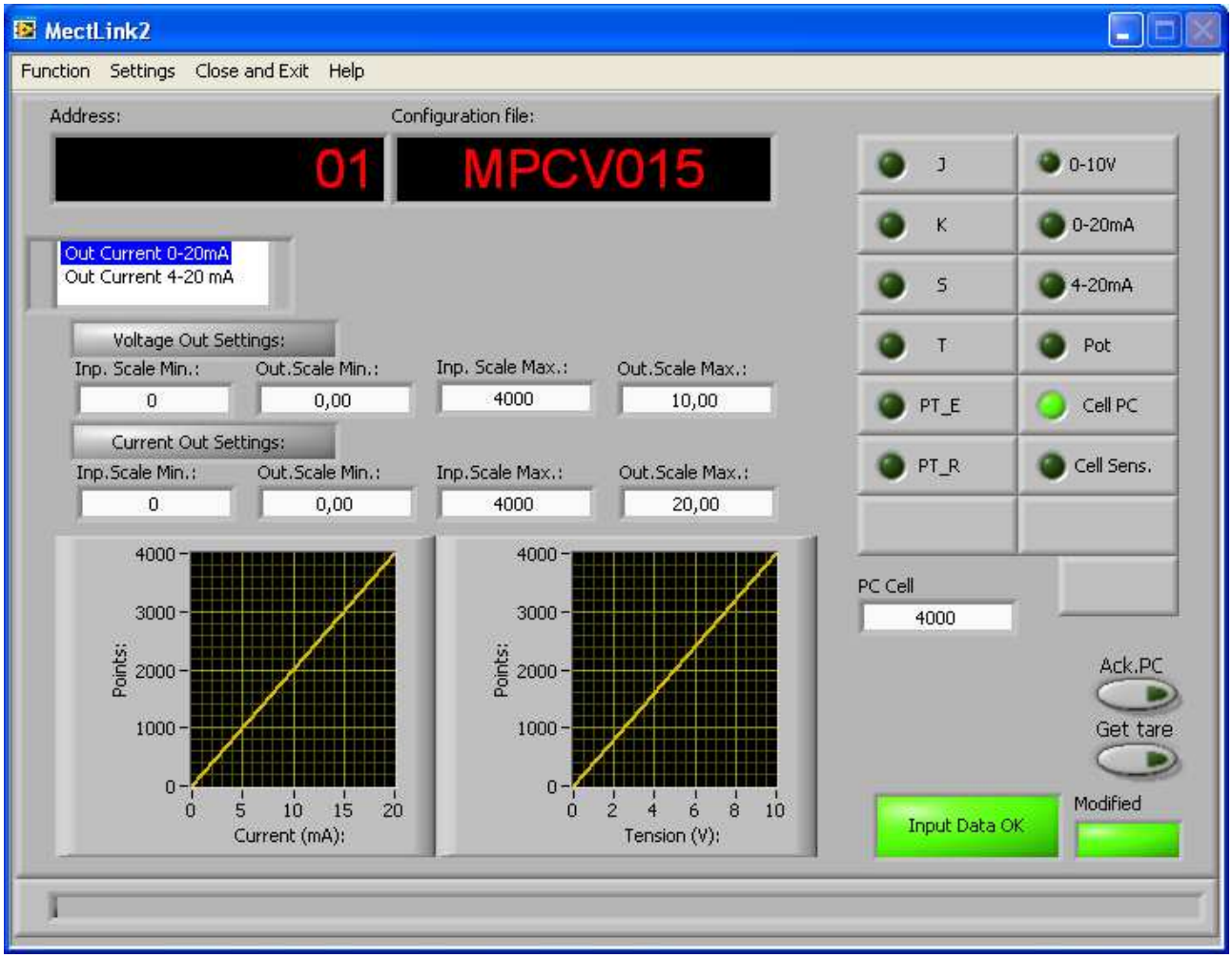
Select “Cell Sens” and input the sensitivity value with 4 decimals in the “Sens. Cell” box. In the field “EOS Cell” insert the full scale value (max 4000 points without decimals). Select in the “Function” menu the item “Send”. Click on the “Get Tare” button to reset previous tare. Select in the “Funcion” menu the item “Send”. To verify the calibration select from menu “Function” the item “Scan” and check in the “Read Out” window the correct value.

3.4.2 Sample weight or 5th wire based calibration.

Select “Cell PC” and click on “Function” item “Send”. Write down the number for the sample weight (or 5th wire) in the “PC Cell” box (write the weight using the max available resolution and without decimals).

By the “Get Tare” button reset the tare value. Save the calibration by choosing “Function” “Send”. Load the strain gauge with the sample weight (the one previously written in to the “PC Cell” field) and click on the “Ack PC” button. Save the calibration by choosing “Function” “Send”. Unload the strain gauge and perform again a reset for the tare value by using the “Get Tare” button. Save the calibration by choosing “Function” “Send”. At this point the strain gauge has been calibrated.

To verify the correctness of the calibration select from the “Function” menu the item “Scan” and check in the “Read Out” field the displayed value.



4.0 NOTES

The instrument does not have a power on switch and a fuse, but it immediately switches on when the correct voltage is applied (see the operating voltage on the instrument label). Keep the power line separate from the signals lines.
For security reasons, it is necessary to provide externally a two phases switch and a protective fuse near the instrument with an easy access for the user.
Avoid the presence of others power elements, humidity, acid, heat sources, etc..
The instruments must be powered by safety isolating transformer or by selv type power supply.

In no event shall Mect srl be liable for any damages whatsoever, including without limitation, incidental and consequential damages to humans or goods resulting from the improper use of the instrument or from the inability to use the instrument accordingly to its characteristics.
Mect srl offers technical assistance to its customer through its help desk office.