USER MANUAL

T201DCH50-M
T201DCH100-M
T201DCH300-M

AC/DC TRUE RMS or DC BIPOLAR CURRENT TRANSFORMER WITH RS485 PORT AND MODBUS RTU PROTOCOL



SENECA®

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ORIGINAL INSTRUCTIONS

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Introduction

Contents of the present documentation refer to products and technologies described in it.
All technical data contained in the document may be modified without prior notice.
Content of this documentation is subject to periodical revision.
To use the product safely and effectively, read carefully the following instructions before use.
The product must be used only for the use for which it was designed and built: any other use must be considered with full responsibility of the user.
The installation, programming and set-up is allowed only to authorized operators, physically and intellectually suitable.
Set up shall be performed only after a correct installation and the user shall perform every operation described in the installation manual carefully.
Seneca is not considered liable for failure, breakdown, accident caused because of ignorance or failure to apply the indicated requirements.
Seneca is not considered liable for any unauthorized changes.
Seneca reserves the right to modify the device, for any commercial or construction requirements, without the obligation to promptly update the reference manuals.
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Use the concepts, examples and other content at your own risk.
There may be errors and inaccuracies in this document that may of course be damaging to your system.
Proceed with caution, and although this is highly unlikely, the author(s) do not take any responsibility for that.
Technical features subject to change without notice.

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Document revisions

DATE	REVISION	NOTES
19/07/2017	1.0.0	First revision.
26/10/2017	1.0.1	Added info for Reset Imin/imax commands.
22/01/2018	1.0.2	Changed Accuracy info.

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1. DEVICE DESCRIPTION AND INTENDED USE

WARNING!

This User Manual extend the information from the Installation Manual about the device configuration. Use the Installation Manual for more info.

WARNING!

Under any circumstances, SENECA s.r.l. or its suppliers shall not be responsible for loss of recording data/incomes or for consequential or incidental damage due to neglect or reckless mishandling of the device, even though SENECA is well aware of these possible damages.
SENECA, its subsidiaries, affiliates, companies of the group, its suppliers and retailers shall not guarantee that the functions will satisfy completely customer's expectations or that device, the firmware and the software shall have no errors or work continuously.

1.1. Description

The T201DCH50/100/300-M are isolated, contact less loop powered AC/DC current transducers. The look and device's function are very similar to those of an active standard Current Transformer, but with the remarkable feature of measuring the DC and AC component. For its electrical endurance, ease of use and compact dimensions, the T201DCH50-M, T201DCH100-M and T201DCH300-M fit every kind of current measurement: up to 50 Adc/Aac, 100 Adc/Aac and 300 Adc/Aac (respectively).
A RS485 port with a standard Modus RTU protocol is also available.

The device can measure a current in 2 different modes (using dip switches or the Easy Setup Software):
- TRUE RMS AC/DC CURRENT MEASURE
- DC BIPOLAR CURRENT MEASURE (used also for obtain the sign +/- of a DC current)

1.2. Features

- Similar usage to a standard alternating current active C.T.
- No shunt, no wasted power from the measure circuit
- High accuracy rating (>2% FS): 0.3% for 50A and 100A models / 0.5% for 300A model.
- Suitable for use with all Seneca modules that allow to power the device with at least 12 Vdc and having a 0 – 10Vdc input
- Simple configurable with dip switches or with the free Easy Setup software
- Two ranges, dip-switch selectable
- Damping filter availability to improve stable reading
- Modbus RTU protocol by RS485 port
- Modbus Address/Baud Rate/Range/Mode configurable also from dip switch

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- Suitable for batteries, battery chargers, solar panels, power units and generic dc and ac loads.
- Compact size: overall dimensions less than 96,5 x 68 x 26 mm
- Baud rate for Modbus RTU: from 1200 baud up to 115200 baud
- Start/Stop Input/Output Values configurable with Easy Setup software
- I Max/Min Resettable Modbus RTU registers available
- Quick installation on DIN 46277 rail

Refer to the installation manual for more information.

1.3. Technical specifications

GENERAL SPECIFICATIONS	
Power supply	11.5 – 28Vdc (between Vcc and GND)
Absorption max	21mA (with no load)

BOX	
Dimensions	96,5 x 68 x 26 mm
Hole Diameter	20.8 mm
Box, protection degree	Black, PA6, IP20

RS485 COMMUNICATION PORTS	
Number	1
Port	Modbus RTU Slave
Baudrate	1200..115200 configurable

ENVIRONMENTAL CONDITIONS	
Temperature	-20°C ÷ +70°C
Humidity	10 ÷ 90% no condensing
Storage temperature	-40°C ÷ +85°C

REFERENCE STANDARDS	
EN 61000-6-4	Emission, industrial environmental
EN 61000-6-2	Immunity, industrial environmental
EN 61010-1	Safety

Refer to the installation manual for more information.

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2. CONFIGURING THE DEVICE

The Device can be configured in two ways:

- A configuration from dip switches
- A full configuration from flash (using Easy Setup Software)

WARNING!

Dip switches configuration are active only after a reboot!

WARNING!

The Dip Switch setting will overwrite the Flash setting so, if you need to use the flash configuration you MUST set ALL dip switches to "OFF".

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3. DIP SWITCH CONFIGURATION

3.1. Loading configuration from flash

If ALL Dip Switch 1…8 are OFF, the device use the Flash configuration (you must use the Easy Setup Software for configure)

Load Configuration	*DIP1*	*DIP2*	*DIP3*	*DIP4*	*DIP5*	*DIP6*	*DIP7*	*DIP8*
FROM FLASH	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

3.2. Setting the Modbus RTU Station Address

Dip Switch 1..4 are using for configure the Modbus RTU Station Address:

Modbus RTU Address	*DIP1*	*DIP2*	*DIP3*	*DIP4*
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

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3.3. Setting the RS485 Baud rate

Dip Switch 5..6 are used for setting the Baud Rate

Baud Rate	*DIP5*	*DIP6*
9600	OFF	OFF
19200	ON	OFF
38400	OFF	ON
57600	ON	ON

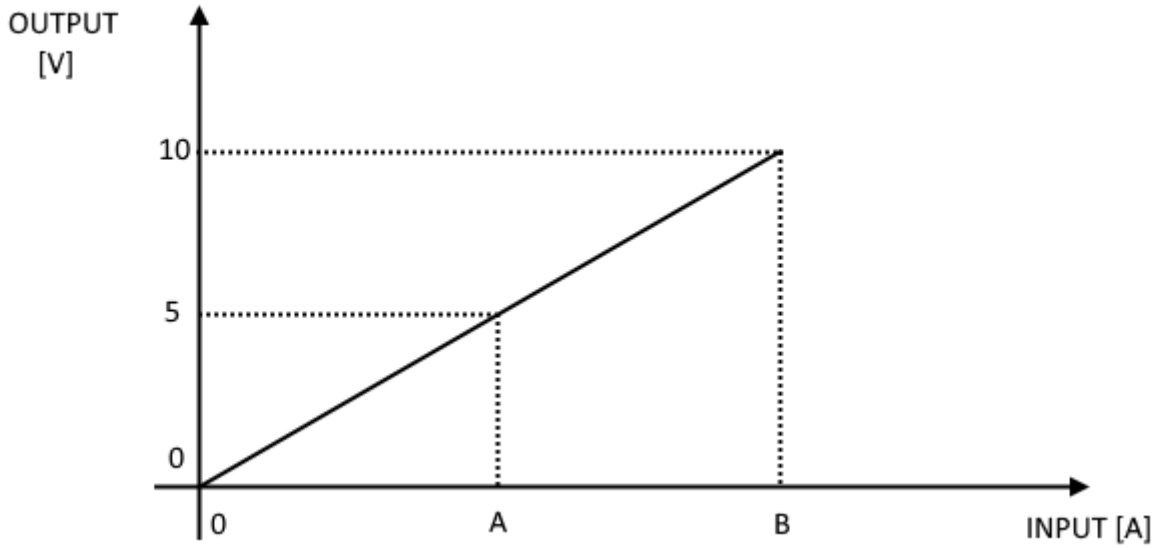
WARNING!

The Parity bit can not be configured with the dip switches configuration but only from the Easy Setup software. By setting the dip switches the parity is always set to "None" (8,N,1).

3.4. Setting the RMS/Bipolar mode and 50% - 100% full scale

Dip Switch 7: Select from True RMS Measure / Bipolar DC Measure
Dip Switch 8: Select 50% of full scale

The following figure is related to RMS measure ("Bipol" dip switch 7 = OFF):

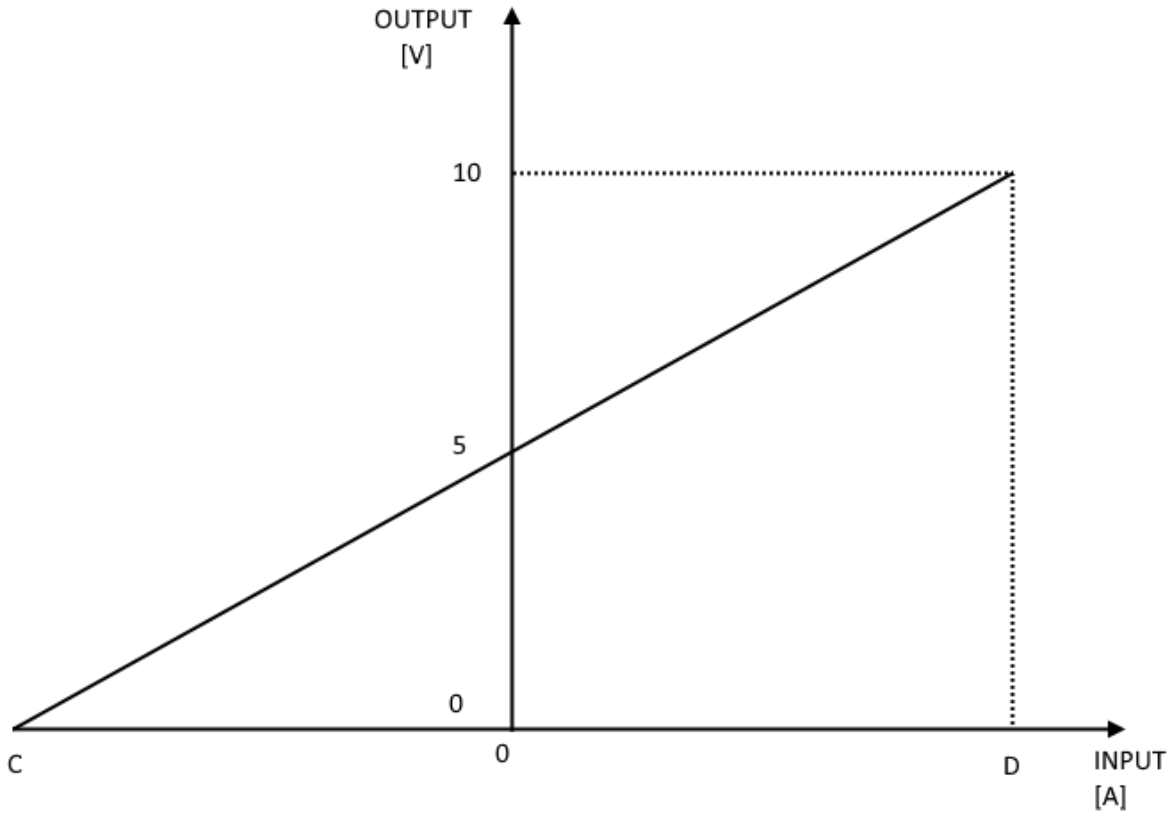


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MODEL	*BIPOL DIP7 SWITCH*	*50% FS DIP8 SWITCH*	*A*	*B*
T201DCH50-M	OFF	OFF	25 A	50 A
T201DCH50-M	OFF	ON	12,5 A	25 A
T201DCH100-M	OFF	OFF	50 A	100 A
T201DCH100-M	OFF	ON	25 A	50 A
T201DCH300-M	OFF	OFF	150 A	300 A
T201DCH300-M	OFF	ON	75 A	150 A

The following figure is related to Bipolar measure ("Bipol" dip switch 7 = ON):



MODEL	*BIPOL DIP7 SWITCH*	*50%FS DIP8 SWITCH*	*C*	*D*
T201DCH50-M	ON	OFF	-50 A	+50 A
T201DCH50-M	ON	ON	-25 A	+25 A
T201DCH100-M	ON	OFF	-100 A	+100 A
T201DCH100-M	ON	ON	-50 A	+50 A
T201DCH300-M	ON	OFF	-300 A	+300 A
T201DCH300-M	ON	ON	-150 A	+150 A

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WARNING!

Dip switches configuration is active only after a reboot!

So, for example using the RMS measure with 0 A input the Output voltage is 0V but using the Bipolar measure with 0 A input the Output voltage is 5V.

4. MODBUS RTU PROTOCOL

The Modbus protocol supported by the T201DCH50-100-300 is:

- Modbus RTU Slave

For more information about these protocols, please refer to the Modbus specification website:

http://www.modbus.org/specs.php.

4.1. Modbus RTU function code supported

The following Modbus RTU functions are supported:

- Read Holding Register (function 3) Max 5 Registers
- Write Single Register (function 6)
- Write Multiple registers (function 16) Max 2 Registers

WARNING!

All 32 bits values are stored into 2 consecutive registers

WARNING!

You can Read a Maximum of 5 Modbus Registers with the Read Holding Register function (function 3)

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⚠WARNING!

You can Write a Maximum of 2 Modbus Registers with the Write Multiple Register function (function 16)

5. MODBUS REGISTERS TABLE

In the following table this abbreviations are used:

MS = Most significant
LS = Less significant
MSW = Most significant Word (16 bits)
LSW = Less significant Word (16 bits)
R = Read only register
RW = Read and writeable register
RW* = Read and writeable register, the value can be stored in flash by using the store flash command
Unsigned 16 bits = Unsigned 16 bits register (from 0 to 65535)
Signed 16 bits = 16 bits register with sign (from -32768 to +32767)
Float 32 bits = Floating point single precision 32 bits (IEEE 754) register
0x = Hexadecimal Value

Register Name	Comment	Register Type	R/W	Default value or Start Value	Modbus Address	Register Offset
Machine ID	Module ID code	Unsigned 16 bits	R	-	40001	0
Firmware Revision	Firmware Revision Code	Unsigned 16 bits	R	-	40002	1
Command	This register is used for sending commands to the device. The following commands are supported: 49600 Store configuration in Flash 49568 Reset the Module	Unsigned 16 bits	R/W	0	40006	5

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	49920 Reset I max Value 49921 Reset I min Value After the command is executed the register will return to 0 value					
Modbus Station Address	Modbus RTU station address	Unsigned 16 bits	RW*	1	40033	32
Baud Rate	RS485 Port Baud rate 0 = 4800 baud 1 = 9600 baud 2 = 19200 baud 3 = 38400 baud 4 = 57600 baud 5 = 115200 baud 6 = 1200 baud 7 = 2400 baud	Unsigned 16 bits	RW*	3	40034	33
Parity	Communication Parity Bit 0 = None (8,N,1) 1 = Even (8,E,1) 2 = Odd (8,O,1)	Unsigned 16 bits	RW*	0	40035	34
True RMS/Bipolar Mode	Select from True RMS or Bipolar DC measurement mode 0 = True RMS 1 = Bipolar DC	Unsigned 16 bits	RW*	0	40036	35
Filter	Select Filter level 0 = LOW RMS =1400 ms response Time BIPOLAR = 78 ms response Time 1 = HIGH RMS = 2900 ms response Time BIPOLAR = 650 ms response Time	Unsigned 16 bits	RW*	0	40038	37
Model	Select the model	Unsigned 16 bits	RW*	0 or 1 or 2 According to	40039	38

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	0 = T201DCH50-M 1 = T201DCH100-M 2 = T201DCH300-M			the model		
Start Input Scale	Select the Start Input Scale	Float32	RW*	0 A	40041 (LSW) 40042 (MSW)	40-41
Stop Input Scale	Select the Stop Input Scale	Float32	RW*	100.0 A	40043 (LSW) 40044 (MSW)	42-43
Start output Scale	Select the Start output Scale	Float32	RW*	0 V	40045 (LSW) 40046 (MSW)	44-45
Stop output Scale	Select the Stop output Scale	Float32	RW*	10.0 V	40047 (LSW) 40048 (MSW)	46-47
Float Current Value [A]	Current Measure Value in floating point LSW-MSW [A]	Float32	R	-	40049 (LSW) 40050 (MSW)	48-49
Integer Current Value [A x100]	Current Measure Value in signed integer [A x100] For example: 18534 = 185.34 A -2500 = -25.00 A	Signed 16 Bits	R	-	40051	50
Current MIN [A]	Minimum Current Value (use register Command for reset the value) The value is set to 0 at startup	Float32	R	-	40059 (LSW) 40060 (MSW)	58-59
Current MAX [A]	Maximum Current Value (use register Command for reset the value) The value is set to 0 at startup	Float32	R	-	40061 (LSW) 40062 (MSW)	60-61
Output Voltage [V]	Output Voltage	Float32	R	-	40063 (LSW) 40064 (MSW)	62-63
Inverse Float Current Value [A]	Current Measure Value in floating point MSW-LSW [A] Copy of Float Current	Float32	R	-	40065 (MSW) 40066 (LSW)	64-65

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	Value Registers with Inverse (MSW-LSW) Floating Point					

6. FULL CONFIGURATION WITH EASY SETUP

For configure all the device parameters you must use the RS485 Port and the Easy T201DCH-M software included in the Easy Setup Suite.
You can download the Easy Setup software for free from:

www.seneca.it

6.1. Easy Setup Menu



Connect: Use the connect icon for connect the PC to the Device. Note that you need a RS485 to USB converter like Seneca S117P1 or S107USB for connect the device to a PC.
New: Load the default parameters in the actual project
Open: Open a stored project
Save: Save the actual project
Read: Read the actual configuration from the device (if the dip switches are not ALL OFF the configuration is read from dip switches)

WARNING!

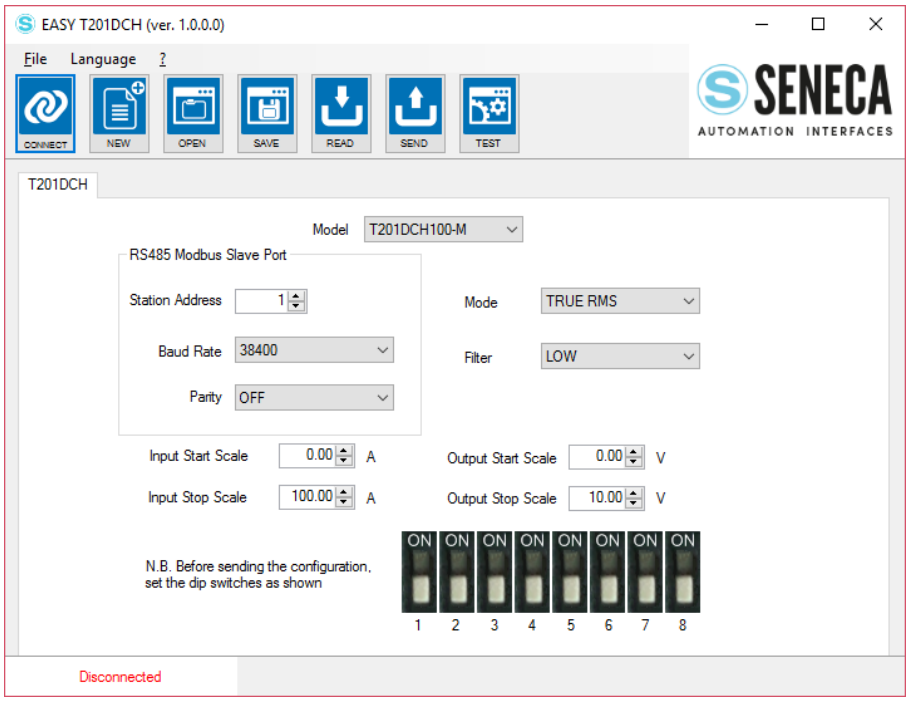
If you read a configuration from the device with at least one dip switch to "ON" the software will read the dip switch configuration because overwrite the flash configuration.

Send: Send the project configuration (if the dip switches are not ALL OFF the device use the dip switch configuration and NOT the sent configuration)
Test: Start a Registers read, you can also reset the MIN/MAX values and start/stop a Datalogger

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6.2. Creating a Project Configuration



WARNING!

You must set all dip switches to OFF before sending the configuration to the device or the actual configuration will be overwritten from the dip switches configuration!

The parameters that can be configured are:

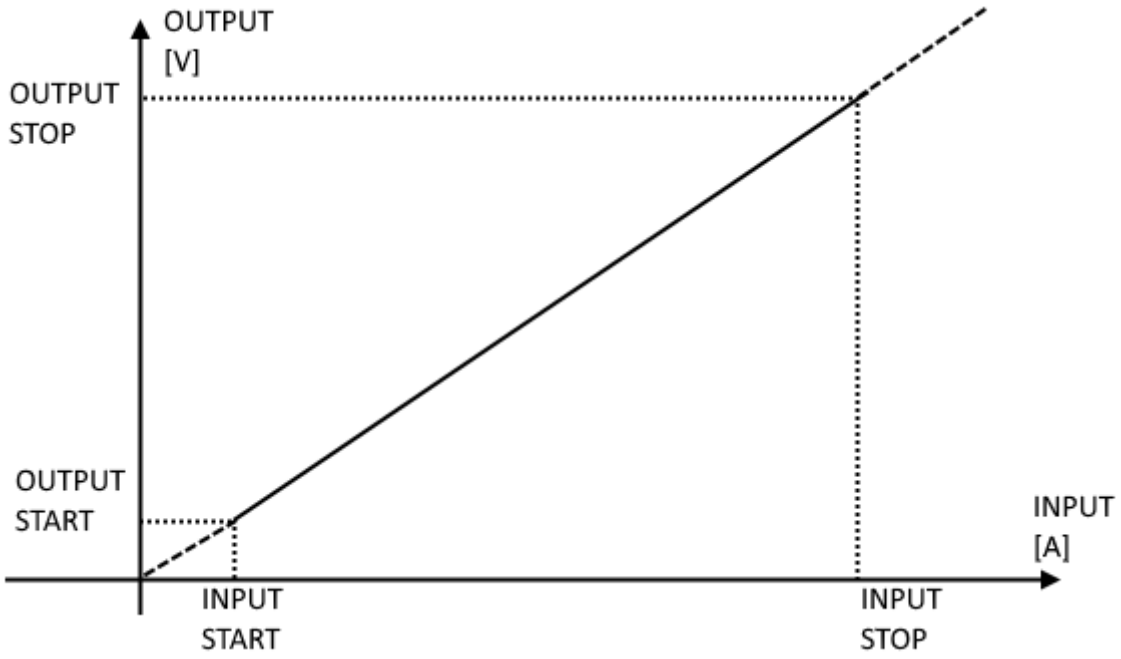
Model: Select between T201DCH50-M, T201DCH100-M or T201DCH300-M model.
Station Address: Select The Modbus RTU station address
Baud Rate: Select the Baud rate from 1200 to 115200 baud
Parity: Select NONE, ODD or EVEN
Mode: Select the current measure mode: True RMS or DC Bipolar
Filter: Select between LOW or HIGH:

FILTER	*RMS RESPONSE TIME (10%-90% F.S.)*	*BIPOLAR DC RESPONSE TIME (10%-90% F.S.)*
LOW	1400 ms	78 ms
HIGH	2900 ms	650 ms

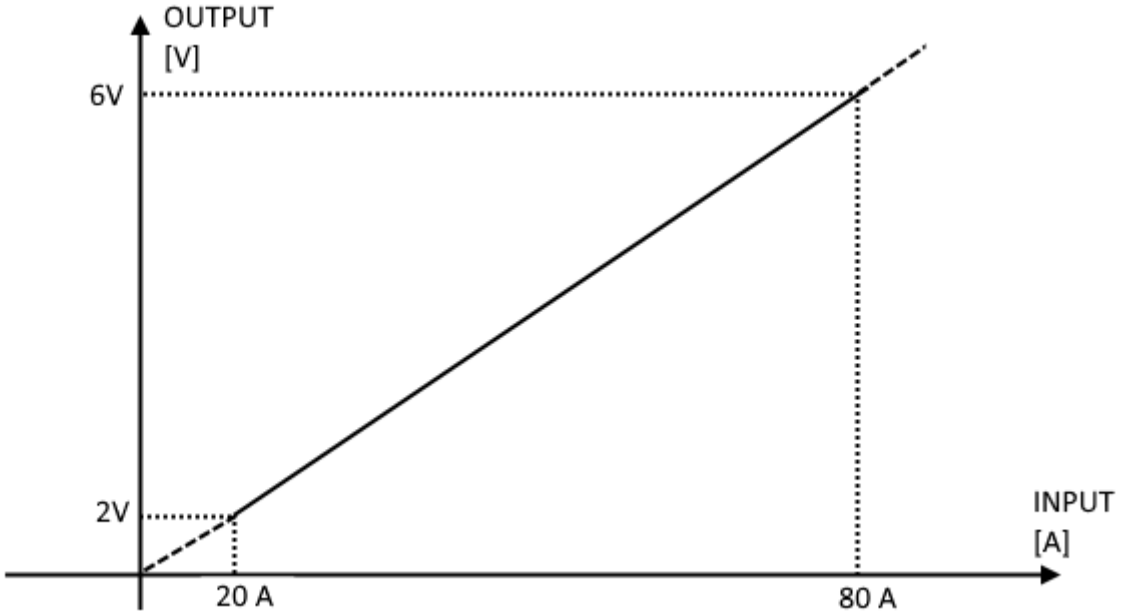
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Input Start/Stop Scale and Output Start/Stop Scale: Select the Start/Stop input and Output Start/Stop scale see figure:



For example:
INPUT START = 20 A
INPUT STOP = 80 A
OUTPUT START = 2 V
OUTPUT STOP = 6 V



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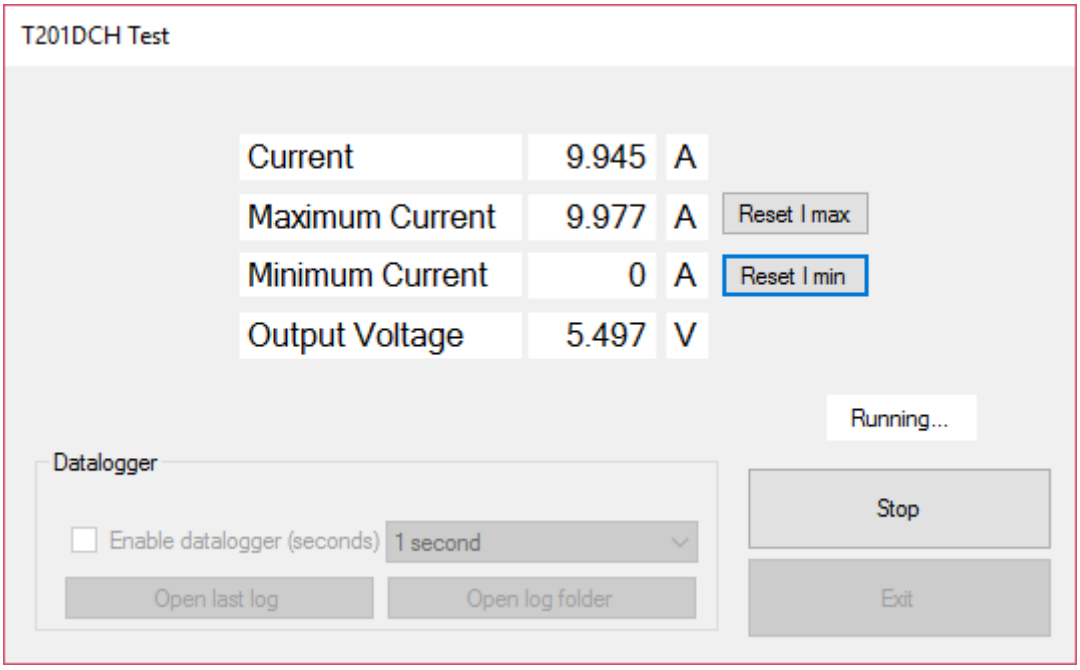
Note that with an input of 0 A the output is 0 V and over 80 A the output is over 6V (6V and 2V are not a limit).

WARNING!

The Output Voltage is limited to about 10.8V

6.3. Testing the Device

When the configuration is sent to the device you can test the actual configuration by using the  icon:



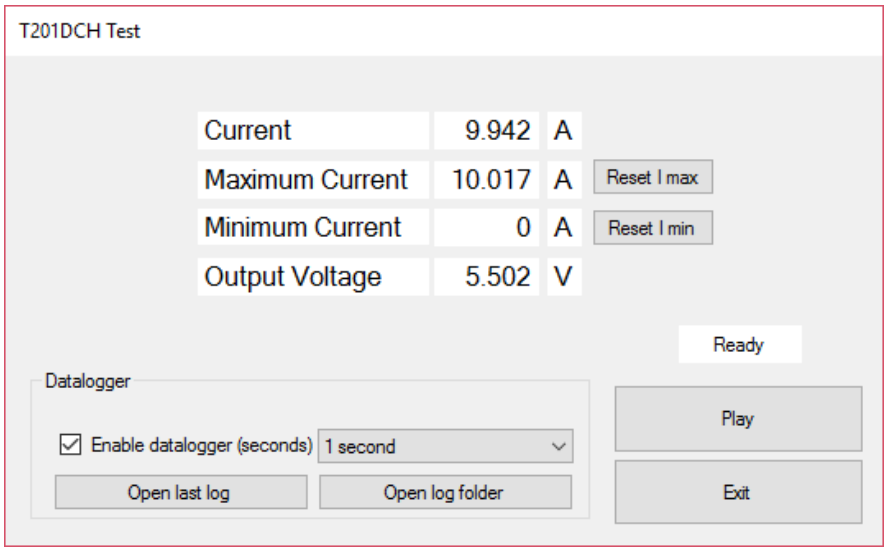
The test configuration will acquire the measure from the Modbus registers, you can also reset the MIN/MAX values.

6.3.1. The datalogger

The datalogger can be used for acquire data that can be used with an external software (for example Microsoft Excel ™). It is possible to set how much time to acquire the samples (minimum 1 second):

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The datalogger will create a file in a standard .csv format that can be open with external tools:

	A	B	C	D	E	F	G
1	INDEX	TYPE	TIMESTAMP	I	IMAX	IMIN	VOUT
2	1	LOG	18/07/2017 17:37:16	9,94183	10,01664	0	5,501532
3	2	LOG	18/07/2017 17:37:17	9,984209	10,0598	0	5,502169
4	3	LOG	18/07/2017 17:37:18	10,04912	10,06021	0	5,46909
5	4	LOG	18/07/2017 17:37:19	9,9916	10,06021	0	5,500545
6	5	LOG	18/07/2017 17:37:20	10,0064	10,06021	0	5,49997
7	6	LOG	18/07/2017 17:37:21	10,00188	10,06021	0	5,503278
8	7	LOG	18/07/2017 17:37:22	9,944716	10,07788	0	5,501326
9	8	LOG	18/07/2017 17:37:23	9,977228	10,07788	0	5,502477
10	9	LOG	18/07/2017 17:37:24	10,06232	10,07788	0	5,50186
11	10	LOG	18/07/2017 17:37:25	9,991206	10,07788	0	5,501265
12	11	LOG	18/07/2017 17:37:26	10,03309	10,07788	0	5,500669
13	12	LOG	18/07/2017 17:37:27	10,03637	10,07788	0	5,500587
14	13	LOG	18/07/2017 17:37:29	10,00598	10,07788	0	5,501203
15	14	LOG	18/07/2017 17:37:30	9,976815	10,07788	0	5,50338
16	15	LOG	18/07/2017 17:37:31	10,01295	10,07788	0	5,50225
17	16	LOG	18/07/2017 17:37:32	10,01624	10,07788	0	5,500751
18	17	LOG	18/07/2017 17:37:33	10,0615	10,07788	0	5,502066
19	18	LOG	18/07/2017 17:37:34	10,03803	10,07788	0	5,502476
20	19	LOG	18/07/2017 17:37:35	10,01379	10,07788	0	5,503421
21	20	LOG	18/07/2017 17:37:36	10,0105	10,07788	0	5,502476
22	21	LOG	18/07/2017 17:37:37	10,00846	10,07788	0	5,501059
23	22	LOG	18/07/2017 17:37:38	10,05898	10,08692	0	5,500854
24	23	LOG	18/07/2017 17:37:39	10,03637	10,08692	0	5,501983
25	24	LOG	18/07/2017 17:37:40	10,03022	10,08692	0	5,501552
26	25	LOG	18/07/2017 17:37:41	10,00187	10,08692	0	5,502662
27	26	LOG	18/07/2017 17:37:42	10,00558	10,08692	0	5,502969

The file can also be open with a text editor:

INDEX;TYPE;TIMESTAMP;I;IMAX;IMIN;VOUT
1;LOG;18/07/2017 17:37:16;9,94182968139648;10,0166397094727;0;5,50153207778931
2;LOG;18/07/2017 17:37:17;9,98420906066895;10,0598001480103;0;5,50216913223267
3;LOG;18/07/2017 17:37:18;10,0491199493408;10,0602102279663;0;5,4690899848938
4;LOG;18/07/2017 17:37:19;9,99160003662109;10,0602102279663;0;5,50054502487183
5;LOG;18/07/2017 17:37:20;10,0064001083374;10,0602102279663;0;5,49996995925903

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6;LOG;18/07/2017 17:37:21;10,0018796920776;10,0602102279663;0;5,50327777862549
7;LOG;18/07/2017 17:37:22;9,94471645355225;10,0778799057007;0;5,50132608413696
8;LOG;18/07/2017 17:37:23;9,97722816467285;10,0778799057007;0;5,50247716903687
9;LOG;18/07/2017 17:37:24;10,0623197555542;10,0778799057007;0;5,50186014175415
10;LOG;18/07/2017 17:37:25;9,99120616912842;10,0778799057007;0;5,50126504898071
11;LOG;18/07/2017 17:37:26;10,0330896377563;10,0778799057007;0;5,50066900253296
12;LOG;18/07/2017 17:37:27;10,0363702774048;10,0778799057007;0;5,50058698654175
13;LOG;18/07/2017 17:37:29;10,0059795379639;10,0778799057007;0;5,50120306015015
14;LOG;18/07/2017 17:37:30;9,97681522369385;10,0778799057007;0;5,50337982177734
15;LOG;18/07/2017 17:37:31;10,0129499435425;10,0778799057007;0;5,50225019454956
16;LOG;18/07/2017 17:37:32;10,0162401199341;10,0778799057007;0;5,50075101852417
17;LOG;18/07/2017 17:37:33;10,0614995956421;10,0778799057007;0;5,50206613540649

7. ACCESSORIES

For connect T201DCH50-100-300-M to a PC you need a RS485 to USB converter. The RS485 to USB converters are:

7.1. Seneca S107USB



S107USB is an interface able to implement a RS485 serial port by using a PC USB port. The available drivers will recognize the serial interface as a standard serial port; so the use of the product is directly allowed through any software able to communicate with the standard serial ports of the operating system (COM1, COM2, etc). RS485 and USB ports are isolated from each other at 1500 V.

You can buy the Seneca S107USB also from our online store:

https://www.seneca.it/en/linee-di-prodotto/acquisizione-dati-e-automazione/moduli-di-comunicazione/convertitori-seriali-usb/s107usb

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7.2. Seneca S117P1



S117P1 is a converter that realizes a serial connection via RS232, RS485 or TTL, using a USB port on the PC.
Through the drivers the operating system treats the serial interface like a standard serial port, allowing the use of the converter through any software that can communicate with the standard serial ports present in the operating system (COM1, COM2, ecc.). RS232, RS485 and TTL ports are electrically isolated from the USB avoiding most of the problems of electrical noises. The package of the product includes USB-miniUSB cable, serial cable Jack-DB9F and programming cable RJ10-AMP

You can buy the Seneca S117P1 also from our online store:
https://www.seneca.it/en/linee-di-prodotto/acquisizione-dati-e-automazione/moduli-di-comunicazione/convertitori-seriali-usb/s117p1

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