D.C. MEASURING CONVERTER

TYPE

"MHIT"

OPERATION MANUAL

CE

1. General Utilization and Commissioning Directions

1.1 - Storage and Transportation

Must comply with the environmental conditions stated in the product's specification or by the applicable IEC standards.

1.2 - Installation

Must be properly made and in compliance with the operational ambient conditions stated by the Manufacturer.

1.3 - Electrical Connection

Must be made strictly according to the wiring diagram supplied with the Product, to its electrical characteristics and in compliance with the applicable standards particularly with reference to human safety.

1.4 - Measuring Inputs and Power Supply

Carefully check that the value of input quantities and power supply voltage are proper and within the permissible variation limits.

1.5 - Outputs Loading

Must be compatible with their declared performance.

1.6 - Protection Earthing

When earthing is required, carefully check its effectiveness.

1.8 - Safety Protection

Carefully check that all safety means are correctly mounted, apply proper seals where required and periodically check their integrity.

1.9 - Handling

Notwithstanding the highest practicable protection means used in designing M.S. electronic circuits, the electronic components and semiconductor devices mounted on the modules can be seriously damaged by electrostatic voltage discharge which can be experienced when handling the modules.
The damage caused by electrostatic discharge may not be immediately apparent, but the design reliability and the long life of the product will have been reduced. The electronic circuits produced by M.S. are completely safe from electrostatic discharge (8 kV IEC 255.22.2) when housed in their case; dismounting the modules without proper cautions expose them to the risk of damage.

1.10 - Maintenance

Make reference to the instruction manual of the Manufacturer; maintenance must be carried-out by specially trained people and in strict conformity with the safety regulations.

1.11 - Waste Disposal of Electrical & Electronic Equipment

(Applicable throughout the European Union and other European countries with separate collection program). This product should not be treated as household waste when you wish dispose of it. Instead, it should be handed over to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequence to the environment and human health, which could otherwise be caused by inappropriate disposal of this product. The recycling of materials will help to conserve natural resource.

1.12 - Fault Detection and Repair

Internal calibrations and components should not be altered or replaced.
For repair, please ask the Manufacturer or its authorized Dealers.

Misapplication of the above warnings and instruction relieves the Manufacturer of any liability.

2. General Characteristics

The MHIT converters provide a measurement of current or voltage fully isolated and safety

Make electric connection in conformity with the diagram reported on relay's enclosure.
Check that input quanties are same as reported on the diagram and on the test certificate.
The auxiliary power is supplied by a built-in module fully isolated and self protected.

2.1 - Auxiliary Supply

The converter can be supply with different voltages (see general characteristics)

2.2 - Interconnection Transmitter/Receiver

The two units are connected by a fiber optic belt 5m (others lengh on request) long with plug-in ST connectors.

Minimum bending radius: during the installation it is necessary to assess that the minimal beam of curving is **not less then 6 cm**; a little radius can damage the fiber optic or increase the dB loss thus causing an incorrect transfer of digital information between Transmitter and Receiver.

The fiber optic connector present on the Transmitter, the Receiver and the fiber optic belt, are protected by proper caps that must be used any time the fiber optic is disconnected.
Leaving the connectors without the protection cap can deteriorate the quality of transmission.

3. Characteristics of transfer transmitter / receiver

Measurement resolution	0.1% Vn / 0.05% F.S. for voltage converter (2Vn) 0.05% In / 0.05% F.S. for current converter (channels 0...1xIn) 0.5% In / 0.05% F.S. for current converter (channels 0...10xIn)
Class	0.2
Reponse time	200 μsec.
Connection Output	Fiber Optic type 200.230.500μ HCS (plastic) or 62.5/125μ (glass) Connection type ST. Fiber Optic standard length 5m (max. 1Km with glass)

4. Transmition unit characteristics (MHIT-T...) with external power supply

Three transmitter version are available: for current measure, voltage or current/voltage.

4.1 - Common Characteristics

Power supply voltage	48 (-20%) ÷ 132 (+15%) Vcc (class DC3) 48 (-15%) ÷ 110 (+10%) Vca (class AC2)
Output	Fiber Optic type 200.230.500μ HCS (plastic) or 62.5/125μ (glass) Connection type ST. Fiber Optic standard length 5m (max. 1Km with glass)
Sampling frequency	5kHz
Enclosure	Material: BMCRF9 protection degree IP44
Connections terminals	Bolt type terminals (M6) for inputs; ST for the F.O. ; Screw type 4 mm^2 for Power Supply.
Power Supply Consumption	≤ 5 VA

4.2 - MHIT-TV

Directly connected to the H.V. line via self contained voltage divider.

Rated input voltage Vn	(**1**) 1000 Vcc (**2**) 2000 Vcc (**3**) 4000 Vcc
Imput impedence	22 MΩ
Measurement range	(0 ÷ ±2)Vn

4.3 - MHIT-TI

Directly connected to the H.V. line across a normal measuring shunt.

Rated input In/..	(**1**) 60 mVcc (**2**) 80 mVcc (**3**) 100 mVcc	(**4**) 120 mVcc
Measurement range	(0 ÷ ±10)In (0 ÷ ±20)In	

4.4 - Protection Function of Shunt Measurement Input

The measurement input from the shunt is protected agains overvoltages that can be generated by the broken of the shunt.
The broken of the shunt will generate the full line voltage to the input terminal. The device is able to protect itself, without external components. The protection operates until two time the nominal voltage at the terminals, it means 6kVcc continuous.
To reset the protection , and enable the normal operation of measurement it's enough switch off and on the device.

4.5 - MHIT-TVI

Directly connected to the H.V. line and to voltage divider

We have the same characteristic for "I" and "V" transmitter write above.

5. Receiver unit characteristic (MHIT-R...)

Two receiver models are avaiable, one to be connected to the voltage transmitter and the other to be connected to che current transmitter.On the receiver can be use as optional a front pannel for the reading of measurement.
Are avaiable two couple of channels galvanical isolated that can be used for test and control funcion of generated signal. The device provide a diagnostic relay that trips for interrupt of fiber optic signal or in case of malfuncioning on transmitter or alarm for not valid measurement.

Power Supply Consumption	≤ 7 VA
Power supply voltage	48 (-20%) ÷ 132 (+15%) Vcc (class DC3) 48 (-15%) ÷ 110 (+10%) Vca (class AC2)
Imput	Fiber Optic from transmitter MHIT-T..
Output	4 current loops (configurable) Range : (0 ÷ 20)mA (0 ÷ 40)mA (4 ÷ 20)mA
Maximun burder	500 ohm
Enclosure	ABS protection degree IP42
Insulation	2kV rms for 1 min. between power supply / output 500V between outputs groups
Connections terminals	Bolt type terminals (2.5 mmq) - ST for Fiber Optic

5.1 - Leds and output relays

	Optical fiber works and Vaux avaiable	*Interrupted optical fiber, shunt interrupted e Vaux avaiable*	*Vaux not avaiable*
Green Led	Illuminated	Illuminated	Off
Red Led	Over threshold : Illuminated Under threshold : Off	Flashing	Off
R1 (diagnostic)	Energized with close contact	Not energized with open contact	Not energized with open contact
R2 (Alarm N.D.) (*)	Over threshold : Energized with close contact Under threshold : Not energized with open contact	Not energized with open contact	Not energized with open contact
R2 (Alarm N.E.) (*)	Over threshold : Not energized with open contact Under threshold : Energized with close contact	Energized with close contact	Not energized with open contact

(*) the threshold trip level can be set by software "MSCom".

5.1 – Setting og output channels CH1, CH2, CH3, CH4

It's possible change the measurement output default setup CH1, CH2, CH3, CH4, by comunication software MSCom2.

Attention!!: Before change the setting ot output, disconnect the connection fiber optic between transmitter and receiver.

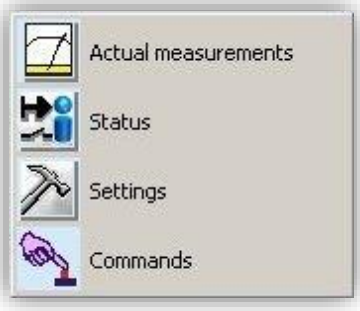
Connect the receiver MHIT-R trought communication port RS485 (on front pannel) with RS232/485 converter (Model CPSC optional) to the PC.

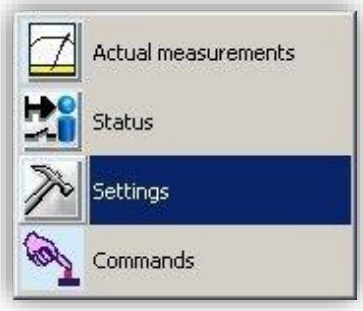
Run the communication software MSCom2.

The "Actual measurement" window will be open:

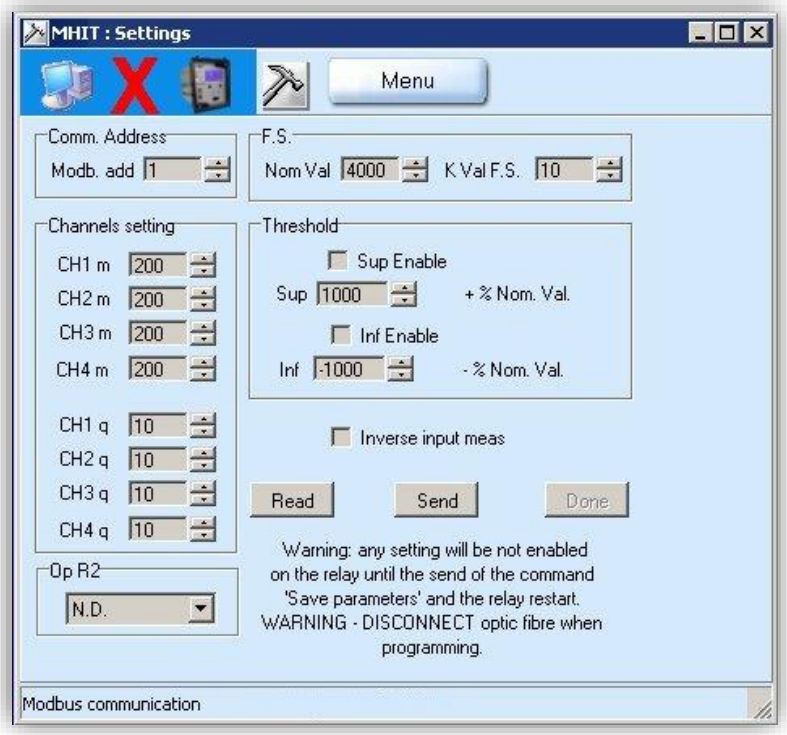
Press the menu button, and select "Change window":

Select "Settings" :





Follower window will appears:



Legenda	*Definitions*
Comm Address	Communication address
Modb. Add	Modbus adress
F.S.	Full Scale transmitter
Nom Val	Nominal value
K Val F.S.	Full scale value refered to nominal one
Channels settings	Channel setting
CH1m	Channel 1 gain
CH2m	Channel 2 gain
CH3m	Channel 3 gain
CH4m	Channel 4 gain
CH1q	Channel 1 offset
CH2q	Channel 2 offset
CH3q	Channel 3 offset
CH4q	Channel 4 offset
Op R2	Working mode of output relay R2
Threshold	
Sup Enable	positive threshold enable
Sup	% of nominal value
Inf Enable	negative threshold enable
Inf	% of nominal value
Inverse input meas	Inverse input measurement

5.3 - Example of output setting

The receiver outputs can be modify as wish.
Following are show the value to insert in the comunication software MScom to abtain the most usual output range.

5.3.1 – Current Receiver - MHIT-RI

Value to set to have an output (0 ÷ 20)mA or (4 ÷ 20)mA, on channel 1 (CH1) with a nomial current "In" or "10In":

5.3.1.1 – Protection Device (U-MLEs, U-MLC, DIA) 0 – 10In

Channels Settings									Dynamic Range	
(y_1)		(y_2)			(x_1)		(x_2)		CHm (gain)	CHq (offset)
0	÷	20	mA	≡	0	÷	10	In	200	10
0	÷	20	mA	≡	0	÷	1	In	2000	10
4	÷	20	mA	≡	0	÷	10	In	160	14
4	÷	20	mA	≡	0	÷	1	In	1600	14

5.3.1.2 – Measure Device (device, plc) 0 – 2In

Channels Settings									Dynamic Range	
(y_1)		(y_2)			(x_1)		(x_2)		CHm (gain)	CHq (offset)
0	÷	20	mA	≡	0	÷	2	In	200	10
0	÷	20	mA	≡	0	÷	1	In	400	10
4	÷	20	mA	≡	0	÷	2	In	160	14
4	÷	20	mA	≡	0	÷	1	In	320	14

This value can be apply in any combination even on channel "CH2, CH3, CH4".
For other setting please contact Microelettrica Scientifica.

5.3.2 – Voltage Reciver - MHIT-RV

Value to set to ahve an output (0 ÷ 20)mA or (4 ÷ 20)mA, on channel 1 (CH1) with a nominal voltage "Vn" or "2Vn":

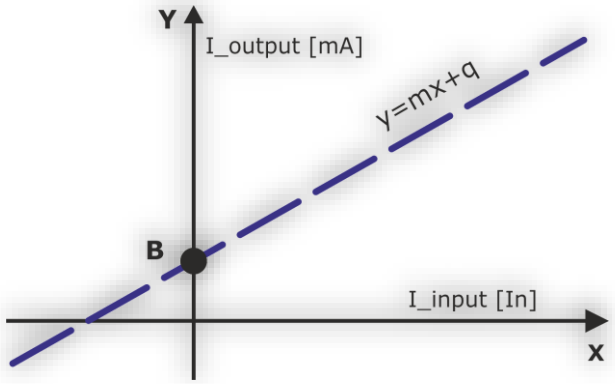
Channels Settings									Dynamic Range	
(y_1)		(y_2)			(x_1)		(x_2)		CHm (gain)	CHq (offset)
0	÷	20	mA	≡	0	÷	2	Vn	200	10
0	÷	20	mA	≡	0	÷	1	Vn	400	10
4	÷	20	mA	≡	0	÷	2	Vn	160	14
4	÷	20	mA	≡	0	÷	1	Vn	320	14

This value can be apply in any combination even on channel "CH2, CH3, CH4".
For other setting please contact Microelettrica Scientifica.

Others output channel value can be obteined by appling follow formulas:

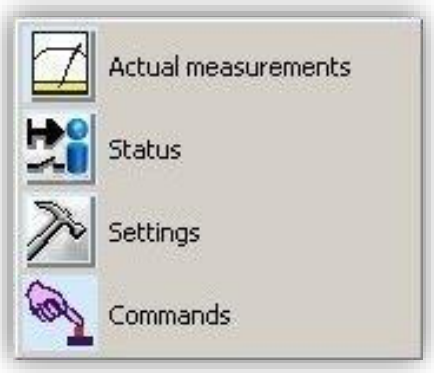
$$\textbf{CHm (gain)} = 100 \cdot \frac{y_2 - y_1}{x_2 - x_1}$$

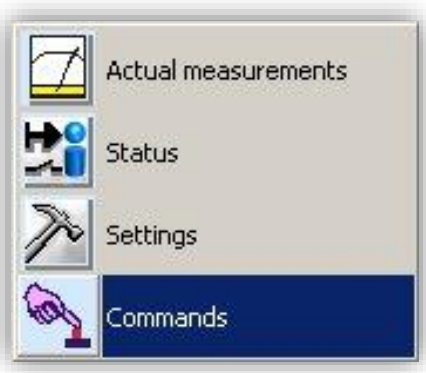
$$\textbf{CHq (offset)} = \frac{y_2 \cdot x_1 + y_1 \cdot x_2}{x_2 - x_1} + 10$$



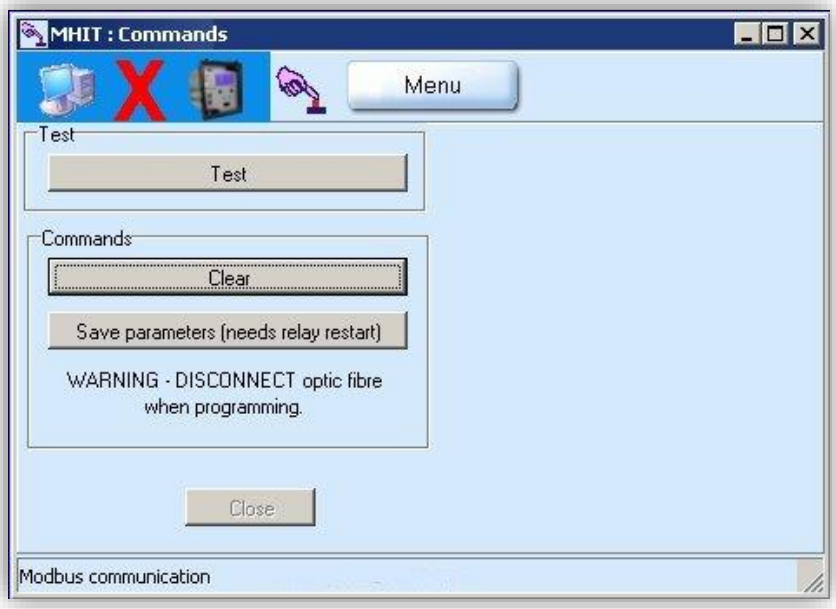
ATTENTION!

At the end of configuration of output channeò, press "Send" button.
By "Menu" button select "Command" :





Follow window will appair:



Press the button "Save Parameters".

Switch off and on the receiver to enable the new parameters.

6. Functional Test

The following procedures allow for a field check of the operation of system Transmitter + Fiber Optic + Receiver: the accuracy of the system is not under evaluation.

6.1 – Current Unit

6.1.1 - Check of zero input

Short circuit the input terminals of the Transmitter and read on the Receiver the value corrisponding to zero input: A residual measurement ≤ 0.1% (0.02mA) of full scale value is acceptable.

Example:

Output Rating	*Offset*
0 ÷ 20mA	±0.02mA
4 ÷ 20mA	±0.02mA

6.1.2 - Check full scale value

Connect a resistor "R" (see table) accross the input terminals of the Transmitter and read out of the Receiver the corrisponding value:

Note: This test is not made for checking the accuracy.

Input Rating			*R (Ω)*	*Rated Output (Channel 0-20mA)*	*Acceptable measurement*
Shunt =	60mVcc	→	341	20mA	(18 ÷ 22)mA
Shunt =	80mVcc	→	459	20mA	(18 ÷ 22)mA
Shunt =	100mVcc	→	578	20mA	(18 ÷ 22)mA
Shunt =	120mVcc	→	712	20mA	(18 ÷ 22)mA

6.2 – Voltage Unit

6.2.1 - Check of zero input

Short circuit the input terminals of the Transmitter and read on the Receiver the value corrisponding to zero input: A residual measurement ≤ 0.1% of full scale value is acceptable.

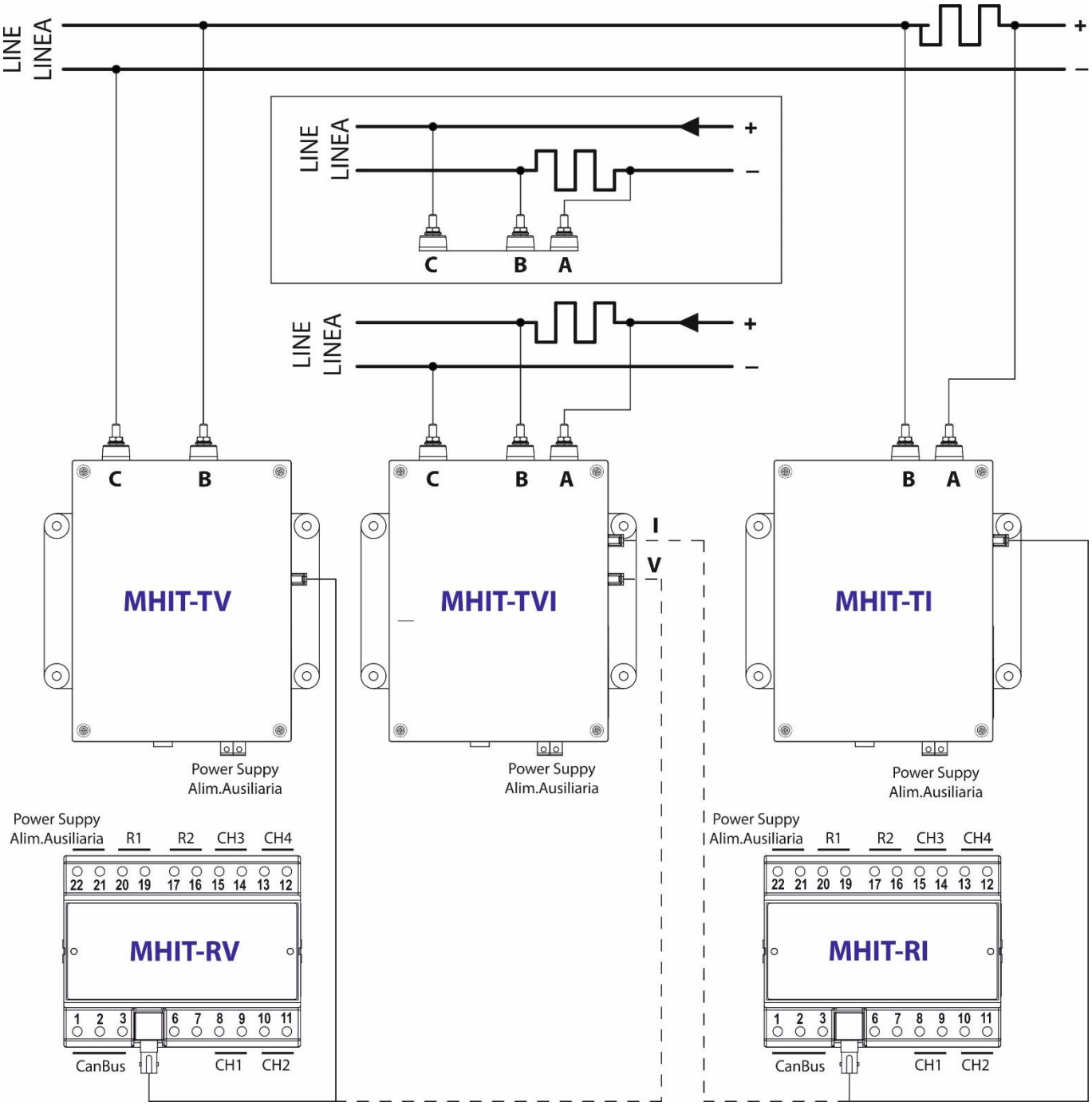
6.2.2 - Check full scale value

Apply to input terminals of the Transmitter a test voltage and check the corrisponding output of the Receiver.

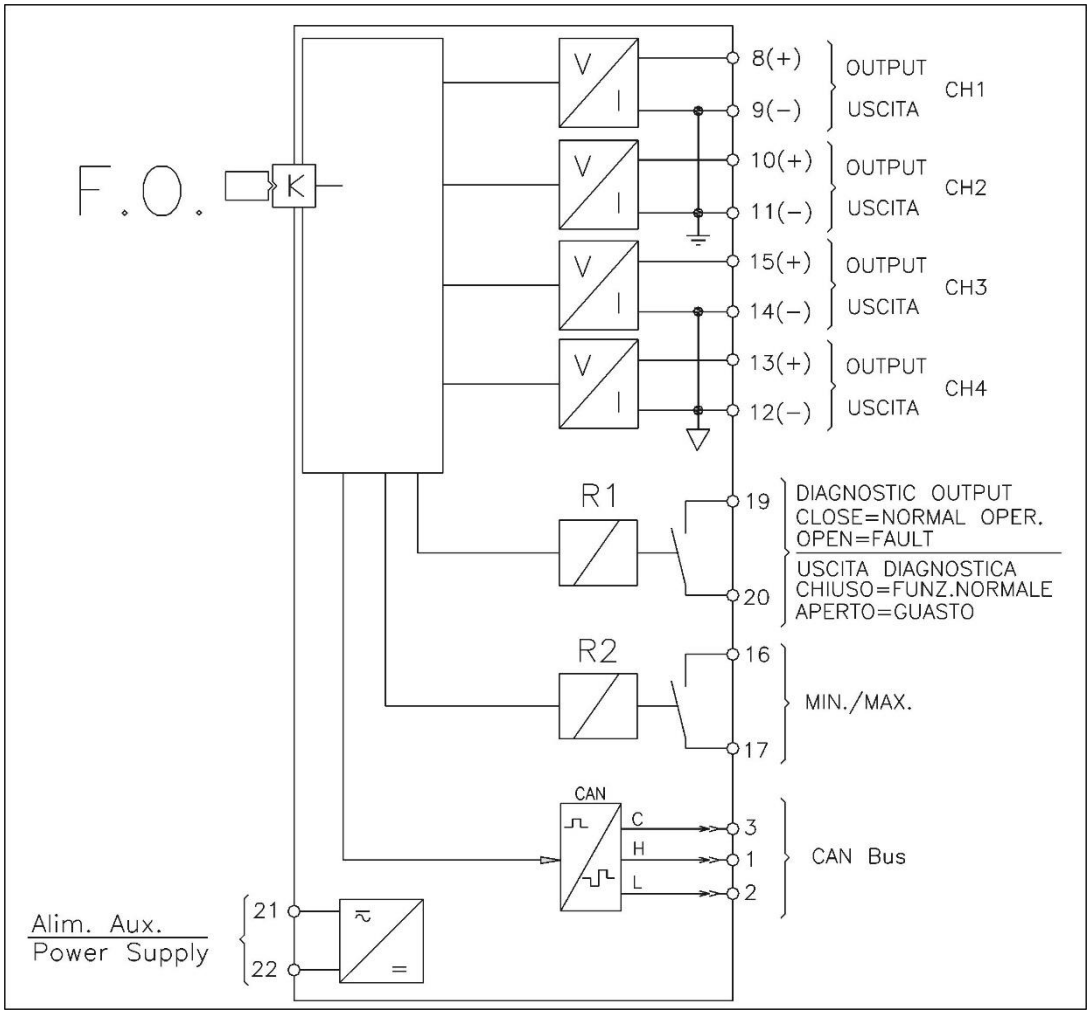
Note: This test is not made for checking the accuracy.

Test Voltage		*Output (Channel 0 ÷ 20mA)*	*Acceptable measurement*
400Vcc	→	1mA	(0.9 ÷ 1.1)mA

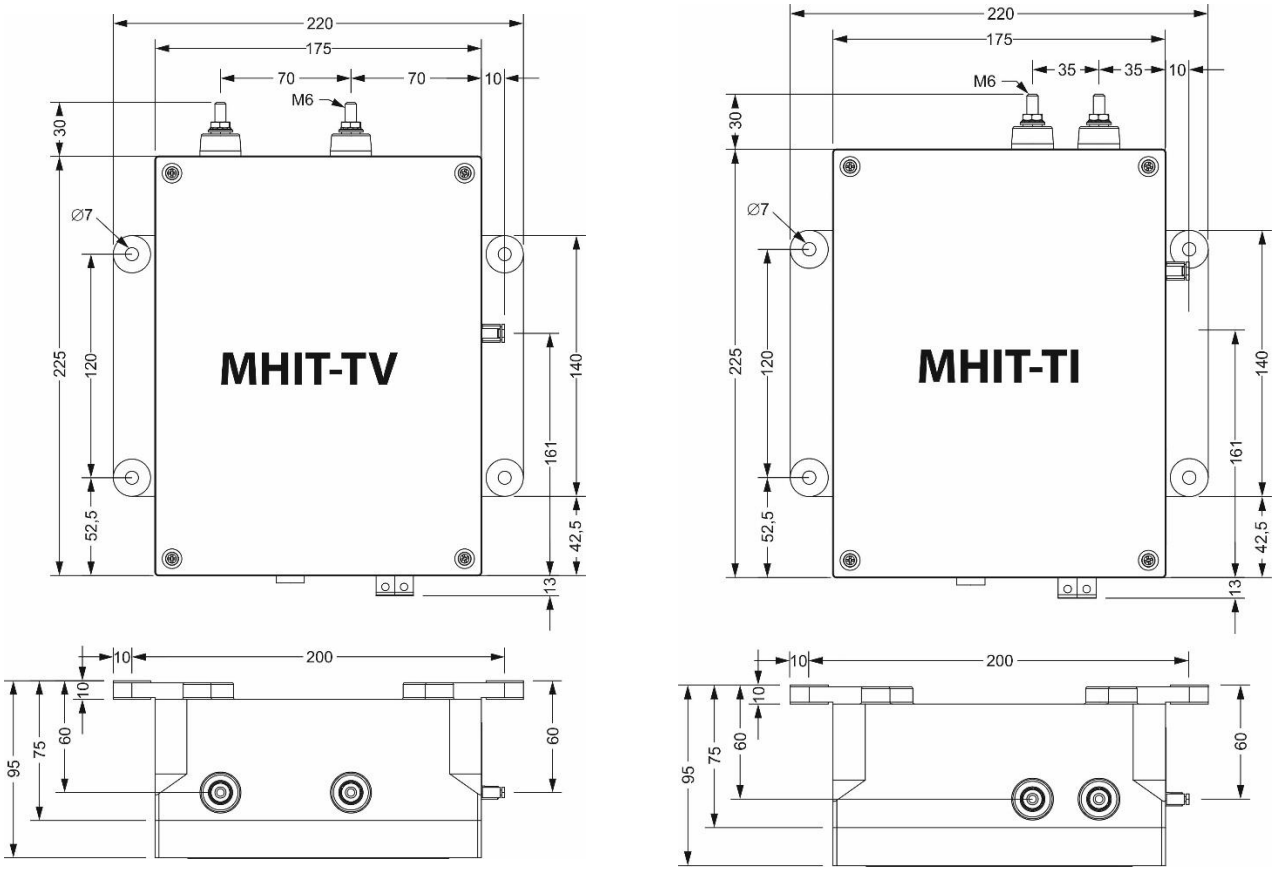
7. Wiring Diagram



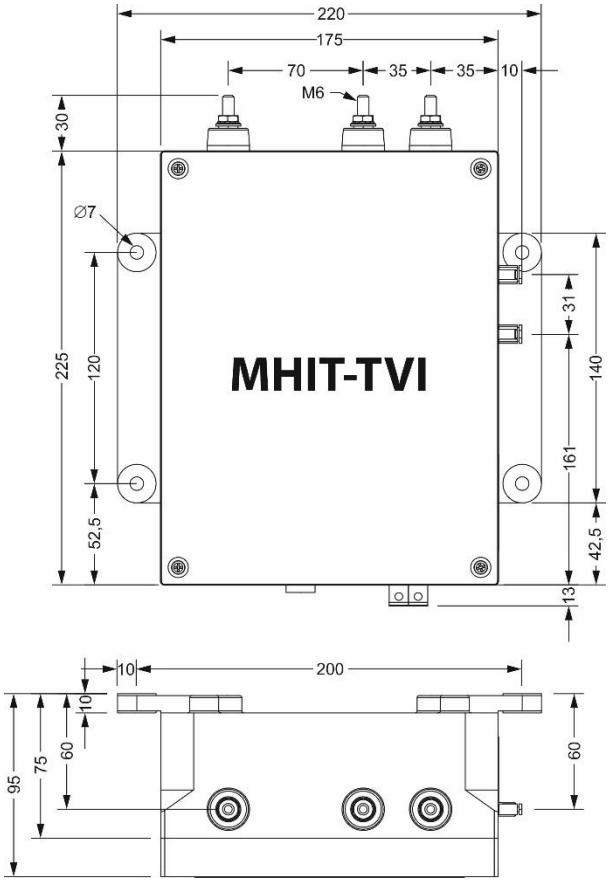
8. Receiver – Wiring Diagram



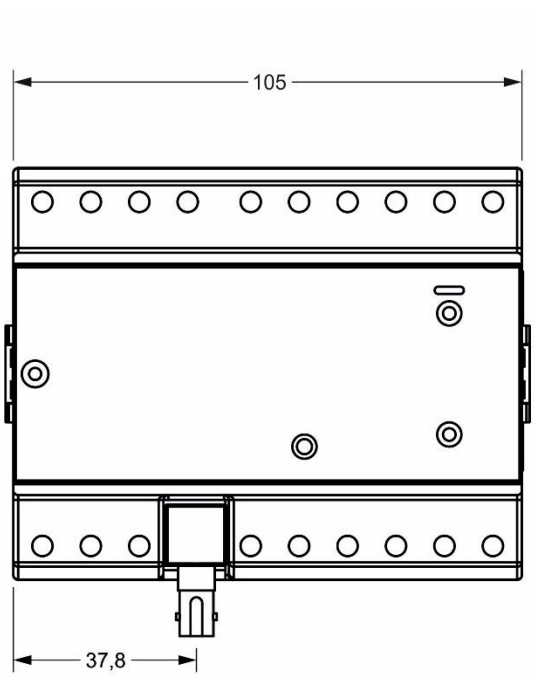
9. Overal Dimensions (mm) - Transmitter - MHIT-TV - MHIT-TI

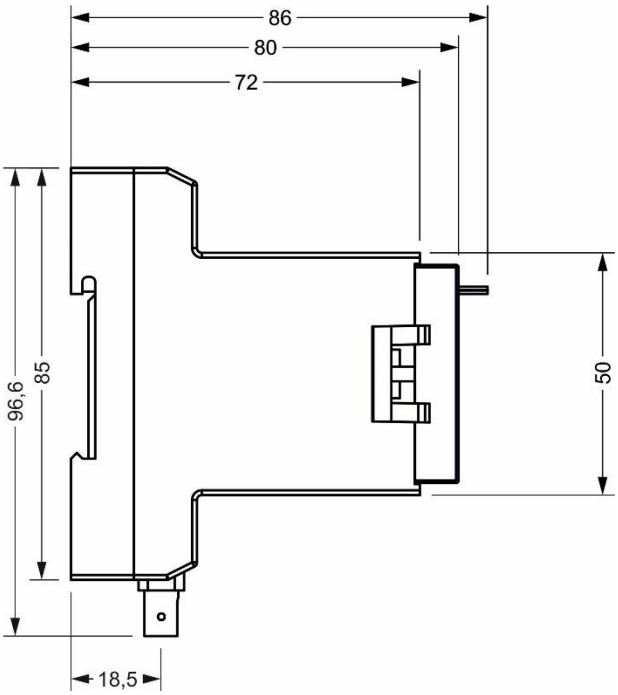


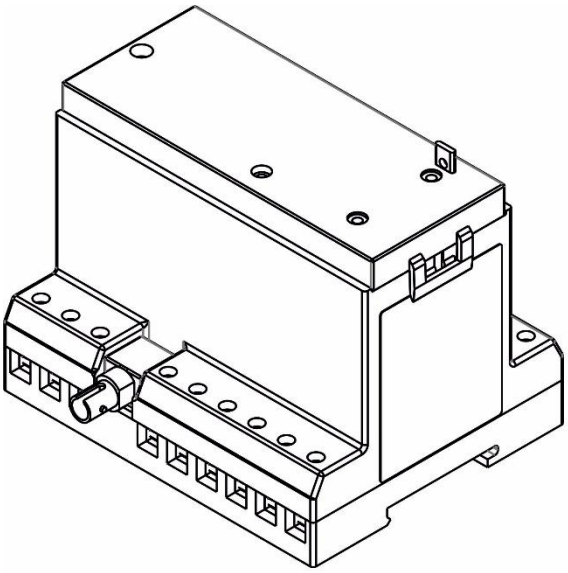
10. Overal Dimensions (mm) - Transmitter - MHIT-TVI



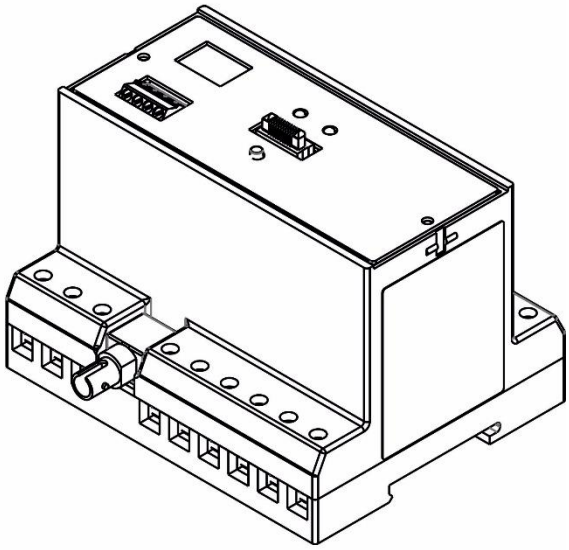
11. Overal Dimensions (mm) - Receiver







With Cover
Con Coperchio



Without Cover
Senza Coperchio

12. Elecrical Characteristics

Reference Standard CE Directive - EN50123 – IEC60255 - RFI.DMA/IM.LA/SSE.360		
Dielectric test voltage	IEC60255-5 EN50123	cat IV – 2kV (EN50124-1 cat OV4 – 18.5kV)
Impulse test voltage	IEC60255-5 EN50123	cat IV – 5kV (EN50124-1 cat OV4 – 40kV)

Enviromental Rif.Std. (IEC 60068)			
Operation ambient temperature	EN 60870-2-2	class C1 (3k5)	-10 °C / +55 °C
Environmental testing (Cold)	IEC 60068-2-1		-10 °C ; 16h
(Dry heat)	IEC 60068-2-2		+55 °C ; U.R.<=35% ; 16h
(Change of temperature)	IEC 60068-2-14		+55 °C ; -10 °C ; 3h
(Damp heat, steady state)	IEC 60068-2-3		+40 °C ; U.R.=93% ; 96h
Resistance to vibration	IEC 60255-21-1	class 2	10-500 Hz ; 2g
Resistance to vibration and shock (bump-shock)	IEC 60255-21-2	class 1	10g - 15g
Sismatic stress resistance	IEC 60255-21-3	class 2	1 g (xy) , 2 g (z)

CE EMC Compatibility					
Electromagnetic emission	EN 55011		30-1000 MHz (tab1 EN50081-2)		A
Conducted disturbances immunity test	EN 55022	classe B	0.15-30 MHz (tab1 EN50081-2)	10 V	A
Radiated electromagnetic field immunity test	EN60870-2-1 A.5.1 → IEC 61000-4-3	livello 3	80-1000 MHz 80%AM	10 V/m	B
	EN50082-2 → EN 50140, EN 50204	livello 3	900 MHz/200 Hz	10 V/m	A
	EN50082-2 → ENV 50140	livello 3			A
Electrostatic discharge test	EN60870-2-1 A.3.1 → IEC 61000-4-2	livello 3	6 kV contact / 8 kV air		B
Power frequency magnetic test	EN60870-2-1 A.4.1 → IEC 61000-4-8	livello 5	Continuous 100 A/m	50/60 Hz	A
Conducted disturbances immunity test.	EN50082-2 → IEC 61000-4-6	livello 3	(80 +/-5)% AM1 kHz sinwave		A
I Damped oscillatory magnetic field	EN60870-2-1 A.4.3 → IEC 61000-4-10	livello 3	30 A/m, 0.1-1 MHz		B
Electrical fast transient/burst (Fast Trasient)	EN60870-2-1 A.2.3 → IEC 61000-4-4	livello 3	2 kV(m.c.)		B
Dumped Oscillatory waves	EN60870-2-1 A.2.5 → IEC 61000-4-1	livello 2	1 kV(m.c.)		
Residual power supply	IEC 60870-2-1	classe DC3 classe AC2			
Power supply tollerance	IEC 60870-2-1	VR3	<=5%		
Surge immunity test	EN60870-2-1 A.2.2 → IEC 61000-4-5	livello 3	8/20us 2 kV(m.c.)		B
Voltage interruptions	EN60870-2-1 A.1.5 → IEC 61000-4-11		20 ms		
Voltage ripple	EN60870-2-1 A.1.4 → IEC 61000-4-11				A=B

Characteristics	
Accuracy at reference value of influencing factors	Class 0,2
Average power supply consumption TX	5 VA
Average power supply consumption RX	7 VA
Output relays	rating 6 A; Vn = 250 V A.C. resistive switching = 1500VA (400V max) make = 30 A (peak) 0,5 sec.; break = 0.2 A, 110 Vcc, L/R = 40 ms (100.000 op.) – Meccanichal life 10^6op.

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