

# DMTME-96

2CSG133030R4022

M204675

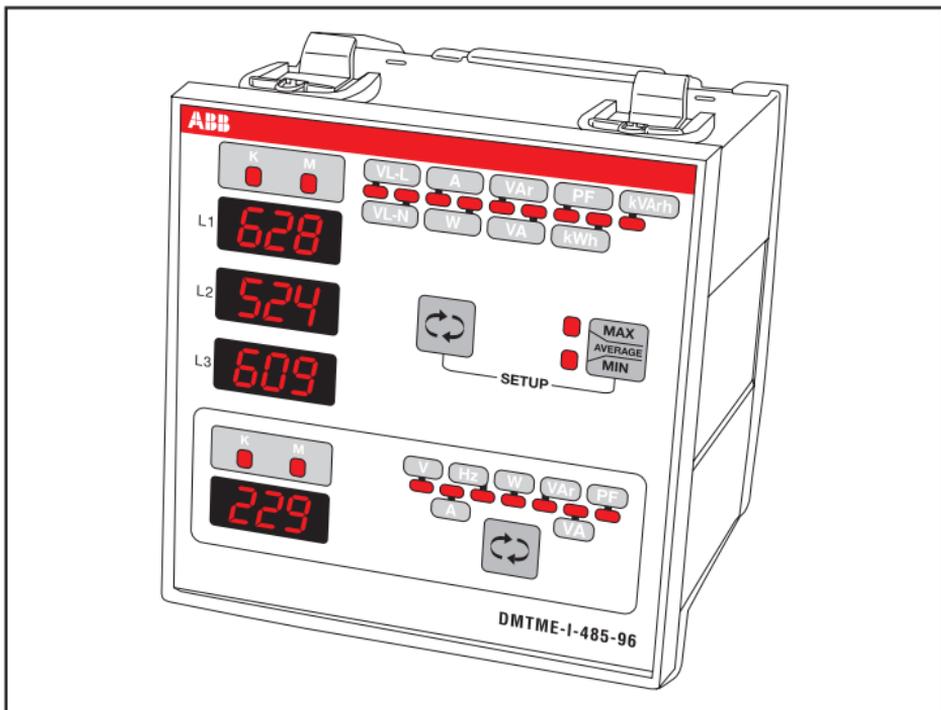
# DMTME-I-485-96

2CSG163030R4022

M204685

2CSG445001D0202

**GB** Operation and assembly instructions



**DMTME-96:** three-phase multimeter for panel mounting, used also in single-phase networks, with 4 red LEDs displays for the measurement of the main electric quantities (including max/min/mean values of some electrical parameters). All the electric quantities can be displayed by pressing the corresponding scan keys.

**DMTME-I-485-96:** multimeter for panel mounting with the same characteristics as the previous model, but with a RS485 serial interface (with galvanic insulation) and two outputs for use either to generate pulses proportional to the count of active and reactive energy consumption, or to generate alarms on the main electrical parameters being measured. This instrument is ideal for the realization of monitoring networks and for the storage of the different consumption levels.

## Main functions

- Scan of the measures and indication of the electric quantity, displayed by the switching on of the corresponding LED
- Dimensions: 96x96 mm
- True RMS measurements
- High accuracy of the measurements thanks to “oversampling” techniques and automatic calibration processes
- 68 total measurements with power analyser functions
- Possibility to select from the setup menu the “default displayed page”, visualized after about 1 minute of inactivity
- Automatic detection of CTs current flow direction

Only for the DMTME-I-485-96 model

- Generation Two outputs, for use either to generate pulses proportional to the count of active and reactive three-phase energy and proportional to an energy consumption which can be selected by the user, or to generate single-threshold alarms on the main electrical parameters being measured.
- RS485 serial interface



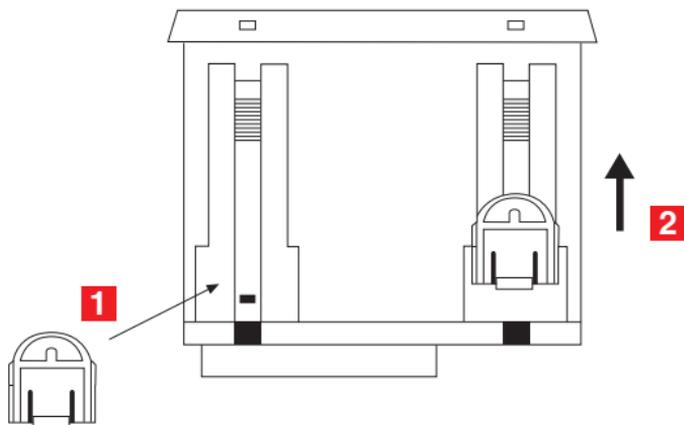
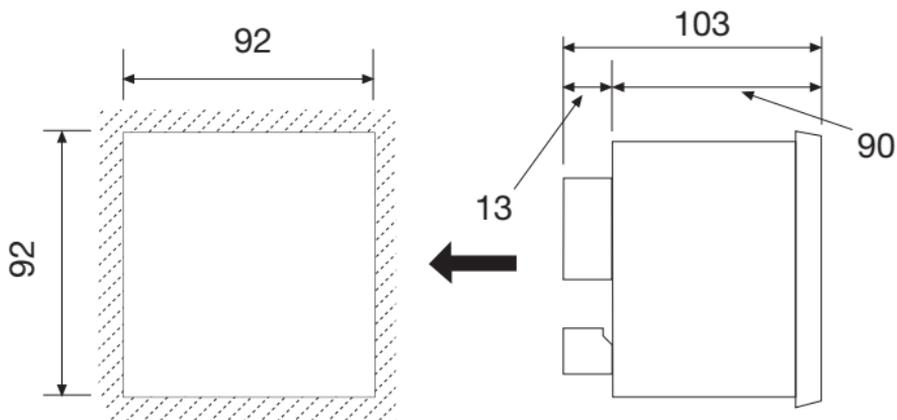
### Bogotá Sala de Ventas

Carrera 12 No 13 - 46  
PBX: 6013360755 - 6013412439  
Celular: 312 3055335

### Centro de Distribución

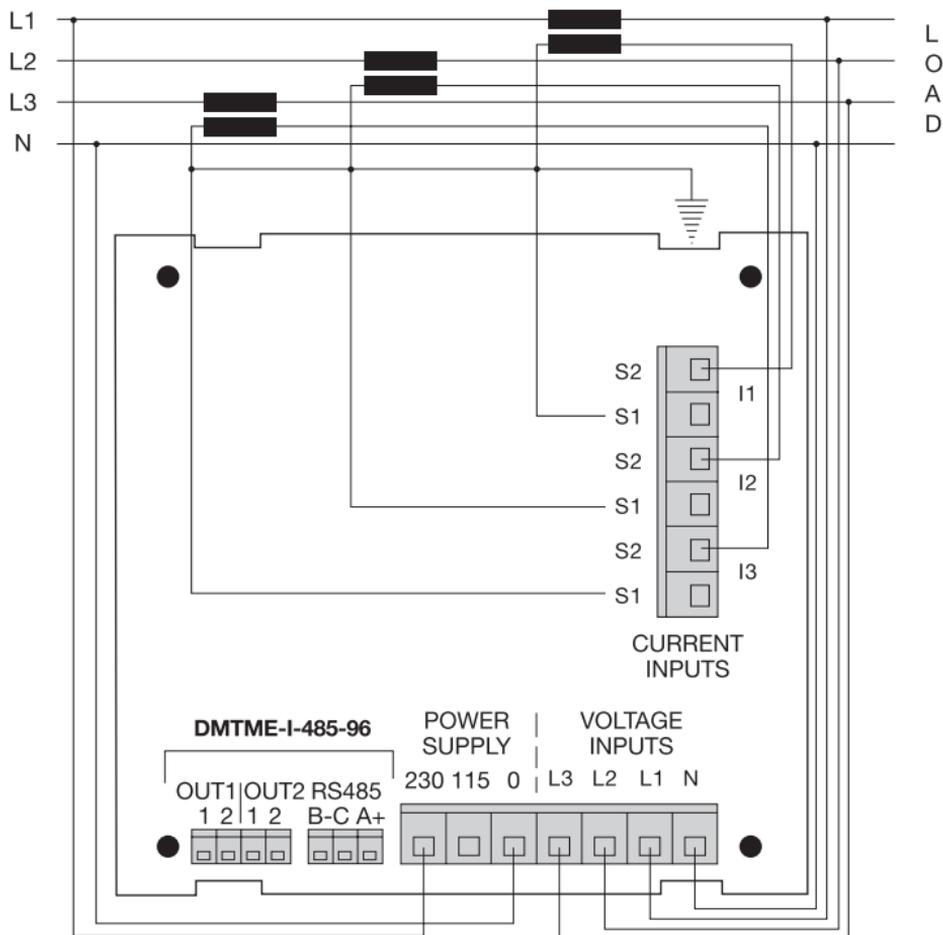
Carrera 18 No 19A - 36  
PBX: 6013360755 EXT: 2101

## Assembly instructions

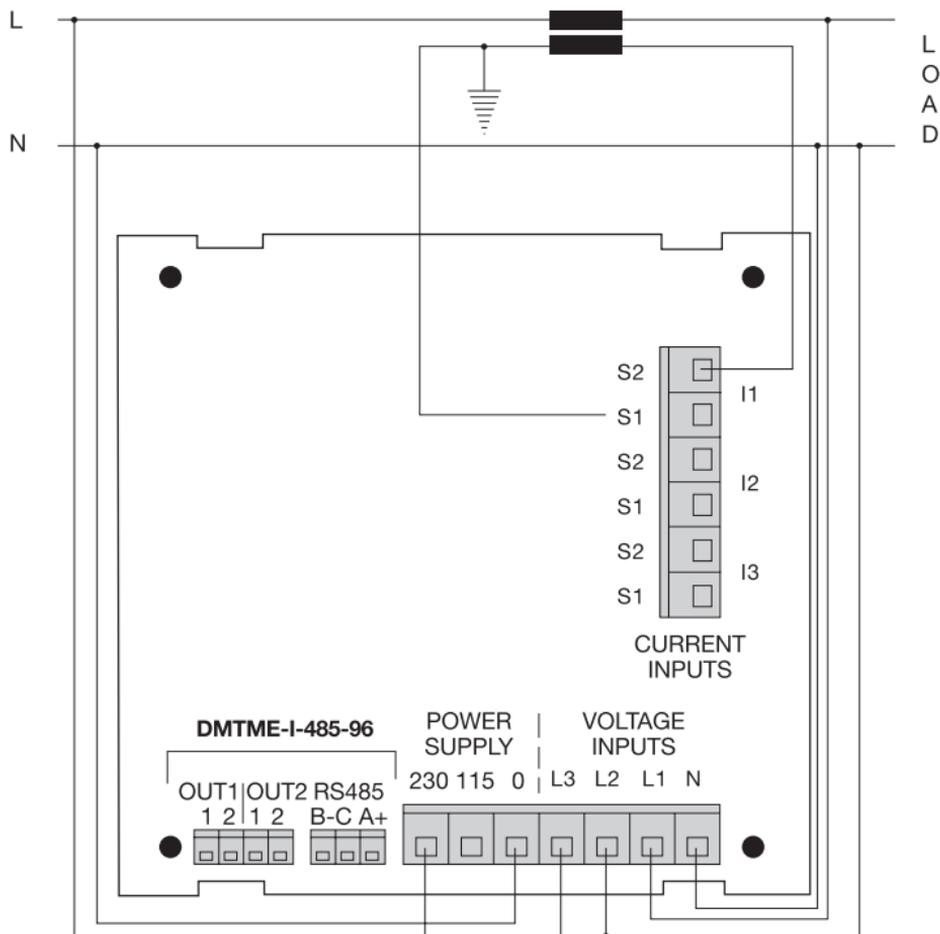


- Introduce the instrument into the hole on the panel to have instrument bezel striking the panel
- Fit the red clips into the casing slots [1]
- Push clips fully inside [2] to have instrument bezel tightly striking the panel, so that clips are locked into the knurled section of the case (to unlock the clips, pull their vertical tab outwards; the detent will be released from the knurled section and clips are moved into the case slots)

## Examples of connections

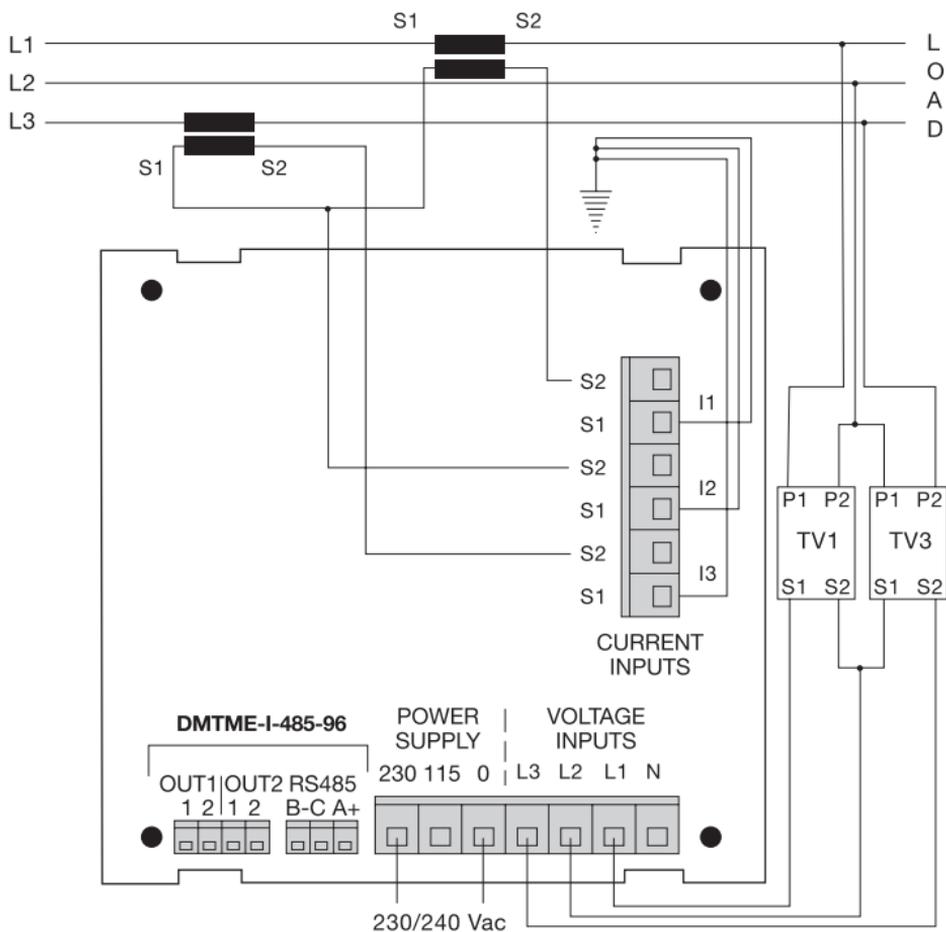


***LV three-phase connection with neutral***



***LV single-phase connection with neutral***

**NOTE:** in single-phase connections the phase-to-phase quantities are not significant.



**Three-phase connection without neutral, with 2TA and 2TV**

## Terminal board connections

Pin Power Supply	Description	Pin Voltage Inputs	Description	Pin Current Inputs	Description
0	0 ~ alim.	S2-I1	S2 – input I1	N	N – Voltmeter inp.
115	115 ~ alim.	S1-I1	S1 – input I1	L1	L1 – Voltmeter inp.
230	230 ~ alim.	S2-I2	S2 – input I2	L2	L2 – Voltmeter inp.
		S1-I2	S1 – input I2	L3	L3 – Voltmeter inp.
		S2-I3	S2 – input I3		
		S1-I3	S1 – input I3		

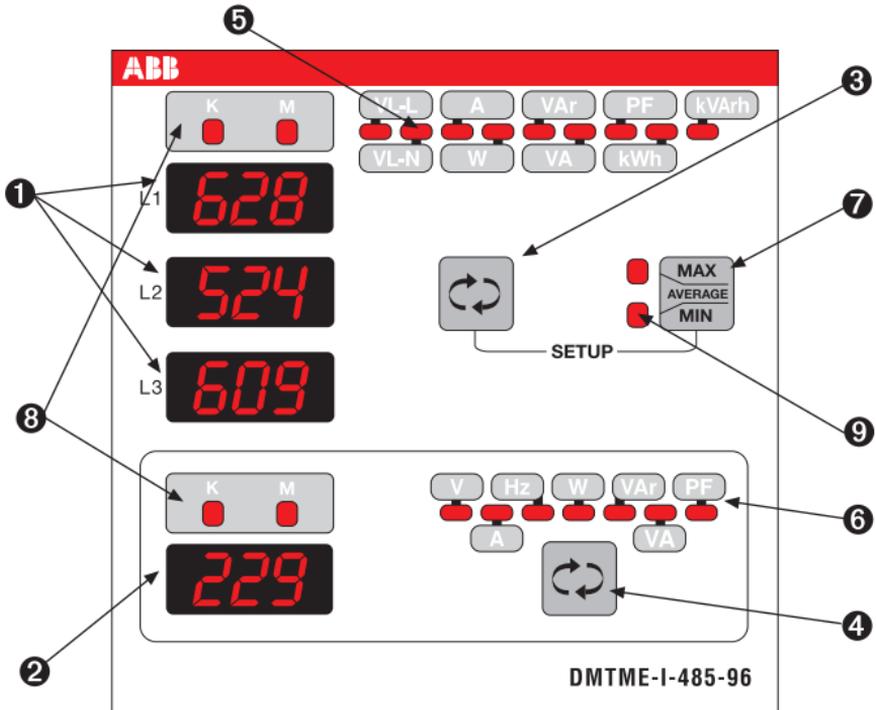
Pin RS485	Description	Pin OUT1-OUT2	Description
A+ (*)	A (+) RS485	OUT1-1 (*)	Pin 1 pulse Output 1
B- (*)	B (-) RS485	OUT1-2 (*)	Pin 2 pulse Output 1
C (*)	Shield	OUT2-1 (*)	Pin 1 pulse Output 2
		OUT2-2 (*)	Pin 2 pulse Output 2

<sup>(\*)</sup> Terminals A+, B-, C, OUT1-1, OUT1-2, OUT2-1 AND OUT 2-2 are meaningful only for the DMTME-I-485-96 model.

**NOTE:** CURRENT INPUTS connector consists of a pull-out terminal that can be screw-locked onto the instrument; therefore, the terminal board should be locked after installation to prevent that it is accidentally removed.

Terminal size: 2,5 mm<sup>2</sup> (except for RS485 and OUT1 and OUT2 outputs).

# Instrument description



- **1** L1, L2, L3 Display for the visualization of the electrical parameters of each single phase, of the energy counters and time counters (energy and time counters values are viewed in ascending sequence on L1, L2 and L3 displays). The lighting point, on the right of the third display (L3), flashes during the RS485 communication (only for the DMTME-I-485-96 model)
- **2** 4<sup>th</sup> display for the visualization of the electrical parameters of the three-phase system
- **3** Key for the scan of the electrical parameters of each single phase and of the energy counters, visualized on the L1, L2, L3 displays (**1**), if you press it and hold down, the previous page will be displayed

- **4** Key for the scan of the three-phase electrical parameters, visualized on the 4<sup>th</sup> display (**2**) and of the time counters, if you press it and hold down, the previous page will be displayed
- **5** 9 LEDs for the identification of the electrical parameters displayed on the first three L1, L2, L3 displays (**1**)
- **6** 7 LEDs for the identification of the electrical parameters displayed on the 4<sup>th</sup> display (**2**)
- **7** Key for the set up of the display of the electrical parameters maximum values (LED MAX **9** switched on), minimum values (LED MIN **9** switched on) and mean values – calculated on a time interval of 15 minutes - (AVERAGE, LED MIN and MAX **9** switched on simultaneously). When the LED showing the selected type of visualization is switched on, it will be possible to scan in sequence the different electrical parameters by pressing **3** and **4** keys
- **8** LED for the identification of the electrical parameters scale displayed on both instrument's displays **1** and **2** ( K factors= kilo, parameter x 1.000, M = mega, parameter x 1.000.000)
- **9** LED for the identification of the max/min/mean values visualized on the displays **1** and **2**
- **3** + **7** By pressing these keys together, it will be possible to enter the configuration menu (*setup*)

## Instrument configuration menu (setup)

To enter the instrument configuration menu press **3** and **7** keys simultaneously, when the writing **“SETUP”** is visualized on the first three displays, press the **4** key.

- In the configuration menu the keys have the following function:
- **3** **Increases** the selected parameter (fast scroll if hold down); in the reset pages it allows the reset of the selected parameters
- **7** **Decreases** the selected parameter (fast scroll if hold down)
- **4** Confirms the modification and **steps to the next page**; if you press it and hold down the previous page will be displayed

The displayed pages (in sequence) in the configuration menu are the following:

- **“Ct rAt”**: setting of the CTs (KA) transformation ratio, variable in the range  $1 \div 1250$ , factory default value 1. For example if you have a 800/5A CT, you must enter the value 160
- **“Ut rAt”**: setting of the VTs (KV) transformation ratio, variable in the range  $1 \div 500$ , factory default value 1
- **“PULSE”** *only for DMTME-I-485-96 model*: possible values 10, 100, 1.00K (1000) or 10.0K (10000)Wh/pulse (VArh/pulse), factory default value 10. Output O1 = kWh count, output O2 = kVArh count. Active pulses only on outputs where the alarms function is disabled (dO1 = OFF, dO2 = OFF)
- **“dO1 ALr”**: *only for DMTME-I-485-96 model*: selection of the quantity for the alarm relating to output O1; OFF = alarm disabled (default). Selected quantities also identified by corresponding led coming on. HI = top threshold exceeded, LO = bottom threshold exceeded. Example: dO1 HI L1 (led VL-N on) = alarm tripped on phase voltage L1 (VL1-N) when value measured is higher than preset threshold
  - **“dO1 th”**: threshold setting for selected quantity
  - **“dO1 dLy”**: setting for delay in seconds for enabling (and resetting) output O1 after an alarm has occurred, default 10
- **“dO2 ALr”**: *only for DMTME-I-485-96 model*: selection of the quantity for the alarm relating to output O2; OFF = alarm disabled (default). Selected quantities also identified by corresponding led coming on. HI = top threshold exceeded, LO = bottom threshold exceeded. Example: dO2 HI L1 (led VL-N on) = alarm tripped on phase voltage L1 (VL1-N) when value measured is higher than preset threshold
  - **“dO2 th”**: threshold setting for selected quantity
  - **“dO2 dLy”**: setting for delay in seconds for enabling (and resetting) output O2 after an alarm has occurred, default 10
- **“PrOt”** *only for DMTME-I-485-96 model*: selection of the communication protocol for the RS485 serial interface; 0 = ASCII protocol (reserved for internal use only), 1 = Modbus-RTU protocol, factory default value 1
- **“Id Adr”** *only for DMTME-I-485-96 model*: instrument address for the communication with the RS485 serial interface, variable in the range  $1 \div 247$  (Modbus-RTU protocol) and  $1 \div 98$  (ASCII protocol), factory default value 31

- “**bAUd**” only for DMTME-I-485-96 model: communication speed of the RS485 serial interface; it is possible to set the following values: 2.4, 4.8, 9.6, 19.2, where the numeric values correspond respectively to 2400bps, 4800bps, 9600bps and 19200bps, factory default value 9600bps (8 bit)
- “**PARitY**” only for DMTME-I-485-96 model: it is possible to set the following values: O = odd, E = even, n = none; factory default value n
- “**StOP**” only for DMTME-I-485-96 model: stop bits; it is possible to set the following values: 1, 2 (with Parity = n), 1 (with Parity = O, E, n); factory default value 1
- “**PAG 1.2.3.**” and “**PAG 4.**”: setting of the default displayed page number, 0 ÷ 15 on the first three displays, factory default value 1 and 0 ÷ 7 on the 4th display, factory default value 1; 0 = it remains the last selected page
- “**t2**”: setting (in hours) of the count-down value of the t2 hours counter, factory default value 8760.00 (1 year)
- “**rESEt PEA**” (*PEAK = Peak Values*): reset of the maximum and minimum values (to reset see note below)
- “**rESEt AUG**” (*AVG = Average*): reset of the mean values (to reset see note below)
- “**rESEt En**” (*En = Energies*): reset of the energy counters (to reset see note below)
- “**rESEt t1**”: reset of the t1 hours counter (to reset see note below)
- “**rESEt ALL**”: restores the default configurations and resets all parameters (min/max values, mean values, energies, t1 counter) - to reset see note below-
- “**rEL**”: revision of the instrument firmware

**NOTE:**

- **to perform** the above mentioned **resets**, on the corresponding page, press and hold down for some seconds the  key until the “**-C- -L- -r-**” writing appears on the first three displays.
- the peak values, the mean values, the energy counters value and the value of the t1 and t2 counters are stored in the instrument’s memory also in case of power failure.

# Measured electric quantities

(The indication  $\Sigma$  is referred to the three-phase measurement of the considered electric quantity)

Voltage between phases ( <b>VL-L</b> )	VL1-L2, VL2-L3, VL3-L1
Phase and three-phase system voltage ( <b>VL-N</b> and $\Sigma V$ )	VL1-N, VL2-N, VL3-N, $\Sigma V$
Phase and three-phase system current ( <b>A</b> and $\Sigma A$ )	I1, I2, I3, $\Sigma I$
Frequency	Hz
Phase and three-phase system active power ( <b>W</b> and $\Sigma W$ )	W1, W2, W3, $\Sigma W$
Phase and three-phase system reactive power ( <b>VAr</b> and $\Sigma VAr$ )	VAr1, VAr2, VAr3, $\Sigma VAr$
Phase and three-phase system apparent power ( <b>VA</b> and $\Sigma VA$ )	VA1, VA2, VA3, $\Sigma VA$
Power factor/phase and three-phase system $\cos\phi$ , with relevant conventional sign (+ = Inductive, - = Capacitive)	PF1, PF2, PF3, $\Sigma PF$
Phase and 3-phase system active and reactive energy counters (phase-to-phase view on displays L1, L2 and L3)	KWh-L1, KWh-L2, KWh-L3, $\Sigma kWh-3P$ , KVArh-L1, KVArh-L2, KVArh-L3, $\Sigma KVArh-3P$
<b>DISPLAYED MAX. VALUES</b>	
Phase voltage ( <b>VL-N</b> )	VL1-N, VL2-N, VL3-N (MAX)
Phase current ( <b>A</b> )	I1, I2, I3 (MAX)
Phase and three-phase system active power ( <b>W</b> and $\Sigma W$ )	W1, W2, W3, $\Sigma W$ (MAX)
Phase and three-phase system reactive power ( <b>VAr</b> and $\Sigma VAr$ )	VAr1, VAr2, VAr3, $\Sigma VAr$ (MAX)
Phase and three-phase system apparent power ( <b>VA</b> and $\Sigma VA$ )	VA1, VA2, VA3, $\Sigma VA$ (MAX)
<b>DISPLAYED MIN. VALUES</b>	
Phase voltage ( <b>VL-N</b> )	VL1-N, VL2-N, VL3-N (MIN)
Phase current ( <b>A</b> )	I1, I2, I3 (MIN)
Three-phase active power ( $\Sigma W$ )	$\Sigma W$ (MIN)
Three-phase reactive power ( $\Sigma VAr$ )	$\Sigma VAr$ (MIN)
Three-phase apparent power ( $\Sigma VA$ )	$\Sigma VA$ (MIN)
<b>DISPLAYED MEAN VALUES (INTEGRATION PERIOD 15 MINUTES)</b>	
Phase and three-phase system active power ( <b>W</b> and $\Sigma W$ )	W1, W2, W3, $\Sigma W$ (AVG)
Phase and three-phase system reactive power ( <b>VAr</b> and $\Sigma VAr$ )	VAr1, VAr2, VAr3, $\Sigma VAr$ (AVG)
Phase and three-phase system apparent power ( <b>VA</b> and $\Sigma VA$ )	VA1, VA2, VA3, $\Sigma VA$ (AVG)
<b>TIME COUNTERS (continuous viewing on L1, L2 and L3 displays)</b>	
"Free-running" hours counter (hours and minutes); it can be reset from the setup menu	
"Count-down" hours counter (hours and minutes) for maintenance reminder (when the counter reaches zero, it shows negative values, indicating the delay time from the programmed expiry time).	
<b>QUANTITIES SELECTABLE FOR ALARMS (only applicable to DMTME-I-485-96)</b>	
Phase-to-phase voltage ( <b>VL-L</b> )	VL1-L2, VL2-L3, VL3-L1
Phase and 3-phase system voltage ( <b>VL-N</b> and $\Sigma V$ )	VL1-N, VL2-N, VL3-N, $\Sigma V$
Phase and 3-phase system current ( <b>A</b> and $\Sigma A$ )	I1, I2, I3, $\Sigma I$
Phase and 3-phase system active power ( <b>W</b> and $\Sigma W$ )	W1, W2, W3, $\Sigma W$
Phase and 3-phase system reactive power ( <b>VAr</b> and $\Sigma VAr$ )	VAr1, VAr2, VAr3, $\Sigma VAr$
Phase and 3-phase system apparent power ( <b>VA</b> and $\Sigma VA$ )	VA1, VA2, VA3, $\Sigma VA$
Phase and 3-phase system power factor ( $\cos\phi$ )	PF1, PF2, PF3, $\Sigma PF$
"Count-down" hour counter	

**NOTE:** In case, on the first installation or further to wrong operations or particular events or due to a faulty non-volatile memory (E2prom), the instrument should stop and show a page visualizing, on the first three displays, the "INI" writing followed by an internal identification code, press any key to reset the default parameters, which may be changed by the user as required.

# Technical characteristics

<b>DIMENSIONS AND WEIGHT</b>			
Dimension	96 mm x 96 mm x 103 mm (LxHxW), IEC 61554		
Weight	About 500 g		
<b>PROTECTION</b>	IP50 on the front panel, IP20 on the terminal boards		
<b>POWER SUPPLY</b>			
<i>Voltage</i>	<i>Frequency</i>	<i>Power Consumption</i>	<i>Fuse</i>
230V rms (+15% -10%)	45 ÷ 65Hz	< 6VA	Fit external fuse 0,1A
240V rms (+10% -15%)			
115V rms (+15% -10%)			
120V rms (+10% -15%)			
<b>VOLTMETER INPUTS</b>			
Range	10 ÷ 500V rms (L-N)		
Max non-destructive value	550V rms		
L-N input impedance	Greater than 8MΩ		
<b>AMMETER INPUTS (USE ALWAYS EXTERNAL CTs)</b>			
Range	50mA ÷ 5A rms		
Overload	1,1 permanent		
Max dispersed power	1,4VA (with I <sub>max</sub> = 5A rms, for each phase input)		
Type of measurement	Current measurement by internal shunts, using <b>external CTs</b>		
Direction of CTs current	Detection and automatic adjustment at power up, independent for each phase		
<b>DIGITAL OUTPUTS</b>			
Pulse duration: 50ms OFF (min)/50ms ON	Max frequency: 10 pulses/sec		
V <sub>max</sub> on contact: 48V (peak DC or AC)	I <sub>max</sub> on contact: 100mA (peak DC or AC)		
W <sub>max</sub> dissipatable: 450mW	Isolation: 750Vmax		
<b>ACCURACY OF THE MEASUREMENT</b>			
Voltage	±0,5% F.S. ±1 digit in the range 10Vac+500Vac rms VL-N		
Current	±0,5% F.S. ±1 digit in the range 50mA+5A rms		
Active power	±1% ±0,1% F.S. (from cosφ= 0,3 Ind. to cosφ= -0,3 Cap.)		
Frequency	40.0 ÷ 99.9Hz:	±0,2% ±0,1Hz	
	100 ÷ 500Hz:	±0,2% ±1Hz	
<b>ENERGY COUNT</b>			
Maximum value for the single-and three-phase energy	4294,9 MWh (MVArh) with KA = KV = 1		
Accuracy	Class 1		
<b>OPERATIVE CONDITIONS</b>			
Operating temperature	0°C ÷ 50°C		
Storage temperature	-10°C ÷ 60°C		
Relative humidity	90% max. (without condense) at 40°C		
<b>NORMATIVE REFERENCES</b>			
<b>ELECTRICAL SAFETY</b>			
EC directive No. 73/23/CEE regarding "Low Voltage" (Low-Voltage Directive)			
<b>ELECTROMAGNETIC COMPATIBILITY</b>			
EC directive No. 89/336/CEE regarding the "Electromagnetic Compatibility"			

# Configuration menu

PARAMETERS	POSSIBLE VALUES	FACTORY DEFAULT
VT transformation ratio	1 ÷ 500	1
CT transformation ratio	1 ÷ 1250	1
Pulses programming value <sup>(1)</sup>	10, 100, 1.000, 10.000 Wh/imp (VArh/imp)	10
Quantities selectable for alarm on output OUT1 and/or OUT2 <sup>(1)</sup>	OFF, V12, V23, V31, VL1-N, VL2-N, VL3-N, ΣV, I1, I2, I3, ΣI, W1, W2, W3, ΣW, VAr1, VAr2, VAr3, ΣVAr, VA1, VA2, VA3, ΣVA, PF1, PF2, PF3, ΣPF, counter t2 (OFF = alarm disabled)	OFF
Alarm threshold for outputs OUT1 and/or OUT2 relating to the selected quantity <sup>(1)</sup>	Depending on measurement range of selected quantity	Approx. half the full scale of the selected quantity
Delay for enabling output OUT1 and/or OUT2 in the event of an alarm <sup>(1)</sup>	1 ÷ 900 (seconds)	10
Type of serial protocols <sup>(1)</sup>	0 = ASCII reserved for internal use only 1 = Modbus-RTU	1
Analyzer's address <sup>(1)</sup>	ASCII Prot.: 1 ÷ 98 Modbus-RTU Prot.: 1 ÷ 247	31
Baud rate for the RS485 serial interface line <sup>(1)</sup>	2.4, 4.8, 9.6, 19.2 (es. 9.6 is related to 9600bit/s)	9.6
Parity for the RS485 serial interface line <sup>(1)</sup>	O = odd, E = even, n = none	n
Stop bits for the RS485 serial interface line <sup>(1)</sup>	1, 2 (with Parity = n), 1 (with Parity = O, E, n)	1
PAG 1.2.3. (default page of the first three displays)	0 ÷ 15 (0 = it remains the last displayed page)	1
PAG 4. (default page of the 4th display)	0 ÷ 7 (0 = it remains the last displayed page)	1
"Free-running" counter hours and minutes - t1	The counter can be reset from the configuration menu	The counter works in the range: 0 ÷ 10000000 (hours) (about 1140 years)
"Count-down" counter hours and minutes - t2	Starting setting in hours: 1 ÷ 32000 (3,5 anni circa)	8760 hours (1 year)
Calculation period for mean values	-	15 minutes

<sup>(1)</sup> only for DMTME-I-485-96 model

## Rev. D (for Firmware rel. 1.13 and higher)

In consideration of the evolution of the standards and products, the company reserves the right to modify at any time the features of the product described in this literature, we recommend therefore to always verify them beforehand.

