DEIF

-power in control

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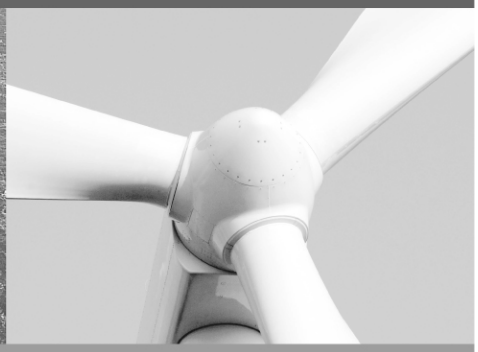
DATA SHEET



Multi-transducer, MTR-3

Measurement input, auto range

- Up to 1000 V AC $_{L-L}$
- Up to 12.5 A (sinusoidal)
- 16…400 Hz

Output

- Up to four analogue outputs
- Relay output
- RS 485 Modbus communication

Response time

- < 200 ms (standard analogue output)
- ≤ 50 ms (FAST analogue output)
- Data refresh time 50 ms

Accuracy, power/U, I

- Analogue output, 0.5/0.3
- Communication, 0.3/0.2

Universal auxiliary power

- 24-300 V DC
- 40-276 V AC

Easy programming

- Free utility software M-Set
- By USB, no aux. supply required

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General information

Application and overview

The MTR-3 is intended for measuring and monitoring single-phase or three-phase electrical power network. The MTR-3 measures RMS value by means of fast sampling of voltage and current signals, which makes the instrument suitable for acquisition of transient events. A built-in microcontroller calculates measurements (voltage, current, frequency, energy, power, power factor, THD phase angles, etc.) from the measured signals.

Features

- Measurements of instantaneous values of more than 50 quantities (V, A, kW, kVA, kVAr, kWh, kVArh, PF, Hz, MD thermal, THD, etc)
- Power accuracy class 0.5 (0.3)
- Serial communication, RS485 up to 115,200 bit/s
- Modbus communication protocol
- Up to four analogue outputs, and two fast analogue outputs
- Single wide auxiliary power supply range 24-300 V DC, 40-276 V AC
- Automatic range of nominal current and voltage (max. 12.5 A and 600 VL-N)
- Housing for DIN rail mounting
- User-friendly configuration software

Standard compliance

Standard	**Description**
EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use
EN 60688	Electrical measuring transducers for converting AC electrical variables into analogue and digital signals
EN 61000-6-2	Electromagnetic compatibility (EMC) – Immunity for industrial environments
EN 61000-6-3	Electromagnetic compatibility (EMC) – Emission standard for light industry and residentials
EN 60 529	Degrees of protection provided by enclosures (IP code)
EN 60 068-2-1/ -2/ -6/ -27/-30	Environmental testing (-1 Cold, -2 Dry heat, -30 Damp heat, -6 Vibration, -27 Shock)
UL 94	Tests for flammability of plastic materials for parts in devices and appliances

Application

The MTR-3 multi-function transducer is used for measuring and monitoring of all single-phase or three-phase values. The range of I/O modules makes MTR-3 a perfect choice for numerous applications. MTR-3 supports standard serial communication RS485 with speed up to 115,200 baud, which is perfect for simple applications and serial bus interfacing.

Additional USB 2.0 interface can be used for a fast set-up without need for auxiliary power supply. This interface is NOT galvanically separated from power input and can be used ONLY unconnected to power inputs.

Programming

The MTR-3 multi-function transducer is completely programmable by M-Set utility software.

Primary-secondary ratio (U, I), energy counter, input and output values are all programmed by setting software on the USB or the RS485 communication.

It is possible to choose between several standard output value ranges (100…0…100 %):

-10…0…10 V,
-1…0…1 V,
-20…0…20 mA,
10…0…10 mA,
5…0…5 mA,
1…0…1 mA,.

Within these six ranges, it is possible to set any linear or bent (with maximum 5 break points) output characteristic.

Technical information

Technical data

Accuracy			
Measured values	Range		Accuracy class*
Rms current (I1, I2, I3, Iavg, In)	1, 5 A		0.3 (0.2)**
Maximum current	12.5 A		0.3 (0.2)**
Rms phase voltage (U1, U2, U3, Uavg)	62.5, 125, 250, 500 V $_{L-N}$		0.3 (0.2)**
Maximum voltage	600 V $_{L-N}$		0.3 (0.2)**
Rms phase-to-phase voltage (U12, U23, U31, Uavg)	800 V $_{L-L}$		0.3 (0.2)**
Frequency (f) − actual	50/60 Hz		0.02
Nominal frequency range	16…400 Hz		0.02
Power angle (φ)	−180…0…180°		0.2°
Power factor (PF)	−1…0…+1 U = 50 … 120 % U_n I = 2 % … 20 % I_n I = 20 % … 200 % I_n		 0.5 0.2
THD	5…500 V 0…400 %		0.5
Active power	75 120 250 500 [W/VAr/VA] I_n = 1 A	375 600 1250 2500 [W/VAr/VA] I_n = 5 A	0.5 (0.3)**
Reactive power			0.5 (0.3)**
Apparent power			0.5 (0.3)**
Active energy			Class 1
Reactive energy			Class 2

* All measurements are calculated with high harmonic signals.
** Accuracy on communication

Inputs		
Voltage inputs	Nominal range values	62.5, 125, 250, 500 V_{LN}
	Nominal voltage (U_N)	500 V_{LN}
	Minimal measurement	2 V sinusoidal
	Frequency range	50/60, 400 Hz*
	Max. measured value (cont.)	600 V_{LN} ; 1000 V_{LL}
	Max. allowed value acc. to IEC/EN 60 688	2 × U_N ; 10 s
	Consumption	< U^2/3.3 MΩ per phase
	Input impedance	3.3 MΩ per phase
Current inputs	Nominal range values	1, 5, or 10 A
	Nominal current (I_N)	5 A
	Min. measurement	Settings from starting current for all powers**
	Frequency range	50/60, 400 Hz*
	Max. measured value	12.5 A sinusoidal
	Max. allowed value (thermal)	15 A cont.
	acc. to IEC/EN 60 688	20 × I_N ; 5 × 1s
	Consumption	< I^2 × 0.01 Ω per phase
Frequency	Nominal frequency (f_N)	50, 60 Hz
	Measuring range	16…400 Hz***
Power Supply Universal	Nominal voltage AC	40 … 276 V
	Nominal frequency	45 … 65 Hz
	Nominal voltage DC	24 … 300 V
	Consumption	< 8 VA
	Power-on transient	< 20 A; 1 ms

* MTR-3 for 400 Hz voltage/current measurements need to be calibrated, available by special request.
** Starting current is set by setting software M-Set/settings/general
*** For frequency measurement only

Analogue outputs		
Analogue output **General**	Linearisation	Linear, quadratic
	No. of break points	5
	Output value limits	± 120 % of nominal output
	Response time	< 200 ms (standard analogue output) ≤50 ms (FAST analogue output)
	Residual ripple	< 1 % p.p. (only for standard output)
DC Current **Output**	Output range values	–100…0…100 %
	-1…0…1 mA	Range 1
	-5…0…5 mA	Range 2
	-10...0...10 mA	Range 3
	-20...0...20 mA	Range 4
	Other ranges	possible by M-Set software
	Burden voltage	10 V
	External resistance	RB_{max} =10 V/I_{outN}
DC Voltage **Output**	Output range values	–100…0…100 %
	-1…0…1 V	Range 5
	-10…0…10 V	Range 6
	Other ranges	possible by M-Set software
	Burden current	20 mA
	External resistance	RB_{min}= U_{outN}/20 mA

Relay outputs		
Electromechanical relay output	Purpose	alarm, pulse, general purpose digital output
	Type	Electromechanical relay switch
	Rated voltage	48 V AC/DC (+40 % max)
	Max. switching current	1000 mA
	Contact resistance	≤ 100 mΩ (100 mA, 24 V)
	Pulse	Max. 4000 imp/hour
	(if used as pulse output)	Min. length 100 ms
	Insulation voltage	
	Between coil and contact	4000 V DC
	Between contacts	1000 V DC

Connection

Permitted conductor cross-sections

Terminals	Max. conductor cross-sections
Voltage inputs (4)	2.5 mm^2 with pin terminal
	4 mm^2 solid wire
Current inputs (6)	2.5 mm^2 with pin terminal
	4 mm^2 solid wire
Power supply (2)	2.5 mm^2 with pin terminal
	4 mm^2 solid wire
Analogue outputs (0/4/6/8)	2.5 mm^2 with pin terminal
	4 mm^2 solid wire
Relay outputs (0/4/6/8)	2.5 mm^2 with pin terminal
	4 mm^2 solid wire

Communication

Type	RS485	USB
Type of connection	Network	Direct
Max. connection length	1000 m	3 m
Number of bus stations	≤ 32	–
Terminals	Screw terminals	USB-mini
Insulation	Protection class I, 3.3 kV AC RMS 1 min	NO INSULATION!
Transfer mode	Asynchronous	
Protocol	Modbus RTU	
Transfer rate	2,400 to 115,200 bit/s	USB 2.0

Electronic features

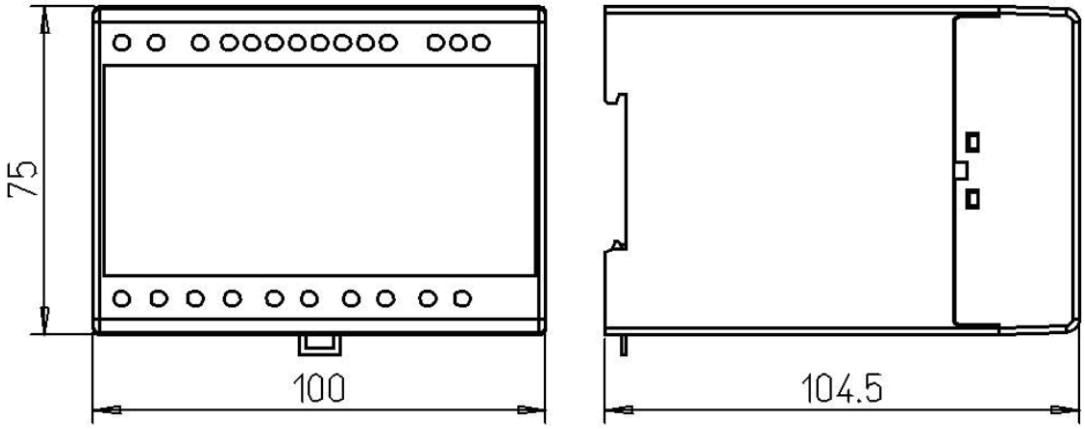
Response time input→ communication	All calculations are averaged over an interval of between 8 to 256 periods. Preset interval is 64 periods, which is 1.28 second at 50 Hz. Modbus table refresh time: 50 ms
Status LEDs PWR	Red = instrument power ON

Safety features	
Protection	Protection class II
Pollution degree	2
Installation category	CAT III; 600 V meas. inputs acc. to EN 61010-1
	CAT III; 300 V aux. supply acc. to EN 61010-1
Test voltages **Acc. to EN 61010-1**	UAUX↔AO, COM: 3320 V AC-RMS
	UAUX↔U, I inputs: 3320 V AC-RMS
	U, I in↔AO,COM: 3320 V AC-RMS
	U in↔I in: 3320 V AC-RMS
EMC	Directive on electromagnetic compatibility 2004/108/EC Acc. to EN 61000-6-2 and EN 61000-6-4
Enclosure material	PC/ABS
Flammability	Acc. to UL 94 V-0
Weight	370 g

Mechanical	
Dimensions	W100 × H75× D105 mm
Max. conductor cross section for terminals	2.5 mm2 stranded wire
	4 mm2 solid wire
Vibration withstand	IEC 60068-2-6, ± 1 mm/0.7 g
Shock withstand	IEC 60068-2-27, 50 g
Mounting	Rail mounting 35 × 15 mm
	acc. to DIN EN 50 022
Enclosure material	PC/ABS
Flammability	Acc. to UL 94 V-0
Weight	370 g

Ambient conditions	
Ambient temperature	usage group III
	-10…0…45…55 °C
	Acc. to IEC/EN 60 688
Operating temperature	-30 to +70 °C
Storage temperature	-40 to +70 °C
Average annual humidity	≤ 93 % r.h.

Unit dimensions



Dimensions are given in mm (inches).

Order specifications

Name	Output				RS 485	DEIF no.	EAN no.
	1	2	3	4			
MTR-3-015					X	1200510001	5703727110315
MTR-3F-215	FAO	FAO			X	1200510002	5703727110322
MTR-3-315	AO	AO	AO		X	1200510003	5703727110339
MTR-3-415	AO	AO	AO	AO	X	1200510004	5703727110346
MTR-3-015 TC					X	1200510005	5703727116157
MTR-3F-315	FAO	FAO	FAO		X	1200510006	5703727116164
MTR-3F-415	FAO	FAO	FAO	FAO	X	1200510007	5703727116171
MTR-3	RO	RO	AO		X	1200510017	

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