DATA SHEET

MTR-4

Multi-transducer

General information

Application and overview

The MTR-4 is intended for measuring and monitoring single-phase or three-phase electrical power network. The MTR-4 measures RMS values 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, and so on) 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, and so on)
- Power accuracy class 0.5 (0.4)
- Serial communication, RS-485 up to 115,200 bit/s optional
- Modbus communication protocol
- Up to four analogue outputs or two relay outputs
- Single wide auxiliary power supply range 20 to 300 V DC, 48 to 276 V AC (tolerances included)
- Automatic range of nominal current and voltage (max. 12.5 A and 600 V_{L-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 61000-6-4	Electromagnetic compatibility (EMC) – Emission standard for industrial environments
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, -6 vibration, -27 shock, -30 damp heat)
UL 94	Tests for flammability of plastic materials for parts in devices and appliances

Application

The MTR-4 multi-function transducer is used for measuring and monitoring all single-phase or three-phase values. The range of I/O modules makes MTR-4 a perfect choice for numerous applications. MTR-4 supports standard serial communication RS-485 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 setup without need for auxiliary power supply. This interface is NOT galvanically separated from power input and can be used ONLY unconnected to power inputs.

The variants with relay output is an easy shortcut to bring your existing wind turbine application in compliance with the GL demand for redundant power measurement.

Programming

The MTR-4 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 RS-485 communication.

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

-10 to 0 to 10 V,
-1 to 0 to 1 V,
-20 to 0 to 20 mA,
10 to 0 to 10 mA,
5 to 0 to 5 mA,

1 to 0 to 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 to 400 Hz		0.02
Power angle (φ)	−180 to 0 to 180°		0.5°
Power factor (PF)	−1 to 0 to +1 U = 50 to 120 % U_n I = 2 % to 20 % I_n I = 20 % to 200 % I_n		0.5
THD	5 to 500 V 0 to 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 (0.4)**
Reactive power			0.5 (0.4)**
Apparent power			0.5 (0.4)**
Active energy			Class 1
Reactive energy			Class 2

* All measurements are calculated with high harmonic signals.
** Accuracy on RS-485 Modbus values.

Inputs		
Voltage inputs	Nominal range values	62.5, 125, 250, 500 V_{LN} - Auto range
	Nominal voltage (U_N)	500 V_{LN}
	Measuring range (cont.)	2 to 600 V_{LN} (1000 V_{LL}) sinusoidal
	Max. allowed value acc. to IEC/EN 60 688	2 × U_N; 1 sec, 10 times and 10 sec interval
	Frequency range	50/60, 400 Hz*
	Consumption	< U^2/3.3 MΩ per phase
	Input impedance	3.3 MΩ per phase
Current inputs	Nominal range values	1, 5, 10 A – Auto range
	Nominal current (I_N)	5 A
	Measuring range	1 mA to 12.5 A sinusoidal
	Min. measurement (noise reduction)	Settings from **"starting current for all powers"****
	Max. allowed value (thermal)	15 A cont.
	acc. to IEC/EN 60 688	20 × I_N ; 5 × 1s ; 300 ms interval
	Frequency range	50/60, 400 Hz*
	Consumption	< I^2 × 0.01 Ω per phase
Frequency	Nominal frequency (f_N)	50, 60 Hz
	Measuring range	16 to 400 Hz***
Power Supply Universal	Nominal voltage AC	48 to 276 V (tolerances included)
	Nominal frequency	45 to 65 Hz
	Nominal voltage DC	20 to 300 V (tolerances included)
	Consumption	< 8 VA
	Power-on transient	< 20 A; 1 ms

* MTR-4 for 400 Hz voltage/current measurements needs 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	≤ 50 ms
	Residual ripple	< 1 % p.p. (only for standard output)
DC Current **Output**	Output range values	–100 to 0 to 100 %
	-1 to 0 to 1 mA	Range 1
	-5 to 0 to 5 mA	Range 2
	-10 to 0 to 10 mA	Range 3
	-20 to 0 to 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 to 0 to 100 %
	-1 to 0 to 1 V	Range 5
	-10 to 0 to 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

The terminal connections are designed for a maximum conductor cross-section of 2.5 mm^2 with a pin terminal or 4 mm^2 with a solid wire.

Communication

Type	RS-485	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

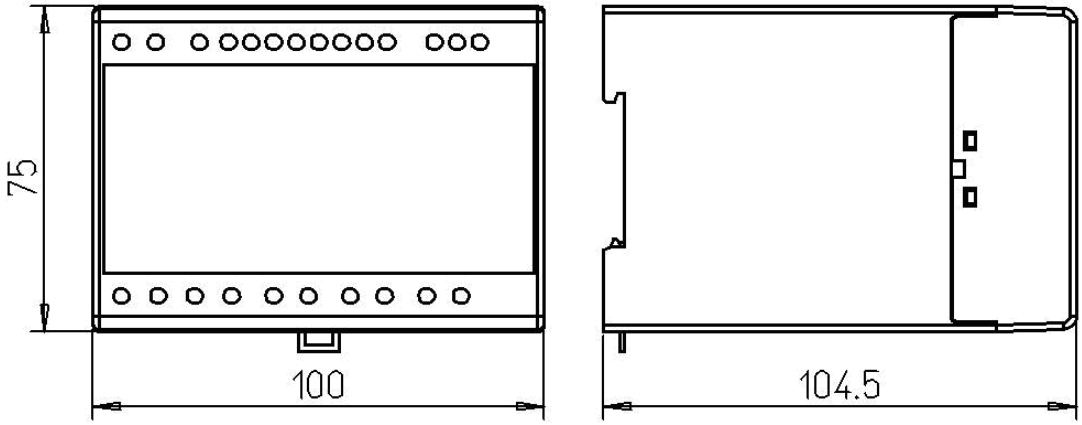
Safety features	
Protection	IP20 acc. to IEC/EN 60529
	Protection class II
Pollution degree	2
Installation category	CAT III; 600 V meas. inputs acc. to EN 61010-1
	CAT III; 300 V aux. supply acc. to EN 61010-1

Galvanic isolation Acc. to EN 61010-1	UAUX↔AO, COM: 3310 V AC, 50 Hz, 60 sec.
	UAUX↔U, I inputs: 3310 V AC, 50 Hz, 60 sec.
	U in↔AO,COM: 3310 V AC, 50Hz, 60sec
	I in↔AO,COM: 2210V AC, 50Hz, 60sec
	U in↔I in: 3310 V AC, 50, 60 sec.

Mechanical	
Dimensions	W100 × H75× D105 mm
Max. conductor cross section for terminals	2.5 mm2 stranded wire
	4 mm2 solid wire
Vibration	IEC 60068-2-6, 3 to 13.2 Hz: 2mmpp. 13.2 to 100 Hz: 0.7 g. To IEC 60068-2-6 & IACS UR E10
Shock	IEC 60068-2-27, 50 g, 11 ms, half sine. To IEC 60068-2-27
EMC	Acc. to EN 61000-6-2 and EN 61000-6-4
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 I
	-5 to 0 to 45 to 55 °C (Accuracy outside reference temperature range is not more than 2x class)
	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.

Order specifications

Name	Output				RS-485	Coating	DEIF no.
	1	2	3	4			
MTR-4-015					X		2962390110.01
MTR-4-105	AO						2962390110.02
MTR-4-215	AO	AO			X		2962390110.03
MTR-4-315	AO	AO	AO		X		2962390110.04
MTR-4-415	AO	AO	AO	AO	X		2962390110.05
MTR-4 2RO, 1AO	RO	RO	AO		X		2962390110.09
MTR-4 2RO, 1AO tropical	RO	RO	AO		X	X	2962390110.11

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