ISKRAEMECO Energy Measurement and Management

ME162

Single-Phase Electronic Meter

Technical Description

Version 1.1, 02.06. 2006

CE

Index:

ISKRAEMECO

Energy Measurement and Management

ME162 – Electronic single-phase time-of-use kWh-meter

The ME162 electronic single-phase meters are designed for measurement and registration of active energy in single-phase two-wire networks for direct connection. The metering and technical properties of the meters comply with the EN 50470-1 and -3 European standards classes A and B as well as with the IEC 62053-21 and IEC 62052-11 (former IEC 61036) international standards for electronic meters of active energy for classes 2 and 1.

A built-in time switch complies with the IEC 62054-21 and IEC 62052-21 standards. It enables energy registration in up to four tariffs.

The meters are designed and manufactured in compliance with the ISO 9001 standard.

ME162 meter properties:

- **Meter of active energy**
  - Accuracy class 1 or 2
  - Accuracy class A or B by EN 50470-1
- **Modes of energy measurement and registration**
  - For one-way energy flow direction (import), with an electronic reverse running stop
  - For two energy flow directions (import, export)
  - For one-way energy flow direction, with always positive registration, i.e. energy flowing in the export direction is registered as it flows in import direction too
- **Meter quality:**
  - Due to high accuracy and long term stability of the metering elements no meter recalibration over its life-time is required
  - Long meter life-time and high meter reliability
  - High immunity to EMC
- **Time-of-use registration (up to 4 tariffs):**
  - Tariffs change-over by internal real-time clock
  - Optional tariff inputs
- **Communication channel:**
  - Infrared optical port in compliance with the IEC 62056-21 for local meter programming and data down-loading
  - CS interface (20-mA current loop - option)
  - IEC 62056 – 21, mode C protocol
- **LCD:**
  - 7-segment, with 8 characters and 7 signal flags
  - Optional no-power data display
- **Data display modes:**
  - Automatic cyclic data display with display time of 8 sec (adjustable)
  - Manual data display mode (by pressing the Scroll push-button)
- **Indicators:**
  - **LCD:**
    - Valid tariff at the moment
    - Meter status and alarms
    - Energy flow direction
  - **LED**:
    - Imp / kWh
- **Pulse output:**
  - Class A by IEC 62053-31 (option)
  - Optomos relay with make contact (option)
- **Plastic meter case:**
  - Made of high quality self-distinguishing UV stabilized material that can be recycled
  - Double insulation
  - IP53 protection against dust and water penetration (by IEC 60529)

1. Meter appearance

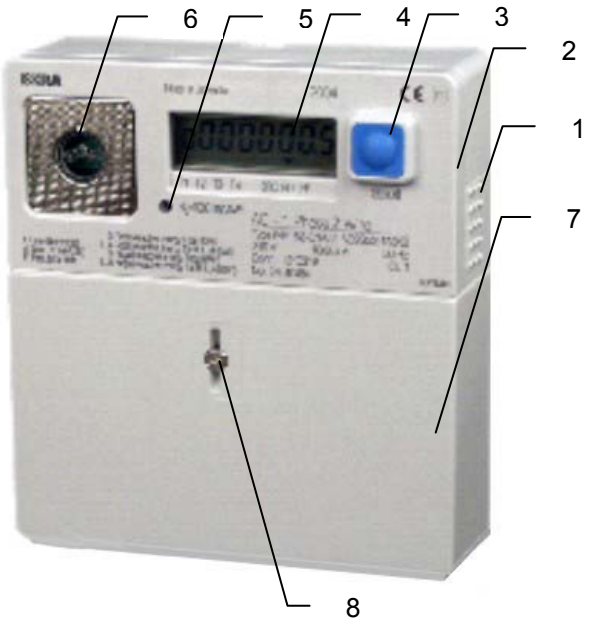


Fig. 1: Meter parts

1. Meter base
2. Meter cover
3. Scroll push-button
4. LCD
5. LED - pulse emitting
6. Optical port
7. Terminal block cover
8. Fixing screw of terminal block cover

A screw for fixing the terminal block cover (item 8) is sealed with a seal of electric utility.

1.1. Meter case

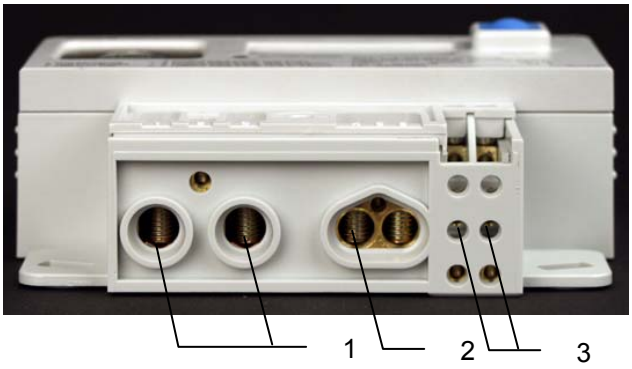
A compact meter case consists of a meter base (item 1) with a terminal block and two fixing elements for mounting the meter, a meter cover (item 2) and a terminal block cover (item 7). The meter case is made of self-extinguishing UV stabilized polycarbonate which can be recycled. The meter case ensures double insulation and IP53 (IEC 60529) protection level against dust and water penetration.

The meter cover is made of polycarbonate. It is permanently stuck to the meter base so that access to the meter interior is not possible. Meter data are engraved in the meter cover.

A nickel-plated iron ring is positioned in the left top corner and is used for attaching an optical probe to the optical port (item 6). A push-button for data scrolling is in the right top angle (item 3).

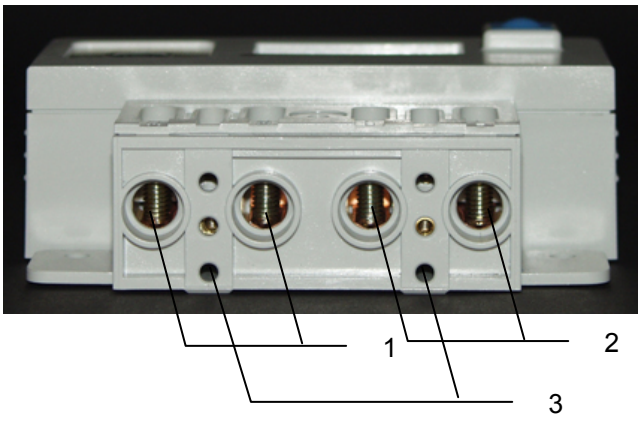
1.2. Terminal block

The terminal block complies with the DIN 43857 or the BS 5685 standard. It accommodates current terminals and optional auxiliary terminals. There is no potential link as the metering element is based on a shunt. Therefore during the meters testing they should be connected via an isolation transformer.



1. Current terminals - phase
2. Current terminals - neutral
3. Auxiliary terminals

Fig. 2: Terminal block in compliance with the DIN 43857 standard



1. Current terminals - mains
2. Current terminals – load
3. Auxiliary terminals

Fig. 3: Terminal block in compliance with the BS 5685 standard

Current terminals (items 1 and 2) are made of solid brass. At the DIN terminal block version the bore diameter is 8.5 mm and enables connection of conductors with cross sections up to 25 mm^2. At the BS terminal block version the bore diameter is 9.5 mm and enables connection of conductors with cross sections up to 35 mm^2. The conductors are fixed with two screws. The recommended torque for fixing the conductors is 2.5 Nm.

Up to six auxiliary terminals (item 3) for optional inputs and outputs can be built into the meter on request. The bore diameter of the auxiliary terminals is 3.5 mm. Wires are fixed with a screw. In addition, two auxiliary voltage terminals for power supply of an external device can be built-in on request too.

Both current and auxiliary terminals are nickel-plated at a tropical meter version.

The terminal cover can be long or short and is fixed with a sealing screw. A meter connection diagram is stuck on the inner side of the terminal cover.

1.3. Meter over-all dimensions

Meter fixing dimensions comply with the DIN 43857 and the BS5695 standards.

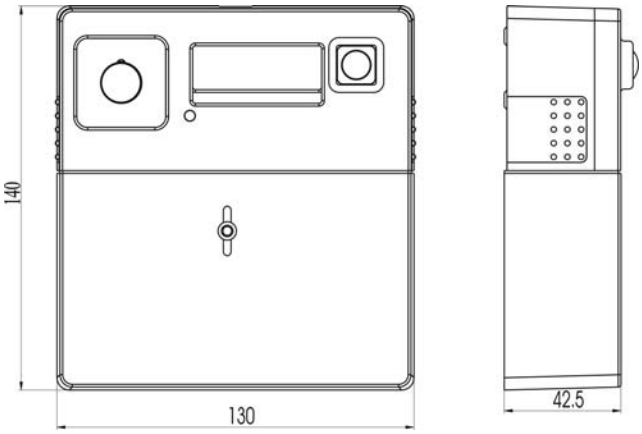


Fig. 4 – Meter with a long terminal cover

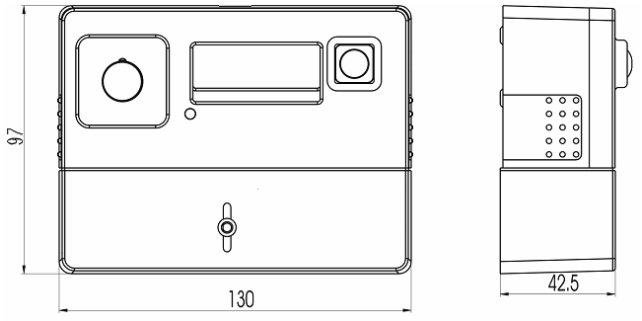


Fig. 5 – Meter with a short terminal cover

2. Meter configuration

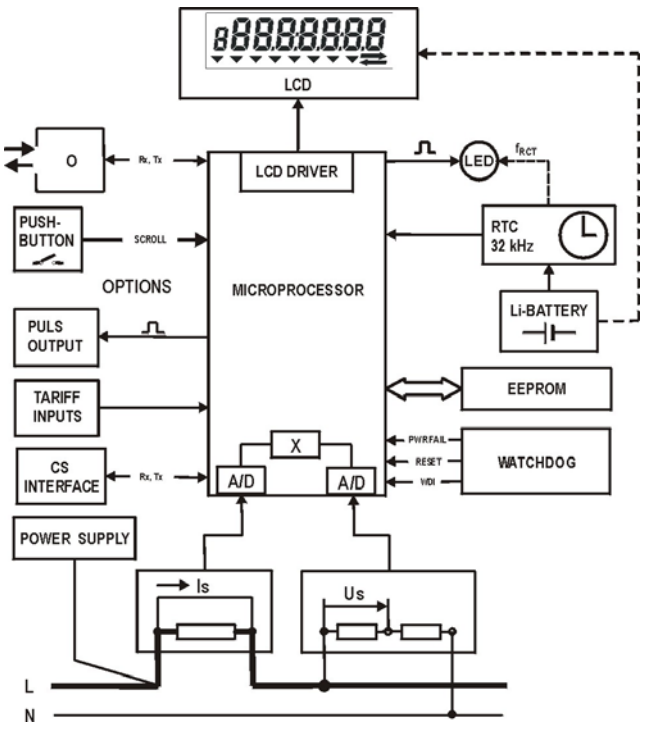


Fig. 6: Meter block-diagram

The meter consists of:

1. Measuring element
2. Meter power supply unit
3. Microprocessor with EEPROM
4. RTC with a Li-battery
5. LCD
6. Impulse LED
7. Scroll key
8. IR optical port
9. CS interface (option)
10. Pulse or tariff output (option)
11. Tariff input (option)

2.1. Metering elements

The metering element enables precise measurement of active energy in a wide metering and a temperature range.

The metering element consists of a current and a voltage sensor. The current sensor is a shunt, while the voltage sensor is a resistive voltage divider. Signals of currents and voltages are fed to the A/D converters. They are digitally multiplied so that instanttaneous power is calculated. The instantaneous power is integrated in a microcontroller, where it is further processed.

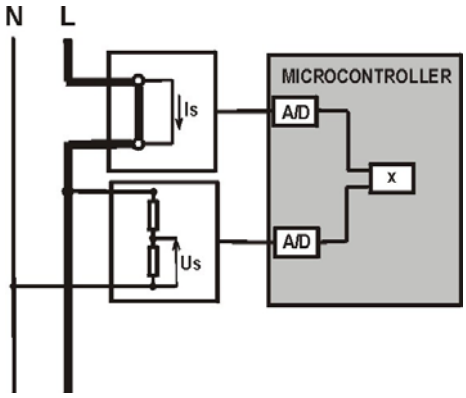


Fig. 7: Metering element

The metering element ensures excellent metering properties:

1. Negligible effect of electromagnetic disturbances and influence quantities
2. High long-term stability so that meter re-calibration is not required over its lifetime
3. Long meter lifetime and high reliability in use

2.2. Power supply stage

The power supply stage is a capacitor type, which enables a meter to operate accurately in a voltage range from 80% to 120% of the rated voltage.

2.3. Microcontroller

The microcontroller acquires signals from the metering elements, processes them and calculates values of measured energy. The results are stored in energy registers for particular tariffs and stores energy data

in previous billing periods. The microcontroller also generates pulses for the LED and pulse output, drives the LCD and enables two-way communication via the optical port and CS interface (if it is built-in).

All measured data are stored in a non-volatile memory (EEPROM) and are kept for more than 10 years period without external power supply.

2.3.1. Billing results keeping

The meter keeps billing results (energy values registered by tariffs and total) for up to last 8 billing periods (months). A number of billing periods (months) for which billing results are kept is set in the factory and can not be changed subsequently. The billing results are stored in a FIFO memory, so that they are always available for the last n (n = 1, 2, …8) billing periods (months), regardless if the meter billing reset was performed by means of the RTC, via the optical port or remotely via CS interface. The metering results of the past billing periods (months) can not be displayed but can be down-loaded via the optical port or remotely by means of CS interface (20.mA current loop).

The billing reset can be set to be executed by the RTC:

- Once a year on a specified date and time
- Every month on specified day in a month and time
- Every month on a specified day in a week after specified day in a month and specified time
- Every week on a specified day in a week and time
- Every day

2.4. Real-time clock

A real-time clock is controlled with a 32.768 kHz quartz crystal which is digitally trimmed. Its accuracy is better than requested by the IEC 62054-21 standard for time switches. The RTC involves an internal calendar that assures information on year, month, day, day in a week, hour, minute, second and leap year.

The RTC enables:

- Time-of-use registration,
- Automatic meter billing reset at the end of the billing period (month)
- Automatic change-over to day-light saving period and back (winter – summer time).

2.4.1. RTC back-up power supply

An Li-battery is used as the RTC back-up power supply. It assures 5 years of the RTC operation reserve and has 15-year lifetime. The lithium battery is positioned on the meter printed circuit board under the meter cover.

On request the Li-battery also supports data display on LCD in a meter no-power state.

2.4.2. Testing RTC accuracy

The RTC accuracy can be tested via the imp/kWh LED (Fig. 1, item 5) when the meter is in the RTC test mode. The meter is set in the RTC test mode via the optical port by means of the Iskraemeco Meter-View software so that a command Clock control is sent to the meter. When the meter is in the RTC test mode, the RTC 4096 Hz test frequency is fed to the imp/kWh LED. The meter will stay in the RTC test mode approximately 18 hours. Then it will return back into the meter mode automatically. Other ways to exit from the RTC test mode are:

- By sending a command to exit RTC test mode by means of the MeterView software
- By disconnecting a meter from the voltage supply

2.4.3. Time-of-use registration

The meter is designed as a multi-tariff with maximum four tariffs. A tariff change-over time is defined with hour and minute. Minimal time period between change-over is five minute. The real-time clock enables complex daily and weekly tariff structures, as well as a couple of seasons in a year:

- Up to 8 seasons in a year (i.e. 8 weekly tariff programs)
- Up to 8 daily definitions of the tariff change-over program
- Up to 10 tariff change-over inside individual daily tariff programs
- Up to 30 holidays (including those based on a lunar calendar) in which a special tariff program is defined

2.5. LCD

The 7-segment LCD has 7 + 1 characters, 8 signal flags and an energy flow-direction indicator. Large characters and a wide angle of view, as well as optional LCD back-light, enable easy data reading.

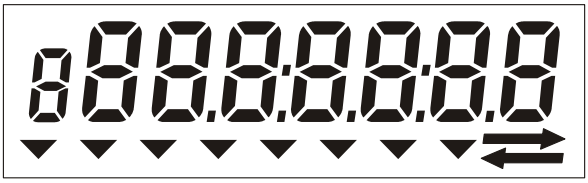


Fig.8: LCD

The data characters are 8 mm high. For data identification one character is employed, it is 6 mm high. Bellow the data characters there are 8 signal flags that indicate current tariff and different meter status and alarms. The meaning of signal flags are engraved on the meter name plate below them.

An indicator of energy flow direction is displayed in the right bottom corner.

2.5.1. LCD testing

The LCD can be tested automatically so that all LCD segments are displayed (Fig. 8) for 2 seconds to check if they are in order. The LCD test can be performed either:

- After voltage is applied to the meter
- In Auto scroll sequence or
- In Manual scroll sequence

2.5.2. Data display

Data defined in Auto scroll sequence and in Manual scroll sequence are displayed on the LCD. Data from Auto scroll sequence are displayed in a circle, and each data is displayed for 8 sec. On request, longer data display time can be set via the meter optical port by means of Iskraemeco MeterView software. At Manual scroll sequence the blue push-button should be pressed for displaying the next piece of data. Data in Manual scroll sequence remains displayed until the push-button is pressed again or until time for automatic return into the Auto scroll sequence is elapsed.

Data that can be displayed at different meter configurations are listed in the table bellow. Which of them will be displayed depends on a customer request at meter ordering.

DATA ID CODE ON LCD	DATA DESCRIPTION
0	Total positive active energy (A+)
	Total absolute active energy |A|
1	Positive active energy in first tariff (T1)
	Absolute active energy in first tariff |T1|
2	Positive active energy in second tariff (T2)
	Absolute active energy in second tariff |T2|
3	Positive active energy in third tariff (T3)
	Absolute active energy in third tariff |T3|
4	Positive active energy in fourth tariff (T4)
	Absolute active energy in fourth tariff |T4|
	Energy registered in a single-wire mode
5	Total negative active energy (A-)
6	Negative active energy in first tariff (T1)
7	Negative active energy in second tariff (T2)
8	Negative active energy in third tariff (T3)
9	Negative active energy in fourth tariff (T4)
t	Time hh:mm:ss
d	Date YY-MM-DD
F	Fatal error

Optionally, data can be displayed on the LCD in a no-power meter state by pressing the Data scroll push-button.

Energy data can be displayed in data formats given in a table bellow.

Data format	No. of integers	No. of decimals
6.0	6	0
7.1	6	1
7.0	7	0

By pressing the pushbutton on the meter front side it is possible to enter into the meter test mode in which energy data are displayed with higher resolution, i.e. in data format 7.3 (i.e. 4 integers + 3 decimals). At the same time imp/kWh LED starts to emit pulses with pulse rate 200,000 imp/kWh. In this way, time needed for meter accuracy testing at low load is shortened.

2.5.3. Signal flags

The signal flags in the display bottom row indicate certain meter status and alarms.

The signal flags from left to right have the following functions:

No.	FLAG	STATUS	MEANING
1	**T1**	Lit	Active first tariff
2	**T2**	Lit	Active second tariff
3	**T3**	Lit	Active third tariff
4	**T4**	Lit	Active fourth tariff
5			Not used
6	**PD**	Lit	Data display on LCD in a no-power meter state
7	**FF**	Lit	Meter fatal error
8	**DRO**	Lit	Meter data down-loading is in progress
	←	Lit	Import energy (+A)
	→	Lit	Export energy (-A) or reversed energy flow

** If the FF signal flag is displayed, the meter should be dismounted from a place of measurement and sent to an authorized repair shop or to the manufacturer for examination.*

2.6. Communication channel(s)

The meters are equipped with an optical port for local meter programming and data downloading. Optionally they can be also equipped with a CS serial interface for remote meter programming and data downloading

2.6.1. Optical port

The optical port complies with the IEC 62056-21 and is used for local meter programming and data downloading. It is located in the right top corner of the meter. The communication protocol complies with IEC 62056-21, mode C. The communication is serial asynchronous with data transmission rate from 300 bit/sec to 19,200 bit/sec. If data transmission rate of the used optical probe is lower than 19,200 bit/sec, the maximum permissible data transmission rate is equal to that value. If higher data transmission rate is

set, communication via optical port will not be possible.

The optical port wavelength is 660 nm and luminous intensity is min. 1 mW/sr for the ON state.

2.6.2. CS interface

On request the meters are equipped with a CS interface (20 mA current loop) in compliance with the DIN 66348 standard. It is used for remote data downloading and the meter programming. If a CS interface is built into the meter, than only one pulse output or one tariff input (or output) can be built in besides it.

The communication has master-slave architecture, where the ME162 meters are slaves and a communicator (e.g. Iskraemeco P2CA) is a master. A number of meters built-in a CS loop depends on their distance from a communicator. Up to 6 meters can be built into a CS loop if they are not far away from the communicator. If a communicator is 1,200 meters away from the meters, maximum 4 meters can be built into the CS loop.

The communication protocol complies with IEC 62056-21, mode C. Data transmission rate is 2,400 Baud.

2.6.3. Data downloaded via communication channel(s)

Data downloaded via communication channels, i.e. via optical port and CS interface (if it is built into the meter are identified with EDIS codes. Besides data for a current billing period, historical data for previous billing periods can also be down-loaded via the communication channels on request. Historical data can be down-loaded for the maximum 8 last billing periods. The following data can be down-loaded via the communication channels.

EDIS CODE	DATA DESCRIPTION
F.F.	Meter fatal error
0.0.0	Device address
C.1.0	Meter serial number
0.9.1	Time (data format: hh:mm:ss)
0.9.2	Date (data format: YY.MM.DD)
1.8.0	Total positive active energy (A+)
1.8.1	Positive active energy in first tariff (T1)
1.8.2	Positive active energy in second tariff (T2)
1.8.3	Positive active energy in third tariff (T3)
1.8.4	Positive active energy in fourth tariff (T4)
2.8.0	Total negative active energy (A-)
2.8.1	Negative active energy in first tariff (T1)
2.8.2	Negative active energy in second tariff (T2)
2.8.3	Negative active energy in third tariff (T3)
2.8.4	Negative active energy in fourth tariff (T4)
15.8.0	Total absolute active energy |A|
15.8.1	Absolute active energy in first tariff |T1|
15.8.2	Absolute active energy in second tariff |T2|
15.8.3	Absolute active energy in third tariff |T3|
15.8.4	Absolute active energy in fourth tariff |T4|
0.1.2*xx	Meter billing reset time stamp of past months
1.8.0*xx	Total positive act. energy (A+) previous value
1.8.1*xx	Positive act. ener. in tariff T1 previous value
1.8.2*xx	Posit. act. energy in tariff T2 previous value
1.8.3*xx	Posit. act. energy in tariff T3 previous value
1.8.4*xx	Posit. act. energy in tariff T4 previous value
2.8.0*xx	Total negative act. ener. (A-) previous value
2.8.1*xx	Negat. act. energy in tariff T1 previous value
2.8.2*xx	Negat. act. energ. in tariff T2 previous value
2.8.3*xx	Negat. act. energ. in tariff T3 previous value
2.8.4*xx	Negat. act. energ. in tariff T4 previous value
15.8.0*xx	Total absolute active ener. |A| prev. value
15.8.1*xx	Abs. active energy in tar. T1 previous value
15.8.2*xx	Abs. active energy in tar. T2 previous value
15.8.3*xx	Abs. active energy in tar.T3 previous value
15.8.4*xx	Abs. active energy in tar. T4 previous value
0.1.2*xx	Previous value time stamp

xx = 01, 02, … 08 index of previous billing periods (months)

2.6.4. Error register description

The error register F.F is a hexadecimal value and generates the following alarms when particular bits are set to 1.

Bit	Error description
0	Check sum error in energy registers in EEPROM
1	Check sum error of meter parameters in EEPROM
2	Check sum error of meter parameters in RAM
3	Check sum error of program code
4	False tariff table
5	Not implemented
6	Not implemented
7	Not implemented

2.6.5. Communication protocol

The communication protocol is IEC 62056-21 (former IEC 61107), mode C. The communication is asynchronous half-duplex.

Data format:

1 start bit, 7 data bits, 1 parity bit, 1 stop bit

The entire data block is protected by a control mark in compliance with the DIN 66219 standard.

After receiving the calling telegram at a 300 baud data transmission rate,

/ ? Device address ! CR LF or / ? ! CR LF

the meter reveals its identification at a 300 baud data transmission rate:

/ I S K 5 M E 162 – "Program version"

The meter address refers to the contents of the 0.0.0 or 0.0.1 registers. Then the meter waits for 2 sec. so that the proposed data transmission rate is confirmed:

ACK 0 5 0 CR LF.

If the proposed baud rate is confirmed, communication at a 9,600 baud rate follows; if it is not confirmed, communication at 300 baud continues. The meter transmits the data telegram:

STX Data ! CR LF ETX BCC

where

STX: stands for the start of a text;
Data: refers to codes and data
! CR LF: stands for the end of data
ETX: stands for the end of a text
BCC: stands for Block Check Character – parity check

2.7. LED

The meter is provided with a LED on the front plate. The imp/kWh LED has two functions depending on the meter mode. In the meter mode it is used for testing the meter accuracy and blinks with a pulse rate 1,000 imp/kWh, the pluses width is 40 ms.

LED	STATUS	INDICATION
Imp/kWh	Blinks	Energy is registered. The pulse rate is proportional to demand
	Lit	Voltage applied to the meter, but load current is lower than the meter starting current.
	OFF	No voltage is applied to the meter.

In the RTC testing mode it is used for testing the RTC accuracy and blinks with 4096 Hz test frequency (see item 2.4.2 Testing RTC accuracy).

2.8. Data scroll push-button

There is a Scroll push-button on the meter front side. Its primary function is to scroll data from the Manual scroll sequence on the LCD. It should be pressed again and again for each next data to be displayed.

It also enables data displaying on the LCD when the meter is in no-power state if such a function was requested at meter ordering. If no voltage is applied to the meter and the Scroll pushbutton is pressed, the first data from the Manual scroll sequence appears on the LCD and, at the same time, the PD signal flag is displayed indicating that the meter is in a no-power state. The LCD remains turned-on for a period of Manual sequence time-out (i.e. 60 sec.) if the Scroll pushbutton is not pressed again. After that time the LCD turns off automatically.

2.9. Tariff Inputs

Optionally the meter can be equipped with one (two-rate meters) or two (3- and 4-rate meters) tariff inputs that are used for external tariff changeover. If a CS interface is built into the meter, than only one tariff input can be built in besides it.

The tariff input control voltage is a phase voltage. The tariff input is set into logic 1 state if voltage applied to the tariff input is $U_t > 0.8U_r$, and is set into logic 0 state if voltage applied to the tariff input is $U_t < 0.2U_r$.

A combination of voltages applied to the tariff inputs determines which tariff is valid, e.g.:

Tariff input 13	Tariff input 33	Valid tariff
0	0	**T1**
1	0	**T2**
0	1	**T3**
1	1	**T4**

On request, a ground of the tariff inputs can be connected internally to the meter ground.

2.10. Outputs

The ME162 meters can be equipped either with pulse or tariff outputs. If a CS interface is built into the meter, than only one pulse or tariff output can be built in besides it.

2.10.1. Pulse outputs

Optionally the meter can be equipped with one or two pulse outputs. Two pulse outputs are built-in only at two energy flow-directions (an output for each energy flow direction).

The pulse output can be either an IEC 62053-31 class A, (S0 by DIN 43864) or an opto-MOS relay type. The pulse transmission distance is 0,5 and 1,000 m respectively. The optomos relay has a make contact with switching capability 25 VA (100 mA at 250 V).

2.10.2. Tariff outputs

Optionally the meter can be equipped with one or two tariff outputs. The tariff output is an optomos relay with a make contact with switching capability 25 VA (100 mA at 250 V).

3. Antifraud protection

Special attention is paid to a system of meter data protection in order to prevent meter tampering by use of hardware and software counter measures as well as a meter design itself.

3.1. Meter seal

The meter cover is permanently stuck to the meter base thus preventing access to the meter interior.

The terminal block cover is fixed with a screw and is secured with a wire and a led or plastic seal.

3.2. Always positive registration

The option of always positive energy registration regardless in which direction energy flows through the metering element prevents meter misuse by wrong connection of the conductors into the terminal block. In addition, a reverse energy flow direction arrow is displayed when energy flows in reversed direction.

3.3. Password

A password is implemented for protection of meter parameters setting that influence in the meter measuring.

3.4. Reverse energy flow indicator

Meters designed for energy measurement in one energy flow direction have a reverse energy flow indicator. In case that energy flows in opposite direction through the meter, the arrow for export energy flow (-A) is displayed in the LCD and at the same time the kWh LED is lit.

4. Handling with the meter

Two sets of tools are available:

- **For service programming and readout:**
  - MeterView (Iskraemeco software)
  - An optical probe
  - PC: a desk-top, a laptop

The tool is intended for the operators who service or reprogram the meters in the laboratory or in the field.

- **For billing readout and programming:**
  - MeterRead (Iskraemeco software) for all types of Palm-top PCs operating in the Windows CE environment
  - An optical probe

The tool is intended for meter readers in the field.

5. Meter maintenance

The meter is designed and manufactured in such a way that no maintenance is required in the entire meter lifetime. Measuring stability assures that no recalibration is required. If a battery is built into the meter, its capacity is sufficient to backup all functions for the entire meter lifetime.

6. Meter connection

When the terminal cover is removed a user can be exposed to voltage that can cause injuries or death. Therefore only a qualified personal is allowed to install the meters.

The meter installation procedure is as follows:

1. Check if network voltage corresponds with the meter rated voltage printed on the meter name plate and current to be measured is lower than the meter maximum current I_{max}.
2. Place the meter to a metering place and fix it with two screws.
3. Connect the meter to network in compliance with the meter connection diagram that is stuck on the inner side of the terminal cover. Tight the terminal screws with recommended 2.5 Nm torque.
4. Check connection indication:
   - LED is lit (voltage applied, load current is less than starting current)
   - LED is blinking (with frequency proportional to load current)
5. Check time and date set in the meter and, if necessary, enter correct values.
6. If automatic billing reset is implemented, perform meter billing reset and seal the Reset pushbutton.
7. Place the terminal cover in its position and fix it with a screw. Seal the terminal cover screw.

7. Meter connection diagrams

The meter connection diagrams in compliance with BS 5685 and DIN 43857 standards respectively are shown in the figure 9.

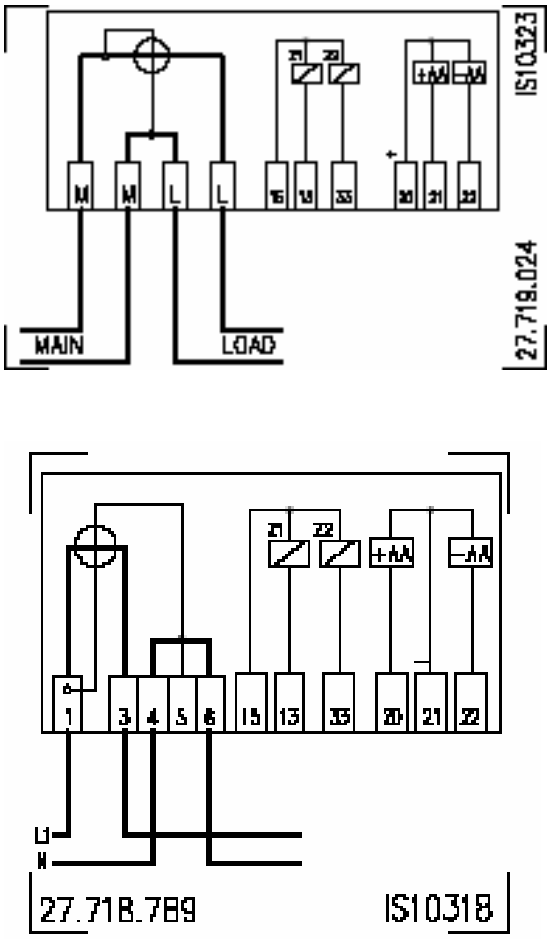


Fig. 9 – Meter connection diagrams

8. Technical data

Accuracy class by IEC 62053-21 by EN 50470-1	 2 or 1 A or B
Basic current Ib	5, 10, 20 A
Max. current Imax	85 A (at DIN meters) 100 A (at BS meters)
Thermal current	1.2 Imax
Min. current	0.05 Ib
Staring current	0.004 Ib
Rated voltage Un	120, 220, 230, 240 V
Voltage range	0.8 Un ... 1.15 Un
Rated frequency	50 Hz, 60 Hz
Meter constant	1,000 imp/kWh
Clock accuracy (25°C)	≤6 ppm i.e. ≤±3 min / year
RTC control	Quartz crystal 32 kHz
Temperature range of operation	-25°C ... +60°C
Extended temperature range of operation	- 40°C ... +70°C
Storing temperature	-40°C ... +85°C
Current circuit burden	<25 mW / 25 mVA
Voltage circuit burden	<0.8 W / 10 VA
Dielectric strength	4 kV, 50 Hz, 1 min
Impulse voltage	6 kV, 1.2/50 µs
Short-circuit current	30 Imax
Electrostatic discharge	15 kV (IEC 1000-4-2)
Electromagnetic field	10 V/m (IEC 1000-4-3)
EMC: High frequency disturbances	6 kV (IEC 1000-4-4)
Flame class	V0 (Standard UL 94)
Optical port standard data transmission rate	 IEC 62056-21 19.200 baud
CS interface (option) standard data transmission rate	 DIN 66348 2.400 baud
Communication protocol	IEC 62056-21, Mode C
Impulse outputs: S0 opto-MOS relay	ti = 40 ms (on request from 10 to 160 ms) ti = 80 ms (on request from 10 to 160 ms) Switching power: 25 VA (100 mA, 250 V)
Dimensions (h x w x d) with short terminal cover with long terminal cover	 97 x 130 x 42.5 mm 140 x 130 x 42.5 mm
Mass	Approx. 0.380 kg
Torque of terminal screws	2.5 Nm

9. Meter type designation

ME162-D1A41-V22G22-M3K0

M	electronic meter
E	single-phase meter
162	meter with LCD and internal clock
D1	terminal block for direct connection up to 85 A by DIN 43857
D3	terminal block for direct connection up to 100 A by BS 5685
A4	active energy measurement, accuracy class 1
A5	active energy measurement, accuracy class 2
1	energy measurement in one direction
2	energy measurement in two directions
4	absolute energy measurement
V 12	1 tariff input (option)
V 22	2 tariff inputs (option)
G12	1 impulse S0 output (option)
G 22	2 impulse S0 outputs (option)
L11	1 OPTOMOS relay, make contact (option)
L 21	2 OPTOMOS relays, make contact (option)
M	real-time clock
3	Li-battery for RTC back-up
K	communication interface
0	optical port by IEC 62056-21 (IEC 61107)
1	CS interface (option)

Owing to periodically improvements of our products the supplied products
can differ in some details from data stated in this technical description.

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