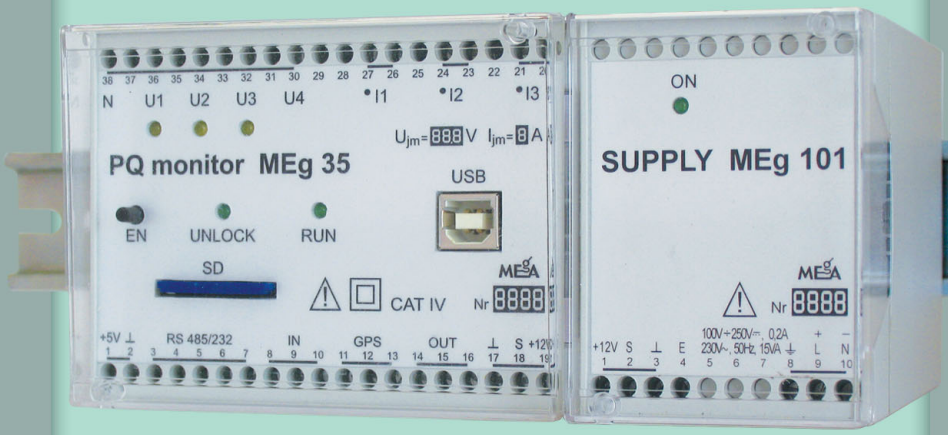
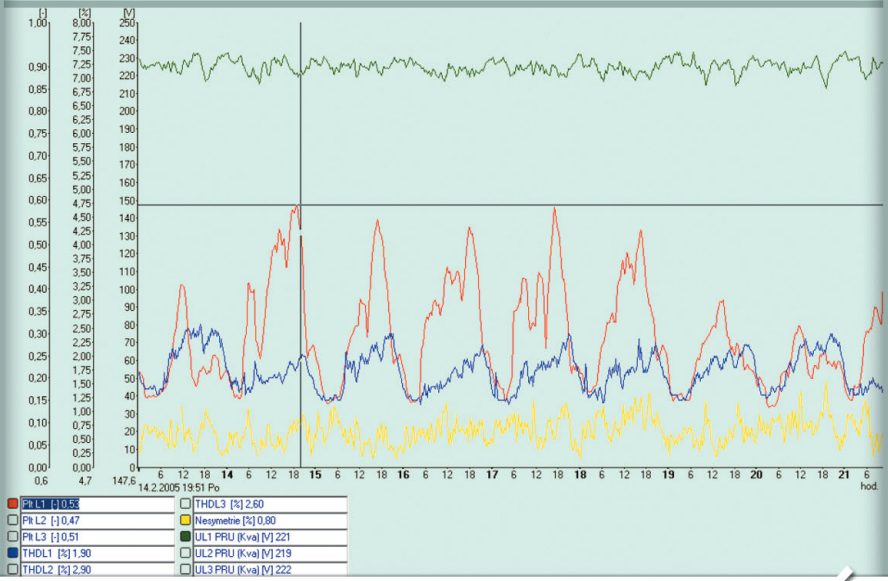
MONITOR PQ MONITOR PQ MONITOR PQ

PQ monitor - MEg35

(english version)



Example of data evaluation:



Měřicí Energetické Aparáty

MEgA

1. Characteristics

The PQ monitor MEg35 is a multi-function measuring instrument to be used for permanent measurement and long-term recording of up to four voltages and three currents, active and reactive power and energies in three-phase four-conductor and five-conductor LV networks, as well as in MV and HV networks. Complying with the ČSN EN 50160 standard and according to methods of the international standard IEC 61000-4-30 it analyses all parameters of the voltage quality on voltage inputs U1, U2 and U3. It registers the voltages and records not only the characteristics of voltage events defined by the standard but also the shapes of voltages $U_{RMS½}$ and currents $I_{R½}$ at the beginning and at the end of each event – the so-called initial and final details. The initial detail of an event also covers the section of time prior to the event (pretrigger) while the final detail also covers the section of time after the event (posttrigger).

Based on the measured shapes of voltages and currents the PQ monitor MEg35 enables the direction of the origination of the event as well as of the flicker to be assessed.

The PQ monitor MEg35 has been designed for being fixly installed on a DIN bar TC35. The set of the MEg35 monitor consists of a basic unit, a supply unit and (option) a LAN communication unit for ETHERNET communication. The basic unit includes a servicing communication interface USB II and an interface for telecommunication RS232 or RS485. The time synchronization of the internal clock of the monitor may be secured by connecting it to a receiver of the GPS signal. The basic unit of the MEg35 monitor also disposes of two input and of two output galvanicly separated two-state signals.

2 Description of measuring and input/output functions of the PQ monitor MEg35

2.1 Function of a monitor (time recorder)

When the monitor operates in this function, average RMS values of all the four voltages, three currents and three active and reactive power values (U1, I1), (U2, I2), (U3, I3) calculated from all periods during the chosen interval of recording are recorded into the memory. Real power factors and energies are then calculated by means of a higher SW based on the recorded data.

2.2 Voltage quality function

The following ten-minute data are recorded in this case:

- average frequency, maximum and minimum frequency in a 10 s interval, derived from the voltage of channel U1,
- number of cases of exceeding the 10 s values of frequency for four limits defined by the ČSN EN 50160,
- values of voltage unbalances calculated from negative-sequence and positive-sequence components of phase as well as of phase-to-phase voltages,
- RMS values of voltages U1 to U3 and currents I1 to I3,
- average values of the basic harmonic component of voltages U1 to U4 and currents I1 to I3,
- average values of harmonic components of voltages U1 to U3 and currents I1 to I3 in the range of the 2^{nd} up to the 25^{th} harmonic component,
- values Umax95 and Umin95 of voltages U1 to U3,
- values of Pst and Plt flicker of voltages U1 to U3,
- magnitude of THD of voltages U1 to U3 in relation to harmonic components and to all interharmonic components, magnitude of THD of currents I1 to I3,
- magnitudes of ripple control signals on voltages U1 to U3.

The voltage quality function may be used both during single-phase and two-phase measurements, input U1 is used as a reference channel in all cases.

2.3 Function of recording the events (statistical voltmeter of events)

The function of recording the events operates over the quantities U1 to U3 and I1 to I3. Each new event is recorded into a list of events and into a detailed list.

Beside the parameters of events unified by ČSN EN 50160, i.e. the time of originating and ending of an event with resolution to 10 ms, the list of events includes the values of the maximum deviations of voltages U1 to U3 from the nominal value. When a GPS receiver is connected, the time of originating and ending of an event is assessed with error required for class A instruments.

A detailed list of events includes the shapes of RMS values being calculated for voltages U1 to U3 and currents I1 to I3 after each 10 ms for the elapsed 20 ms. The total time of recording the initial detail of an event is 0.6 s, out of which the interval of 0.2 s is recorded prior to the origination of the event. The total time of recording the final detail of an event is 0.6 s, out of which the interval of 0.2 s is recorded after the event has been ended.

2.4 Function of the oscilloscopic measurement

This function serves for checking the correct connection of the set of the PQ monitor MEg35. A notebook with series interface USB II is used for displaying the shapes of voltages U1 to U4 and currents I1 to I3. The recording with duration of 2 periods (40 ms) may be started individually or repeatedly.

2.5 Communication function

The communication interface of the PQ monitor MEg35 for servicing activities is a series interface USB II with the data transmission rate 460.8 kbit/s. The interface RS232 or the interface RS485 are available in basic unit for remote communication purposes. Both these interfaces become automatically blocked when the interface USB II is functioning. Connection into LAN networks is made by using the LAN unit MEg35 converting the RS485 communication onto the protocol Ethernet 2.0/IEEE 802.3.

2.6 External input, relay output

External galvanicly separated inputs are two-state ones and they enable DC and AC voltages up to 24 V to be connected. The decision making level is the 3.5 V level. The external input may generate an event without recording its detail. The front or the trailing edge of the voltage of the external input may be active according to how this has been programmed.

Relay outputs are made by the opening and the closing contact of the relay. One or more of the following meanings may be programmably assigned to the relay outputs:

- voltage U1 to U4 outside pre-chosen tolerances,
- frequency outside pre-chosen tolerances,
- Pst flicker higher than 1.0,
- any harmonic component has exceeded the pre-chosen limit,
- THD has exceeded the pre-chosen limit,
- unbalance has exceeded the pre-chosen limit.

2.7 Signalization by LED diodes

The indication of the state of the PQ monitor MEg35 is signalized by diode RUN lighting permanently when the monitor is operating. LED diodes U1, U2 and U3 indicate, by permanent lighting, the state of voltages U1, U2, U3 in a preset tolerance band (90% U_{nom} to 106% U_{nom}) and by intermittent lighting with frequency f = 1 Hz they signalize that the corresponding voltage is outside the preset tolerance band. The lighting of LED diode

UNLOCK signalizes the possibility of drawing out the SD memory card. The requirement to draw out the SD memory card is initiated by the user by pressing the button EN. The lighting of diode ON on the supply source SUPPLY MEg101 signalizes the output voltage of the supply source and the charging up of the accumulator built inside the source. The lighting of diode ON on the communication unit MEg201 signalizes the presence of the supply and the lighting of LED diode COM signalizes that the communication is on.

3. Technical data

The set of the PQ monitor MEg35 consists of a unit of the MEg35 monitor with a supply source SUPPLY MEg101a or MEg101b and, in case of communication by using a LAN network, with the MEg201 unit.

3.1 PQ monitor MEg35

Measurement of voltages U1, U2, U3, U4	
U_{nom} of phase voltages U1, U2, U3, U4:	230 V – LV version 57.735 V – MV and HV version
Range of measurement of phase voltages:	0 to 460 V_{ef} – LV version 0 to 140 V_{ef} – MV and HV version
Highest permissible phase voltage:	465 V_{ef} – LV version 250 V_{ef} – MV and HV version
Accuracy of voltage measurement:	±0.1% U_{nom}
Temperature coefficient:	better than 0.05% U_{nom}/10°C
Category of measurement:	CAT IV
Measurement of currents I1, I2, I3, I4	
I_{nom} of the current:	5 A/1 A
Range of measurement of the current:	0 to 2 I_{nom}
Accuracy of current measurement:	±0.1% of the measured value and ±0.1% I_{nom} at 0.1 I_{nom} to 2 I_{nom}
Temperature coefficient:	better than 0.05% I_{nom}/10°C
Permissible current overloading:	30 × I_{nom} during 1 s
Highest permissible voltage of current inputs to ground:	50 V
Measurement of frequency	
Nominal value:	f_{nom} = 50.0 Hz
Range of measurement:	47 Hz to 53 Hz

Accuracy of frequency measurement:	better than 10 mHz in the range 48 Hz to 52 Hz
Resolution:	1 mHz
Measurement of power factor	
Range of measurement:	0 to 1.0 in all four quadrants
Accuracy of power factor measurement:	better than 0.25% at U_{nom} and I_{nom}
Measurement of power	
Accuracy of power measurement:	0.5% P_{nom} at f = 50 Hz, 0.8 U_{nom} to 1.2 U_{nom}, 0.1 I_{nom} to 1.2 I_{nom}
Measurement of voltage unbalance	
Range of measurement:	0 to 5%
Accuracy of measurement:	0.15%
Resolution of measurement:	0.01%
Measurement of flicker	
Range of measurement:	0.1 to 5
Accuracy of measurement:	0.05
Resolution of measurement:	0.01
Measurement of harmonic and interharmonic components	
Accuracy of measurement of harmonic and interharmonic voltages:	5% U_{nom} at $U_{meas} \geq 1\%\ U_{nom}$ 0.05% U_{nom} at $U_{meas} < 1\%\ U_{nom}$
Accuracy of measurement of harmonic and interharmonic currents:	5% I_{nom} at $I_{meas} \geq 2\%\ I_{nom}$ 0.15% I_{nom} at $I_{meas} < 3\%\ I_{nom}$
Range of measurement of harmonic voltages:	0 to 10% U_{nom}
Range of measurement of harmonic currents:	0 to 20% I_{nom}
Resolution of measurement of harmonic voltages:	0.01% U_{nom}
Resolution of measurement of harmonic currents:	0.05% I_{nom}
Measurement of the voltage of signals at the supply voltage of chosen frequency	
Range of measurement:	0 to 9% U_{nom}
Accuracy of measurement:	7% of the measured value
Voltage dips and swells, voltage interruptions	
Range of measurement:	0 to 2 U_{nom}
Accuracy of measurement:	0.2% U_{nom} +0.1% of the measured value

Fast voltage changes

Frequencies of occurrence per hour for four levels

ΔU_{max}	3% U_{nom}, 2.5% U_{nom}, 1.5% U_{nom}, 1% U_{nom}

Reference ambient conditions

Ambient temperature:	23°C ± 2°C
Relative humidity:	40% to 60%
Atmospheric pressure:	86 kPa to 105 kPa

Without frost, bedewing, rain and sunshine

Operating ambient conditions

Operating temperature:	–20°C to +60°C (also from switched-off state)
Operation:	in indoor space
Relative humidity:	20% to 90%
Altitude:	up to 2000 m
Operating position:	arbitrary
Protection class:	IP40
Category of measurement:	CAT IV (ČSN EN 61010-1)
Contamination class:	2

Protection under condition of one failure is ensured by protective impedance with a combination of component parts.

Data memory

Type:	non-volatile, Flash-type
Capacity:	8 (16) MB, up to 1 GB when using SD memory card

Real time clock

Autonomous with possible synchronization by GPS signal
Deviation at autonomous regime: max. 2 s/24h
Supply backed up by Li battery CR ½ AA

GPS – synchronization of internal time of MEg35

Series, galvanicly separated interface RS232/485 – 9600 Bd
Protocol NMEA 0183 or DICOM TXD
Galvanicly separated supply 5 V/0.1 A available for receivers GARMIN or DICOM

Communication

USB II, RS232, RS485 – standard
ETHERNET, LAN MEg35 unit – option

Input and output signals

Signal IN	U0:	0 V to 2 V
	U1:	5 V to 20 V
	Insulation voltage:	500 V
Signal OUT	galvanicly separated closing contact of the relay	
	Max. DC/AC voltage:	30 V
	Max. switched/permanent current:	1 A
	Max. switched power:	30 W

Supply of MEg35

U_{nom}:	+12 V
Supply voltage range:	+10.8 V to 13.2 V
Maximum power input including additional units:	5 W

Supply of additional units

Voltage/max. consumption of the current:	5 V_{DC}/300 mA

Dimensions and weight, design

Length × width × height:	100 × 75 × 110 mm
Weight:	0.5 kg

The unit has been designed for being installed on a DIN bar, type TC 35 (35×7.5 mm)

3.2 Supply source SUPPLY MEg101a

Input

U_{nom}:	230 V_{ef}
Supply voltage range:	85 V_{ef} to 265 V_{ef}
P_{max}:	10 VA
Fuse type:	0.5 A -T
Insulation voltage:	3 kV

Output

$U_{nom\ output}$:	12 V
$I_{max\ output}$:	400 mA
Duration of supply at supply voltage interruption and at maximum consumption:	1 hour
Maximum duration of charged state of the accumulator:	10 hours

Design

Length × width × height:	55 × 75 × 110 mm
Weight:	0.4 kg

The unit has been designed for being installed on a DIN bar, type TC 35.

Note: Contact 8 of the grounding of the MEg101a supply source must be connected to ground in order to suppress interferences.

3.3 Supply source SUPPLY MEg101b

Input

Supply voltage range:	18 V_{DC} to 75 V_{DC}
P_{max}:	10 VA
Fuse type:	1 A -T
Insulation voltage:	1500 V

Output

$U_{nom\ output}$:	12 V
$I_{max\ output}$:	400 mA
Duration of supply at supply voltage interruption and at maximum consumption:	1 hour
Maximum duration of charged state of the accumulator:	10 hours

Design

Length × width × height:	55 × 75 × 110 mm
Weight:	0.35 kg

The unit has been designed for being installed on a DIN bar, type TC 35.

Note: Contact 8 of the grounding of the MEg101b supply source must be connected to ground in order to suppress interferences.

3.4 Communication unit LAN MEg35

Communication

Ethernet 2.0/IEEE 802.3 10 Base-T or 100 Base-TX (auto-sensing), connector RJ45
Supported by protocols ARP, UDP, TCP, ICMP, Telnet, TFTP, AutoIP, DHCP, HTTP, SNMP
Configuration by using of the built-in www server

Supply

Supply:	+5 V/200 mA

Dimensions and weight, design

Length × width × height:	55 × 75 × 110 mm
Weight:	0.2 kg

The unit has been designed for being installed on a DIN bar, type TC 35.

4. Design

4.1 Design of MEg35

PQ monitors MEg35 are intended for a fixed mounting in LV, MV and HV networks. The unit of MEg35 is placed in a plastic, self-extinguishing case made of ABS with dimensions 100 × 75 × 100 mm and it has been designed for being installed on a DIN bar, type TC35. Voltages and currents being measured, supply and communication facilities are connected by means of bolted-type terminals for conductor cross section of up to 5 mm^2. The voltages being measured are connected to terminals U1 (36), U2 (34), U3 (32), U4 (30), as well as to terminal N (38). The magnitude of voltages U1, U2, U3 is signalized by LED diodes. The currents being measured are connected to the pairs of terminals I1 (27, 26), I2 (24, 23) and I3 (21, 20). The input terminal for connecting the current is marked by a point. The nominal range of currents and voltages is indicated on the panel of the unit. There is also a LED diode RUN signalizing the operation of the MEg35 unit. The MEg35 unit and/or the connected communication LAN MEg201 unit are supplied from terminals +12 V (19) and ⊥ (17). Signal S (18) signalizes the supplying from the accumulator when the voltage of the supply source has failed. The supply voltage of the LAN MEg201 unit is 5 V and is taken from terminals +5 V (1) and ⊥ (2). The signals of the GPS receiver are applied to GPS terminals (11, 12, 13). The GPS receiver is supplied from a separate source. Two double-value input signals using a common conductor are applied to terminals IN (8, 8, 10) and are galvanicly separated from the circuits of the MEg35 unit. Two output signals OUT (14, 15, 16) are initiated by closing and opening contacts of the two relays.

A connector USB type USB1 is to be used for servicing communication. The remote communication is realized – according to the order – by interfaces RS485 or RS232 on terminals 3 to 7 of the MEg35 unit. The interface RS485/232 converted to ETH interface in the LAN MEg201 unit is used for the connection into a LAN network.

In installations where no remote communication means are available, a SD memory card can be advantageously used for recording the measured data. It may be drawn out only after pressing the button EN and after the LED diode UNLOCK begins to light. Otherwise the last block of the measured data might be lost. The SD memory card can be inserted into the MEg35 unit even without pressing the unblocking button EN in advance.

The panel of the MEg35 unit is covered with a transparent cover which may be provided with a bond. Unauthorized manipulations may thus be prevented by this bond.

Table 1: Table of terminals of the MEg35 unit

1	Voltage +5 V for supplying LAN MEg201
2	⊥ Common conductor of the MEg35 set for supplying LAN MEg201
3	RS232 – RxD, RS485-B
4	RS232 – TxD, RS485-A
5	RS232 – CTS
6	RS232 – RTS
7	Common conductor for communication GND1
8	Input signal D1
9	Input signal D2
10	Common conductor of input signals GND2
11	Signal GPS DATA
12	One-second signal GPS 1 s, active ascending edge
13	Common conductor GPS GND3
14	Opening contact SW1
15	Common conductor for output signals SW0
16	Closing contact SW2
17	⊥ Common conductor of the MEg35 set – GND
18	S-signalization of supply from accumulator when the supply voltage has failed
19	Voltage +12 V for supplying MEg35 and the MEg201 communication unit
20	Output of current I3
21	Input of current I3
23	Output of current I2
24	Input of current I2
26	Output of current I1
27	Input of current I1
30	Input of voltage U4
32	Input of voltage U3
34	Input of voltage U2
36	Input of voltage U1
38	Common conductor of voltage inputs N

4.2 Design of supply sources SUPPLY MEg101a, MEg101b

Supply sources MEg101a and MEg101b are built-in in a plastic self-extinguishing case with dimensions 55 × 75 × 110 mm and they have been designed for being installed on a DIN bar, type TC35. Bolted-type terminals are situated in one row, the maximum cross section of connected conductors is 5 mm^2. AC or DC supply voltage is applied to termi-

nals marked as L or + (9) and N, or – (10). Terminal ⊥ (8) serves for protective screening and for h. f. grounding of the supply source MEg101 including the MEg35 unit by using its common conductor connected to terminal ⊥ (17). The interconnection of terminal ⊥ (8) with ground is necessary for suppressing interferences. If voltage is present at the output of the supply source, the LED diode ON on its panel is lighting. The converter of the supply source provides the energy for supplying the units of the MEg35 set, as well as for charging up the accumulator of the supply source MEg101. The output voltage +12 V supplying the units of the MEg35 set is available on terminals +12 V (1) and on the common conductor (3) of the supply source MEg101. Signal on terminal S (2) signalizes the supplying of the MEg35 set from the accumulator when the supply voltage has failed.

When the input supply voltage has been lost the functioning of the converter may be switched-off by connecting terminal E (4) to ground (3) and a total discharging of the accumulator may thus be prevented during revisions and checking works. The panel of the MEg101a and MEg101b units is covered with a transparent cover which may be provided with a seal.

Table 2: Table of terminals of MEg101a and MEg101b units

1	Output voltage +12 V for supplying MEg35
2	Signal of input voltage failure
3	⊥ Common conductor of the MEg35 set – GND
4	Signal E. By connecting it with the common conductor of the MEg35 set the converter will be blocked when the input voltage is not available
8	Protective screening and h. f. grounding
9	Positive pole of DC input supply voltage or one pole of AC input supply voltage
10	Negative pole of DC input supply voltage or the second pole of AC input supply voltage

4.3 Design of LAN MEg201

The MEg201 unit is built-in in a plastic self-extinguishing case with dimensions 55 × 75 × 110 mm and has been designed for being installed on a DIN bar, type TC35. Bolted-type terminals are situated in one row, the maximum cross section of connected conductors is 5 mm^2. The supply voltage +5 V the MEg201 unit is applied to terminals +5 V (10) and to the common conductor of the MEg35 set (9). Communication between the MEg201 and MEg35 units is realized via the RS485/232 interface on terminals 4 to 8. Communication between the LAN network and the MEg201 unit is realized by using connector ETH, type RJ45 placed on the panel of the MEg201 unit. The LED diode ON signalizes the availability of the supply voltage +5 V and the LED diode COM signalizes the communication.

Table 3: Table of terminals of the MEg201 unit

1	Communication signal A
2	Communication signal B
4	Common conductor for communication GND1
5	Signal RTS
6	Signal CTS
7	Signal TxD/A
8	Signal RxD/B
9	Common conductor of the MEg35 set – GND
10	Voltage +5 V for supplying LAN MEg201

5. Installation

The installing of the set of the PQ monitor includes the installing of the MEg35 unit, of the MEg101 supply source and/or of the remote communication. The remote communication by using the ETHERNET protocol requires the LAN MEg201 unit to be installed. All mentioned units are installed on a DIN bar TC35 in positions according to Fig. 1. The set with the MEg201 communication unit is 210 mm long and that without the MEg201 communication unit is 155 mm long. A source MEg101a or MEg101b shall be installed depending on the kind and magnitude of the supply voltage. The agreement of the nominal current of measuring current transformers and of the MEg35 unit, as well as of the nominal voltage of measuring voltage transformers and of the MEg35 unit shall be checked up. It is recommended to use a terminal board with the possibility of short-circuiting the currents for connecting the current inputs of the MEg35 unit into the current circuits. The current circuits must not be connected to live parts directly. When the voltages are directly measured in LV networks, it is recommended to use a disconnector OPV 10/3 with fuses PV 10 6A gG for connecting the voltage inputs of the MEg35 unit. Voltage inputs of the MEg35 unit may be connected to the voltage directly, too. The conductors for connecting current circuits shall have the cross section of at least 3 mm^2, the conductors for connecting the voltage in a LV network must have a double insulation. The connection diagram of measuring inputs of the PQ monitor MEg35 in LV, MV and HV networks is shown in Fig. 2 to Fig. 5. The connection diagram of communication circuits of the MEg35 unit when the communication RS485 or the communication RS232 are used or when being connected to a LAN network with communication ETHERNET via the MEg201 unit can be seen in Fig. 7. Connection of a GPS receiver, types DICOM TxD or GARMIN to the MEg35 unit and the connection diagram of input circuits IN and of output circuits OUT are shown in Fig. 8.

Connection of the set of the MEg35 monitor to the supply source is demonstrated in Fig. 9. The supply unit MEg101a shall be used when the set is supplied with AC voltage ranging from 85 V_{ef} to 265 V_{ef} or with DC voltage from 100 V_{DC} to 250 V_{DC} while the supply unit MEg101b shall be used when the set is supplied with DC voltage ranging from 18 V_{DC} to 75 V_{DC}. The supply sources MEg101a and MEg101b are equipped with a back-up accumulator which supplies the set of the MEg35 monitor when the supply voltage has failed. The common conductor of the MEg35 set must be connected to ground at the outlet terminal 8 of the MEg101 unit!

After the measuring, communication and supply circuits have been connected and after the supply has been switched-on, the correct magnitude and direction of voltages and currents being measured shall be checked by using a notebook connected to the servicing communication USB II, and by means of the activated user program PQ-monitor, page Measuring instrument, function On-line measurement. The user SW of the PQ monitor MEg35 is described in a separate manual. After the servicing communication USB II has been ended and the communication cable drawn out of the connector USB II, a correct functioning of the remote communication may also be checked. When the SD memory card has been inserted into the MEg35 unit the measured data will be recorded onto the SD card as well.

Using the set of the PQ monitor in another way than in that for which it has been intended may result in impairing the protection provided by the equipment.

6. Demands on maintenance

6.1 PQ monitor MEg35

The set of PQ monitor MEg35 consisting of the MEg35, MEg101a or MEg101b and/or the MEg201 units has no demands on forced ventilation, it does not comprise any moving control elements and, except for a routine cleaning of the surface, it has no special demands on maintenance. Only soft materials shall be used for cleaning the surface.

The preventive inspection includes:
- checking the mechanically undamaged state of the units,
- checking the undamaged state of used seals,
- checking the capacity of the back-up accumulator of the supply source MEg101, type P-03PF 2x5
- checking the remote communication.

When checking the capacity of the back-up accumulator, the supply voltage shall be disconnected for 1 hour and it shall be observed whether the set of the MEg35 monitor is measuring without interruption during the this time.

It is recommended to carry out preventive inspections after each 2 years of operation.

The intervals of checking the accuracy of measurement shall be specified by the user of the PQ monitor according to the importance of the measurement and to characteristic features of the location where the monitor has been installed. It is recommended to check the accuracy of measurement each 4 years. When checking the accuracy of measurement, it is recommended to replace the accumulator battery of the internal source of the back-up supply, type P-03PF 2xF.

It is not permitted to remove the cover of the monitor unit on installed or connected monitors. The removal of the cover is dangerous to life.

7. Content of the monitor set

7.1 Content of the set of the MEg35 monitor

Unit of the PQ monitor MEg35:

- Supply source MEg101a or MEg101b
- User guide for PQ monitor
- Program on CD

Optional parts of the set:

- Clamping to a DIN bar
- Communication cable USB – PQ/2 m
- Communication unit MEg201
- GPS receiver DICOM TXT or Garmin according to the requirement specified in the order
- 3 pcs split-core measuring current transformers MEgMT with I_{nom} = 100 A, 200 A, 300 A, 400 A, 500 A

8. Delivery

The place of delivery is the address of the manufacturer's seat if not otherwise stated.

The set of the PQ monitor MEg35 is delivered in a polystyrene package. Delivery note and certificate of guarantee with the indicated date of sale are component parts of the delivery.

9. Guarantee

It is not permitted to open the units of the set of the MEg35 monitor during the guarantee period.

A guarantee in the length of two years since the date of sale is provided for the PQ monitors in version MEg35. Defects originating during this period as a demonstrable result of a defective design, manufacturing or using unproper material will be repaired free of charge by the manufacturer. The place of fulfilment of guarantee obligations is the seat of the manufacturer.

The guarantee becomes unvalid if the user has broken the seal or carried out unpermitted modifications or changes on the PQ monitor and/or its accessories, if he connects it incorrectly, or when the PQ monitor or its accessories have been operated out of keeping with technical conditions.

The defects on the PQ monitor MEg35 and on its accessories originating during the guarantee period shall be claimed by the user to the manufacturer of the monitor. The claim without the attached certificate of guarantee will not be accepted.

The manufacturer bears in any case no responsibility for subsequent damages caused by using the PQ monitor and its accessories. No responsibility which would exceed the price of the PQ monitor MEg35 follows for the manufacturer from this guarantee.

11. Manufacturer

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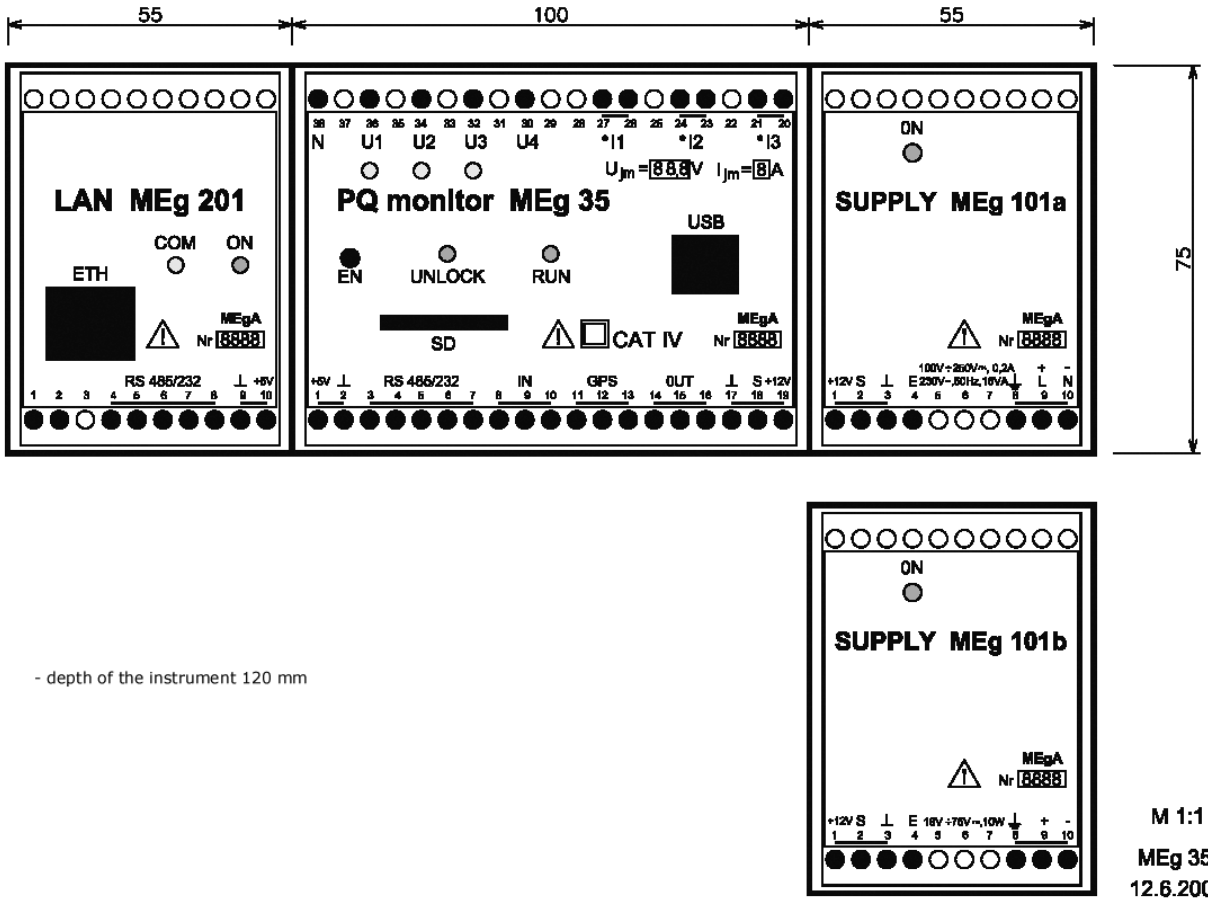

Fig. 1: Mechanical set of the PQ monitor MEg35

- depth of the instrument 120 mm

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MEg 35

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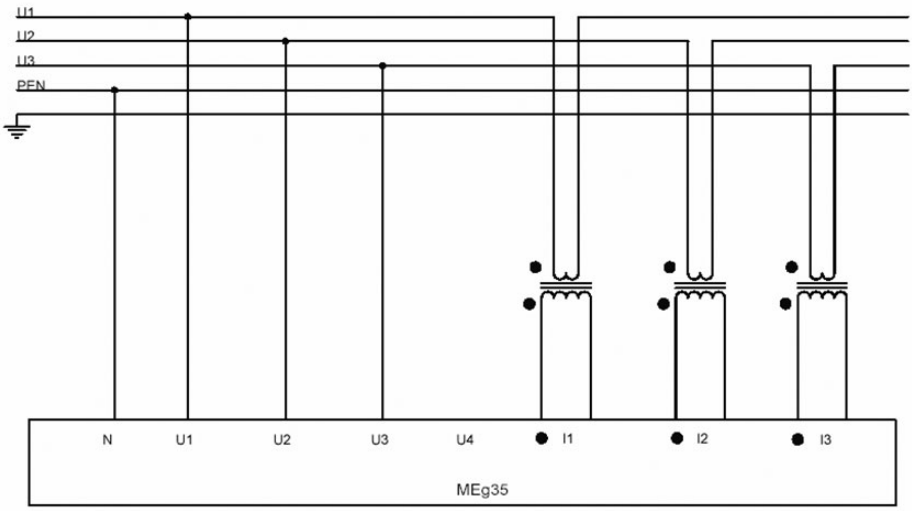


Fig. 2: Simplified connection diagram of MEg35 in a LV network

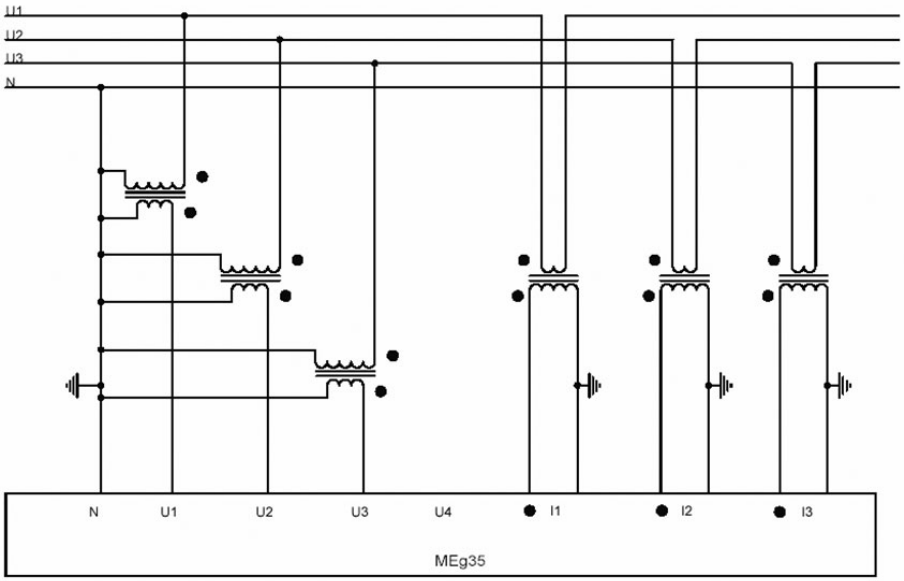


Fig. 3: Simplified connection diagram of MEg35 in a grounded MV network and in a HV network

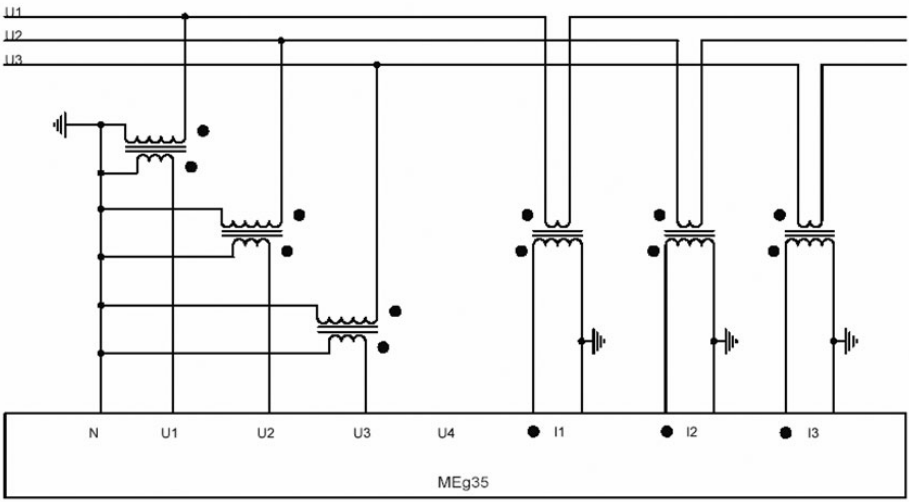


Fig. 4: Simplified connection diagram of MEg35 in compensated MV network

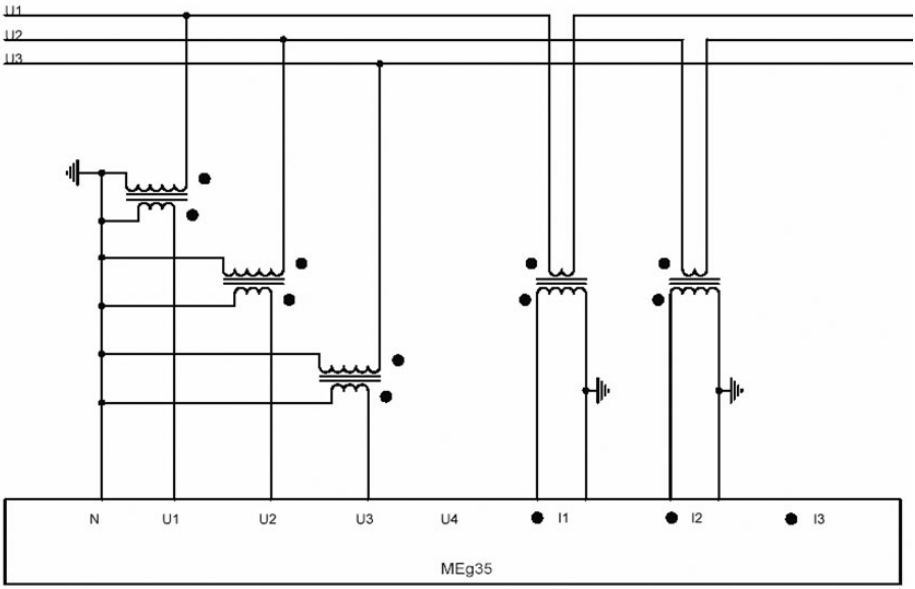


Fig. 5: Simplified connection diagram of MEg35 for connecting two current transformers in a MV network

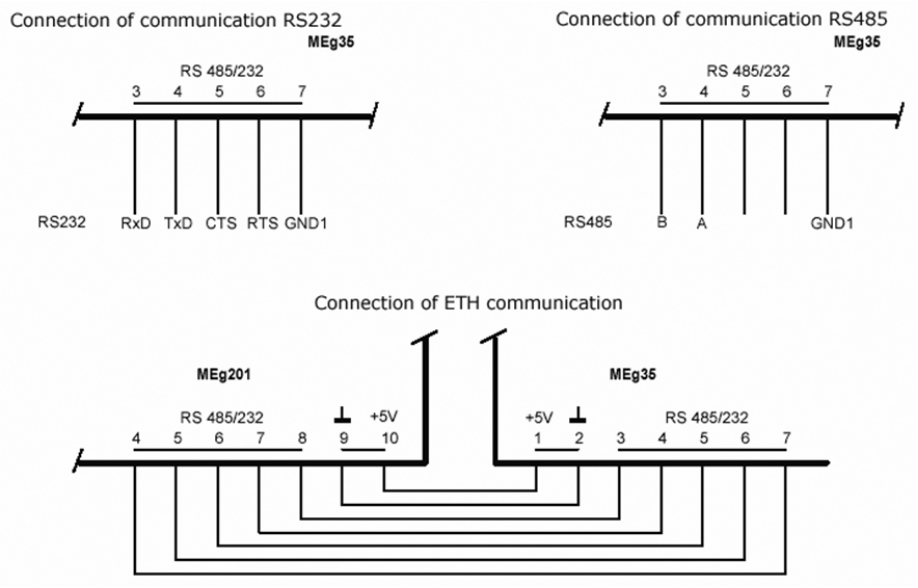


Fig. 7: Connection diagrams of communication used in MEg35

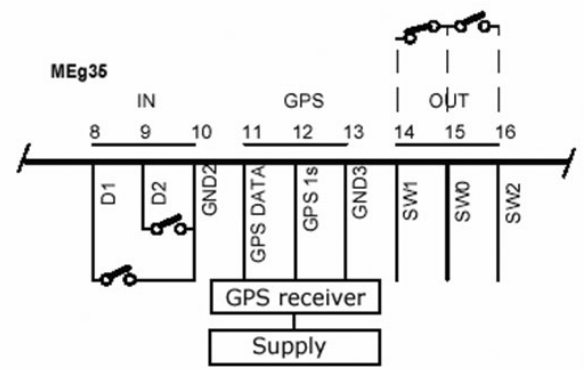


Fig. 8: Connection diagram of the GPS receiver of inputs and outputs

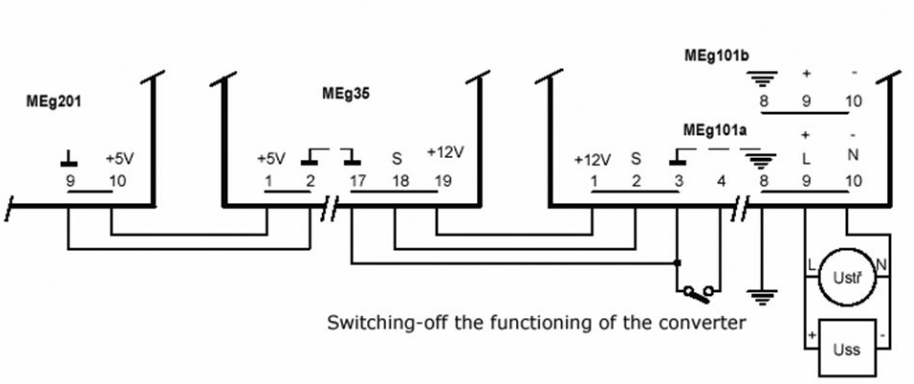
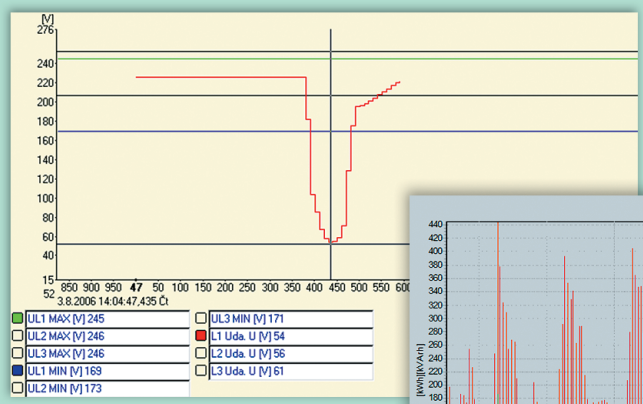
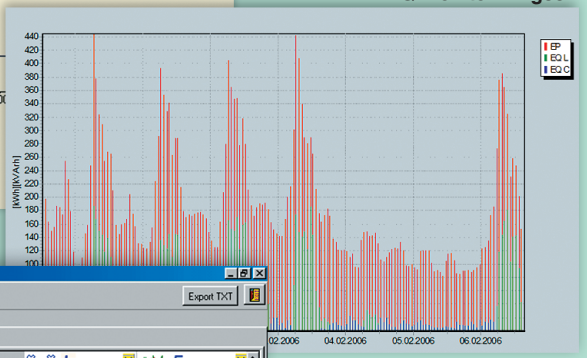


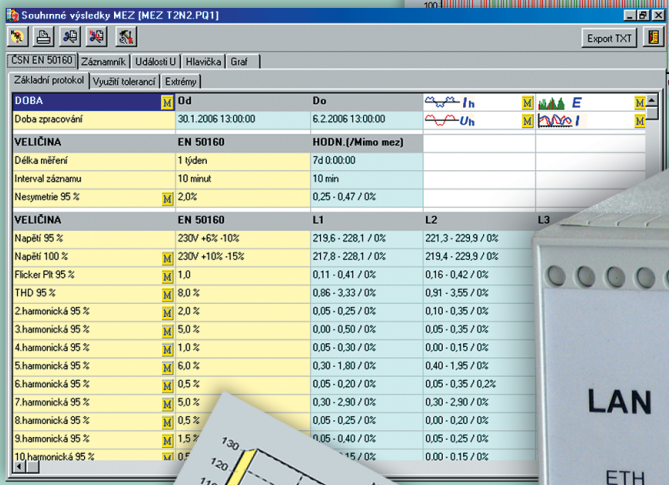
Fig. 9: Connection diagram of the supply of the MEg35 PQ monitor set



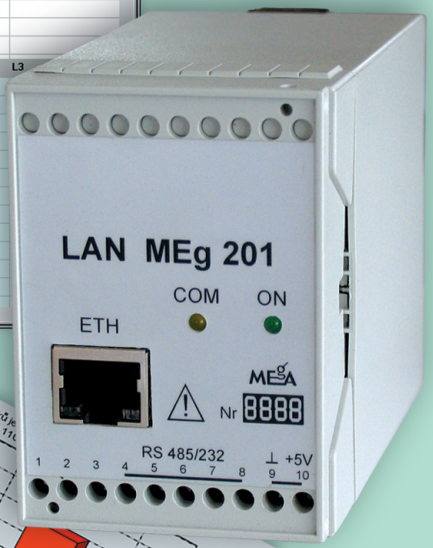
Record of voltage dip

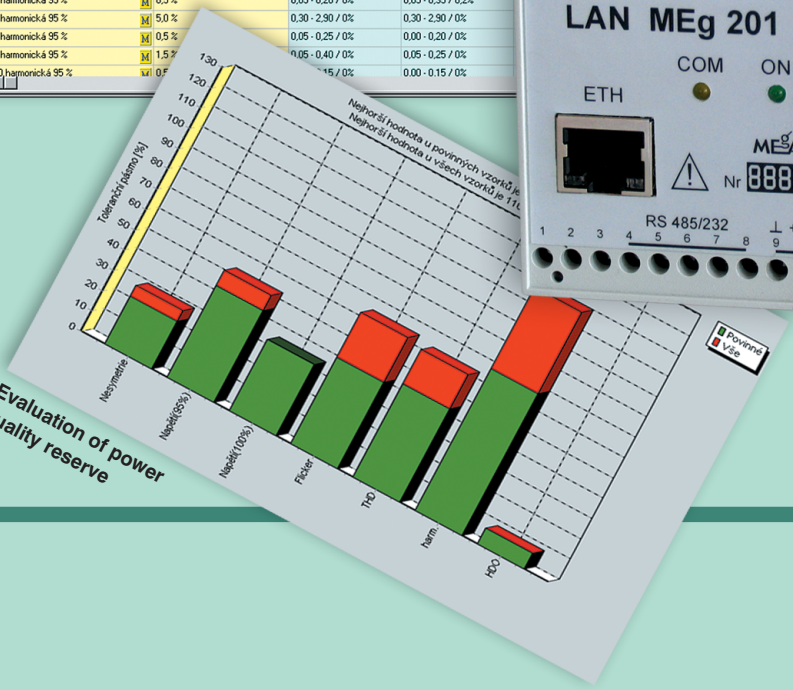
Measurement of energy by PQ monitor MEg35





General table of power quality





Evaluation of power quality reserve

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