





## Universal Measuring Instruments

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# UNIVERSAL MEASURING INSTRUMENTS

Universal measuring instruments are applied for measuring, recording and monitoring of electrical values in low and middle voltage networks.

The measurement is rated for 1 and 3 phase systems with or without neutral. These instruments are featuring high accuracy, compact design, and measuring of harmonic currents / voltages for all phases.

Universal measuring instruments replace up to 15 other devices, such as ammeters, voltmeters, volt-meter-switches, power meters (kW, kVA, kvar und cos phi), active / reactive power counters, harmonic analysers, measuring converters, hour counters, etc.

Therefore the costs for the planning, installation, wiring and storage can be significantly reduced in comparison to analogue measuring instruments.

# UNIVERSAL MEASURING INSTRUMENTS

## TNM35



### TNM35 Energy meter & Electrical powermeter

TNM35 energy powermeter is a compact, multi functional, three-phase powermeter, especially designed to meet the stringent needs of power and energy measurement in any electrical installation.

It includes history data logging and supports standard communication protocols BACnet and Modbus with simple integration into Building Management Systems over RS485.

An indispensable tool for the Building Engineer, it aids efficient use of electricity by showing Power Factor, Max and Min demand, active and reactive energy and much more.

### Order Information

Description	Article Nr.
TNM35 (5/1A)	70200 - 0035

### Technical Data

Power requirements	90 ∞ 250 VAC 110 ∞ 280 VDC 60/ 50 Hz 8 VA
Dimensions (HxWxD)	96 x 76 x 57 mm
Shipping weight	0.45 Kg.
Environmental	Operation: -20 ∞ 70°C Storage: -20 ∞ 70°C Humidity: 0 ∞ 95 RH% non-condensing
Front panel protection	IP33

### Input and output rating

Accuracy	Active energy 0.2% Reactive energy 0.2%
Voltage	Line-Line: 0 ∞ 650 VAC RMS Line-Neutral: 0 ∞ 650 VAC RMS Maximum: 1000V RMS continuous Burden: < 0.06 VA
Current	Rated: 0 - 1A or 0 - 5 A Overload: 50A RMS continuous Withstand: 100A for 1 minute Burden < 0.05 VA
Display	2 x 12 text LCD display
Maximum input voltage	1000V
Maximum input current	6A

### Communication

RS-485 port	Up to 38400 bauds Modbus and BACnet
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### Measurement and Display values

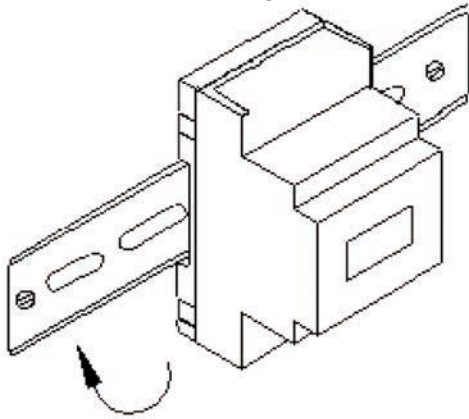
Measurement Parameter	Display range in direct connection (scaling factor 1)	Measuring range in direct connection (scaling factor 1)	Display range
Current 5/60	0.0001 - 6 A	0.0001 - 6 A	0.0001 - 99999 KA
Neutral current (calculated)	0.0001 - 6 A	0.0001 - 6 A	0.0001 - 99999 KA
Voltage L-N	0.0001 - 550 V	0.0001 - 550 V	0.0001 - 99999 KV
Voltage L-L	0.000 - 550 V	0.000 - 550 V	0.0001 - 99999 KV
Frequency (Hz)	45 - 65 Hz	45 - 65 Hz	45.001 - 65.001 Hz
Active power total/phase			0.0000 W - 99999 KW
Reactive power total/phase			0.0000 VAR - 99999 KVAR
Apparent power total/phase			0.0000 VA - 99999 KVA
Power factor (cap./ ind)	-1.0000 ÷ 1.0000	-1.0000 ÷ 1.0000	-1.0000 ÷ 1.0000
Active energy total/phase			0.000001 WH - 9999999 KWH
Reactive energy total/phase			0.000001 VARH - 9999999 KVARH
Apparent energy total/phase			0.000001 VAH - 9999999 KVAH

### Standards:

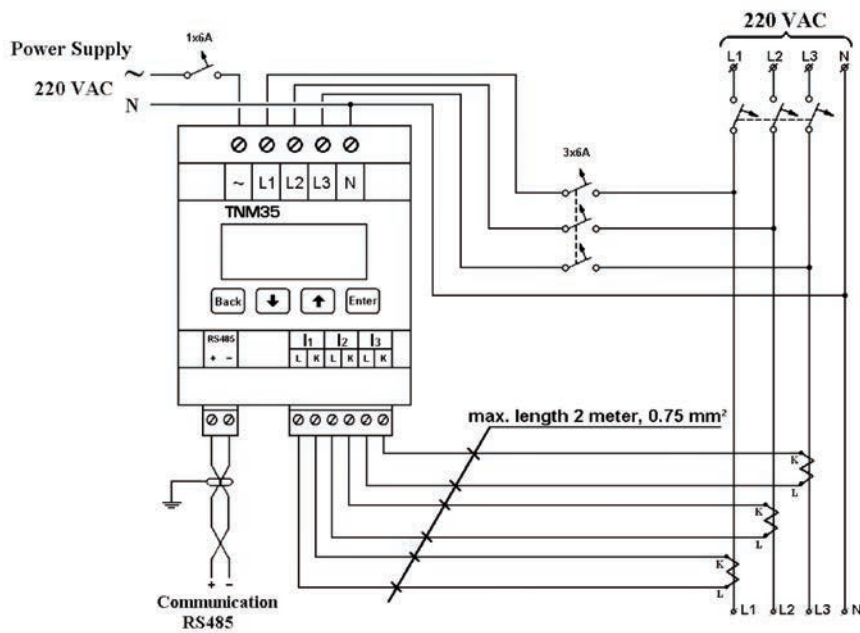
EN 55022, Class A,  
Amendments A1; A2  
EN 55024, Amendments A1; A2  
EN 61000-3-2, Class A  
EN 61000-3-3, Amendment A1  
IEC 61000-4-2  
IEC 61000-4-3  
IEC 61000-4-4  
IEC 61000-4-5  
IEC 61000-4-6  
ICE 61000-4-11

# UNIVERSAL MEASURING INSTRUMENTS

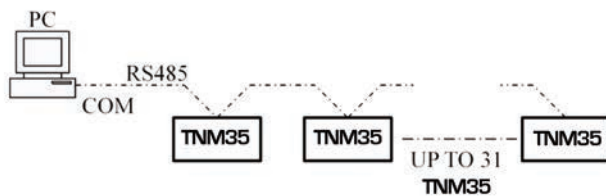
## Mechanical mounting:



## Wiring diagram example::



## Communication diagram example:



----- RS485 (Shielded & Grounded)

## TNM96-ED

### TNM96-ED Electrical powermeter



TNM96-ED powermeter is a compact, multi functional, three-phase powermeter, especially designed to meet the stringent needs of power measurement in any electrical installation for monitoring the parameters of electrical network.

TNM96-ED includes history data logging and supports standard communication protocols Modbus with simple integration into building management systems over RS485.

An indispensable tool for the building engineer, it aids efficient use of electricity by showing power factor, max and min demand and THD.

### Order Information

Description	Article Nr.
TNM96-ED	70200 - 0134

### Technical Data

Power requirements	90 ∞ 250 VAC 110 ∞ 280 VDC 60/ 50 Hz 9 VA
Dimensions (HxWxD)	96 x 96 x 80 mm
Shipping weight	0.65 Kg.
Environmental	Operation: -20 ∞ 70°C Storage: -20 ∞ 80°C Humidity: 0 ∞ 95 RH% non condensing
Front panel protection	IP64

### Input and output rating

Accuracy	Active energy 0.5% FS Reactive energy 0.5% FS
Voltage	Line-Line: 0 ∞ 950 VAC RMS Line-Neutral: 0 ∞ 550 VAC RMS Maximum: 1000V RMS continuous Burden: < 0.06 VA
Current	Rated: 0 - 1A or 0 - 5 A Overload: 50A RMS continuous Withstand: 100A for 1 minute Burden < 0.05 VA
Display	High resolution color LCD display 320x240 pixels
Maximum input voltage	1000V
Maximum input current	6A

### Communication

RS-485 port	Up to 115200 bauds Modbus
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### Measurement and Display values

Measurement Parameter	Display range in direct connection (scaling factor 1)	Measuring range in direct connection (scaling factor 1)	Display range
Current	0.001 - 6 A	0.001 - 6 A	0.001 - 99999 KA
Neutral current (calculated)	0.001 - 6 A	0.001 - 6 A	0.001 - 99999 KA
Voltage L-N	0.000 - 550 V	0.000 - 550 V	0.001 - 99999 KV
Voltage L-L	0.000 - 950 V	0.000 - 950 V	0.001 - 99999 KV
Frequency (Hz)	45.001 - 65.001 Hz	45.001 - 65.001 Hz	45.001 - 65.001 Hz
Active power total/phase			0.000 W - 99999 MW
Reactive power total/phase			0.000 VAR - 99999 MVAR
Apparent power total/phase			0.000 VA - 99999 MVA
Power factor (cap./ ind)	-1.000 ÷ 1.000	-1.000 ÷ 1.000	-1.000 ÷ 1.000
Active energy total/phase			0.001 WH - 99999999 MWH
Reactive energy total/phase			0.001 VARH - 99999999 MVARH
Apparent energy total/phase			0.001 VAH - 99999999 MVAH

### Standards:

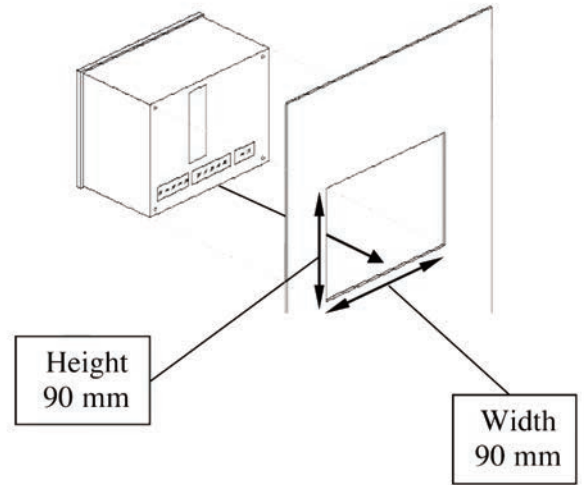
IEC 62053-22  
IEC 62053-23  
IEC 62052-11  
EN 55022, Class A, Amendments A1; A2  
EN 55024, Amendments A1; A2  
EN 61000-3-2, Class A  
EN 61000-3-3, Amendment A1  
IEC 61000-4-2  
IEC 61000-4-3  
IEC 61000-4-4  
IEC 61000-4-5  
IEC 61000-4-6  
IEC 61000-4-11

# UNIVERSAL MEASURING INSTRUMENTS

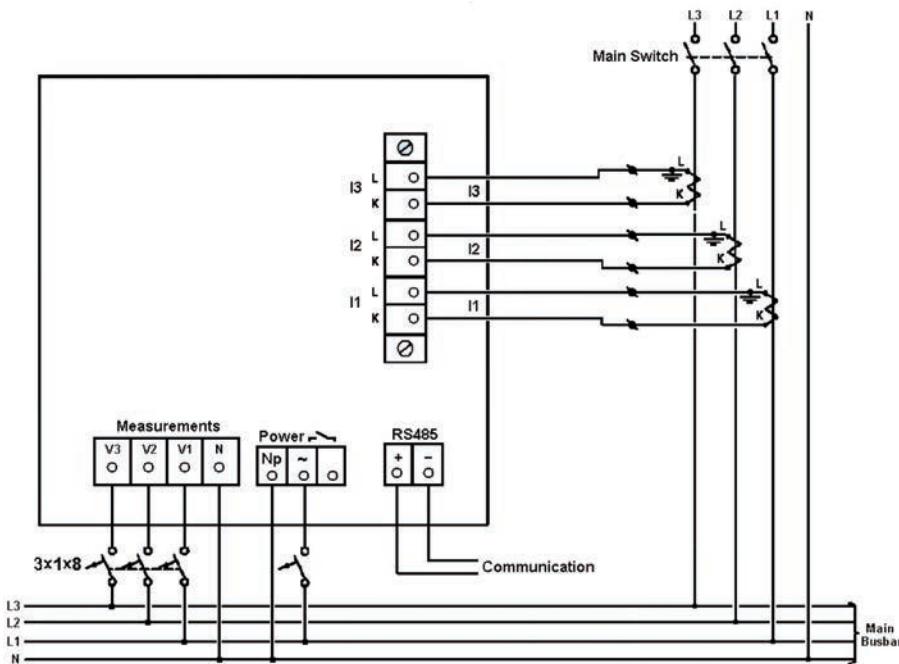
## Accuracy (FS):

Voltage	± 0.2%
Current	± 0.2%
Energy	± 0.2%
Power	± 0.4%
Frequency	± 0.05%

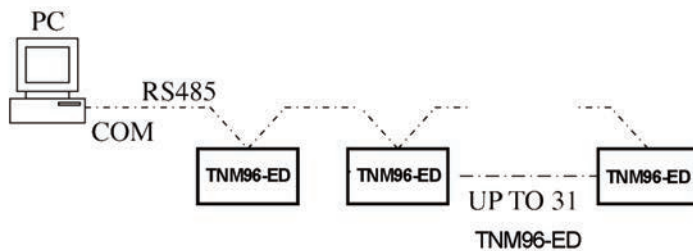
## Mechanical mounting:



## Wiring diagram example::



## Communication diagram example:



----- RS 485 (Shielded & Grounded)



# UNIVERSAL MEASURING INSTRUMENTS

## TNM96-ETL



### TNM96-ETL Energy meter & Electrical powermeter

TNM96-ETL energy powermeter is a compact, multi functional, three-phase powermeter, especially designed to meet the stringent needs of power and energy measurement in any electrical installation for monitoring the parameters of electrical network.

TNM96-ETL includes history data logging and supports standard communication protocols BACnet and Modbus with simple integration into building management systems over RS485.

An indispensable tool for the building engineer, it aids efficient use of electricity by showing power factor, max and min demand and THD.Werte, der Wirk- und Blindleistung und vieles mehr.

### Order Information

Description	Article Nr.
TNM96-ETL	70200 - 0135

### Technical Data

Power requirements	90 ∞ 250 VAC 110 ∞ 280 VDC 60/ 50 Hz 9 VA
Dimensions (HxWxD)	96 x 96 x 80 mm
Shipping weight	0.65 Kg.
Environmental	Operation: -20 ∞ 70°C Storage: -20 ∞ 80°C Humidity: 0 ∞ 95 RH% non condensing
IP Schutzklasse	IP64

### Input and output rating

Accuracy	Active energy 0.5% FS Reactive energy 0.5% FS
Voltage	Line-Line: 0 ∞ 950 VAC RMS Line-Neutral: 0 ∞ 550 VAC RMS Maximum: 1000V RMS continuous Burden: < 0.06 VA
Current	Rated: 0 - 1A or 0 - 5 A Overload: 50A RMS continuous Withstand: 100A for 1 minute Burden < 0.05 VA
Display	High resolution color LCD display 320x240 pixels
Maximum input voltage	1000V
Maximum input current	6A

### Communication

RS-485 port	Up to 115200 bauds Modbus
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### Measurement and Display values

Measurement Parameter	Display range in direct connection (scaling factor 1)	Measuring range in direct connection (scaling factor 1)	Display range
Current	0.001 - 6 A	0.001 - 6 A	0.001 - 99999 KA
Neutral current (calculated)	0.001 - 6 A	0.001 - 6 A	0.001 - 99999 KA
Voltage L-N	0.000 - 550 V	0.000 - 550 V	0.001 - 99999 KV
Voltage L-L	0.000 - 950 V	0.000 - 950 V	0.001 - 99999 KV
Frequency (Hz)	45.001 - 65.001 Hz	45.001 - 65.001 Hz	45.001 - 65.001 Hz
Active power total/phase			0.000 W - 99999 MW
Reactive power total/phase			0.000 VAR - 99999 MVAR
Apparent power total/phase			0.000 VA - 99999 MVA
Power factor (cap./ ind)	-1.000 ÷ 1.000	-1.000 ÷ 1.000	-1.000 ÷ 1.000
Active energy total/phase			0.001 WH - 99999999 MWH
Reactive energy total/phase			0.001 VARH - 99999999 MVARH
Apparent energy total/phase			0.001 VAH - 99999999 MVAH
Harmonic THD V/I			0.000 - 100%

### Standards:

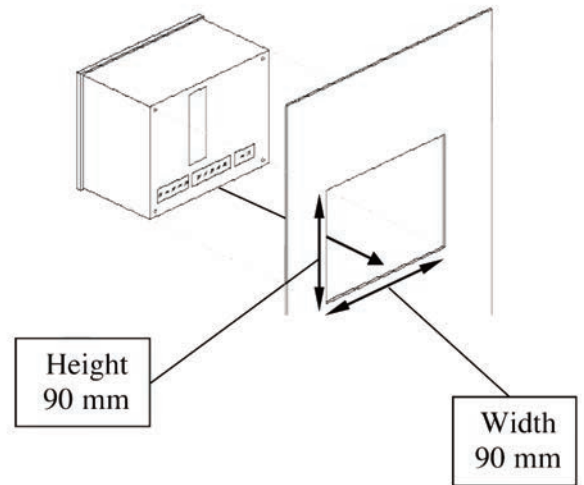
IEC 62053-22  
IEC 62053-23  
IEC 62052-11  
EN 55022, Class A, Amendments A1; A2  
EN 55024, Amendments A1; A2  
EN 61000-3-2, Class A  
EN 61000-3-3, Amendment A1  
IEC 61000-4-2  
IEC 61000-4-3  
IEC 61000-4-4  
IEC 61000-4-5  
IEC 61000-4-6  
IEC 61000-4-11

# UNIVERSAL MEASURING INSTRUMENTS

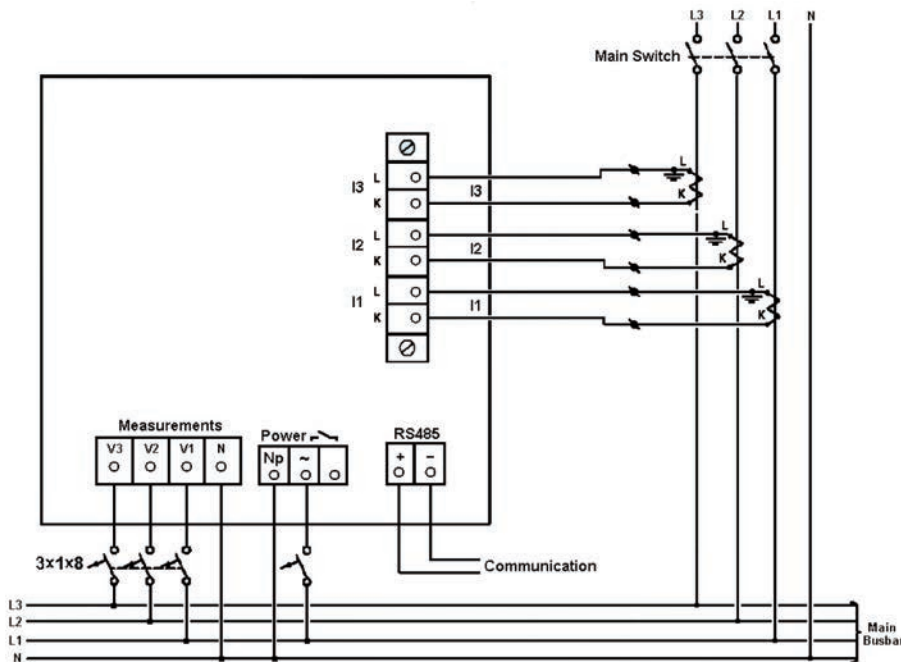
## Accuracy (FS):

Voltage	± 0.2%
Current	± 0.2%
Energy	± 0.2%
Power	± 0.4%
Frequency	± 0.05%

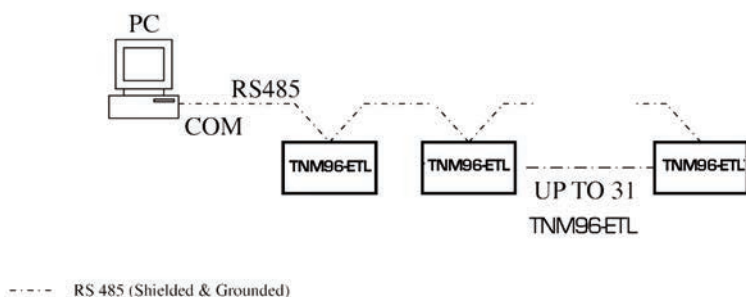
## Mechanical mounting:



## Wiring diagram example::



## Communication diagram example:



# UNIVERSAL MEASURING INSTRUMENTS

## TNM96-ETN

### TNM96-ETN Energy meter & Electrical powermeter



TNM96-ETN energy powermeter is a compact, highly accurate 0.2% (0.1% optional), three-phase powermeter, especially designed to meet the needs of power and energy measurement in any electrical installation for monitoring the parameters of electrical network.

TNM96-ETN includes history data logging and supports standard communication protocols BACnet and Modbus with simple integration into building management systems over RS485 or Ethernet TCP. IP communication, the built in web browser turns the device to be even more user friendly solution.

An indispensable tool for the building engineer, it aids efficient use of electricity by showing power factor, max and min demand, current in neutral Line, harmonics up to 64th, periodic Energy and very important safety tool - a leakage current.

#### Order Information

Description	Article Nr.
TNM96-ETN-I (RS485)	70200 -0132
TNM96-ETN-II (TCP/IP und RS485)	70200 -0133

#### Technical Data

Power requirements	90 ∞ 250 VAC 110 ∞ 280 VDC 60/ 50 Hz 9 VA
Dimensions (HxWxD)	96 x 96 x 80 mm
Shipping weight	0.65 Kg.
Environmental	Operation: -20 ∞ 70°C Storage: -20 ∞ 80°C Humidity: 0 ∞ 95 RH% non condensing
Front panel protection	IP64

#### Input and output rating

Accuracy	Active energy 0.2% Reactive energy 0.2%
Voltage	Line-Line: 0 ∞ 950 VAC RMS Line-Neutral: 0 ∞ 550 VAC RMS Maximum: 1000V RMS continuous Burden: < 0.06 VA
Current	Rated: 0 - 1A or 0 - 5 A Overload: 50A RMS continuous Withstand: 100A for 1 minute Burden < 0.05 VA
Display	High resolution color LCD display 320x240 pixels
Maximum input voltage	1000V
Maximum input current	6A
Digital inputs	2, 230 VAC (ON)
Digital output	1, dry contact maximum load 250 mA

#### Communication

RS-485 port	Up to 115200 bauds Modbus and BACnet
Ethernet (TCP/ IP)	Web browser capability

#### Measurement and Display values

Measurement Parameter	Display range in direct connection (scaling factor 1)	Measuring range in direct connection (scaling factor 1)	Display range
Current	0.001 - 6 A	0.001 - 6 A	0.001 - 99999 KA
Neutral current (calculated)	0.001 - 6 A	0.001 - 6 A	0.001 - 99999 KA
Voltage L-N	0.000 - 550 V	0.000 - 550 V	0.001 - 99999 KV
Voltage L-L	0.000 - 950 V	0.000 - 950 V	0.001 - 99999 KV
Frequency (Hz)	45.001 - 65.001 Hz	45.001 - 65.001 Hz	45.001 - 65.001 Hz
Active power total/phase			0.000 W - 99999 Mw
Reactive power total/phase			0.000 VAR - 99999 MVAR
Apparent power total/phase			0.000 VA - 99999 MVA
Power factor (cap./ ind)	-1.000 ÷ 1.000	-1.000 ÷ 1.000	-1.000 ÷ 1.000
Active energy total/phase			0.001 WH - 99999999 MWH
Reactive energy total/phase			0.001 VARH - 99999999 MVARH
Apparent energy total/phase			0.001 VAH - 99999999 MVAH
Harmonic THD V/I			0.000 - 100%
Partial Harmonic THD V/I			0.000 - 100%
Operating hour meter			99999 - HH:MM:SS

#### Standards:

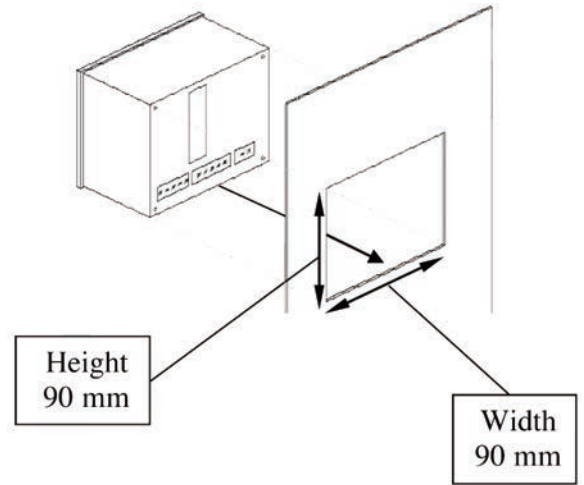
IEC 62053-22  
IEC 62053-23  
IEC 62052-11  
EN 55022, Class A, Amendments A1; A2  
EN 55024, Amendments A1; A2  
EN 61000-3-2, Class A  
EN 61000-3-3, Amendment A1  
IEC 61000-4-2  
IEC 61000-4-3  
IEC 61000-4-4  
IEC 61000-4-5  
IEC 61000-4-6  
ICE 61000-4-11

# UNIVERSAL MEASURING INSTRUMENTS

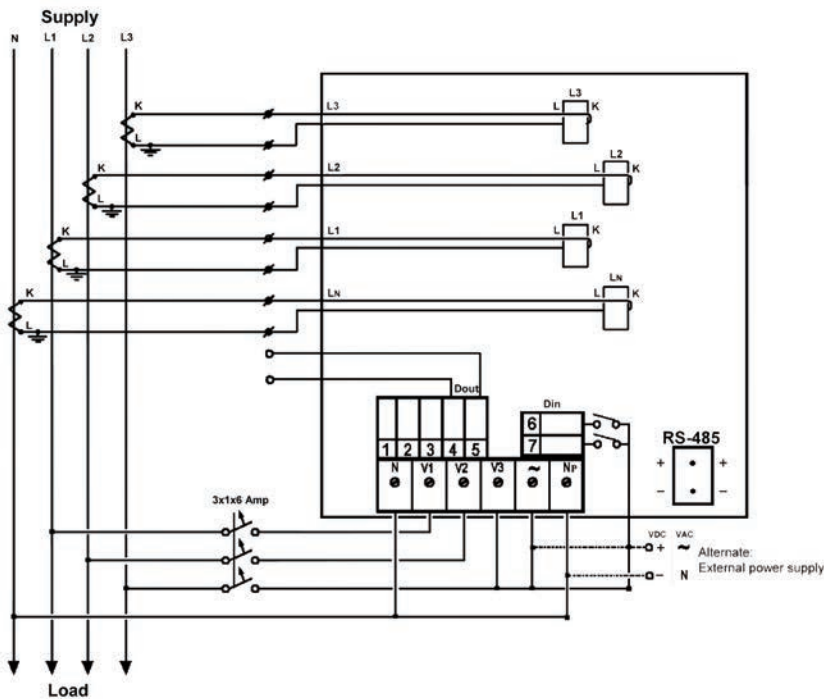
## Accuracy (FS):

Voltage	± 0.2%
Current	± 0.2%
Energy	± 0.2%
Power	± 0.4%
Frequency	± 0.05%
Power factor	± 0.5%

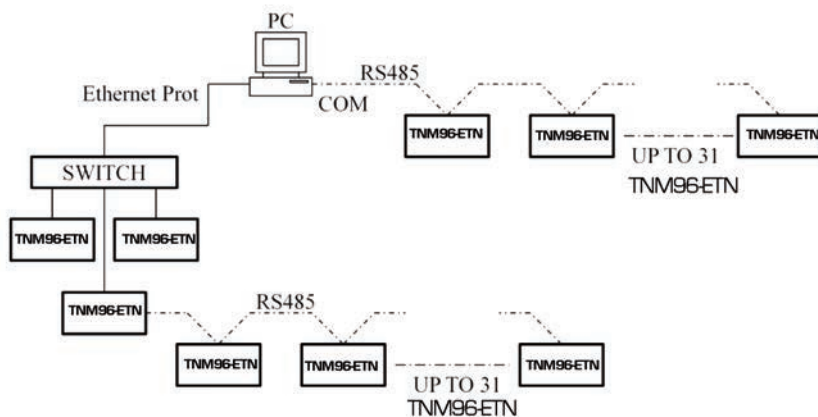
## Mechanical mounting:



## Wiring diagram example:



## Communication diagram example:



— TCP/IP ETHERNET (Shielded & Grounded)

- - - - RS485 (Shielded & Grounded)

## TNM144



### TNM144 - I : Electrical multimeter & power quality analyzer

TNM144-I multimeter is a highly accurate multifunctional, three-phase power quality analyzer, the unit is especially designed to meet the stringent needs of power analyzing in any electrical network. TNM144-I allows producing a detailed report according to EN50160 standard as well providing records of the wave forms during the power quality events (such as Sag, Swell etc with sampling resolution of 1600 bit per cycle). The TNM144-I model allows analyzing and receiving profile recording and event recording such as minimum and maximum RMS value over 10 min of voltage, current, harmonics, power and power factor. Voltage Unbalanced (positive and negative as well as Zero Sequence). PST and PLT.

TNM144-I includes history data logging and supports standard communication protocols BACnet and Modbus with simple integration into building management systems over RS485 or Ethernet TCP. In addition to power quality monitoring the TNM144-I stores the daily based energy, showing the power factor, max and min demand, voltage, current, THD, TDD, K factor, up to 64th Harmonics, phasor diagram and much more.

### Order Information

Description	Article Nr.
TNM144 - I	70200 -0132
TNM144 - II	70200 -0133

### TNM144 - II : Energy meter & electrical powermeter

TNM144-II energy powermeter is a multifunctional, three-phase powermeter, the unit is especially designed to meet the stringent needs of power and energy measurement in any electrical installation. TNM144-II includes 2 years of history data logging and supports standard communication protocols BACnet and Modbus with simple integration into Building Management Systems over RS485 or Ethernet TCP. An indispensable tool for the Building Engineer, it aids efficient use of electricity by showing Power Factor, Max and Min demand, Voltage, Current, THD, TDD, K Factor, up to 64th Harmonics, phasor display, online wave forms and much more.

### Technical Data

Power requirements	90 ∞ 250 VAC 110 ∞ 280 VDC 60/ 50 Hz 8 VA
Dimensions (HxWxD)	144 x 144 x 100 mm
Shipping weight	1.00 Kg.
Environmental	Operation: -20 ∞ 70°C Storage: -20 ∞ 70°C Humidity: 0 ∞ 95 RH% non-condensing
Front panel protection	IP33
Memory size (only TNM144- I )	4GB

### Communication

RS-485 port	Up to 115200 bauds Modbus RTU, BACnet and MSTP
Ethernet (TCP/IP)	Modbus and BACnet + Web browser capability

### Input and output rating

Accuracy	Active energy 0.2% Reactive energy 0.2%
Voltage	Line-Line: 0 ∞ 950 VAC RMS Line-Neutral: 0 ∞ 550 VAC RMS Maximum: 1000V RMS continuous Burden: < 0.06 VA
Current	Rated: 0 - 1A or 0 - 5 A Overload: 50A RMS continuous Withstand: 100A for 1 minute Burden < 0.05 VA
Display	High resolution color LCD display 320 x 234 pixels
Maximum input voltage	1000V
Maximum input current	6A
Digital inputs	4, 230VAC (ON)
Digital output	TNM144- I : 3, dry contact maximum load 250mA TNM144- II : 3, dry contact maximum load 0.6 Amp

# UNIVERSAL MEASURING INSTRUMENTS

## Measurement and Display values

Measurement Parameter	Display range in direct connection (scaling factor 1)	Measuring range in direct connection (scaling factor 1)	Display range
Current	0.001 - 6 A	0.001 - 6 A	0.001 - 99999 KA
Neutral current	0.001 - 6 A	0.001 - 6 A	0.001 - 99999 KA
Voltage L-N	0.000 - 550 V	0.000 - 550 V	0.001 - 99999 KV
Voltage L-L	0.000 - 650 V	0.000 - 650 V	0.001 - 99999 KV
Frequency (Hz)	45.001 - 65.001 Hz	45.001 - 65.001 Hz	45.001 - 65.001 Hz
Active power total/phase			0.000 W - 99999 MV
Reactive power total/phase			0.000 VAR - 99999 MVAR
Apparent power total/phase			0.000 VA - 99999 MVA
Power factor (cap./ ind)	-1.0000 ÷ 1.0000	-1.0000 ÷ 1.0000	-1.0000 ÷ 1.0000
Active energy total/phase			0.001 WH - 9999999 MWH
Reactive energy total/phase			0.001 VARH - 9999999 MVARH
Apparent energy total/phase			0.001 VAH - 9999999 MVAH
Harmonic THD V/I			0.000 - 100%
Partial Harmonic V/I			0.000 - 100%
Operating hour meter			99999-HH:MM:SS

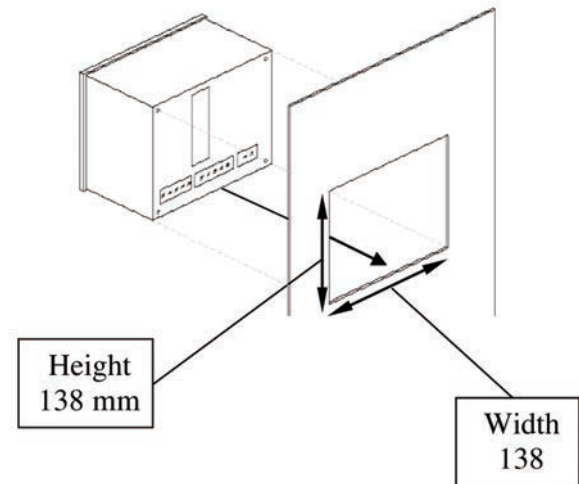
### Standards:

- IEC 62053-22
- IEC 62053-23
- IEC 62052-11
- EN 55022, Class A, Amendments A1; A2
- EN 55024, Amendments A1; A2
- EN 61000-3-2, Class A
- EN 61000-3-3, Amendment A1
- IEC 61000-4-2
- IEC 61000-4-3
- IEC 61000-4-4
- IEC 61000-4-5
- IEC 61000-4-6
- IEC 61000-4-11
- Only for TNM144-I:
- IEC 61000-4-30 class A compatible
- IEC 61000-4-7 compatible
- IEC 61000-4-15 compatible

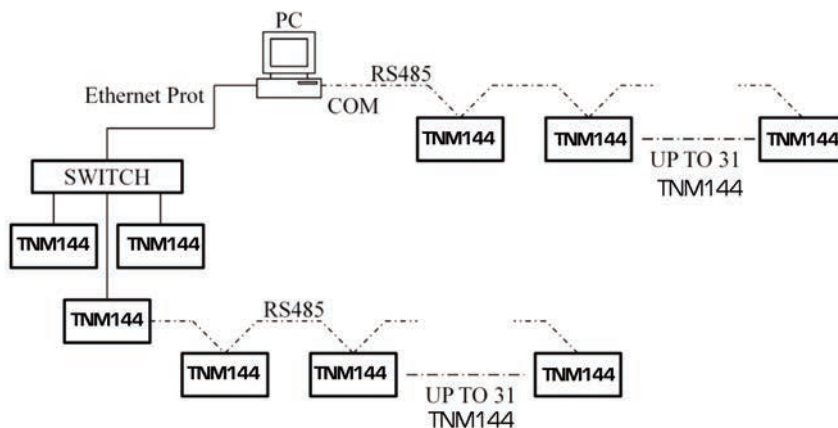
### Accuracy (FS): (only for TNM144-I)

Voltage	± 0.2%
Current	± 0.2%
Energy	± 0.2%
Power	± 0.4%
Frequency	± 0.05%
Power factor	± 0.5%

### Mechanical mounting:



### Communication diagram example:



— TCP/IP ETHERNET (Shielded & Grounded)

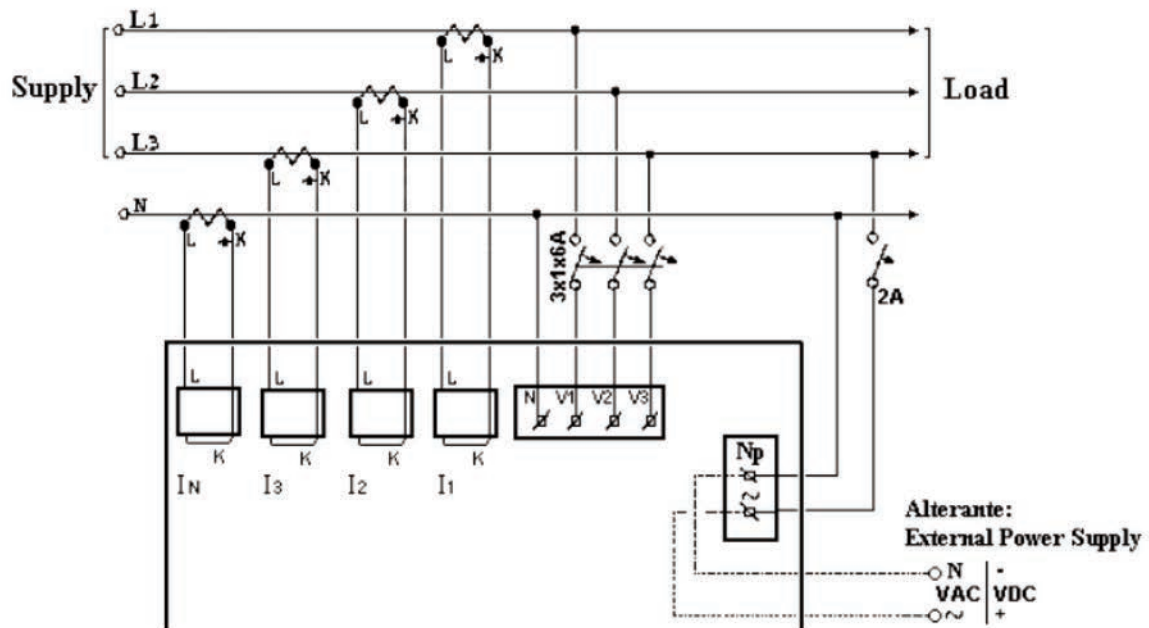
- - - - RS485 (Shielded & Grounded)



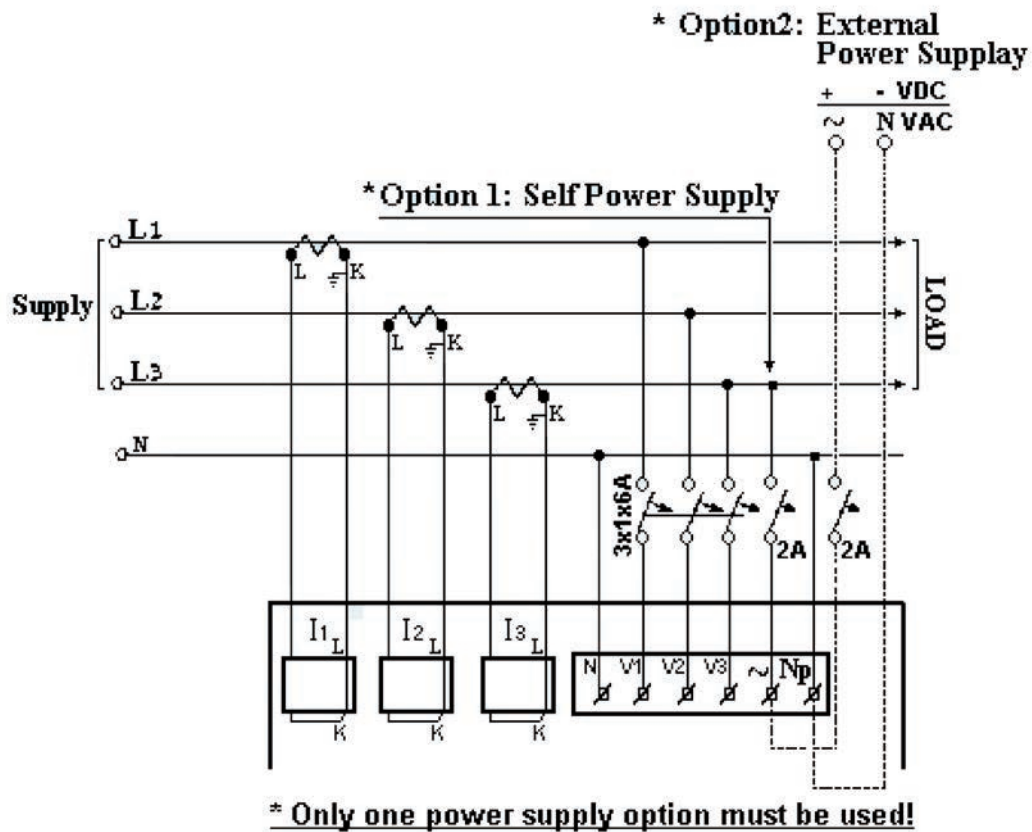
# UNIVERSAL MEASURING INSTRUMENTS

Wiring diagram example:

TNM144-I



TNM144-II





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