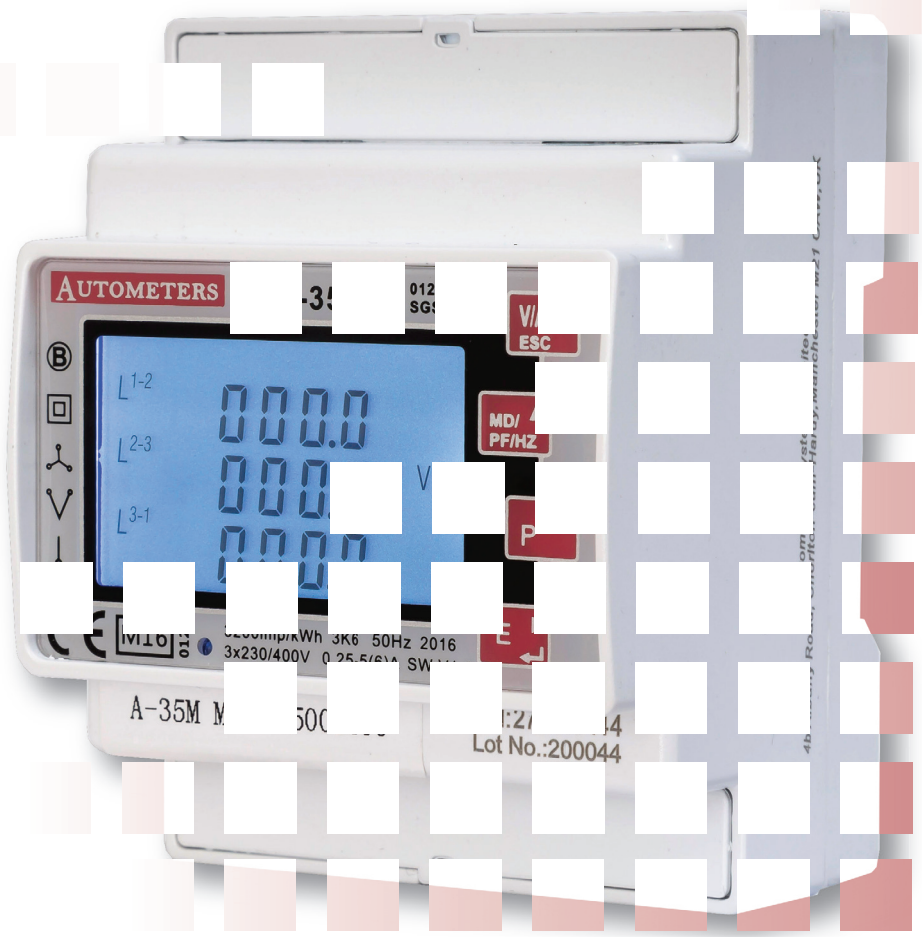
FORMATION CENTRE A-35 Series

Three phase multi-functional DIN rail energy meter



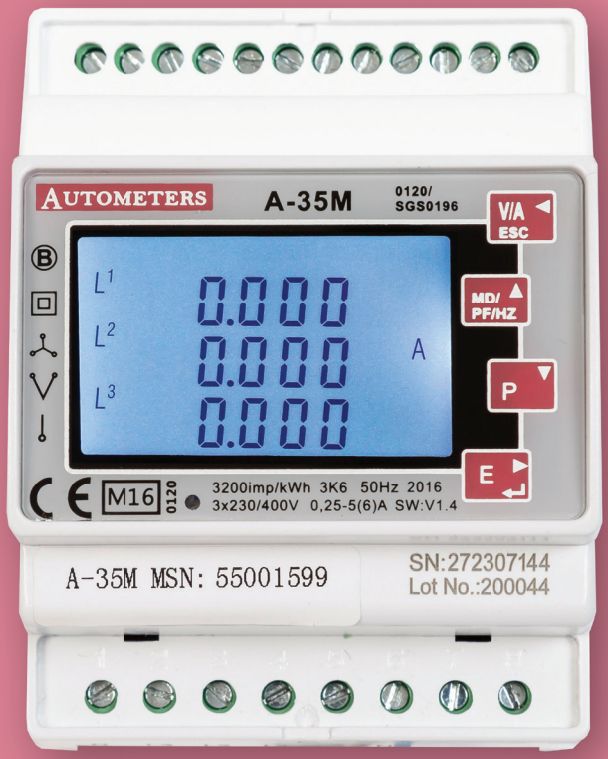
- MID Approved (SGS.UK) Appendix B and D
- Measures kWh, KVArh, KVar,PF,Hz, Max demand
- Total Harmonic Distortion of Voltage and Current
- RS 485 Modbus (Autometers V6 protocol)
- Two Pulse Outputs
- BI- Directional Measurement for Import and Export
- Back light LCD for full viewing Angles
- Available as 1 Phase 2 Wire, 3 Phase 3 Wire and 3 Phase 4 Wire
- 1 or 5 Amp current transformer connection

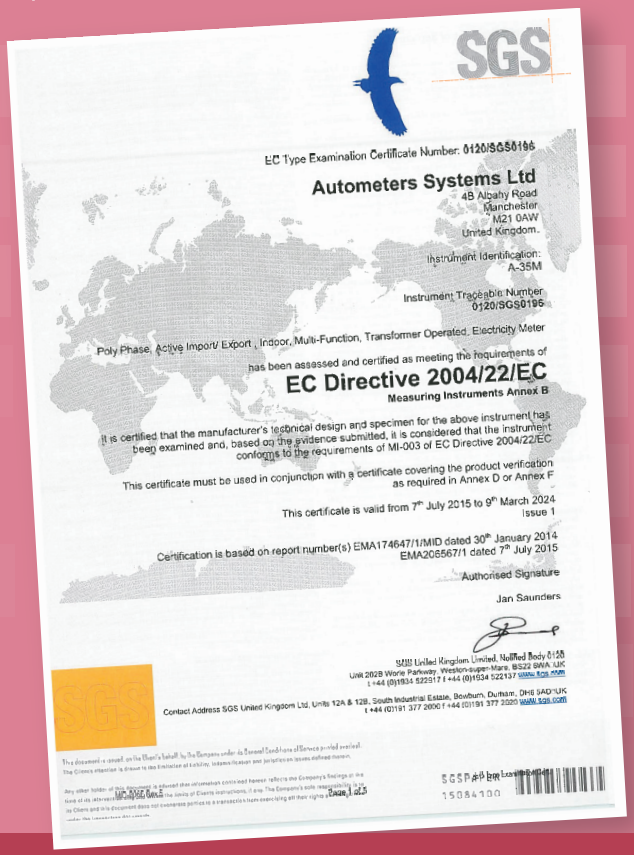
AUTOMETERS SYSTEMS

Introduction

This document provides operating, maintenance and installation instructions. This unit measures and displays the characteristics of single phase two wires(1p2w),three phase three wires(3p3w) and three phase four wires(3p4w) networks.The measuring parameters include voltage(V), frequency(Hz),current(A),power(kW/Kva/Kvar),Imported, exported and total Energy(kWh/kvArh).The unit can also measures Maximum demand current and power, this is measured over preset periods of up to 60 minutes.

This unit is a 1A or 5A current transformer operated and can be configured to work with a wide range of CTs.Built-in pulse and RS 485 Modbus RTU outputs.Configuration is password protected.




SGS

EC Type Examination Certificate Number: 0120/SGS0196

Autometers Systems Ltd
4B Albany Road
Manchester
M21 0AW
United Kingdom.

Instrument Identification:
A-35M

Instrument Traceable Number
0120/SGS0195

Poly Phase, Active Import/ Export , Indoor, Multi-Function, Transformer Operated, Electricity Meter

has been assessed and certified as meeting the requirements of

EC Directive 2004/22/EC
Measuring Instruments Annex B

It is certified that the manufacturer's technical design and specimen for the above instrument has been examined and, based on the evidence submitted, it is considered that the instrument conforms to the requirements of MI-003 of EC Directive 2004/22/EC

This certificate must be used in conjunction with a certificate covering the product verification as required in Annex D or Annex F

This certificate is valid from 7th July 2015 to 9th March 2024
Issue 1

Certification is based on report number(s) EMA174647/1/MID dated 30th January 2014
EMA206567/1 dated 7th July 2015

Authorised Signature

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This unit can be powered from a separate auxiliary (AC or DC) supply. Alternatively it can be powered from the monitored supply by linking the voltage reference and neutral reference in to terminals 5 + 6 (Please refer to wiring diagram).

Product development is continous and Autometers systems Ltd reserves the right to make alterations and manufacture without notice. Products as delivered may therefor differ from the descriptions and illustrations in this publication.

Declaration of Conformity for the A-35 Series Meter.

We Autometers Systems Ltd declare under our sole responsibility as the manufacturer that the poly phase multifuntion electrical energy meter “A-35 Series” correspond to the production model described in the EC-type examination certificate and to the requirements of the Directive 2004/22/EC EC type examination certificate number 0120/SGS0196. Identification number of the NB0120

I. Unit Characteristics

1.1 Unit Characteristics:

The unit can measure and display:

- Voltage and THD% (total harmonic distortion) of all phases
- Line frequency
- Currents,current demand and current THD% of all phases
- Power, maximum power demand and power factor
- Active energy imported and exported
- Reactive energy imported and exported

The unit has password protected set-up screens for:

- Changing password
- Supply system selection 1p2w, 3p3w,3p4w
- Demand interval time
- Reset for demand measurements
- Pulse output duration

Two pulse output indicate real-time energy measurement. An RS-485 output allows remote monitoring from another display or a computer.

1.2 Current Transformer Primary Current

A35M CT has a pre configured CT Ration of 100 or 200A depending on part code. The unit is a current transformer supplied device, and you will need to set the correct ratio.
As an example: If using 100/5A CT, you will need to insure CT2 (Secondary) is set to 5 and CT rate is 0020. You divide the primary by the secondary to get the CT rate to be entered (100/5=20).

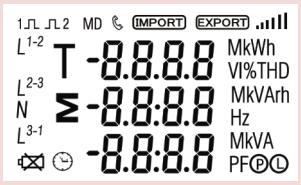
1.3 RS 485 Serial – Modbus RTU (Autometers Protocol V6)

RS 485 serial port with Modbus RTU protocol to provide a means of remotely monitoring and controlling the Unit.Set-up screens are provided for setting up the RS 485 port. Refers to section 4.8.

1.4 Pulse output

Two pulse outputs that pulse measured active and reactive energy. The Pulse 2 constant for active energy is 3200imp/kWh. (Terminals 11 & 12) The pulse width for Pulse 1 can be set from the set-up menu (Terminals 9 & 10). See section 4.7.

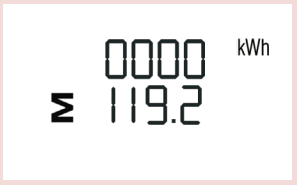
2. Start up screens



The first screen lights all LED segments and can be used as a display LED check

The second screen indicates the software version of the unit.
(the above picture is just for reference)

The unit performs a self-test and the screen indicates if the test is passed.



After a short delay, the screen will display active energy measurements.

3. Keys and Displays

3.1 Button Functions

Button	Click
V/A ESC	■ Selects the Voltage and Current display screens. ■ In Set-up Mode, this is the “Left” or “Back” button.
MD/ PF/HZ	■ Select the Frequency and Power factor display screens. ■ In Set-up Mode, this is the “Up” button.
P	■ Select the Power display screens. ■ In Set-up Mode, this is the “Down” button.
E	■ Select the Energy display screens. ■ In Set-up mode, this is the “Enter” or “Right” button.

3.2 Voltage and Current

Each successive press of the V/A ESC button selects a new parameter:

Phase to neutral voltages.

Current on each phase.

Phase to neutral voltage THD%.

Current THD% for each phase.

3.3 Frequency and Power Factor and Demand

Each successive press of the MD/ PF/HZ button selects a new range:

Frequency and Power Factor (total).

Power Factor or each phase.

Maximum Current Demand.

Maximum Power Demand.

3.4 Power

Each successive press of the P button selects a new range:

Instantaneous Active Power in kW.

Instantaneous Reactive Power in kVAr.

Instantaneous Volt-Amps in KVA.

Total kW, kVArh, kVA.

3.5 Energy Measurements

Each successive press of the E button selects a new range:

Imported active energy in kWh.

Exported active energy in kWh.

Imported reactive energy in kVArh.

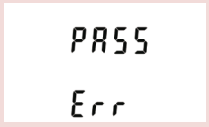
Exported reactive energy in kVArh.

Software SN.

4. Set Up

To enter set-up mode, press the E button for 3 seconds until the password screen appears.

Setting up is password-protected so you must enter the correct password (default '1000') before processing.



If an incorrect password is entered, the display will show:

PASS Err

To exit set-up mode, press the V/A ESC button repeatedly until the measurement screen is restored.

4.1 Set-up Entry Methods

Some menu items, such as password and CT, require a four-digit number entry while others, such as supply system, require selection from a number of menu options.

4.1.1 Menu Option Selection

Use the MD/ PF/HZ and P buttons to scroll through the different options of the set-up menu.

Press E to confirm your selection.

If an item flashes, then it can be adjusted by the MD/ PF/HZ and P buttons.

Having selected an option from the current layer, press E to confirm your selection. The SET indicator will appear.

Having completed a parameter setting, press V/A ESC to return to a higher menu level. The SET indicator will be removed and you will be able to use the MD/ PF/HZ and P buttons for further menu selection.

On completion of all setting-up, press V/A ESC repeatedly until the measurement screen is restored.

4.1.2 Number Entry Procedure

When Setting up the unit, some screens require the entering of a number. In particular, on entry to the setting up section, a password must be entered. Digits are set individually, from left to right. The procedure is as follows:

The current digit to be set flashes and is set using the MD/PF/HZ and P buttons.

Press E to confirm each digit setting. The SET indicator appears after the last digit has been set.

After setting the last digit, press V/A ESC to exit the number setting routine. The SET indicator will be removed.

4.2 Change Password

Use MD/PF/HZ and P to choose the change password option.

Press the E button to enter the change password routine. The new password screen will appear with the first digit flashing.

Use MD/PF/HZ and P to set the first digit and press E to confirm your selection. The next digit will flash.

Repeat the procedure for the remaining three digits.

After setting the last digit SET will show.

Press V/A ESC to exit the number setting routine and return to the set-up menu. SET will be removed.

4.3 DIT Demand Integration Time

This sets the period in minutes over which the current and power readings are integrated for maximum demand measurement. The options are: off, 5, 10,15 30,60 minutes.

From the set-up menu, use MD/PF/HZ and P buttons to select the DIT option. The screen will show the currently selected integration time.

Press E to enter the selection routine. The current time interval will flash.

Use MD/PF/HZ and P buttons to select the time required.

Press E to confirm the selection. SET indicator will appear.

Press V/A ESC to exit the DIT selection routine and return to the menu.

4.4 Supply System

The unit has a default setting of 3Phase 4wire (3P4). Use this section to set the type of electrical system.

From the set-up menu, use MD/PF/HZ and P buttons to select the system option. The screen will show the currently selected power supply.

Press E to enter the selection routine. The current selection will flash.

Use MD/PF/HZ and P buttons to select the required system option: 1P2(W),3P3(W) ,3P4(W).

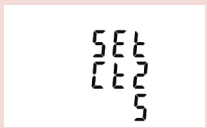
Press E to confirm the selection. SET indicator will appear.

Press V/A ESC to exit the system selection routine and return to the menu. SET will disappear and you will be returned to the main set-up Menu.

4.5 CT

The CT option sets the secondary current (CT2 1A or 5A) of the current transformer (CT) that wires to the meter.

From the set-up menu, use MD/PF/HZ and P buttons to select the CT option.



Secondary CT setting

Press E to enter the CT secondary current selection routine.:5A/1A

Set CT Ratio value Press E to enter the CT Ratio setting screen. The range is from 0001 to 9999.

For example, if using a 100/5A current transformer you will enter 0020, as you need to divide the primary by the secondary to get the ratio (CT rate).

*** Please note for the MID approved version device,you will only have one opportunity to set the ratio.**

C.T Primary	Number to program into the meter	C.T Primary	Number to program into the meter
100/5	20	800/5	160
150/5	30	1000/5	200
200/5	40	1200/5	240
250/5	50	1500/5	300
300/5	60	1600/5	320
400/5	80	2000/5	400
500/5	100	2500/5	500
600/5	120	3000/5	600

4.6 PT

The PT option sets the secondary voltage (PT2 100 to 500V) of the voltage transformer (PT) that may be connected to the meter.

Use MD/PF/HZ and P buttons to select the PT option. The screen will show the voltage PT secondary voltage value. The default value is 400V.

Secondary PT setting

Press E to enter the PT secondary voltage selection routine. The range is from 100 to 500V.

Set PT ratios value

Press E to enter the PT ratio screen. The range is from 0001 to 9999. For example, if set the ratio to be 100,it means the primary voltage equals secondary voltage x100.

4.7 Pulse Output

This option allows you to configure the pulse output. The output can be set to provide a pulse for a defined amount of energy active or reactive. Use this section to set up the pulse output—Units: kWh, kVArh

From the set-up menu, use MD/PF/HZ and P buttons to select the Pulse Output option.

Press E to enter the selection routine. The unit symbol will flash.

Use MD/PF/HZ and P buttons to choose kWh or kVArh.

On completion of the entry procedure, press E to confirm the setting and press V/A ESC to return to the main set up menu.

4.7.1 Pulse Rate

Use this to set the energy represented by each pulse. Rate can be set to 1 pulse per 0.01kWh / 0.1kWh / 1kWh / 10kWh / 100kWh.

(It shows 1 impulse = 10kWh/kVArh)

From the set-up menu, use MD/PF/HZ and P buttons to select the Pulse Rate option.

Press E to enter the selection routine. The current setting will flash. 0.01/0.1/1/10/100kWh/kVArh per pulse.

Use MD/PF/HZ and P buttons to choose pulse rate. On completion of the entry procedure, press E to confirm the setting and press V/A ESC to return to the main set up menu.

4.7.2 Pulse Duration

The energy monitored can be active or reactive and the pulse width can be selected as 200, 100 or 60ms.

(It shows pulse width of 200ms)

From the set-up menu, use MD/ PF/HZ and P buttons to select the Pulse width option.

Press E to enter the selection routine. The current setting will flash.

Use MD/ PF/HZ and P buttons to choose pulse rate. On completion of the entry procedure, press E to confirm the setting and press V/A ESC to return to the main set up menu.

4.8 Communication

There is a RS 485 port can be used for communication using Modbus RTU protocol. For Modbus RTU, parameters are selected from Front panel.

4.8.1 RS 485 Address

(The range is from 001 to 247)

From the set-up menu, use MD/ PF/HZ and P buttons to select the address ID.

Press E button to enter the selection routine. The current setting will be flashing.

Use MD/ PF/HZ and P buttons to choose Modbus address (001 to 247).

On completion of the entry procedure, press E button to confirm the setting and press V/A ESC button to return the main set-up menu.

4.8.2 Baud Rate

From the set-up menu, use MD/ PF/HZ and P buttons to select the Baud Rate option.

Press E to enter the selection routine. The current setting will flash.

Use MD/ PF/HZ and P buttons to choose Baud rate 2.4k. 4.8k, 9.6k, 19.2k, 38.4k

On completion of the entry procedure, press E to confirm the setting and press V/A ESC to return to the main set up menu.

4.8.3 Parity

From the set-up menu, use MD/PF/HZ and P buttons to select the Parity option.

Press E to enter the selection routine. The current setting will flash.

Use MD/PF/HZ and P buttons o choose parity (EVEN / ODD / NONE (default)).
On completion of the entry procedure, press E to confirm the setting and press V/A ESC to return to the main set up menu.

4.9 Backlit set-up

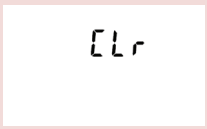
The meter provides a function to set the blue backlit lasting time (0/5/10/30/60/120 minutes). Option 0 means the backlit always on here.

Default:60
If it's set to 5,the backlit will be off in 5minutes.

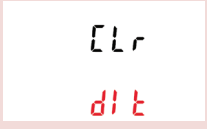
Use MD/PF/HZ and P buttons to choose the time
Press E to confirm the setting and press V/A ESC to return to the main set up menu.

4.10 CLR

The meter provides a function to reset the maximum demand value of current and power.



Use MD/PF/HZ and P buttons to select the reset option.



Press E to enter the selection routine. The dIt will flash
Press E to confirm the setting and press V/A ESC to return to the main set up menu..

5. Specification

5.1 Measured Parameters

The unit can monitor and display the following parameters of a single phase two wire(1p2w), three phase three wire(3p3w) or four phase four wire(3p4w) system.

5.1.1 Voltage and Current

Phase to neutral voltages 100 to 289V a.c. (not for 3p3w supplies).
Voltages between phases 173 to 500V a.c.
Percentage total voltage harmonic distortion (THD%) for each phase to N (not for 3p3w supplies).
Percentage voltage THD% between phases
Current THD% for each phase

5.1.2 Power factor and Frequency and Maximum Demand

Frequency in Hz
Instantaneous power:
Power 0 to 3600 MW
Reactive power 0 to 3600 MVAr
Volt-amps 0 to 3600 MVA
Maximum demanded power since last Demand reset Power factor
Maximum neutral demand current, since the last Demand reset (for three phase supplies only)

5.1.3 Energy Measurements

Imported/Exported active energy.....	0 to 9999999.9 kWh
Imported/Exported reactive energy.....	0 to 9999999.9 kVArh
Total active energy.....	0 to 9999999.9 kWh
Total reactive energy.....	0 to 9999999.9 kVArh

5.2 Measured Inputs

Voltage inputs through 4-way fixed connector with 2.5mm² stranded wire capacity.single phase two wire(1p2w), three phase three wire(3p3w) or four phase four wire(3p4w) unbalanced. Line frequency measured from L1 voltage or
L3 voltage.
Three current inputs (six physical terminals) with 2.5mm² stranded wire capacity for connection of external CTs. Nominal rated input current 5A or 1A a.c. Rms.

5.3 Accuracy

■ Voltage	0.5% of range maximum
■ Current.....	0.5% of nominal
■ Frequency.....	0.2% of mid-frequncy
■ Power factor.....	1% of unity (0.01)
■ Active power (W).....	±1% of range maximum
■ Reactive power (VAr).....	±1% of range maximum
■ Apparent power (VA).....	±1% of range maximum
■ Active energy (Wh).....	Class 1 IEC 62053-21
■ Reactive energy (VARh).....	±1% of range maximum
■ THD.....	1% up to 31st harmonic
■ Response time to step input...	1s, typical, to >99% of final reading, at 50 Hz

5.4 Auxilliary Supply

Two-way fixed connector with 2·5mm2 stranded wire capacity. 85 to 275V a.c. 50/60Hz ±10% or 120V to 380V d.c. ±20%. Consumption < 10W.

5.5 Interfaces for External Monitoring

Three interfaces are provided:
- RS 485 communication channel that can be programmed for Modbus RTU protocol
- Relay output indicating real-time measured energy (configurable)
- Pulse output 3200imp/kWh (not configurable)

The Modbus configuration (baud rate etc.) and the pulse relay output assignments (kW/kVArh, import/export etc.) are configured through the set-up screens.

5.5.1 Pulse Output

The pulse output can be set to generate pulses to represent kWh or kVArh.
Rate can be set to generate 1 pulse per:
0.01 = 10 Wh/VArh
0.1 = 100 Wh/VArh
1 = 1 kWh/kVArh
10 = 10 kWh/kVArh
100 = 100 kWh/kVArh

Pulse width 200/100/60 ms.
Relay Rating 240V ac 50mA

5.5.2 RS 485 Output for Modbus RTU

For Modbus RTU, the following RS 485 communication parameters can be configured from the set-up menu:
Baud rate 2400, 4800, 9600, 19200, 38400
Parity none (default) / odd / even
Stop bits 1 or 2
RS 485 network address nnn – 3-digit number, 1 to 247

Modbus™ Word order Hi/Lo byte order is set automatically to normal or reverse. It cannot be configured from the
set-up menu.

5.6 Reference Conditions of Influence Quantities

Influence Quantities are variables that affect measurement errors to a minor degree. Accuracy is verified under nominal value (within the specified tolerance) of these conditions.

- Ambient temperature..... 23°C ± 1°C
- Input waveform..... 50 or 60Hz ±2%
- Input waveform..... Sinusoidal (distortion factor < 0·005)
- Auxilliary supply voltage..... Nominal ±1%
- Auxilliary supply frequency..... Nominal ±1%
- Auxilliary supply waveform (if AC)... Sinusoidal (distortion factor < 0·05)
- Magnetic field of external origin..... Terrestrial flux

5.7 Environment

Operating temperature	-25°C to +55°C*
Storage temperature	-40°C to +70°C*
Relative humidity	0 to 95%, non-condensing
Altitude	Up to 3000m
Warm up time	1 minute
Vibration	10Hz to 50Hz, IEC 60068-2-6, 2g
Shock	30g in 3 planes

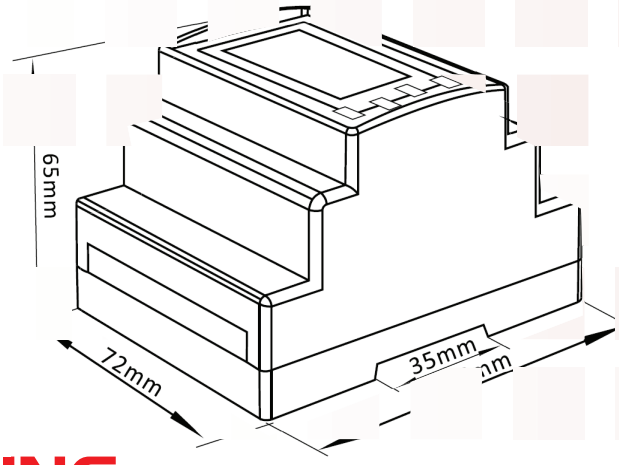
* Maximum operating and storage temperatures are in the context of typical daily and seasonal variation.

5.8 Mechanics

DIN rail dimensions	72 x 94.5 mm (WxH) per DIN 43880
Mounting	DIN rail (DIN 43880)
Sealing	Ip51 (indoor)
Material	Self-extinguishing Ul94 V-0

6. Dimensions

The meter is a 72mm x 94.5mm panel mounted meter with a depth of 65mm The cut out hole for the panel meter is 72mm x 94.5mm.



WARNING

Important Safety Information is contained in sections 7-8. Familiarize yourself with this information before attempting installation or other procedures. Symbols used in this document

Risk of Danger: These instructions contain important safety information. Read them before starting installation or servicing of the equipment.
Caution: Risk of Electric Shock

7. Maintenance

In normal use, little maintenance is needed. As appropriate for service conditions, isolate electrical power, inspect the unit and remove any dust or other foreign material present. Periodically check all connections for freedom from corrosion and screw tightness, particularly if vibration is present.

The front of the case should be wiped with a dry cloth only. Use minimal pressure, especially over the viewing window area. If necessary wipe the rear case with a dry cloth. If a cleaning agent is necessary, isopropyl alcohol is the only recommended agent and should be used sparingly. Water should not be used. If the rear case exterior or terminals should be contaminated accidentally with water, the unit must be returned to Autometers Systems Ltd for inspection and testing.

8. Electrician.

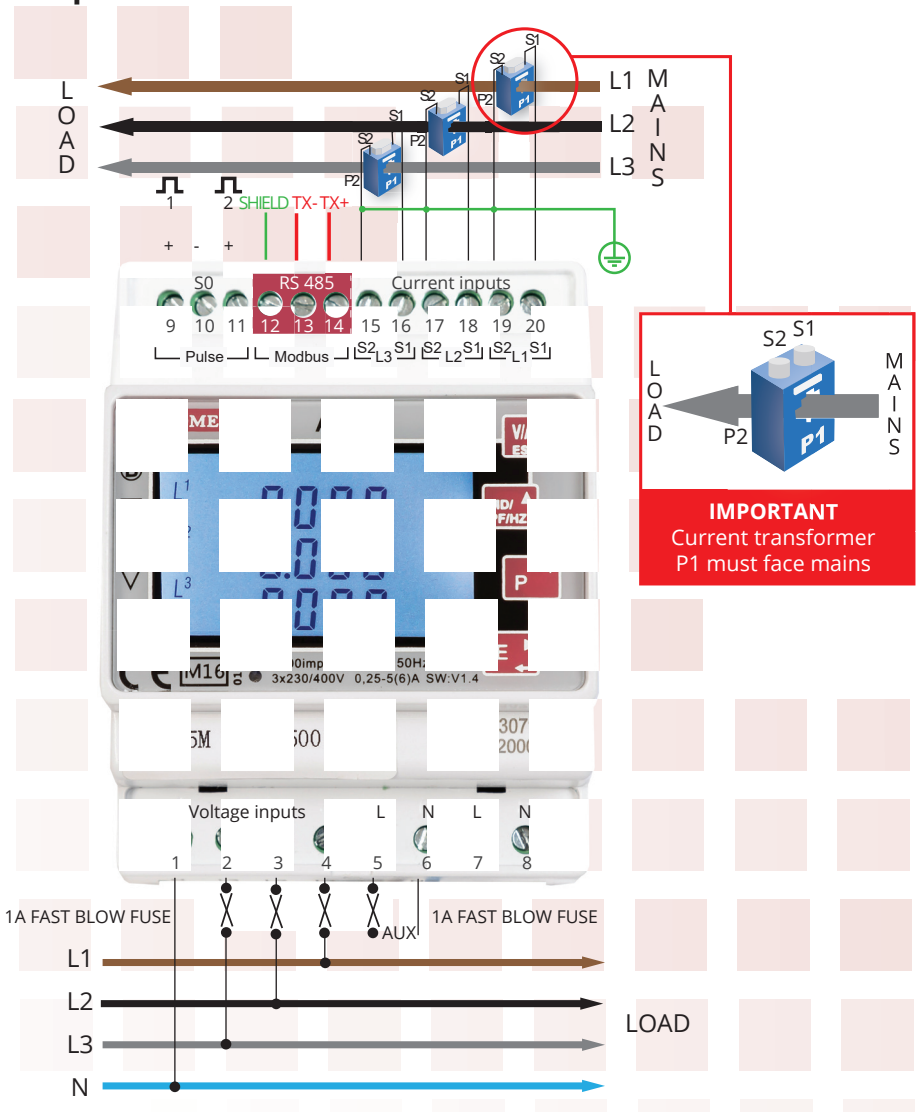
The A-35 Series panel meter should only be installed by a fully qualified electrician who has knowledge of electricity meters connected with current transformers.

It is the installer who is fully responsible for the safe installation of this meter. It must be installed to meet the current electrical regulations concerning installation of panel meters.

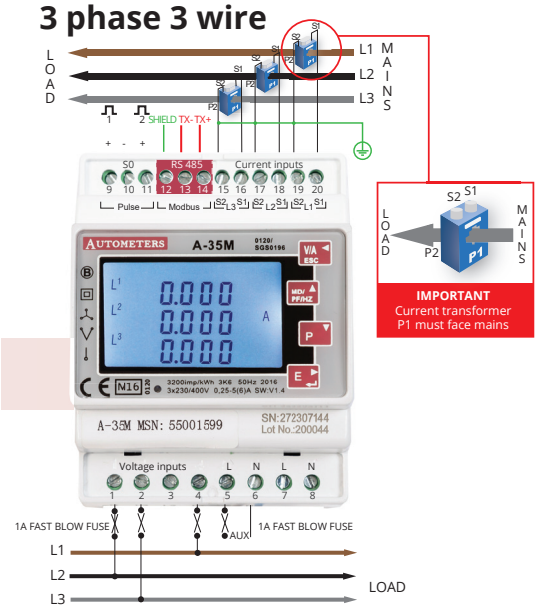
9. Wiring Diagram

It is imperative that the current transformers are of the correct accuracy, fitted correctly and the meter is programmed to match the current transformers ratio.

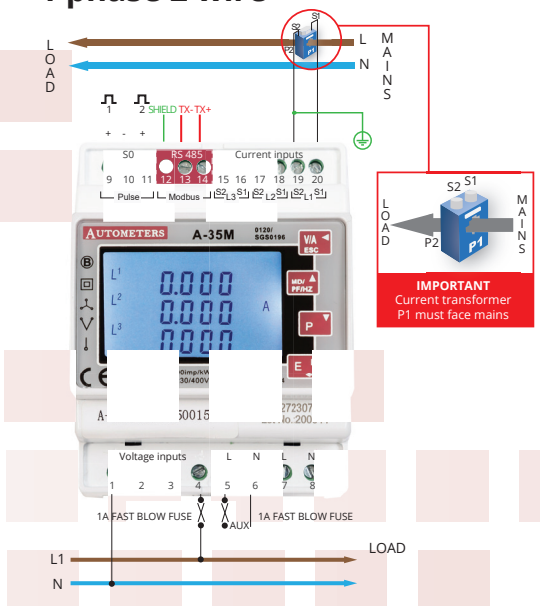
3 phase 4 wire



3 phase 3 wire

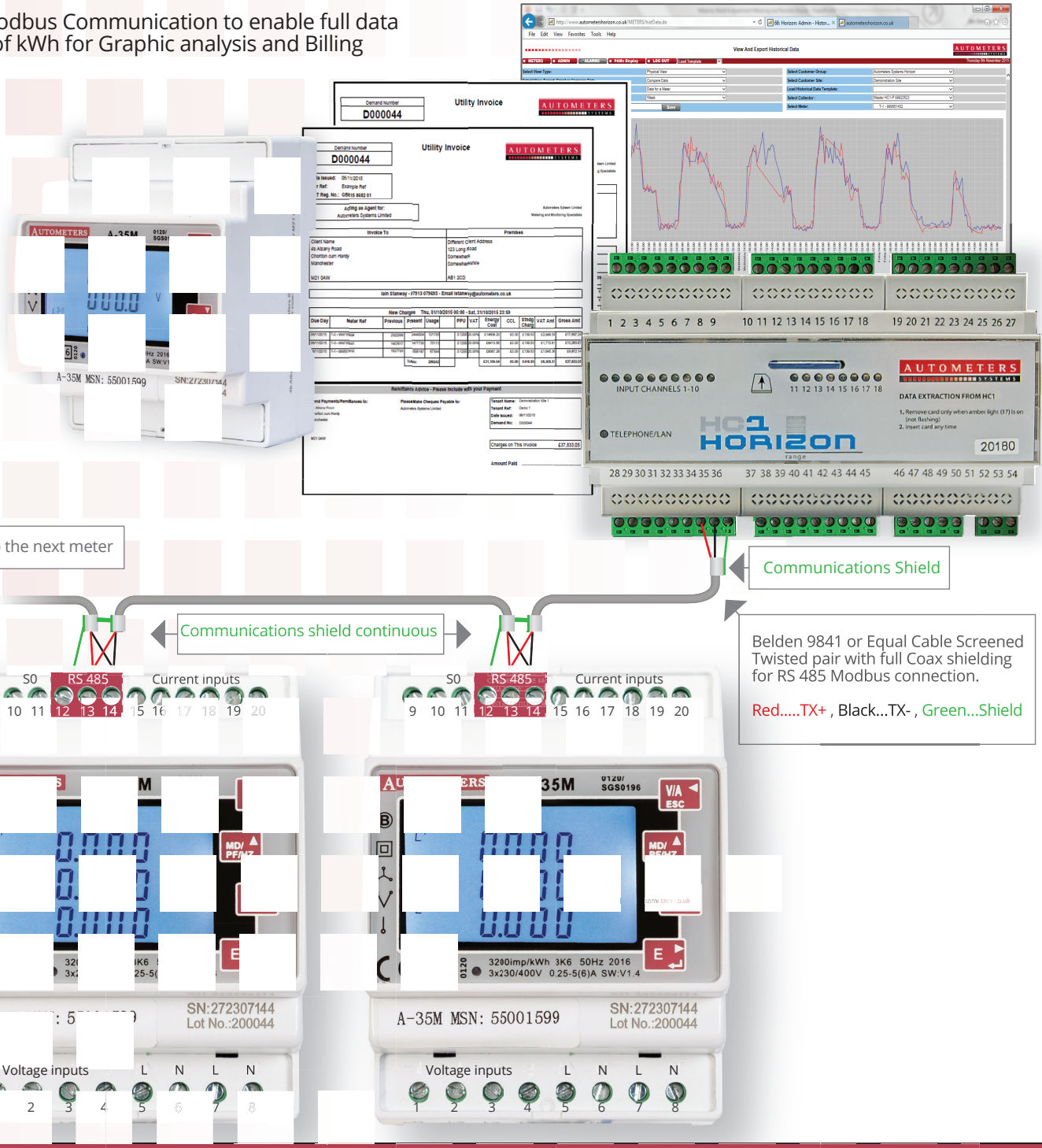


1 phase 2 wire



The Horizon Energy Monitoring System With the New A-35 Series

RS 485 Modbus Communication to enable full data retrieval of kWh for Graphic analysis and Billing



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AUTOMETERS SYSTEMS

Ref. ICA-35 Series.12.2020