

SMART ELECTRICITY METERS

AM170 AM370



The AMx70 family electricity meters are modern electronic devices, designed for application in AMM systems for monitoring, checking and governing of electricity consumption. The electricity meters allow for saving of operating data and are equipped with a communication module for bidirectional remote data and control command transmission. The communication protocol is as per IEC 62056-21 and DLMS. The electricity meters can be configured to meet customer requirements and needs. The electricity meters enable direct or semi-indirect measurement of active energy in both directions (consumption and supply) as well as measurement of reactive energy in four quadrants.

The electricity meters have been designed to serve billing purposes. They are MID certified and WELMEC 7.2 compliant to bill active energy, as well as certified to measure reactive energy as per national Metrology Act No. 505/1990 Coll.

MEASURING SYSTEM

The AMx70 series electricity meter:

- is a single or poly-phase static device;
- measures active energy in accuracy classes 2 (i.e. A), 1 (i.e. B), 0.5 (i.e. C);
- measures reactive energy in accuracy classes 2 or 3;
- complies with IEC 62052-11, IEC 62053-21, IEC 62053-22 (i.e. EN 50470-1, EN 50470-3) and IEC 62053-23, IEC 62054-24 (active / reactive energy);
- is designed for direct or semi-indirect connection;
- includes a real time clock with a replaceable battery.

At the heart of the measuring part is the microprocessor that executes all major calculations and operations. It converts analog signals from current and voltage sensors to digital, calculates required measurands, governs subsequent processing and data saving to the internal memory. Calibration is made via software calibration constants, this implying that the measuring system has no adjustable mechanical parts.

Another important functionality is checking for and logging of tampering occurrence that could hamper metrological functionality. The microprocessor also governs the data displayed, disconnecter, tariff switching, calibration LED flashing, etc. Display values and disconnecter status can be modified via two push buttons.

The meter communicates via its optical interface locally and via its internal communication module remotely with the superordinate Meter Data Management System (MDMS).

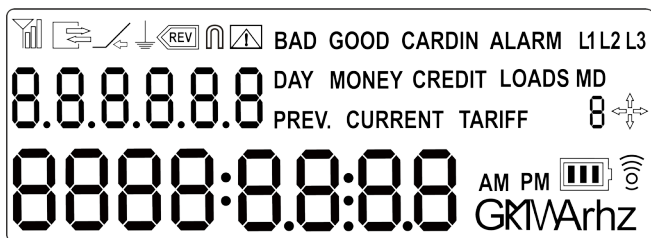
METER DESIGN

The AMx70 electricity meter, stemming from a design traditionally proven, is designed so as to withstand demanding operation conditions, enable simple handling and deliver increased protection from unauthorized consumptions. The set of sealing positions safeguards various concealed parts of the meter from unauthorized entry. The design solution offers simple installation. The meter case and terminal block dimensions comply with DIN 43857. The meter cover enables stacking of the meters for storage.

LIQUID CRYSTAL DISPLAY (LCD)

The LCD shows measurand values. Displayed measurands vary according to the display mode chosen. The modes can be either customer and service mode with automatic screen scrolling or customer, service and battery mode with manual scrolling via push buttons. Values are displayed together with OBIS codes and usually with corresponding units. LCD also shows other icons describing current status of meter.

LCD SEGMENT LAYOUT (TWO DIGIT ROWS, 6+8)



PUSH BUTTONS

Push buttons are used for up and down scrolling of display data and for pulling up display data in battery mode. A long simultaneous push of both push buttons governs the disconnecter, provided this functionality is enabled in the mode engaged. A long push of bottom button lights up the display. A long push of bottom button stops display being lit.

BILLING INFORMATION

The meter carries registers to store three kinds of billing information (total and rated absolute, kWh or kvarh):

- Current billing information: since last billing end to actual time, comprising A+, A-, Ri+ (QI), Ri- (QII), Rc- (QIII) and Rc+ (QIV);
- Daily billing information: stored at midnight for up to 45 days, comprising A+, A-, Ri+ (QI), Ri- (QII), Rc- (QIII) and Rc+ (QIV);
- End of billing information: stored at least 12 times (periods of one month or shorter), comprising A+, A-, Ri+ (QI), Ri- (QII), Rc- (QIII) and Rc+ (QIV), Max Demand.

METER PROFILES

The meter carries registers to store an instantaneous values profile and two load profiles, hourly and daily, with timestamps and status codes. For instantaneous values profile and hourly load profile, the meter stores at least 2976 entries (every 15 minutes for 31 days). The 15 mins capture period is by default, but available also are other capture periods, 1 to 60 mins. Daily load profile stores at least 45 entries (for 45 days).

The instantaneous load profile (values stored at period end) comprises: Voltage(s) L1(L2, L3), Current(s) L1 (L2, L3), Current (sum over all three phases), Active power P+, Active Power P-, Reactive Power Q+, Reactive Power Q-, Power Factor. Hourly (incremental value) and daily (absolute value) load profiles both comprise A+, A-, Ri+ (QI), Ri- (QII), Rc- (QIII) and Rc+ (QIV).

EVENT LOGGERS

Detected events are timestamped and logged to Event Loggers in a prescribed structure. As a rule, meter functionalities listed below create events that can be detected (identified), registered (logged) and notified (an alarm is triggered). Each event has a unique code to identify the action which triggered it and is assigned to a unique log. There are 5 groups of events, split into 11 subgroups, each housing at least 45 entries. The subgroups are: Standard, Import power contract,

Firmware, Synchronization, Export power contract, Disconnect control, Non-finished quality events, Finished quality events, Fraud, Correct security operations, Failed security operations.

METER REGISTRATION

The meter carries objects with specific rights. Opening of an association with a client is only possible if the client is allowed on the corresponding ports: secure, management and reading. Implementation of associations is done as per Green Book, ver. 8.3.

REMOTE TARIFF PROGRAMMING

The meter supports remote programming of winter and summer seasons as well as up to three contracts for both working days and off-work days.

METER READING ON DEMAND & FOR BILLING

Current billing information can be generated on demand. Daily load profile values are stored at the end of the day. End of Billing information contains both incremental and absolute energy registers. Generated billing information and profiles are preserved when power failure occurs.

LOAD MANAGEMENT

The direct current meter is equipped with (a) current terminal(s) disconnecter (semi-indirect meter with disconnecter relay) with a preset control mode 4 and remotely settable power limit. If this limit is exceeded (110 % and more), the disconnecter opens current terminals with a variable delay (semi-indirect meter opens the disconnecter relay). An opened disconnecter / disconnecter relay can be closed both locally and remotely. For polyphase meters, unbalanced currents do not open the disconnecter / disconnecter relay.

QUALITY OF SUPPLY

Voltage variations (below 80 % / above 115 % of nominal voltage) events are detected.

CLOCK SYNCHRONIZATION (RTC)

The meter is equipped with a Real Time Clock (RTC). The RTC adjusts the time and date in the meter, allowing for correct generation of load curves and historical energy records. The RTC is adjusted during the manufacturing process and can be adjusted via the optical interface locally or via the communication module remotely. The meter supports daylight saving mode. A battery backs up the RTC during power outages.

FIRMWARE UPDATE

Both Application and PRIME FWs in the meter can be updated remotely without changing the meter configuration. The updating process is robust, as data blocks already received do not get lost if communication gets interrupted and also corrupt FW images are rejected.

METER SUPERVISION

The meter is equipped with a battery, replaceable after opening of the terminal cover (i.e. breaking the terminal cover seal). Battery status is shown on the display. Detected are events like power failure and fraudulent behavior, such as terminal cover opening, meter bypassing, terminal manipulation and high magnetic field.

ALARM NEUTRAL LOSS & PHASE SEQUENCE

Poly-phase meters detect loss of neutral as well as correct / incorrect phase sequence.

METER OVERFLOW

The meter detects power overflow by rolling over values in meter registers and incrementing the AMI Profile Status code in load profiles.

SECURITY

The meter supports security requirements according to DLMS security suite 0 with the below mentioned symmetrical algorithms:

- data encryption: AES128-GCM;
- data authentication: AES GMAC 128;
- user authentication: High Level Security (HLS) based on AES GMAC 128.

METER COMMUNICATION INTERFACE

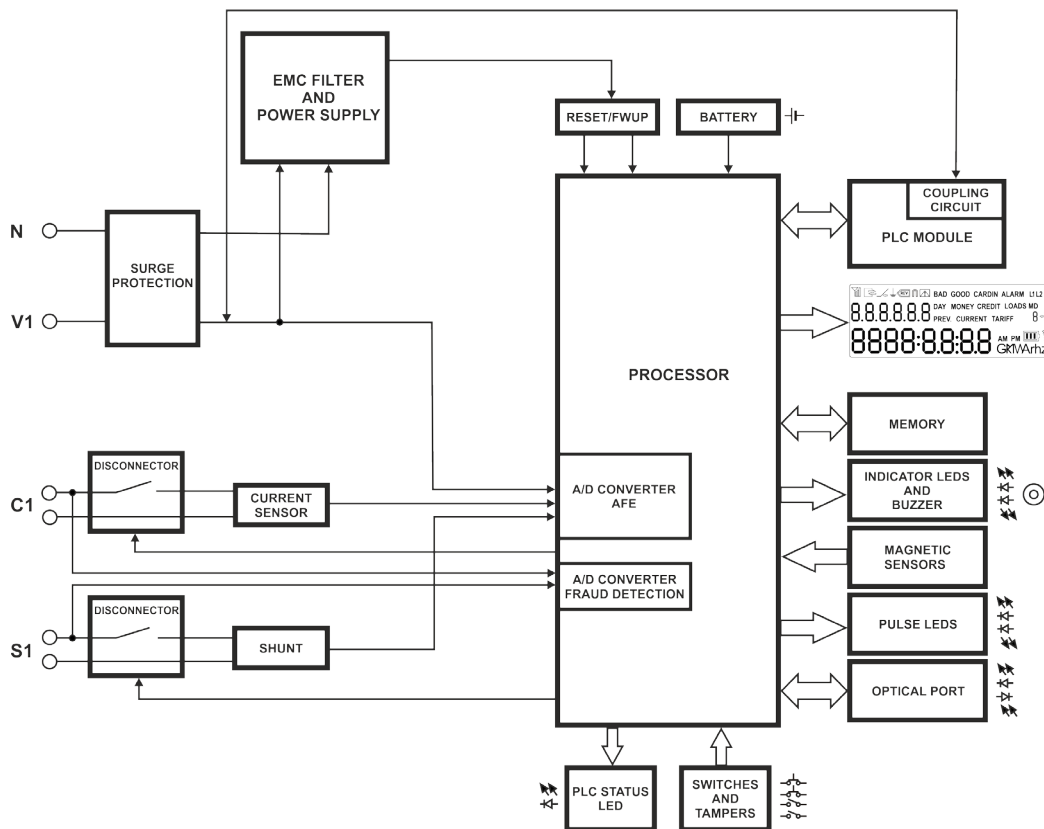
The meter can be accessed via optical or PLC PRIME interfaces.

NORMS AND STANDARDS:

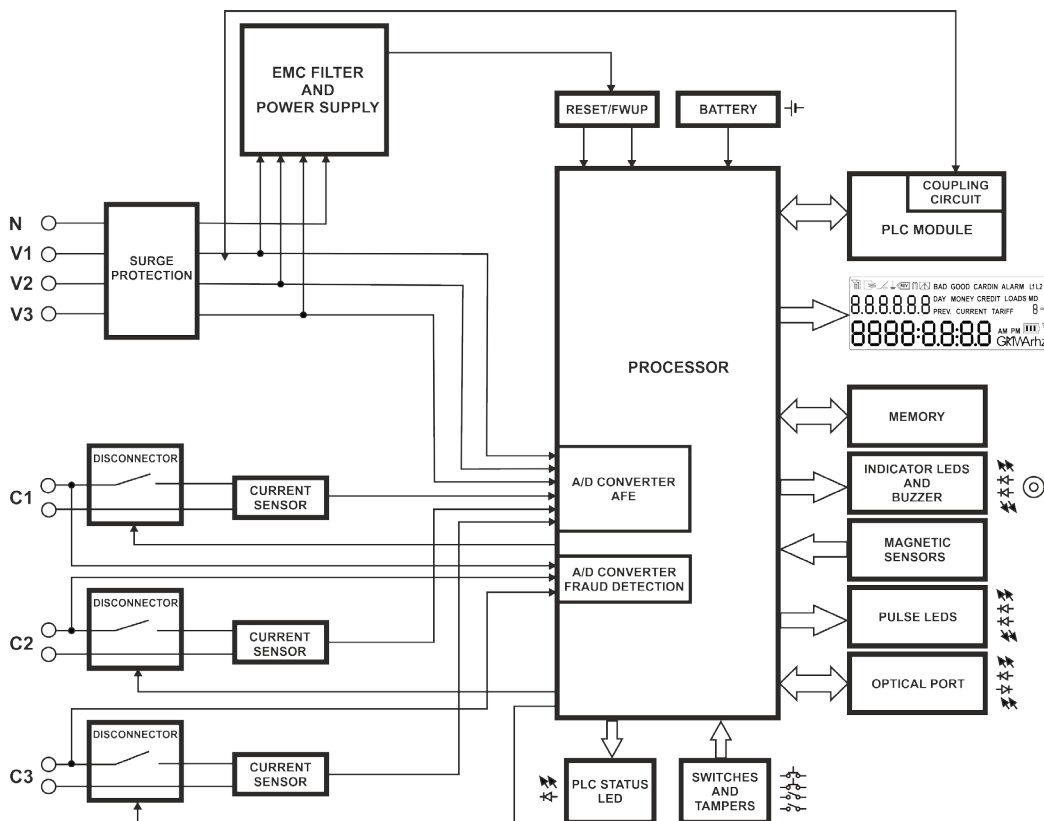
EN 50 470-1	Electricity metering equipment (a.c.) Part 1: General requirements, tests and test conditions -Metering equipment (class indexes A, B and C)
EN 50 470-3	Electricity metering equipment (a.c.) Part 3: Particular requirements - Static meters for active energy (class indexes A, B and C)
IEC EN 60529	Degrees of protection provided by enclosures (IP Code)
IEC EN 62052-11	Electricity metering equipment (a.c.) - General requirements, tests and test conditions - Part 11: Metering equipment
IEC EN 62052-21	Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 21: Tariff and load control equipment
IEC EN 62053-21	Electricity metering equipment (a.c.) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2)
IEC EN 62053-23	Electricity metering equipment (a.c.) - Particular requirements - Part 23: Static meters for reactive energy (classes 2 and 3)
IEC EN 62053-52	Electricity metering equipment (a.c.) - Particular requirements - Part 52: Symbols
IEC EN 62054-21	Electricity metering (a.c.) - Tariff and load control - Part 21: Particular requirements for time switches
IEC EN 62056-21	Electricity metering - Data exchange for meter reading, tariff and load control - Part 21: Direct local data exchange
IEC EN 62056-46	Electricity metering - Data exchange for meter reading, tariff and load control - Part 46: Data link layer using HDLC protocol
IEC EN 62056-47	Electricity metering - Data exchange for meter reading, tariff and load control - Part 47: COSEM transport layers for IPv4 networks
IEC EN 62056-53	Electricity metering - Data exchange for meter reading, tariff and load control - Part 53: COSEM application layer
IEC EN 62056-61	Electricity metering - Data exchange for meter reading, tariff and load control - Part 61: Object identification system (OBIS)
IEC EN 62056-62	Electricity metering - Data exchange for meter reading, tariff and load control - Part 62: Interface classes
IEC EN 60068	Environmental testing
IEC EN 60068-2-1	Environmental testing – Part 2-1: Tests – Test A: Cold
IEC EN 60068-2-2	Environmental testing – Part 2-2: Tests – Test B: Dry heat
IEC EN 61000	Electromagnetic compatibility (EMC)
IEC EN 61000-4-2	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques -Electrostatic discharge immunity test
IEC EN 61000-4-3	Electromagnetic compatibility (EMC) -Part 4-3: Testing and measurement techniques - Radiated, radiofrequency, electromagnetic field immunity test
IEC EN 61000-4-4	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
IEC EN 61000-4-5	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
IEC EN 61000-4-6	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
IEC EN 61000-4-8	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test IEC
IEC EN 61000-4-11	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests
EN 55032	Electromagnetic compatibility of multimedia equipment – Emission requirements
CENELEC EN 50065-1	Signalling on low-voltage electrical installations in the frequency range 2 kHz to 148,5 kHz. General requirements, Frequency bands and electromagnetic disturbances
CENELEC EN 50065-2-3	Signalling on low-voltage electrical installations in the frequency range 2 kHz to 148,5 kHz. Immunity requirements for mains communications equipment and systems operating in the range of frequencies 3 kHz to 95 kHz and intended for use by electricity suppliers and distributors
CENELEC EN 50065-7	Signalling on low-voltage electrical installations in the frequency range 2 kHz to 148,5 kHz. Equipment impedance

BLOCK DIAGRAM

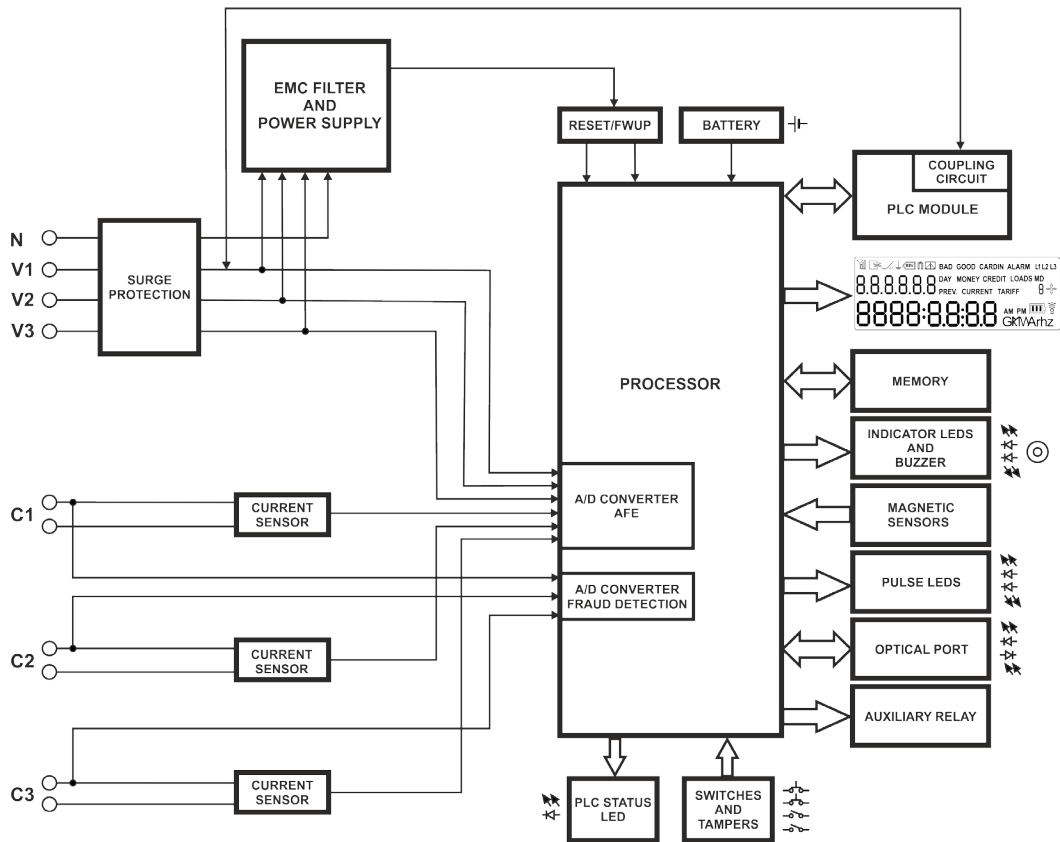
AM170 - Direct Measurement



AM370.D - Direct Measurement



AM370.I - Indirect Measurement



TYPE DESIGNATION

	AM	#	70	.	#	.	#	-	##	.	##	-	##	.	#	#	#	
Single phase	1																	
Poly-phase	3																	
Model		70																
Direct Connection			D															
Indirect Connection			I															
Direct with neutral measurement			Z															
Disconnecter																		
Not Mounted									0									
Direct Meters - disconnecter									1									
Indirect Meters - disconnecter relay for control of external disconnecter									1									
Communication module																		
Without communication module									N									
Internal module									I									
FW Version (manufacturer hexadecimal coding)											XX							
HW Version (manufacturer hexadecimal coding)												XX						
Type of internal module (manufacturer hexadecimal coding)														XX				
Module PLC															10			
Additional information (metrologically not relevant), (manufacturer hexadecimal coding)																X	X	X



TECHNICAL DATA

Basic Data	AM170	AM370.D
Connection	Direct two-wire	Direct four-wire
Reference Voltage U_n	220 V	3 x 220 / 380 V
Operating Voltage Range	0.9 – 1.1 U_n	0.9 – 1.1 U_n
Operation Voltage Range Limits	85 V thru 270 V	85 V thru 460 V (lower limit is determined by phase-neutral voltage, upper limit by phase-phase voltage)
Reference Frequency f_n	50 Hz	50 Hz
Operation Frequency Range Limits	$\pm 5\% f_n$	$\pm 5\% f_n$
Actual Consumption of Each Voltage Circuit (PLC module included)	max. 2 W, max. 4 VA capacitive	max. 1.5 W, max. 3 VA capacitive
Consumption of PLC Coupling Circuit	max. 10 VA capacitive	max. 10 VA capacitive in phase L1
Actual Consumption of Each Current Circuit (Disconnecter included)	< 0.3 VA for I = 5 A < 1.2 VA for I = 10 A < 2.7 VA for I = 15 A < 4.8 VA for I = 20 A	< 0.3 VA for I = 5 A < 1.2 VA for I = 10 A < 2.7 VA for I = 15 A < 4.8 VA for I = 20 A
As per IEC EN 62052-11, IEC EN 62053-23, i.e. EN 50470-1, i.e. EN 50470-3 (Active Energy Measurement)		
Reference Current I_{ref}	5 A	5 A
Maximum Current I_{max}	80 A	100 A
Transitional Current I_{tr}	0.1 I_{ref}	0.1 I_{ref}
Minimum Current I_{min}	0.5 I_b	0.5 I_b
Start-Up Current I_{st}	0.004 I_b	0.004 I_b
Active Energy Accuracy Class	B 1 % or A 2 %	B 1 % or A 2 %
As per IEC EN 62052-11, IEC EN 62053-23 (Reactive Energy Measurement)		
Basic Current I_b	5 A	5 A
Maximum Current I_{max}	80 A	60, 80 or 100 A
Start-Up Current I_{st}	0.004 I_b	0.004 I_b
Reactive Energy Accuracy Class	2	2
Disconnecter Technical Specification		
Maximum Switching Power		25,000 VA
Maximum Switching Voltage	250 V	380 V
Maximum Tripping Current	80 A	100 A
Mechanical Service Life	1 x 10 ⁵ cycles	5 x 10 ⁵ cycles
Electrical Service Life	5 x 10 ³ cycles	5 x 10 ³ cycles
Product Specification	ZC88N-12 VDC	ZC81-12 VDC
Mechanical Specification		
Width * Height * Depth	141,1 * 212,5 * 66,1 mm	171,5 * 259,7 * 88,5 mm
A-Base Installation as per Dimensional Sketch (Width x Height)	105 mm x 155 / 175 mm	150 mm x 210 / 230 mm
Case Dimensions	As per DIN 43857	As per DIN 43857
Operating Position	Vertical	Vertical
Insulating Encased Meter of Protective Class II	As per EN 50470-1	As per EN 50470-1
Clearance and Creepage Distances	As per EN 50470-1, IEC EN 62052-11	As per EN 50470-1, IEC EN 62052-11
Connection of Current and Neutral Wires		
Connecting Screws	M6 x 12,6 mm	M6 x 13,6 mm
Torque	3,2 Nm	5,6 Nm
Terminals Diameter	9 mm	10 mm
Wire Cross-Section Min. / Max.	4 mm ² / 55 mm ²	4 mm ² / 70 mm ²
Screw Head Shape and Diameter	CH (cylindrical head) / 6,8 mm	CH (cylindrical head) / 6,8 mm
Cross Groove	SL - PH (Combination Slot – Phillips, size 2 as per ISO 4757)	SL - PZ (Combination Slot – Phillips, size 2 as per ISO 4757)
Strength Class	5,8	5,8
Outputs		
Display*	6+8	6+8
Testing LED for Active Energy	Configurable, usually 3,200 imp. / 1 kWh	Configurable, usually 1,000 imp. / 1 kWh
Testing LED for Reactive Energy	Configurable, usually 3,200 imp. / 1 kvarh	Configurable, usually 1,000 imp. / 1 kvarh
S0 Output (0 - 2)*	Class A as per IEC EN 62053-31	Class A as per IEC EN 62053-31
Auxiliary Relay Output (0 - 2)*	Closing Contact 5 A / 250 V	Closing Contact 5 A / 250 V
Real Time Function		
Accuracy	As per IEC EN 62054-21	As per IEC EN 62054-21
Battery Shelf-life	10 years	10 years
Battery Type	CR2032 or ER14250	CR2032 or ER14250
Impact of Surroundings		
Operation Temperature	- 25 °C thru + 70 °C	- 25 °C thru + 70 °C
Storage Temperature	- 25 °C thru + 70 °C	- 25 °C thru + 70 °C
Mechanical Class / Electromagnetic Class	M1 / E2	M1 / E2
Relative Humidity	As per EN 50470-1, IEC EN 62052-11	As per EN 50470-1, IEC EN 62052-11
Ingress Protection	IP 54	IP 54

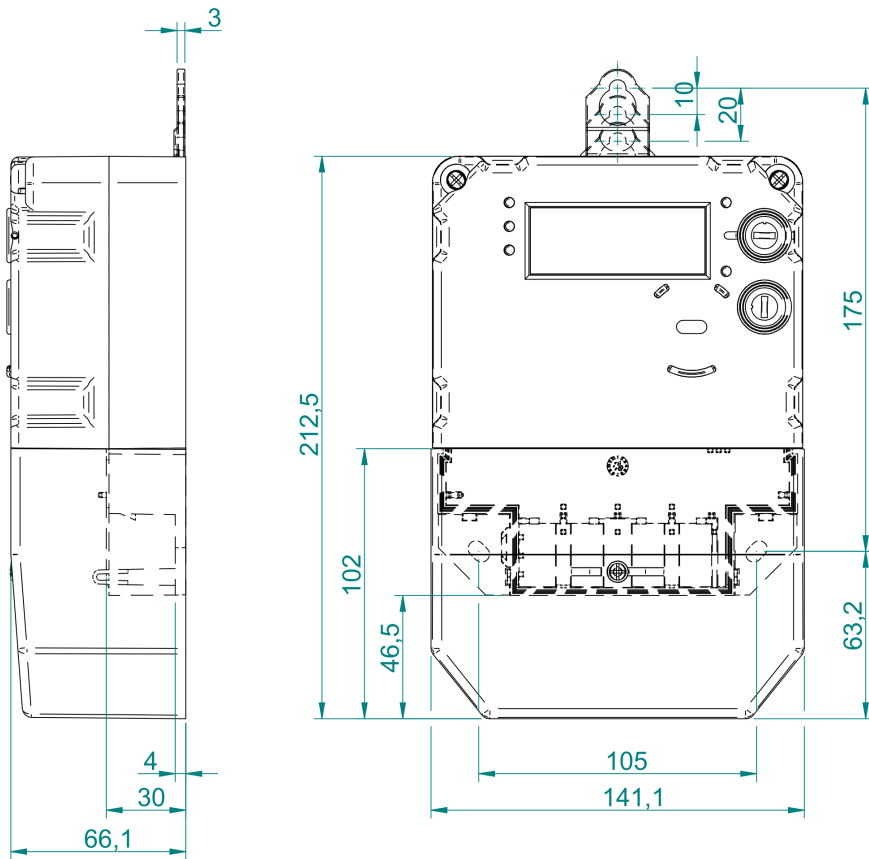
* Based on HW and FW modification

TECHNICAL DATA

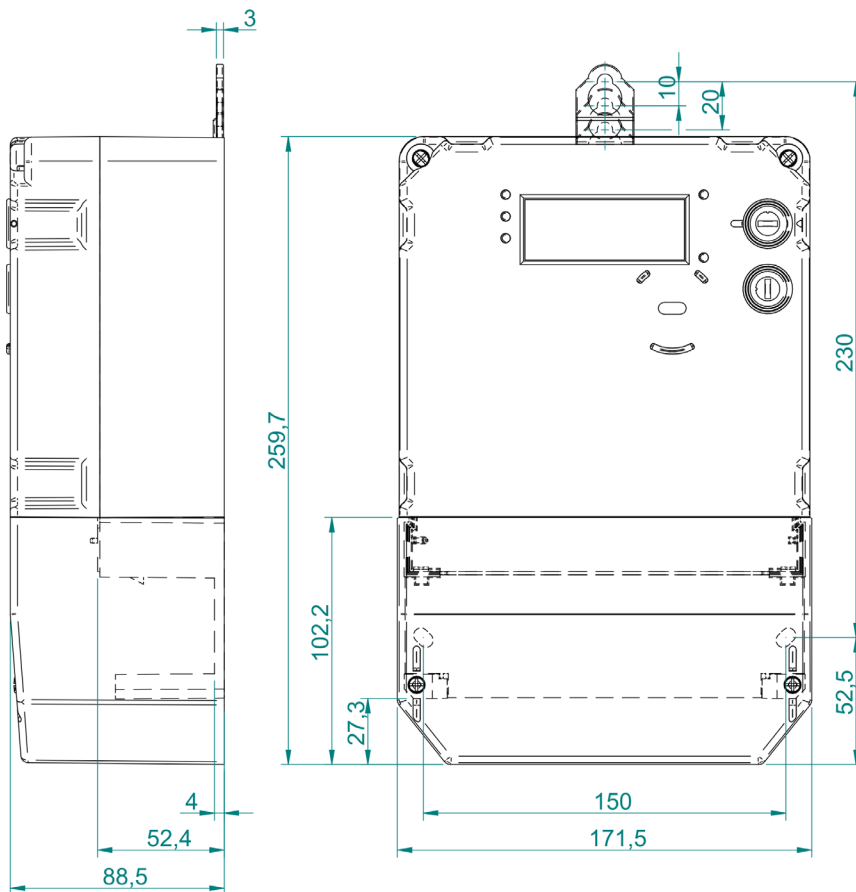
Basic Data		AM370.I
Connection of Current		Via Current Transformers
Reference Voltage U_n		3 x 220 / 380 V
Operating Voltage Range		0.9 – 1.1 U_n
Operation Voltage Range Limits		85 V thru 460 V (lower limit is determined by phase-neutral voltage, upper limit by phase-phase voltage)
Reference Frequency f_n		50 Hz
Operation Frequency Range Limits		$\pm 5\% f_n$
Actual Consumption of Each Voltage Circuit (PLC module included)		max. 1.5 W, max. 3 VA capacitive
Consumption of PLC Coupling Circuit		max. 10 VA capacitive on phase L1
Actual Consumption of Each Current Circuit		< 0.3 VA for I = 5 A
As per IEC EN 62052-11, IEC EN 62053-21, i.e. EN 50470-1, i.e. EN 50470-3 (Active Energy Measurement)		
Reference Current $I_{ref} = I_n$		1, 2 or 5 A
Maximum Current I_{max}		2, 4 or 6 A
Transitional Current I_{tr}		$(0.05 * I_{ref}) \Rightarrow 0.05, 0.1$ or 0.25 A
Minimum Current I_{min}		$(0.2 * I_{ref}) \Rightarrow 0.01, 0.02$ or 0.05 A
Start-Up Current I_{st}		$(0.02 I_p) \Rightarrow 0.001, 0.002$ or 0.005 A
Active Energy Accuracy Class		B or C
As per IEC EN 62052-11, IEC EN 62053-23 (Reactive Energy Measurement)		
Basic Current I_b		1, 2 or 5 A
Maximum Current I_{max}		2, 4 or 6 A
Start-Up Current I_{st}		0.003 I_n
Reactive Energy Accuracy Class		2 or 3
Disconnecter Relay Technical Specification		
Maximum Switching Power		2,000 VA
Maximum Switching Voltage		277 V
Maximum Tripping Current		8 A
Mechanical Service Life		1×10^7 cycles
Electrical Service Life		1×10^6 cycles
Mechanical Specification		
Width * Height * Depth		178 * 284 * 70 mm
A-Base Installation as per Dimensional Sketch (Width x Height)		150 mm x 210 / 230 mm
Case Dimensions		as per DIN 43857
Operating Position		Vertical
Insulating Encased Meter of Protective Class II		As per EN 50470-1
Clearance and Creepage Distances		As per EN 50470-1, IEC EN 62052-11
Connection of Current and Neutral Wires		
Connecting Screws		M6 x 13,6 mm
Torque		5.6 Nm
Terminals Diameter		8 mm
Wire Cross-Section Min. / Max.		4 mm ² / 45 mm ²
Screw Head Shape and Diameter		CH (cylindrical head) / 6.8 mm
Cross Groove		SL-PH (Combination Slot – Phillips, size 2 as per ISO 4757)
Strength Class		5.8
Outputs		
Display*		6+8
Testing LED for Active Energy		Configurable, usually 10,000 imp. / 1 kWh
Testing LED for Reactive Energy		Configurable, usually 10,000 imp. / 1 kvarh
S0 Output (0 - 2)*		Class A as per IEC EN 62053-31
Auxiliary Relay Output (0 - 2)*		Closing Contact 5 A / 250 V
Real Time Function		
Accuracy		As per IEC EN 62054-21
Battery Shelf-life		Min. 10 years
Battery Type		CR2032 or ER14250
Impact of Surroundings		
Operation Temperature		- 25 °C thru + 70 °C
Storage Temperature		- 25 °C thru + 70 °C
Mechanical Class / Electromagnetic Class		M1 / E2
Relative Humidity		As per EN 50470-1, IEC EN 62052-11
Ingress Protection		IP 54

* Based on HW and FW modification

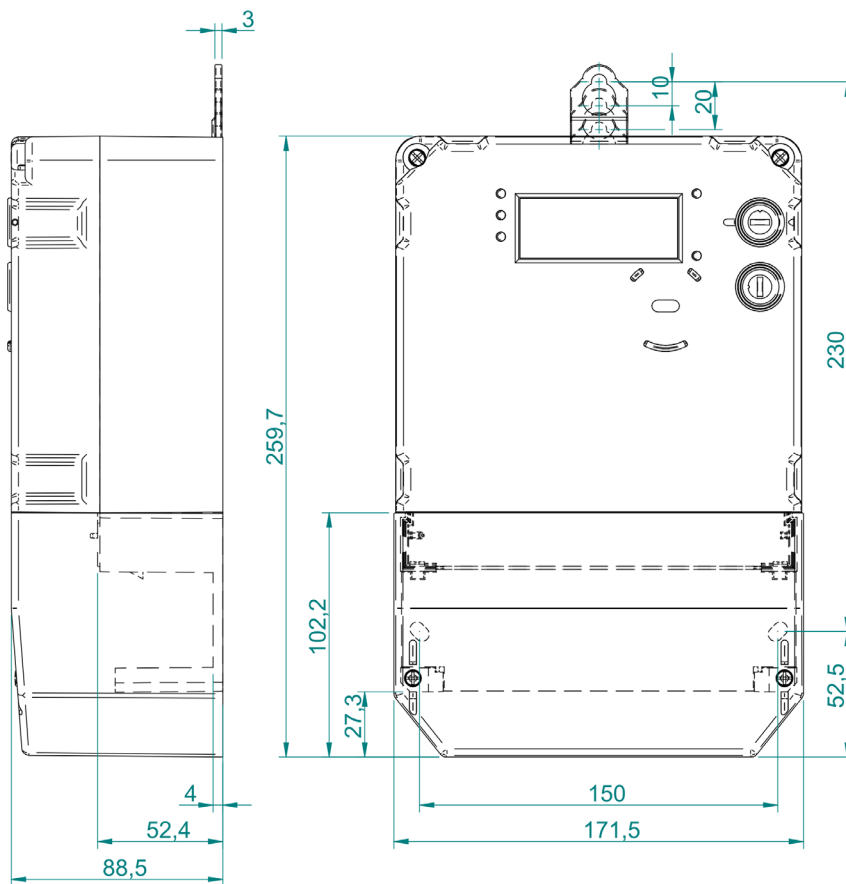
METER HOUSING DIMENSIONAL SKETCH AM170



METER HOUSING DIMENSIONAL SKETCH AM370.D

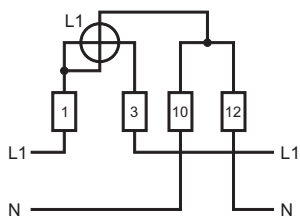


METER HOUSING DIMENSIONAL SKETCH AM370.I

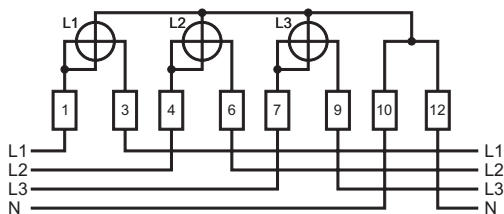


TERMINAL BOARD WIRING DIAGRAM EXAMPLES

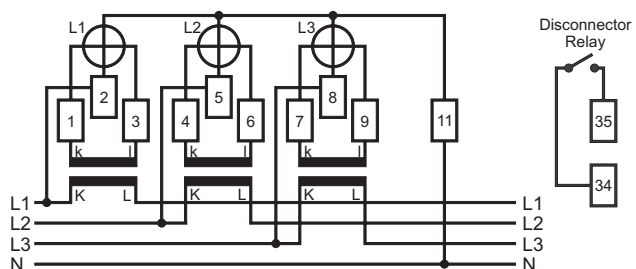
AM170



AM370.D



AM370.I



INSTALLATION

Installation is done using three screws on an A-Base. Sliding of hook in and out changes pitch. The meter shall be fixed on a solid and fireproof object. Detailed instructions follow.

INSTALLATION AUTHORIZATION

To install the meter, the following pre-requisites shall be observed:

- Installation shall be done only by knowledgeable persons or persons with higher qualification, adequately trained;
- Installation shall be done only on surfaces for such purpose prepared and modified. This shall be checked prior to installation start;
- Installation shall be done in line with user wiring conditions.

INSTALLATION EXECUTION

Prior to and during installation, the following shall be observed / used:

- Meter with correct designation, correctly filled-in label, prescribed seals;
- Terminal board wiring;
- Prescribed connecting material for meter connection (screws, ...);
- Seals and sealing pliers for sealing of cover plates and terminal cover;
- Prescribed, undamaged tools;
- Measuring device or indicator.

Wires Connection

- Supply wires shall be checked to be voltage free;
- Supply wires shall be stripped of insulation in sufficient length;
- Wires shall be inserted into corresponding terminals of terminal block, terminal board screws shall be tightened using appropriate torque (see section Technical data).

If wire cross-section is small, attention shall be paid to its correct location in the terminal block. The correct location of the wire is inside the terminal block groove. Usage of a measuring device is recommended for verification of correct wire attachment.

Installation Inspection

To be checked after installation:

- Meter identification number shall match meter prescribed location;
- Bridge between voltage and current terminals (1 and 2 (4 and 5, 7 and 8, poly-phase only)) in terminal block upper part shall be connected;
- Tightening of terminal block screws shall be proper;
- Connection order of input and output wires shall be correct;
- Connection of neutral wire shall be proper – incorrect connection can result in meter breakdown;
- Meter functions – corresponding LEDs shall be lit and display shall show correct signs (no error messages shall be present);
- Tariff switching and identification shall be correct.

Installation inspection completed successfully, the terminal cover shall be mounted and sealed.

TROUBLESHOOTING

Display did not light up	<ul style="list-style-type: none"> • No voltage in supply wires • Bridge between terminals 1 and 2 disconnected • Meter designed for different voltage
L1, L2, L3 symbols flash one after the other (Poly-phase meters only)	<ul style="list-style-type: none"> • Incorrect order of phases (swap positions of any two phases)
One of the symbols: L1, L2, L3, did not light up	<ul style="list-style-type: none"> • Corresponding phase voltage is missing
Meter not communicating with reading device (PDA, PC ...)	<ul style="list-style-type: none"> • Optical probe not connected to PC, PDA, ... • Incorrectly set up serial port on PC, PDA, ... • Incorrectly set up start-up speed • PC, PDA SW does not support meter
Meter not communicating with MDMS	<ul style="list-style-type: none"> • Poor communication signal • Excess disturbance of communication signal • Meter unknown to MDMS • Meter has incorrect (or missing) AMM address

MAINTENANCE AND STORAGE

Care And Maintenance

The device is a maintenance-free electricity meter with a determined minimum operation service life of 15 years. For possible cleaning of the outside surface from dust and other impurities, the manufacturer does not recommend use of organic solvents, aggressive chemicals and abrasive cleaning agents. Prescribed storage temperatures shall be complied with: failure to do so can result in shortening of electronic components service life. The electricity meter shall be protected against wet and humid conditions. It is designed for internal use, i.e. it may be used only in places providing additional protection against effects of external environment (e.g. in a building or cabinet). Precipitation, humidity and liquids containing minerals can cause corrosion of electric circuits if the electricity meter becomes wet. The electricity meter shall not be placed on and dried by a source of heat or inserted into a source of heat (e.g. microwave oven, classic oven or radiator / heater) as it can overheat and some of its parts explode. It shall not be exposed to excessive heat as this can lead to deformation of case / cover. The electricity meter shall not be stored in cold premises, especially with subsequent warming-up (to nominal operation temperature). Humidity can condensate inside and damage electronic components, or electricity meter isolation properties can deteriorate.

Service

Service shall be ensured by: ZPA Smart Energy a.s., Komenskeho 821, 541 01 Trutnov, Czech Republic, Trademark Smart Energy, Tel. + 420 499 907 111, E-mail zpa@zpa.cz, www.zpa.cz.

Battery Replacement

Battery can be replaced after opening of the terminal cover (breaking of terminal cover seals cannot be avoided).

Transport

Electricity meter shall be packed for transport either in the package, in which it was originally delivered by the manufacturer, or in a package causing / ensuring no damage due to handling or transport.

SAFETY

Manufacturer Warnings

The electricity meter is capable of safe operation. The manufacturer has issued an EU Declaration of Conformity as per Act 90/2016 Coll.

Despite this fact, the manufacturer warns of the risk of possible danger resulting from electricity meter incorrect handling or incorrect use as follows:

- Installation and maintenance shall be performed by personnel with corresponding electro-technical qualification and adequately trained, that shall inform the operator on conditions of safe operation,
- Electricity meter shall not be used for purposes other than those it was manufactured for,
- Electricity meter shall not be wilfully modified contrary to its type design,
- Electricity meter shall not be operated with voltage, current or frequency other than those it was produced or professionally modified for,
- Electricity meter shall be located and secured so as to complicate or disable handling by persons with no electro-technical qualification, especially children,
- Before every new putting to operation, e.g. after repair, maintenance etc., electricity meter Ingress Protection shall be restored in full, all safety measures taken and inspection done by a designated electrical inspector,
- During operation, premises where the electricity meter is installed, shall be free of danger of fire or explosion in case of development of gases, vapours of inflammable liquids and occurrence of inflammable dust,
- Electricity meter shall be handled by a qualified and adequately trained person only, and handling shall be performed without voltage with the exception of measurement by measuring meter with insulated tips,
- Electricity meter shall not be operated under conditions or in an environment not ensuring safe operation (e.g. location on inflammable base, cover from inflammable material, insufficient protection from penetration of foreign elements, water or other liquids),
- Electricity meter shall be located and operated in an indoor environment, i.e. in places providing additional protection against effects of external environment (e.g. inside a building or cabinet),
- Electricity meter shall not be operated in an environment with major vibrations and oscillations or under such conditions.

Failure of the user to observe any of the aforesaid warnings renders the manufacturer not being liable for a defect occurring as an incidental consequence of this failure. Non-observance of storage and operation conditions recommended in article Care And Maintenance can have an adverse effect on the electricity meter service life.

RESPONSIBILITY

The electricity meter owner (usually utility) is responsible for ensuring that all persons engaged in working with and handling the electricity meter:

- are knowledgeable and qualified as per national regulations,
- have read and understood corresponding parts of this document,
- strictly observe safety regulations and operation data stipulated in its individual articles.

The electricity meter owner is further responsible for:

- protection of persons,
- prevention of damage to material,
- personnel training.

Safety Instructions

The following safety regulations shall be observed under all circumstances:

- Wires the electricity meter is connected to shall be powered neither during installation nor replacement. Powered contacts pose a life threat. For this reason, until the work is finished, the corresponding power supply fuses shall be removed and stored in a place, safeguarding against unnoticed reinstallation by a person holding no responsibility,
- Local safety regulations shall be observed. Electricity meter installation shall be executed solely by qualified and trained personnel,
- With no exception, prior to terminal cover opening, current transformer secondary circuits shall be short circuited. High voltage generated during current transformer circuit interruption poses a life threat and damages the transformer,
- Transformers in medium or high voltage systems shall be grounded on one side or in a neutral point on the secondary side. Non-observance can result in their being charged to a voltage exceeding electricity meter isolation strength and also posing a life threat,
- During installation, the electricity meter shall be firmly held or secured against falling and causing injury,
- Dropped electricity meters shall not be installed even if showing no visible signs of damage. They shall be returned for inspection either to designated repair office or directly to manufacturer. Internal damage can cause functional failures or a short circuit,
- Electricity meter shall by no means be cleaned under running water or by high-pressure equipment. Water penetration can cause a short circuit.

DISPOSAL

As per certificate ISO 14001 data, electricity meter components are mostly separable and so can be disposed of or recycled accordingly. At the end of its service life, the electricity meter shall be handed over to specialized companies, dealing in used material separation and consequent

recycling. An unused electricity meter shall be disposed of ecologically as per the Waste Act. The electricity meter contains no radioactive, carcinogenic or other materials having an adverse effect either on human health or environment. All plastic materials can be recycled. Packaging is recyclable and at the end of its service life shall be handed over to specialized companies as a source of secondary raw materials or energy.

Liquidation And Legal Regulations, Concerning Environment Protection

Electricity meter disposal shall strictly observe local regulations for environment protection.

Components	Disposal
Printed circuit boards, LCD, LED	Electronic waste. Dispose of as per local regulations.
Battery	Dangerous waste. Dispose of as per local regulations.
Metal parts	Separate and hand over to the waste collection centre for disposal as per local regulations.
Plastic components	Separate and hand over for disposal or re-granulation as per local regulations.