

# SINGLE AND POLY-PHASE SMART ELECTRICITY METERS

## AM160 AM360



The AMx60 and AMx65 families electricity meters are modern electronic devices, designed for application in AMM systems for monitoring, checking and governing of electricity consumption. The AMx60 and AMx65 families are based on the same measurement and application core, the AMx60 family is a light variant with a reduced number of functionalities. The electricity meters allow for saving of operating data and are equipped with a communication module for bi-directional remote data and control command transmission. The communication protocol is as per IEC 62056-21 and DLMS. The electricity meters can be configured as per customer requirements and needs of the customer. 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.

Meters have been designed to serve billing purposes, being MID certified and WELMEC 7.2 compliant, for measurement of active energy as well as certified for measurement of reactive energy as per national Metrology Act No. 505/1990 Coll.

### MEASURING SYSTEM

The AMx60 series electricity meter:

- is a single or poly-phase static device;
- registers energy in up to 8\* tariff register sets and single total register set;
- measures active energy in accuracy classes A, B or C;
- measures reactive energy in accuracy classes 2 or 3;
- complies with EN 50470-1, 50470-3 (active energy) and EN 62053-23 and EN 62052-11 (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.

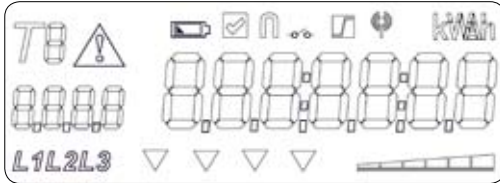
The meter communicates via its optical interface locally and via its internal communication module remotely with the superordinate Meter Data Management System (MDMS).

\* Based on HW and FW modification

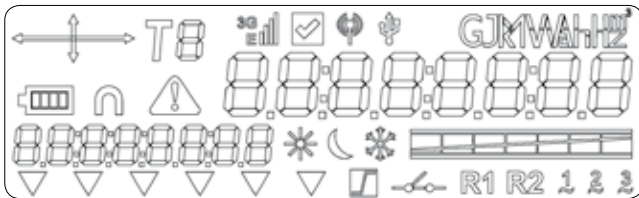
## LIQUID CRYSTAL DISPLAY (LCD)

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.

### 4+7 (STANDARD)



### 8+8 (ADVANCED)



## 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.

## REAL TIME CLOCK (RTC)

The meter is equipped with an RTC and date. The RTC can be adjusted via the optical interface locally or via the communication module remotely. A battery backs up the RTC during power outages.

The battery can be replaced after opening the terminal cover (i.e. breaking the terminal cover seal). Battery status is shown on the display.

## TARIFFS

The meter can manage up to 8\* tariffs. Tariff currently active is indicated on the display by symbols T1-T8\*. Tariff switching is done either locally, based on the internal clock time-plan or limiter outputs, or remotely by the MDMS. Switching priorities can be modified by meter configuration.

## METER REGISTERS

The meter carries active and reactive energy registers, separate for energy flow, phases and tariffs. Other registers log instantaneous effective values of voltage, current, active power and power factor.

## SWITCHING FUNCTION (SCHEDULER)

The scheduler manages tariff switching, activates the event logger and generates further events for managing functionalities as required.

## PROFILE REGISTERS (LOAD PROFILE)

Pre-selected values are saved to registers automatically at regular intervals. If memory capacity is exceeded, the oldest record is dropped (FIFO).

## HISTORY REGISTERS

Based on events, generated by the scheduler, limiter, push buttons etc. pre-selected values (registers) with time stamps are logged in the corresponding registers. For example, logged can be energy registers at the end of the billing period (e.g. last day of month at 23:59:59). If the memory capacity is exceeded, the oldest record is dropped (FIFO).

## EVENTS LOGGER

Any pre-selected event generated can be logged in the event logger together with a time stamp. If the pre-selected memory capacity is exceeded, the oldest log is dropped (FIFO).

As a rule, the following events are logged:

- Strong DC magnetic field occurrence – e.g. if the meter encounters a strong magnet (tampering),
- Terminal cover opening (tampering),
- Meter case opening (tampering),
- Power outages and drops below pre-selected limits,
- Current effective value beyond limit during period monitored,
- Tariff switching,
- Disconnector status change – by customer, by limiter or manually by push buttons.

## METER CORE LOGGER (refers to meters with semi-indirect measurement current only)

A special event logger registers a change of the current transformer ratio. The time stamped log stores transformer ratios as well as values of Total Energy Registers A+, A-, RL(QI), RC(QII), RL(QIII), RC (QIV). The Meter Core Logger stores up to 15 most recent changes.

## LIMITER

Based on real time values of selected registers of voltage, current, power, energy etc. and pre-selected limits, events are generated that can be used for managing meter further activities (disconnecter opening / closing, log in event logger, tariff switching, etc.).

## DISCONNECTOR / DISCONNECTOR RELAY

Based on pre-selectable requirements, the disconnecter of a direct meter can open / close its output current terminals and a semi-indirect meter disconnecter relay can control an external contactor.

## AUXILIARY RELAY

The electricity meter can be equipped with up to two\* auxiliary relays to control an external contactor Auxiliary relays are managed by the time switch (scheduler) or remotely.

## S0 OUTPUTS

The electricity meter can be equipped with up to two\* auxiliary S0 impulse outputs. Impulse frequency and length are configurable.

## TAMPERING PROTECTION

The electricity meter is equipped with sensors of terminal cover dismantling, meter case opening and a magnetic field sensor. Sensors report tampering.

## METER DESIGN

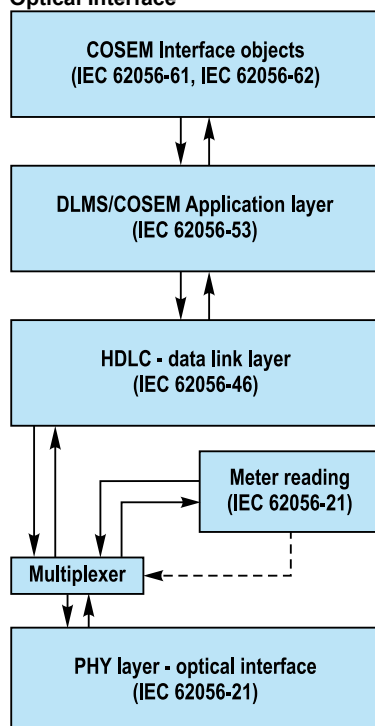
The AMx60 electricity meter, stemming from a design traditionally proven, is designed so as to withstand demanding operation conditions, enable simple handling and deliver increased protection from unauthorized consumptions. The set of sealing positions safeguards various concealed parts of the meter 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.

\* Based on HW and FW modification

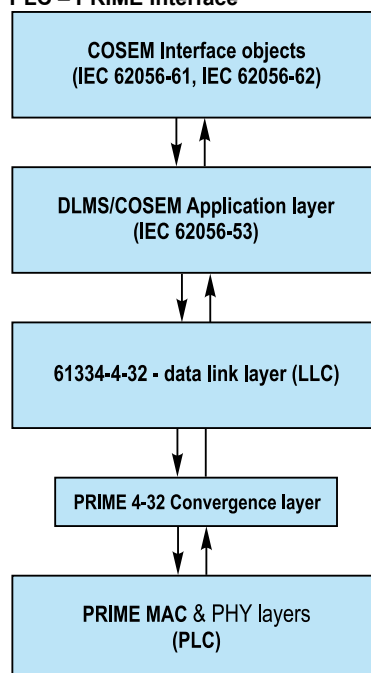
## METER COMMUNICATION INTERFACE

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

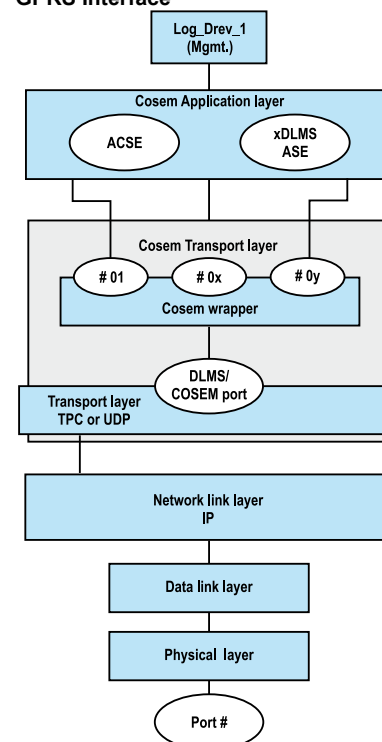
### Optical Interface



### PLC – PRIME Interface



### GPRS Interface



## 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)
EN 60529	Degrees of protection provided by enclosures (IP Code)
EN 62052-21	Electricity metering equipment (a.c.) - General requirements, tests and test conditions - Part 21: Tariff and load control equipment
EN 62052-11	Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: Metering equipment
EN 62053-21	Electricity metering equipment (a.c.) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2)
EN 62053-23	Electricity metering equipment (a.c.) - Particular requirements - Part 23: Static meters for reactive energy (classes 2 and 3)
EN 62054-21	Electricity metering (a.c.) - Tariff and load control - Part 21: Particular requirements for time switches
EN 62056-21	Electricity metering - Data exchange for meter reading, tariff and load control - Part 21: Direct local data exchange
EN 62056-46	Electricity metering - Data exchange for meter reading, tariff and load control - Part 46: Data link layer using HDLC protocol
EN 62056-47	Electricity metering - Data exchange for meter reading, tariff and load control - Part 47: COSEM transport layers for IPv4 networks
EN 62056-53	Electricity metering - Data exchange for meter reading, tariff and load control - Part 53: COSEM application layer
EN 62056-61	Electricity metering - Data exchange for meter reading, tariff and load control - Part 61: Object identification system (OBIS)
EN 62056-62	Electricity metering - Data exchange for meter reading, tariff and load control - Part 62: Interface classes
EN 60068	Environmental testing
EN 60068-2-1	Environmental testing – Part 2-1: Tests – Test A: Cold
EN 60068-2-2	Environmental testing – Part 2-2: Tests – Test B: Dry heat
EN 61000	Electromagnetic compatibility (EMC)
EN 61000-4-2	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques -Electrostatic discharge immunity test
EN 61000-4-3	Electromagnetic compatibility (EMC) -Part 4-3: Testing and measurement techniques - Radiated, radiofrequency, electromagnetic field immunity test
EN 61000-4-4	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
EN 61000-4-5	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
EN 61000-4-6	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-8	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test IEC
EN 61000-4-11	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests



## TECHNICAL DATA

Basic Data	AM160	AM360.D
Connection	Direct two-wire	Direct four-wire
Nominal Voltage $U_n$	220 V or 230 V	3 x 220 / 380 V or 3 x 230 / 400 V
Nominal 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)
Nominal 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 EN 50470-1, EN 50470-3 (Active Energy Measurement)n		
Reference Current $I_{ref}$	5, 10, 15 or 20 A	5, 10, 15 or 20 A
Maximum Current $I_{max}$	40, 60 or 80 A	60, 80 or 100 A
Transitional Current $I_{tr}$	0.1 $I_{ref}$	0.1 $I_{ref}$
Minimum Current $I_{min}$	0.5 $I_{tr}$	0.5 $I_{tr}$
Start-Up Current $I_{st}$	0.02 $I_{tr}$	0.02 $I_{tr}$
Active Energy Accuracy Class	A or B	A or B
As per EN 62052-11, EN 62053-23 (Reactive Energy Measurement)		
Basic Current $I_b$	5, 10, 15 or 20 A	5, 10, 15 or 20 A
Maximum Current $I_{max}$	40, 60 or 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 or 3	2 or 3
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 × 10 <sup>5</sup> cycles	5 × 10 <sup>5</sup> cycles
Electrical Service Life	5 × 10 <sup>3</sup> cycles	5 × 10 <sup>3</sup> cycles
Mechanical Specification		
Weight	0.8 kg / 0.75 kg	1.75 / 1.3 kg
Width	125 mm	178 mm
Height	204 mm	284 mm
Depth	74 mm	70 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
Connection of Current and Neutral Wires		
Connecting Screws	M5 x 10 mm	M6 x 14 mm
Torque	3.2 Nm	5.6 Nm
Terminals Diameter	7.2 mm	7.2 mm
Wire Cross-Section Max.	35 mm <sup>2</sup>	35 mm <sup>2</sup>
Wire Cross-Section Min.	4 mm <sup>2</sup>	4 mm <sup>2</sup>
Screw Head Shape and Diameter	CH (cylindrical head) / 6.5 mm	CH (cylindrical head) / 6.5 mm
Cross Groove	SL - PZ (Combination Slot – Pozidrive, size 2 as per ISO 4757)	SL - PZ (Combination Slot – Pozidrive, size 2 as per ISO 4757)
Strength Class	5.8	5.8
Outputs		
Display*	4+7 (standard) or 8+8 (advanced)	4+7 (standard) or 8+8 (advanced)
Testing LED for Active Energy	Configurable, usually 10,000 imp. / 1 kWh	Configurable, usually 10,000 imp. / 1 kWh
Testing LED for Reactive Energy	Configurable, usually 10,000 imp. / 1 kvarh	Configurable, usually 10,000 imp. / 1 kvarh
S0 Output (0 - 2)*	Class A as per CSN EN 62053-31	Class A as per CSN 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 EN 62054-21	As per EN 62054-21
Back-Up Time	Min. 4 years	Min. 4 years
Battery Type	Panasonic CR2354	Panasonic CR2354
Impact of Surroundings		
Operation Temperature	– 25 °C thru + 70 °C	– 25 °C thru + 70 °C
Storage Temperature	– 35 °C thru + 70 °C	– 35 °C thru + 70 °C
Ingress Protection	IP 53	IP 53

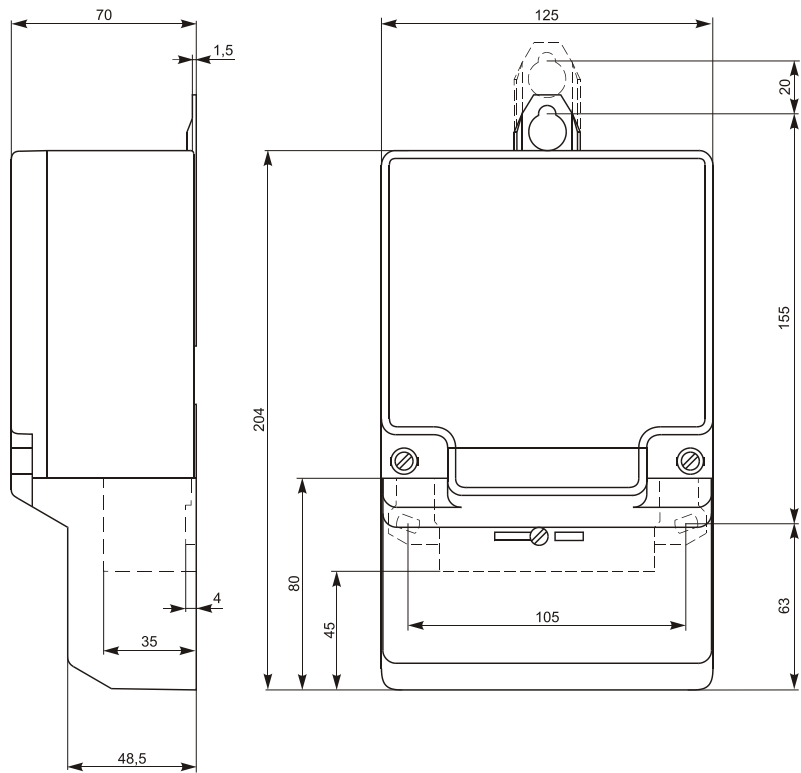
\* Based on HW and FW modification

## TECHNICAL DATA

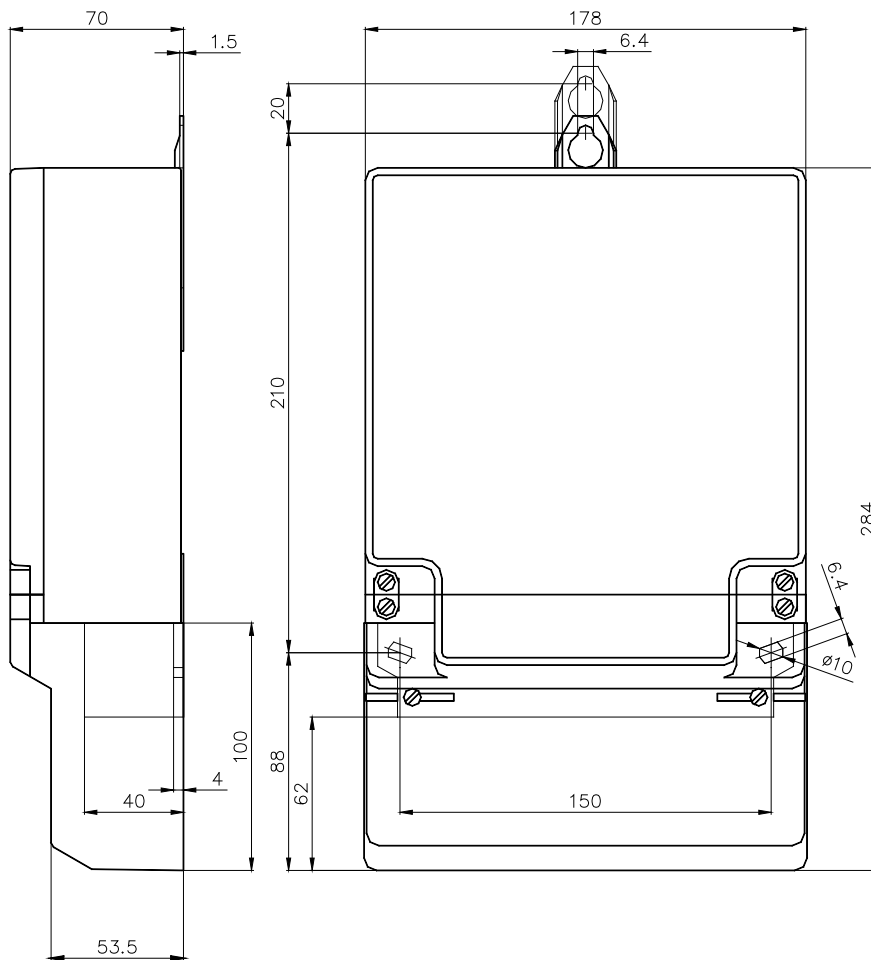
Basic Data		AM360.I
Connection of Current		Via Current Transformers
Nominal Voltage $U_n$		3 x 220 / 380 V or 3 x 230 / 400 V
Nominal Voltage Range		0.9 – 1.1 $U_n$
Operation Voltage Range Limits		85 V thru 460 V (lower limit is determined by phase-neutral voltage, upper limit by phase-phase voltage)
Nominal 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 EN 50470-1, 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 $I_{st}$		$(0.02 I_{ref}) \Rightarrow 0.001, 0.002$ or 0.005 A
Active Energy Accuracy Class		B or C
As per EN 62052-11, 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 x 10 <sup>7</sup> cycles
Electrical Service Life		1 x 10 <sup>8</sup> cycles
Mechanical Specification		
Weight		1.3 kg
Width		178 mm
Height		284 mm
Depth		70 mm
A-Base Installation as per Dimensional Sketch (Width x Height)		150 mm x 210/2,305 mm
Case Dimensions		as per DIN 43857
Operating Position		Vertical
Connection of Current and Neutral Wires		
Connecting Screws		M6 x 14 mm
Torque		5.6 Nm
Terminals Diameter		7.2 mm
Wire Cross-Section Max.		35 mm <sup>2</sup>
Wire Cross-Section Min.		4 mm <sup>2</sup>
Screw Head Shape and Diameter		CH (cylindrical head) / 6.5 mm
Cross Groove		SL-PZ (Combination Slot – Pozidrive, size 2 as per ISO 4757)
Strength Class		5.8
Outputs		
Display*		4+7 (standard) or 8+8 (advanced)
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 CSN EN 62053-31
Auxiliary Relay Output (0 - 2)*		Closing Contact 5 A / 250 V
Real Time Function		
Accuracy		As per EN 62054-21
Back-Up Time		Min. 4 years
Battery Type		Panasonic CR2354
Impact of Surroundings		
Operation Temperature		- 25 °C thru + 70 °C
Storage Temperature		- 35 °C thru + 70 °C
Ingress Protection		IP 53

\* Based on HW and FW modification

**METER HOUSING DIMENSIONAL SKETCH AM160**



**METER HOUSING DIMENSIONAL SKETCH AM360.D AND AM360.I**



## TYPE DESIGNATION

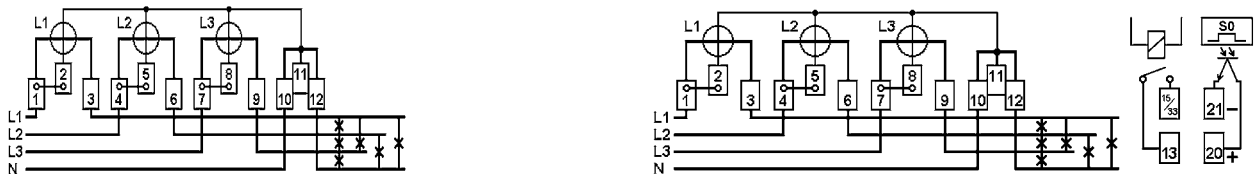
	AM	#	6	#	.	#	.	#	I	-	##	.	##	-	##	.	#	#	#
Single Phase		1																	
Poly Phase		3																	
Measuring Core 4Q			6																
Model Light				0															
Model Advanced, new case				5															
Direct Connection								D											
Indirect Connection								I											
Disconnecter Not Mounted									0										
Direct Meters - I <sub>max</sub> of Disconnecter = I <sub>max</sub> of Meter									1										
Indirect Meters - Auxiliary Relay for External Disconnecter Control									1										
Internal Communication Module										I									
<b>SW (FW) Version</b>																			
AMx60 - As per DLMS standard (2x server)																			80
AMx65 - As per DLMS standard (3x server)																			81
<b>HW Modification for AMx60</b>																			
Standard Display 4+7																			00
Standard Display 4+7 + internal derivation jumpers																			01
<b>HW Modification for AMx60 a AMx65</b>																			
Advanced Display 8+8 (4Q)																			40
Advanced Display 8+8 (4Q) + internal derivation jumpers																			41
Advanced Display 8+8 (4Q), up to -40 °C (display heating, internal battery)																			42
Advanced Display 8+8 (4Q), up to -40 °C + internal derivation jumpers																			43
<b>Internal Module for AMx60</b>																			
Without Module																			M 0
PLC PRIME - Atmel ATPL210																			P 1
PLC PRIME - Atmel SAM4																			P 2
RS485																			S 1
GPRS Module																			G 1
<b>Internal Module for AMx65</b>																			
PLC PRIME - Atmel SAM4																			WAN HAN
GPRS Module																			1 x
RS485 - slave																			2 x
Without HAN Communication																			3 x
WMBus																			x 0
RS485 - slave																			x 1
RS485 - master (+12 V)																			x 2
RS485 - master																			x 3
USB																			x 4
<b>Additional Information On I/O Interface of AMx60</b>																			
8 Tariffs Without External Control, Without Auxiliary Terminal																			0 X 8
1 Standard Output S0																			1
1 Output Relay Instead of External Tariff Switching																			R
8 Tariffs																			8
<b>Additional Information On I/O Interface of AMx60.I</b>																			
8 Tariffs Without External Control, Without Auxiliary Terminal																			0 X 8
8 Tariffs, Relay for External Disconnecter Control (13, 15 / 33)																			0 D 8
1 Standard Output S0																			1
1 Output Relay Instead of External Tariff Switching																			R
8 Tariffs																			8
<b>Additional Information On I/O Interface of AMx65</b>																			
Without Tariff Terminals																			0
x Tariff Inputs Against the Common Terminal (where x = 1 to 3)																			1 - 3
x Tariff Inputs Against L (3 + x, where x = 1 to 3)																			4 - 6
x Tariff Inputs Against N (6 + x, where x = 1 to 3)																			7 - 9
Without Tariff Relays																			0
x Relays With Closing Contact (x * 2 Terminals, where x = 1 to 2)																			1 - 2
x Relays With Switching Contact (x * 3 Terminals, where x = 1 to 2)																			3 - 4
Without S0 Output																			0
x S0 Outputs With One Common Terminal (where x = 1 to 6)																			1 - 6
External Power Supply 230 V, 5 Auxiliary 24 V Inputs																			S 0 1

## TERMINAL BOARD WIRING DIAGRAM EXAMPLES

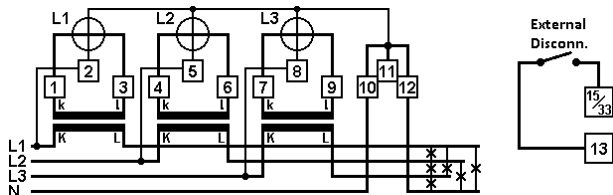
### AM160.D



### AM360.D



### AM360.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"> <li>● No voltage in supply wires</li> <li>● Bridge between terminals 1 and 2 disconnected</li> <li>● Meter designed for different voltage</li> </ul>
L1, L2, L3 symbols flash one after the other (Poly-phase meters only)	<ul style="list-style-type: none"> <li>● Incorrect order of phases (swap positions of any two phases)</li> </ul>
One of the symbols: L1, L2, L3, did not light up	<ul style="list-style-type: none"> <li>● Corresponding phase voltage is missing</li> </ul>
Meter not communicating with reading device (PDA, PC ...)	<ul style="list-style-type: none"> <li>● Optical probe not connected to PC, PDA, ...</li> <li>● Incorrectly set up serial port on PC, PDA, ...</li> <li>● Incorrectly set up start-up speed</li> <li>● PC, PDA SW does not support meter</li> </ul>
Meter not communicating with MDMS	<ul style="list-style-type: none"> <li>● Poor communication signal</li> <li>● Excess disturbance of communication signal</li> <li>● Meter unknown to MDMS</li> <li>● Meter has incorrect (or missing) AMM address</li> </ul>

## 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.