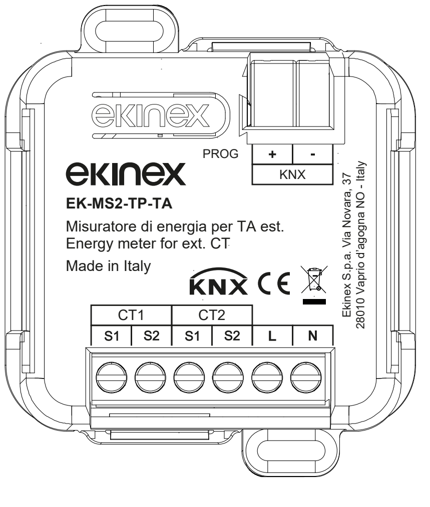
CONTROL YOUR LIVING SPACE

# Single-phase KNX energy meter with external CT

Code: EK-MS2-TP-TA

S TP1 Datasheet STEKMS2TPTA_EN

KNX bus device to be installed downstream of the delivery meter for measuring the electrical power and energy consumption of individual or group users. Use in home and building automation systems with KNX standard.




REFLEKMS2TPTA

## Description

The ekinex® EK-MS2-TP-TA sub-meter is a KNX S-mode device, suitable for measuring electrical quantities and accounting of energy produced and absorbed in modern buildings equipped with renewable generation systems, storage systems and subject to different types of loads such as heat pumps, vehicle charging systems, lighting and household appliances. Designed for home and building automation systems with KNX standard, the submeter is equipped with a KNX bus communication module and can be easily integrated into the consumption monitor of the ekinex® delégo supervisor: the delégo app offers a coordinated display of all acquired energy flows and immediate consultation of historical data.

The device has 2 independent measurement channels and is suitable for measuring up to 2 independent single-phase power lines (230 Vac, 50-60 Hz), using external current transformers (TA). The flush-mounted box mounting is made in a compact case, with the possibility of mounting on a 35 mm DIN rail (EN 60715) using a special adapter included in the supply.

On the KNX bus, the device sends and allows the user to consult the the instantaneous values of the measured electrical quantities (total active power, imported and exported active energy, voltage, current and power factor), the errors detected by the measurement system and other information on the product (FW version, ETS application or serial number of the KNX node).

Data communication by the submeter can be of the “passive” type (when it is interrogated by another bus device) and/or “active” (when it sends data to the bus on its own initiative). “Active” sending can occur in different ways:

- upon variation of the value (with minimum variation threshold settable in value or percentage)
- cyclically (with settable frequency)
- cyclically and upon change of value (combination of the two previous modes).

## Main functional characteristics

- Applications: 2 independent single-phase channels (230 Vac, 50-60 Hz)
- Calculation of active power (kW), reactive power (kVAr), apparent power (VA), power factor (cosφ), current measurement (A) and voltage (V)
- Current measurement using external current transformers
- Possibility of accounting for total and partial, imported and exported energy
- Availability of up to 8 comparators for exceeding a threshold or for values lower than a pre-set threshold. The comparators can be applied to any electrical quantity acquired by the device.
- 8 channels of AND-OR-XOR logic functions, 8 inputs per channel
- Communication interface: KNX TP
- KNX configuration: via ETS software
- Mounting in flush-mounted box made in a compact housing, with the possibility of mounting on 35 mm DIN rail (EN 60715) using the special adapter included in the supply.

## Technical data

- Current measurement range: 20A max per channel
- Voltage measurement range: 230 Vac for independent channels (50-60 Hz), 400 Vac for three-phase (50-60 Hz)
- Accuracy (on active energy with 0.75 ≤ P.F. [Power Factor] ≤ 1): < 2 %
- PMD-II device class according to CEI EN IEC 61557-12
- Logic part power supply (microcontroller): from 230 Vac mains
- Current draw from the mains: 2mA @250 Vac
- Current draw from KNX bus: 10mA @21 - 30 Vdc
- Operating temperature: -5°C… +45°C
- Storage temperature: -30° C...+70° C
- Maximum case temperature (tc): 80 °C
- Max. humidity: annual average 75%, short-term 95%, non-condensing
- Housing in plastic material
- Protection class IP20
- Dimensions (WxHxD): 53 x 61 x 29 mm
- Weight: 37 g

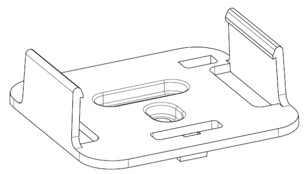
***Note.*** *The accuracy stated in the technical data is not guaranteed outside the indicated range.*

***Note.*** *Please consider that no measurement is taken in the first 10 seconds after the submeter is turned on.*

## Accessories for EK-MS2-TP-TA model

Rail-mounting support

The device EK-MS2-TP-TA can be mounted on 35 mm rail (according to EN 60715) with the plastic support included in the delivery.



Current tranformers (CT)

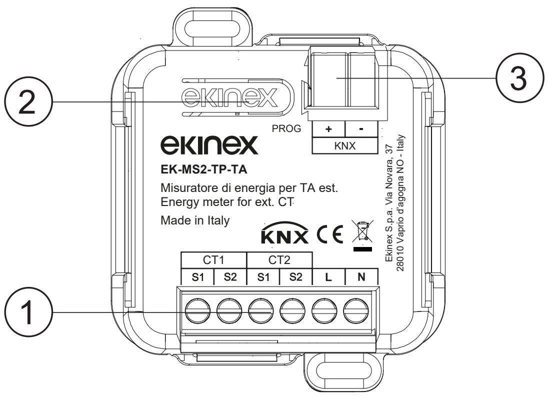
The following CT can be ordered separately.

| Product code | Measuring range<br>Accuracy (on active energy with 0.75 ≤ P.F. ≤ 1): < 2 % |
|---|---|
| EK-MST-5A | 0.2 - 5 A |
| EK-MST-20A | 0.5 - 20 A |
| EK-MST-60A | 1.0 - 60 A |
| EK-MST-120A | 2.0 - 120 A |

***Note.** The accuracy stated in the technical data is not guaranteed outside the indicated range.*

## Control, signaling and connection elements

The device is equipped with a screw terminal for connecting the load (1), channel 1 (CT1) and channel 2 (CT2), a KNX programming button with LED under the cover (2) and a terminal for connecting the KNX bus line (3).

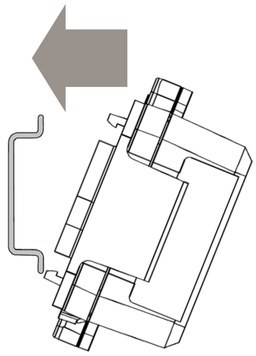



| Nr. | Label | Connection |
|---|---|---|
| 1 | CT1 S1/S2 | Terminals for load connection, channel 1 (CT1) and channel 2 (CT2) |
| | CT2 S1/S2 | |
| | L - N | |
| 2 | PROG | KNX programming button and programming LED (under the button) |
| 3 | KNX | KNX bus line connection terminal |

## Mounting

The device has a housing with degree of protection IP20 designed for mounting on a profile rail according to EN 60715 inside electrical distribution panels or cabinets. The installation is carried out in a horizontal position.

To mount the device on the rail, insert the mounting support in the appropriate shaped profile of the back side of the device, then hook the teeth to the profile guide starting from the bottom. Finally, push the upper part towards the guide for final coupling.



Before removing the device, be sure that inputs, outputs, and the input power supply have been disconnected. Use a screwdriver to slide down the locking device and remove the device from the rail.

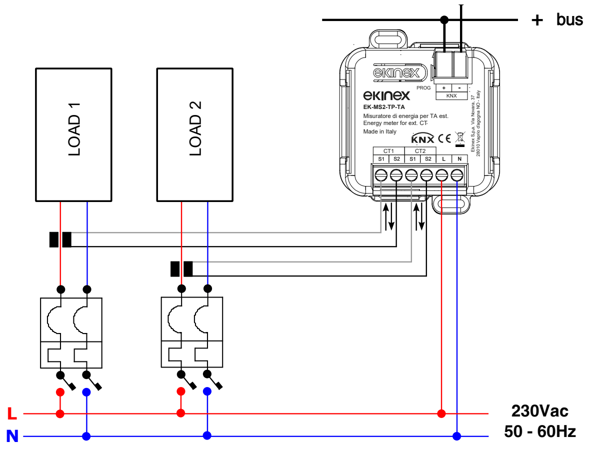
***Note.** When mounting the device in boards and cabinets it shall be provided the necessary ventilation so that the temperature can be kept within the operating range of the device.*

### INSTALLATION TECHNICAL NOTES

- **Installation and maintenance must be performed only if the power supply has been turned off.**
- **Installation and maintenance must only be performed by qualified personnel only, in compliance with current regulations. Incorrect installation may cause electrocution or fire.**
- **The device is not equipped with earthing. Protection from accidental contact is guaranteed by the casing.**
- **In the system, keep the 230Vac circuits and the non-SELV circuits separated from the SELV circuits at very low safety voltage and from the KNX bus.**
- **It is absolutely forbidden to connect, for any reason, directly or indirectly, the 230 Vac mains voltage to the KNX bus terminal.**
- **The device must be used exclusively for measuring electrical energy and cannot be used outside the specified technical data. When installing or replacing the meter, the conductors must be voltage-free (power supply / voltage switched off). Contact with live components is dangerous! Therefore, the appropriate fuses must be removed and made safe. No one must be able to activate the voltage / power without warning. Before opening/disconnecting the terminals, short-circuit the secondary circuits of the current transformers. The resulting high voltage on the current transformer is extremely dangerous (life-threatening) and could destroy the current transformer.**

## Electrical wiring

Below is the electrical and KNX bus and power network connection diagram for the device.




EK-MS2-TP-TA sub-meter with external current transformers

## Connection to KNX bus network, power supply and loads

The connection to the bus network takes place via the KNX terminal included in the delivery and inserted in the special housing located on the front of the device in the lower part.

Characteristics of the KNX terminal block

- spring clamping of conductors
- 4 seats for conductors for each polarity
- terminal suitable for KNX bus cable with single-wire conductors and diameter between 0.6 and 0.8 mm
- recommended wire stripping approx. 5 mm
- color codification: red = + (positive) bus conductor, black = − (negative) bus conductor

***Warning!*** *To power the KNX bus lines, use exclusively KNX bus power supplies (e.g. ekinex EK-AB1-TP, EK-AG1-TP or EK-AM1-TP). The use of other power devices can compromise communication and damage the devices connected to the bus.*

The connection to the 230 Vac 50-60Hz power supply is done via the spring terminals located in the upper part of the device.

Characteristics of the supply and loads terminal block

- Screw tightening of the conductors
- Power and loads wiring: solid or stranded wire, max 2.5 mm$^2$ (12 ~ 24 AWG)
- Stripping recommended approx.: 6.5 mm
- Max torque 0.5 Nm

## Configuration and commissioning

The configuration and commissioning of the device requires the use of the ETS® (Engineering Tool Software) V5 program or later versions. These activities must be carried out in accordance with the design of the building automation system created by a qualified professional.

***Note.*** *The configuration and commissioning of KNX devices require specialized skills. To acquire these skills, you should attend the workshops at KNX certified training centers.*

Configuration

To configure the device parameters, the corresponding application program or the entire ekinex® product database must be loaded into the ETS® program. For detailed information on the configuration possibilities, consult the application manual of the appliance available on the website www.ekinex.com.

Commissioning

For commissioning the device the following activities are required:

- make the electrical connections as described above;
- turn on the bus power supply;
- switch the device operation to the programming mode by pressing the programming pushbutton located on the front side of the housing. In this mode of operation, the programming LED is turned on;
- download into the device the physical address and the configuration with the ETS® program.

At the end of the download the operation of the device automatically returns to normal mode; in this mode the programming LED is turned off. Now the bus device is programmed and ready for use.

## Device reset

To reset the device, press the programming button and hold it for about 10 s; when the programming LED flashes quickly, it means that the reset has been performed. At this point, it is necessary to re-address and configure the device using ETS.

***Warning!*** *The reset operation brings back the device to its factory delivery state. The addressing and value of the parameters set during configuration are lost.*

## Bidirectional measurement

The device supports bidirectional measurement mode. In this way, it can be used when there can be an energy flow in both directions at the point of insertion; this is the case of a home that can draw electricity from the distributor's network and produce electricity locally (e.g. with a photovoltaic solar system).

The counting performed must therefore concern both the "imported" energy (or positive, withdrawal from the grid) and the "exported" energy (or negative, on-site production and injection into the grid).

For this purpose, each submeter has separate memory registers:

- register for imported energy; it increases only when the energy flow occurs in a positive direction;
- register for exported energy; it increases only when the energy flow occurs in a negative direction.

The increment of the various registers is shown in the following table.

| Situation | Consumption meter (withdrawal from the grid) | Production counter (local generation) |
|---|---|---|
| More energy is consumed than is generated | Count | Does not count |
| More energy is generated than is consumed | Does not count | Count |
| The energy consumed is equal to that generated | Does not count | Does not count |

The communication objects for exported energy are hidden by default; they can be enabled in the general parameters with ETS.

## Energy counting

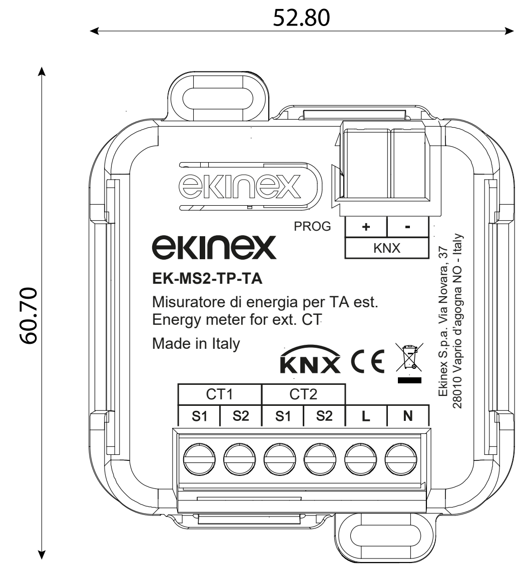
Energy counting includes the following functions:

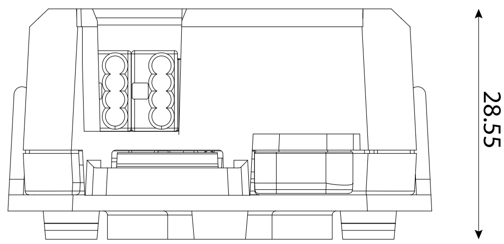
- energy counting of the “total” type (cumulative value since the first commissioning of the device) and “partial” type (value between two readings or between a reset and a reading). With the partial counting values transmitted on the bus, a supervision can display the energy of a given period calculated as Reading (end of period) – Reading (start of period) or simply Reading (end of period) if the counting was initially reset;
- setting the initial value (“preset” function) for the “total” energy counting. In ETS it is possible to configure the execution of this setting even at a time after the start of the counting, by receiving a corresponding communication object from the bus;

***Note:*** *using the “preset” function, the total energy count of the submeter can be aligned during the configuration phase with that of another electricity meter, for example a delivery meter that has been installed and functioning for some time (placed upstream of the KNX submeter) or with that of a KNX submeter of the same type, in the event of replacement of the device.*

- the total counting can be reset when the application is downloaded from ETS, from the bus via a communication object or when the maximum counting limit is reached (overflow). The reset objects are hidden by default; they can be enabled at the first configuration with ETS;
- the partial count reset can occur automatically at the end of the counting period, when downloading the application from ETS or from bus via communication object. The reset objects are hidden by default; they can be enabled in the first configuration with ETS;
- automatic sending of the cumulative energy value at the end of the period. The period is chosen between day, week, month, year (n.b. the period is generally different from the measurement sampling frequency);
- setting of the behavior when downloading the application between: maintaining the values in the registers; resetting the registers; initializing the registers with a value other than zero (e.g. in case of replacement of the device).

## Dimensions




## Marks

- KNX
- CE, UKCA: the device complies with the Electromagnetic Compatibility Directive (2014/30/EU), the Low Voltage Directive (2014/35/EU) and the RoHS 2 Directive (2011/65/EU).
- Reference Standards: EN 63044-5-1:2019, EN 63044-5-2:2019, EN 63044-3:2017, EN 62368-1:2020.

## Maintenance

The device is maintenance-free. To clean use a dry cloth. It must be avoided the use of solvents or other aggressive substances.

## Disposal

At the end of its useful life the product described in this datasheet is classified as waste from electronic equipment in accordance with the European Directive 2012/19/EU (WEEE recast), and cannot be disposed together with the municipal undifferentiated solid waste.

***Warning! Incorrect disposal of this product may cause serious damage to the environment and human health. Please be informed about the correct disposal procedures for waste collecting and processing provided by local authorities.***

## Document

This technical datasheet refers to the A1.0 release of the ekinex® device code EK-MS2-TP-TA and is available for download on the website www.ekinex.com in PDF format (Portable Data Format).

| Product code | Application software (## = release) | Communication objects (max nr.) | Group adresses (max nr.) |
|---|---|---|---|
| EK-MS2-TP-TA | APEKMSxTPTA20D##.knxprod | 201 | 254 |

## Warnings

- Installation, electrical connection, configuration and commissioning of the device can only be carried out by qualified personnel in compliance with the applicable technical standards and laws of the respective countries
- Before making the electrical connections, make sure that the mains voltage is switched off
- The power supply line to which the appliance is connected must be equipped with an easily accessible disconnecting device with a contact gap of at least 3 mm
- Opening the housing of the device causes the immediate end of the warranty period
- In case of tampering, the compliance with the essential requirements of the applicable directives, for which the device has been certified, is no longer guaranteed
- ekinex® KNX defective devices must be returned to the manufacturer at the following address: EKINEX S.p.A. Via Novara 37, I-28010 Vaprio d'Agogna (NO) Italy

## Other information

- This datasheet is aimed at installers, system integrators and planners
- For further information on the product, please contact the ekinex® technical support at the e-mail address: support@ekinex.com or visit the website www.ekinex.com
- Each ekinex® device has a unique serial number on the label. The serial number can be used by installers or system integrators for documentation purposes and has to be added in each communication addressed to the EKINEX technical support in case of malfunctioning of the device
- KNX® and ETS® are registered trademarks of KNX Association cvba, Brussels