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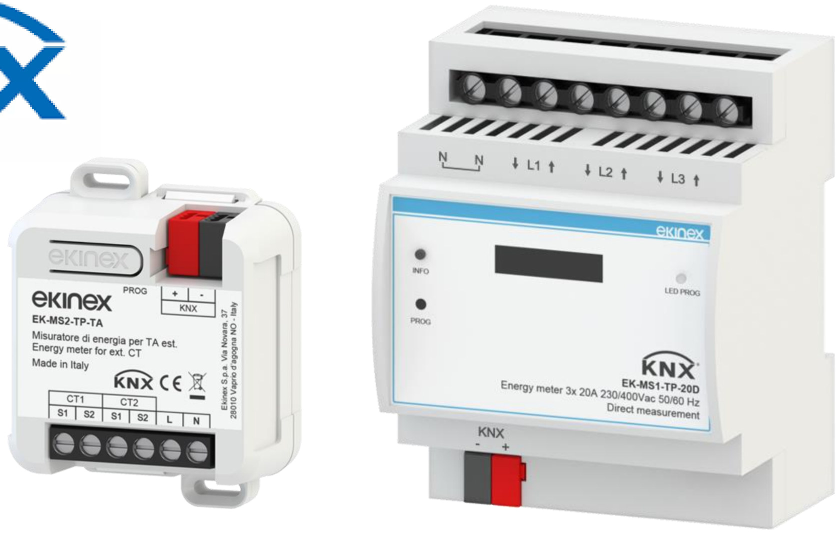

Application manual
KNX Energy Sub-meters

EK-MS2-TP-TA 2-channels,
with external amperometric-transformer

EK-MS1-TP-20D 3-phases,
direct measurement

EK-MS1-TP-TA 3-phases,
with external amperometric-transformer

Summary

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Revision	Modifications	Date
1.1	Update with DIN rail mounting product EK-MS1-TP-TA	10/09/2025
1.0	First emission	25/03/2025

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1 Warnings

DANGER TO LIFE FROM ELECTRIC CURRENT

The device may only be installed and connected by qualified electrical installers. Observe country-specific regulations and applicable KNX guidelines.

The devices are approved for operation in the EU and bear the CE mark. Use in the USA and Canada is not permitted.

Before starting work on the device, always disconnect it from the power supply via the upstream fuses.

After installation, all live terminals and connections must be completely closed by the control panel cover so that they cannot be touched. It must not be possible to open the control panel cover without tools!

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2 Scope of the document

This application manual describes application details for ekinex® electrical sub-meters EK-MS1-TP-TA and EK-MS1-TP-20D.

The document is aimed at the system configurator as a description and reference of device features and application programming. For installation, mechanical and electrical details of the device please refer to the technical description datasheet.

Application manual and application programs for ETS are available for download at www.ekinex.com.

Item	File name (## = release)	Version	Device rel.	Update
Product datasheet	STEKMS1TP_EN.pdf	EK-MS1-TP	A1.0	03 / 2025
Application manual	MAEKMS1TP_EN.pdf	EK-MS1-TP		
Application program	APEKMS1TP##.knxprod	EK-MS1-TP		

You can access the most up-to-date version of the full documentation for the device using following QR codes:

Electrical sub-meters EK-MS1-TP-TA, EK-MS1-TP-20D and EK-MS1-TP-TA

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3 Product description

The ®ekinex EK-MS2-TP-TA and EK-MS1-TP-20D sub-meter devices are KNX S-mode devices, suitable for measuring electrical quantities and accounting for 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. The devices, designed for KNX-standard home and building automation systems, are equipped with a KNX bus communication module and can be easily integrated into the delégo ®ekinex supervisor consumption monitor: the delégo app provides a coordinated display of all captured energy flows and immediate consultation of historical data.

The EK-MS2-TP-TA device has 2 independent measurement channels via external current transformers and is suitable for measuring single-phase power lines (230 Vac, 50-60 Hz). Flush-mounting is realized in compact housing with possibility of mounting on 35 mm DIN rail (EN 60715) by means of special adapter included in delivery.

On the other hand, the EK-MS1-TP-20D device has 3 independent measurement channels with direct insertion and is suitable for measurement of up to 3 independent single-phase power lines (230 Vac, 50-60 Hz) or 1 three-phase power line (400 Vac, 50-60 Hz). Mounting is on 35 mm DIN rail with dimensions of 4 modular units (L = 144 mm).

The panel-mounted product EK-MS1-TP-20D is equipped with a display (graphic OLED, 128x32) and an interrogation button. By short and long presses of the query pusante it is possible to consult the instantaneous values of measured electrical quantities (total active power, imported and exported active energy, voltage, current and power factor), errors detected by the measurement system and other product information (KNX node serial number).

3.1 Main functional characteristics

EK-MS1-TP-20D

- 3 independent measurement channels
- direct insertion current measurement max 20A
- applications: 3 independent single-phase power lines (230 Vac, 50-60 Hz) or 1 three-phase power line (400 Vac, 50-60 Hz)
- OLED display for visualization of measured electrical quantities
- mounting on 35 mm DIN rail

EK-MS1-TP-TA

- 3 independent measurement channels
- Current measurement using external current transformers
- applications: 3 independent single-phase power lines (230 Vac, 50-60 Hz) or 1 three-phase power line (400 Vac, 50-60 Hz)
- OLED display for visualization of measured electrical quantities
- mounting on 35 mm DIN rail

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EK-MS2-TP-TA

- 2 independent measurement channels
- Current measurement using external current transformers
- applications: 2 independent single-phase power lines (230 Vac, 50-60 Hz)
- mounting in flush-mounted box realized in compact housing, with possibility of mounting on 35 mm DIN rail (EN 60715) by means of special adapter included in delivery.

- Application for 1 three-phase power line: calculation of active, reactive, apparent power and power factor

- Possibility of total and subtotal energy counters

- Availability of up to 8 comparators for exceeding a threshold or for values below a set threshold. Comparators can be applied to any electrical quantity acquired by the device or read from bus.

- 8 channels of AND-OR-XOR-NOR-NAND logic functions, 8 inputs per channel

Measured and calculated electrical quantities are available through group objects with the format (Data Point Type) and unit of measure best suited to your integration needs:

- Current: 4-byte floating point datum (DPT 14.019), unit Ampere [A]; 2-byte floating point datum (DPT 9.021), unit milliAmpere [mA].
- Voltage: 4-byte floating-point datum (DPT 14.027), unit of measurement Volts [V];
- Power: 4-byte floating-point datum (DPT 14.056), unit of measure Watts [W]; 2-byte floating-point datum (DPT 9.024), unit of measure KiloWatts [kW].
- Energy: 4-byte signed integer datum (DPT 13.013), unit of measure KiloWattHours [kWh].
- Power Factor: 4-byte floating point datum (DPT 14.057) pure number, range [-1,.. +1]

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3.2 Technical Sheets

Sub-meter part-number	**EK-MS1-TP-20D**
ELECTRIC MEASUREMENTS	
Channel number	3 indipendent mono-phase 1 three-phase
Current measurement method	direct insertion
Current measurement range	20A max for channel
Voltage measurement range	230 Vac for indipendent channels (50-60 Hz) 400 Vac three-phase (50-60 Hz)
Accuracy (on active energy with 0.75 ≤ P.F. [Power Factor] ≤ 1)	< 2 %
Appliance class	PMD-II for CEI EN IEC 61557-12
KNX BUS	
Power supply logic part (microcontroller)	From KNX bus (30 Vdc)
Current consumption from the bus	< 30 mA
Display	OLED graphic 128x32, monochromatic white
Operating temperature	-5°C… +45°C
Degree of protection	IP20
Dimensions	72 x 90 x 70 mm (L x H x P)

Sub-meter part-number	**EK-MS1-TP-TA**
ELECTRIC MEASUREMENTS	
Channel number	3 indipendent mono-phase 1 three-phase
Current measurement method	with external amperometric transformers
Voltage measurement range	230 Vac for indipendent channels (50-60 Hz) 400 Vac three-phase (50-60 Hz)
Accuracy (on active energy with 0.75 ≤ P.F. [Power Factor] ≤ 1)	< 2 %
Appliance class	PMD-II for CEI EN IEC 61557-12
KNX BUS	
Power supply logic part (microcontroller)	From KNX bus (30 Vdc)
Current consumption from the bus	< 30 mA
Display	OLED graphic 128x32, monochromatic white
Operating temperature	-5°C… +45°C
Degree of protection	IP20
Dimensions	72 x 90 x 70 mm (L x H x P)

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Sub-meter part-number	**EK-MS2-TP-TA**
ELECTRIC MEASUREMENTS	
Current measurement method	2 indipendent mono-phase
Current measurement range	with external amperometric transformers
Voltage measurement range	230 Vac for indipendent channels (50-60 Hz
Accuracy (on active energy with 0.75 ≤ P.F. [Power Factor] ≤ 1)	< 2 %
Appliance class	PMD-II for CEI EN IEC 61557-12
KNX BUS	
Power supply logic part (microcontroller)	From KNX bus (30 Vdc)
Current consumption from the bus	< 30 mA
Operating temperature	-5°C… +45°C
Degree of protection	IP20
Dimensions	72 x 90 x 70 mm (L x H x P)

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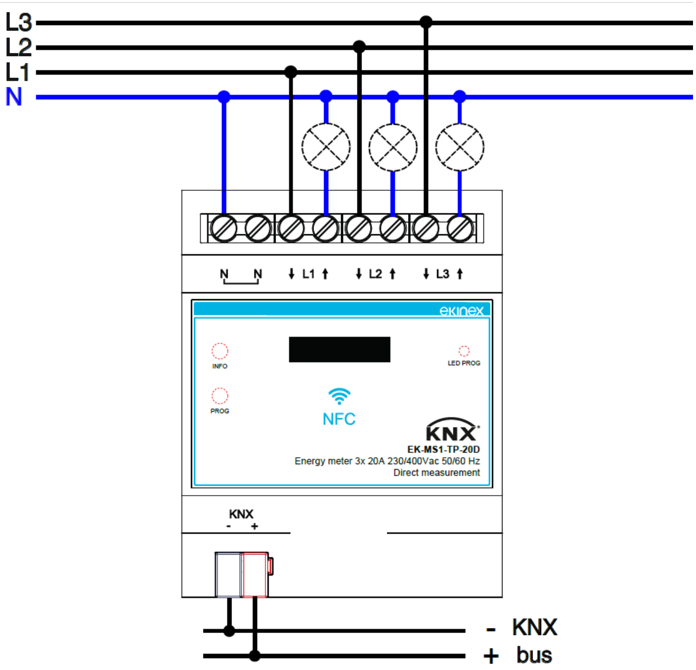
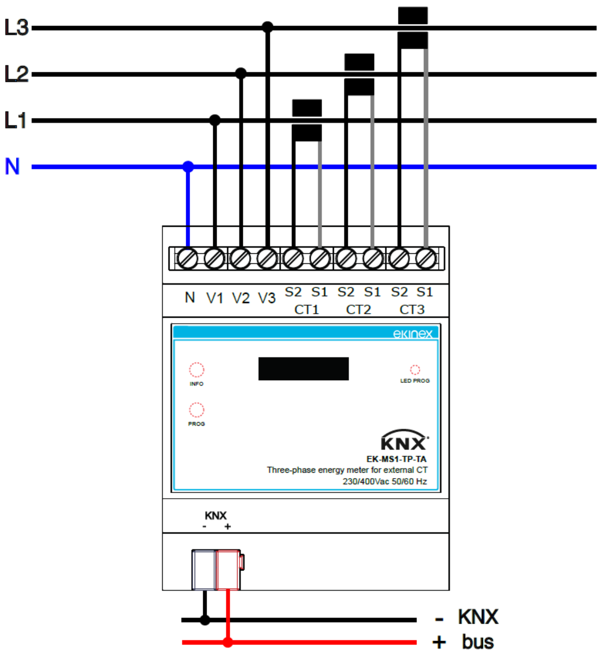
3.3 Electrical connections



Sub-meter EK-MS1-TP-20D with direct insertion



Sub-meter EK-MS1-TP-20D with external amperometric transformers

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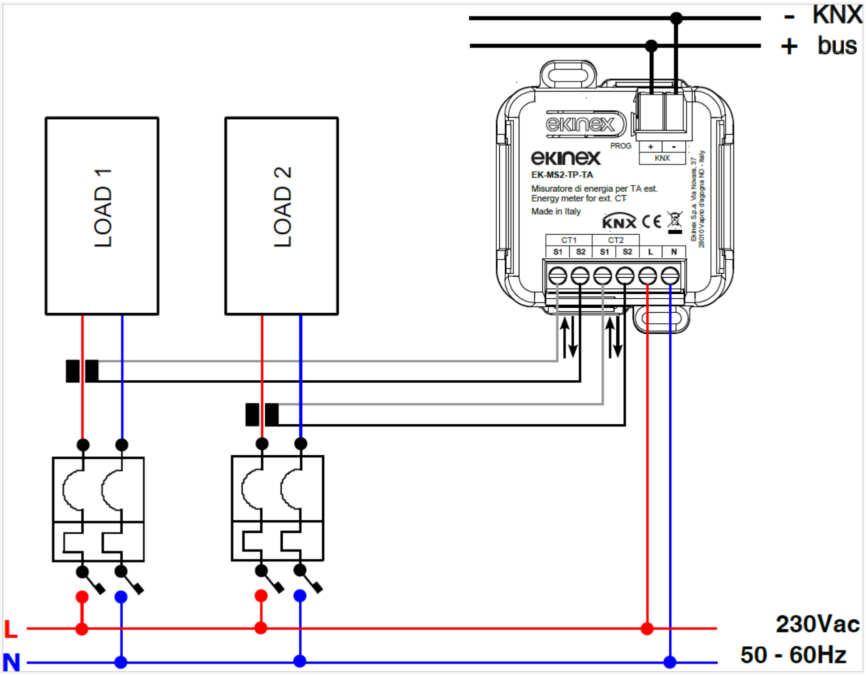

Sub-meter EK-MS2-TP-TA with external amperometric transformers

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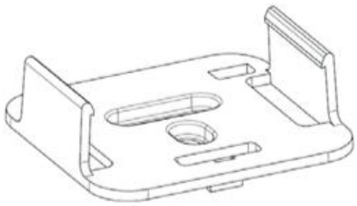
3.4 Accessories for EK-MS2-TP-TA model

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 transformers (CT)

The following CT can be ordered separately.

Product code	Measuring range Accuracy: < 2% (on active energy with 0,75 ≤ P.F. ≤ 1)
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. Moreover, no measurement is taken in the first 10 seconds after the submeter is turned on.

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4 Switching, display and connection elements

EK-MS1-TP-20D

The device is equipped with a graphic OLED display and an interrogation button that enables the visualization of measured electrical quantities.

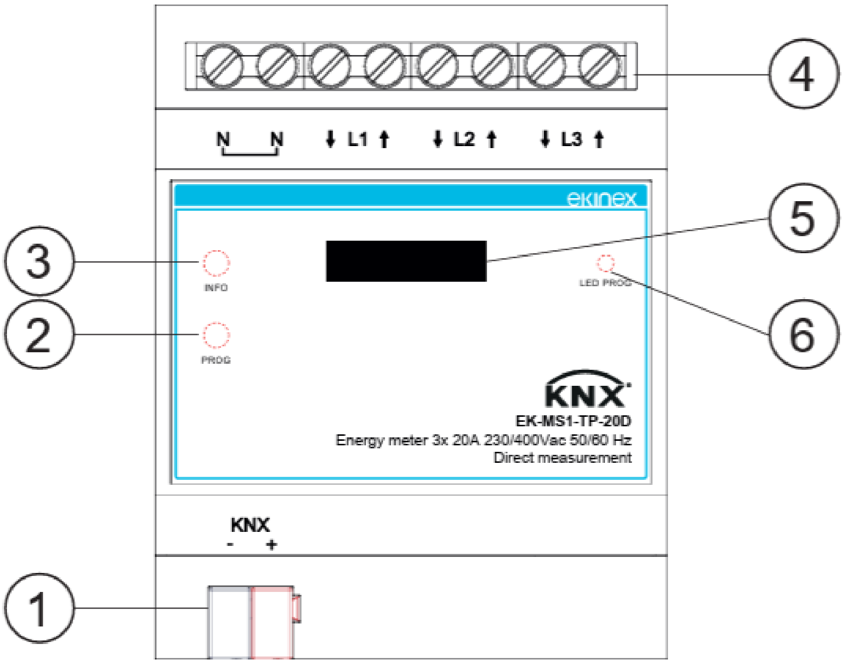

Fig. 2A - EK-MS1-TP-20D switching and connection elements.

1) KNX bus line connection terminal

2) KNX programming button

3) Button for querying data on the display

4) Electrical load connection terminals

5) OLED Graphic display

6) KNX programming led

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EK-MS2-TP-TA

Fig. 2B - EK-MS2-TP-TA switching and connection elements.

1) Terminals for load connection, channel 1 (CT1) and channel 2 (CT2)

2) KNX programming button and programming LED (under the button)

3) KNX bus line connection terminal

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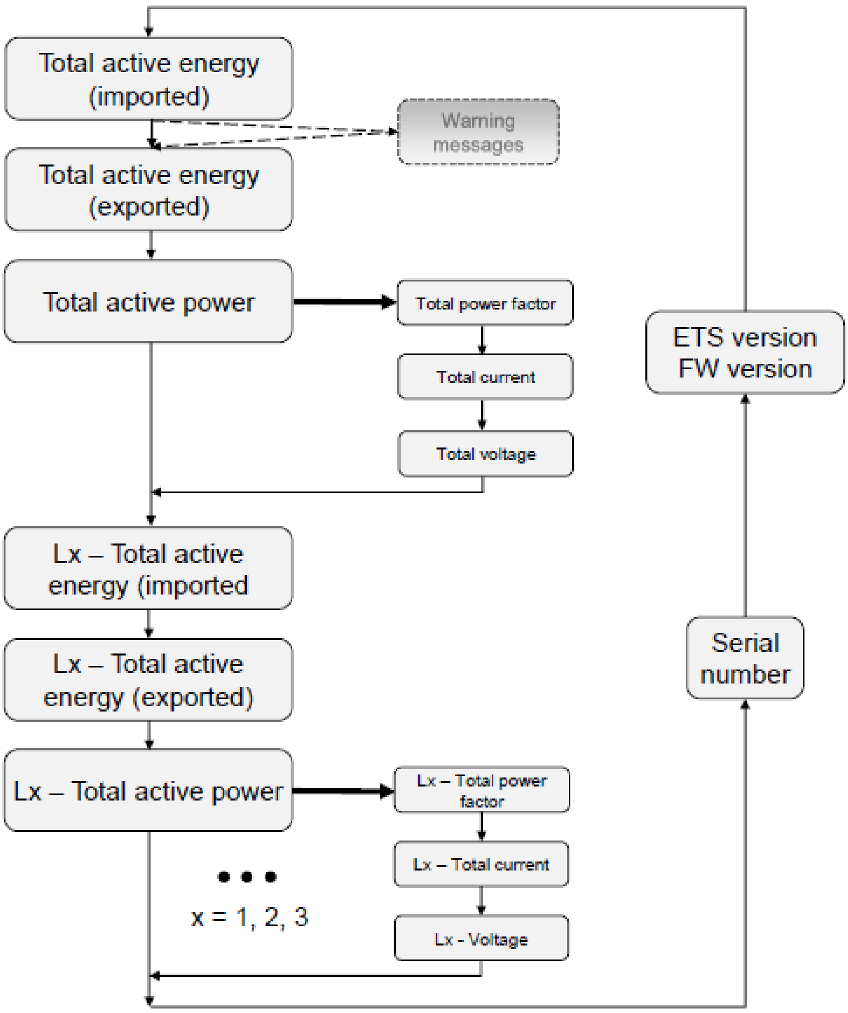
4.1 User interface for EK-MS1-TP-20D/TA

The submeter is equipped with a graphical display and an interrogation button. The display is activated on the first press of the button and opens to the readout menu (sequence of measurement information). By further short press of the button (< 2s), one scrolls through the main screens, while by long press (> 5s), the measurement information present at the second level is displayed.

	**Info display** 1. Measured parameter value 2. Imported and exported energy symbols 3. Symbol measured parameter (P.tot , En.L1, I (L2) etc. 4. Warning symbol, if any 5. Unit symbol (kWh, A, etc.).



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4.1.1 Power on: imported active energy

As soon as it is turned on, the display presents the imported active energy screen:

- if configured for a single-phase circuit, the total imported active energy register is displayed. The "→" symbol is active;
- if configured for a three-phase circuit, the total imported active energy register is displayed as the sum of the imported active energy of the three phases. The symbol "→" is active;
- if configured for multiple single-phase circuits, the total imported energy registers of the individual phases are displayed, showing "En. L1", "En. L2", "En. L3" according to the phase whose parameter is being shown. In addition, the "→" symbol is active.

The symbol "kWh" or "Wh" is active, depending on the configuration.

4.1.2 Error visualization

The presence of errors or faults is shown on the display by the symbol "∆" appearing on any previous screen.

The error screen, which is accessed by short press of the button (< 2s) appears immediately after the power-on screen indicating the fault present, e.g., "KNX Missing," "L2 Missing," etc.

4.1.3 Exported active energy

If there are no anomalies, the second screen that compare by short press of the key (< 2s) is about the exported active energy:

- if configured for a single-phase circuit, the total exported active energy register is displayed. The symbol "←" is active;
- if configured for a three-phase circuit, the total exported active energy register is displayed as the sum of the exported active energy of the three phases. The symbol "←" is active;
- if configured for multiple single-phase circuits, the total exported energy registers of the individual phases are displayed, showing "En. L1", "En. L2", "En. L3" according to the phase whose parameter is being shown. In addition, the symbol "←" is active.

4.1.4 Active power

- If configured for a three-phase circuit, upon short press of the button (< 2s), downstream of the screen inherent in the exported active energy, the total active power register (sum of the power of the three phases) is displayed. The symbol "→" or "←" is active to indicate whether we are importing or exporting energy, respectively;

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- If configured for multiple single-phase circuits, downstream of the exported active power register screen, upon short press of the button (< 2s), the power register of the individual phase is displayed with "P. L1", "P. L2", "P. L3" indication according to the phase whose parameter is being shown. In addition, the symbol "→" or "←" is active.

The symbol "kW" or "W" is active, depending on the unit of measurement configured via ETS.

4.1.5 Power Factor

The power factor can be displayed:

- if configured for a three-phase circuit, on prolonged button press (> 5s), downstream of the screen showing the total active power;
- if configured for multiple single-phase circuits, downstream of the screen on the single-phase total active power register, at prolonged button press (> 5s), the power factor measurement of the single phase is displayed with "φ. L1", "φ. L2", "φ. L3".

4.1.6 Current and voltage

For each phase, in the menu accessed by long press of the button (> 5s), downstream of the power factor, by short press of the button (< 2s) the current and voltage registers of the connected circuits are displayed in sequence.

The symbols "A" (Amps) and "V" (Volts) and that of the phase or circuit concerned (L1, L2, L3) are active. In addition, the symbol "→" or "←" is active for the current register.

4.1.7 Serial number KNX

In the penultimate screen, the serial number of the device is shown, characterized by 12 digits, the first 4 of which are fixed as they relate to the manufacturer's code (00B6, in the case of Ekinex).

4.1.8 ETS application and firmware version

Downstream of the serial screen, by prolonged key press (> 5s), the screen showing the ETS and firmware version of the installed device can be accessed.

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About 2 minutes after the last button press, the display automatically switches to offline mode.

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5 Configuration

The functionality of the device is determined by the settings made via software.

In order to configure the device, the ETS5 development tool (or later versions) and the ekinex® application programme dedicated to the device (the name is APEKMS1TPxx.knxprod) are required; these can be downloaded from the ekinex website www.ekinex.com.

The application programme allows access, within the ETS5 environment, to the configuration of all the working parameters of the device. The programme must be loaded into ETS (alternatively, the entire ekinex® product database can be loaded in a single operation), after which all device specimens of the type in question can be added to the project being defined.

The configurable parameters for the device will be described in detail in the following paragraphs.

The configuration can be, and generally will be, defined completely in off-line mode; the transfer of the set configuration to the device will then take place in the programming phase, described in the next paragraph.

Product code	EAN	Input Nr.	Application program ETS (## = revision)	Communication objects (Nr. max)	Group addresses (Nr. max)
EK-MS1-TP-20D			APEKMS1TP##.knxprod	232	254
EK-MS1-TP-TA			APEKMS1TP##.knxprod	232	254

The configuration and programming of KNX devices requires specific knowledge; to acquire this knowledge, it is recommended to attend the appropriate training courses at a KNX consortium-certified centre.

For further information, please visit www.knx.org.

6 Commissioning

For the commissioning of sub-meters, the following activities are required:

- make the electrical connections as described above;
- turn on the KNX bus power supply;
- switch the device operation to the programming mode by scrolling the display pages to the INFO page and pressing the PROGRAM virtual button for 5s, which will turn red;

The reset resets the device to the factory delivery state. The addressing and parameter value set during configuration will be lost.

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7 Function description

After switching on the bus, which also acts as a power supply, the device becomes fully functional after a very short time needed for reinitialization. A delay is programmable for the device to become active on the bus in order to avoid a bus traffic overload during the first moments of start-up of the whole network.

In case of a bus power failure (voltage lower than 19 V for 1 s or more), the device becomes unreactive: before the power supply becomes insufficient, the status is internally stored. The timing functions are not active, neither are the programmed group addresses.

As soon as the bus voltage is restored, the device will resume operation in its previous state (which is saved on power fail), unless different initialization settings are programmed.

7.1 Offline operation

A fully unprogrammed device does not operate in standby mode. Since the operation relies entirely on the exchange of information through communication objects, there is no part of the device that can operate independently from a KNX bus.

7.2 Online operation

In general the device works like a configurable digital sensor that is listening to own inputs or outputs of other devices. On input events the device performs output functionality over KNX bus like sending values or controlling external devices like KNX actuators.

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7.3 Software working cycle

The main purpose of the software is following:

- Handle user virtual pushbutton presses and generate bus telegrams according to the assigned functions;
- Implement virtual pushbutton interlock and timing functions;
- Handle incoming bus messages in order to update the status of pushbutton activations and LED indicators;
- Respond to bus messages requesting feedback on the status of the inputs.

The status of the device and specifically of its entities (input activation status and LED indicators) relies on KNX *communication objects*, which can be freely defined and bound in various ways to the physical elements of the device; these communication objects acts as *state variables* for the device.

There are also special events on which it is possible to trigger additional features. These events are the bus failure and recovery, and the download of a new configuration with ETS.

7.4 Logic functions

The KNX virtual pushbutton allows to use some useful logic functions (AND, OR, NOT, exclusive OR, NOR and NAND) in order to implement complex functions in the building automation system.

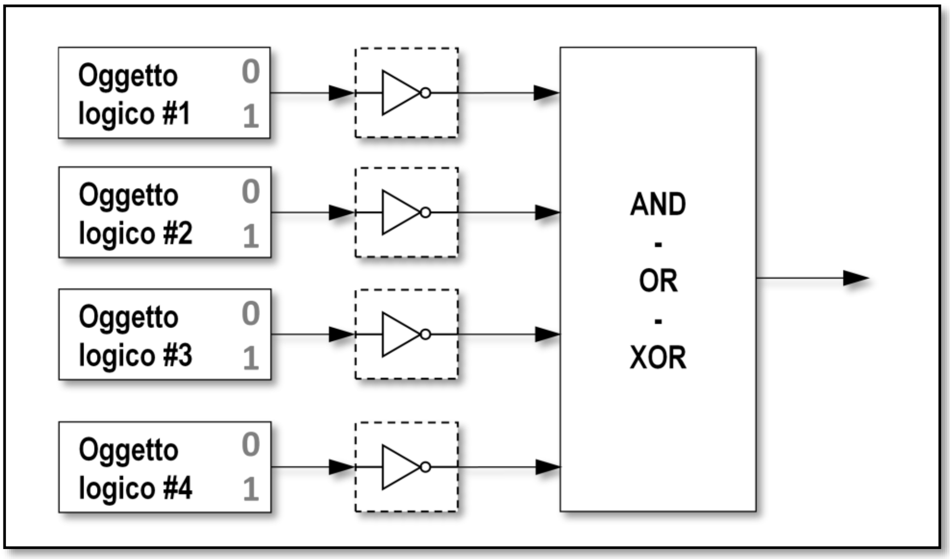
You can configure:

- 8 channels of logical functions
- 4 inputs for each channel

Each object value, if desired, can be individually inverted by inserting a NOT logic operator.

The inputs created by the objects are then logically combined as shown in the following figure:

Figure 1 – Logic combination function



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The logic block on the right side of the figure has the following function, based on the selected operation:

- OR – the output is ON if at least one input is ON;
- AND – the output is ON if all inputs are ON;
- XOR – the output is ON if an odd number of inputs is ON;

This last function is more intuitive when there are only 2 inputs: in this case, the output is ON when one input or the other one is ON, but not the two of them simultaneously.

Please note that in this description, with "input" and "output" we refer only to the logic block; for the device operation, the effective "inputs" are given by communication objects, so also the possible activation of NOT logic operators has to be considered.

The following figures show the basic logic functions, assuming 2 inputs and only one logic communication object:

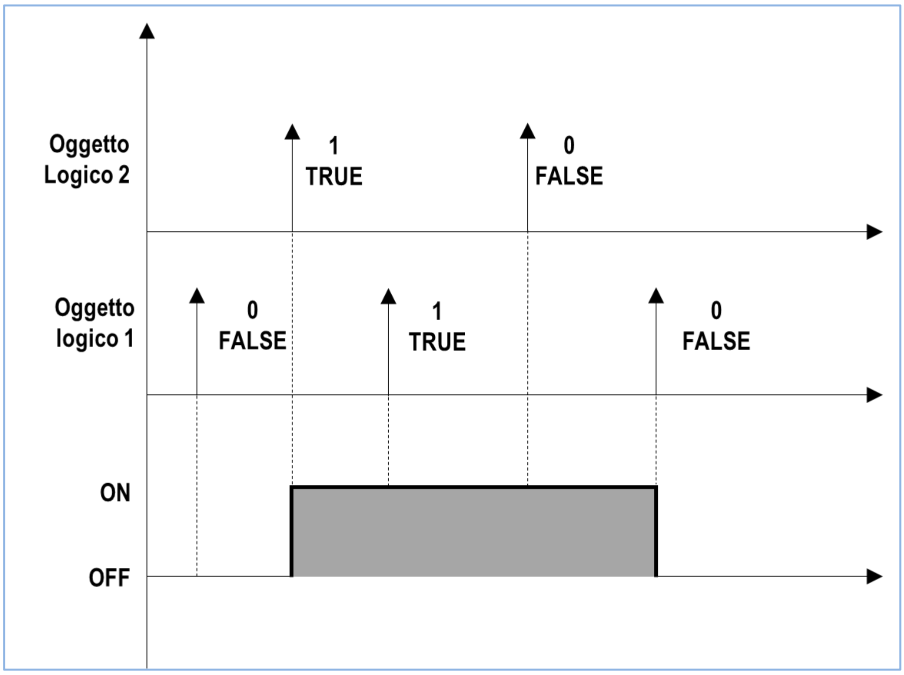

Figure 2 – Logic function OR

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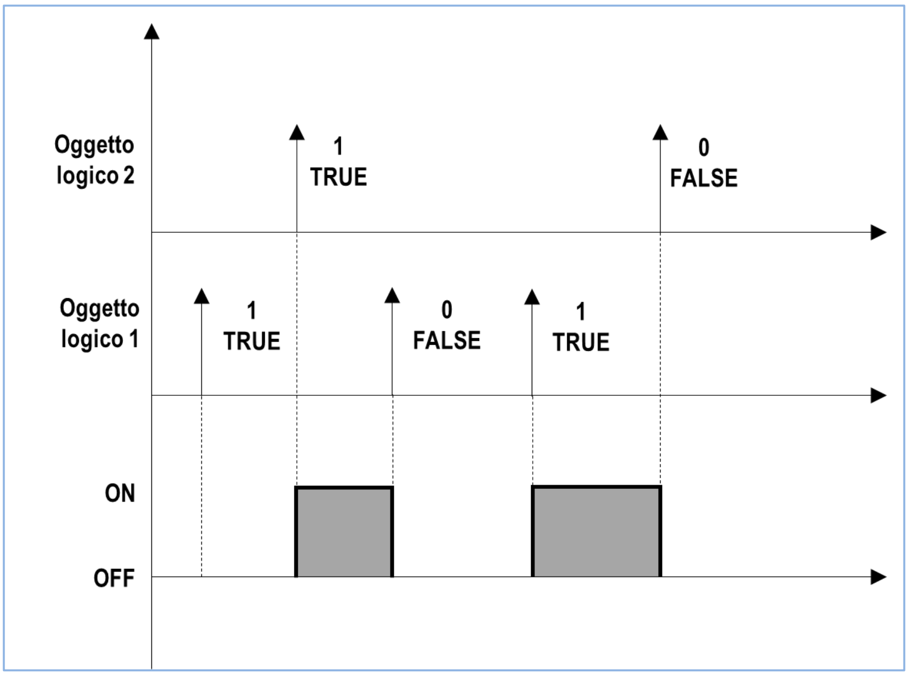

Figure 3 – Logic function AND

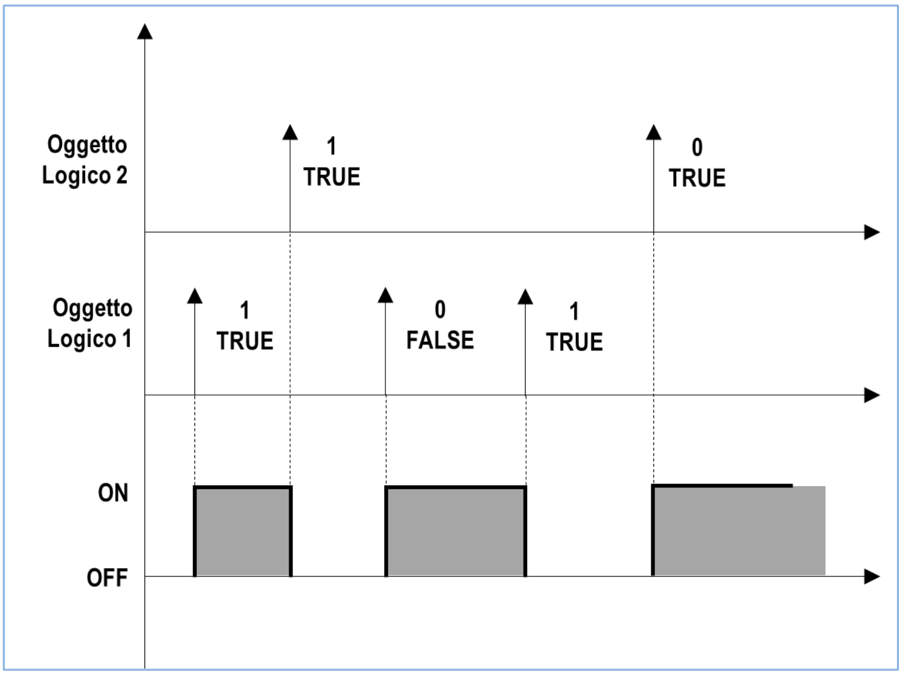

Figure 4 – Logic function Exclusive OR (XOR)

For each channel, a parameter *Delay after bus voltage recovery* is available: this parameter represents the time interval between the bus voltage recovery and the first reading of the input communication objects for evaluating the logic functions.

The communication function representing the logic function output is sent on the bus on event of change; alternatively, a cyclic sending can be set.

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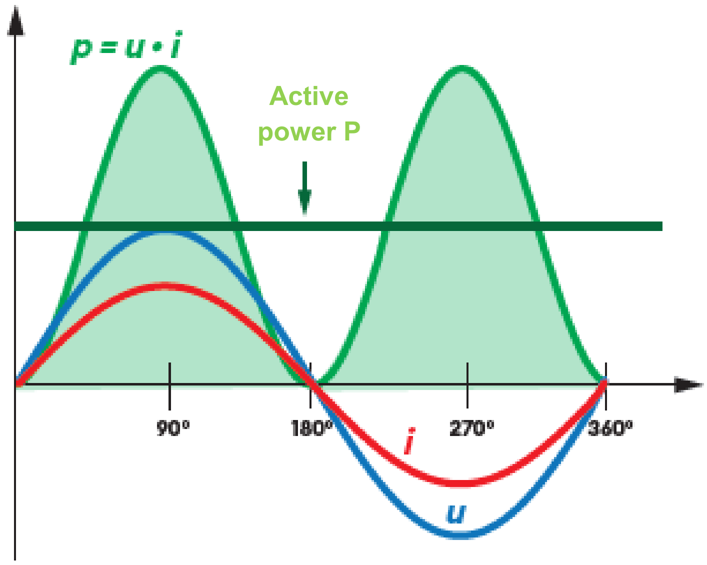
7.5 Notes on alternating current power lines

7.5.1 Active power

Active power is the power available for use by the consumer. For example, it can be used in a lamp to generate light, in a heating system for heat, or in an electric motor of an automobile. Active power is denoted by the symbol P and its unit of measurement is the Watt [W]. The electricity meter in our homes measures this power, so that only the energy actually used is taken into account. If a sinusoidal alternating voltage acts on a purely resistive load, the voltage and current are always in phase (phase shift ϕ = 0°). The instantaneous value of the power p = v x i is therefore positive at all times. With respect to voltage and current, the power oscillates at twice the frequency. The active power can be calculated by dividing the maximum value by 2. If the actual values of voltage and current are known, the active power can also be determined by the following formula: P = Veff x Ieff. The area subtended by the power curve (drawn in green in the diagram) corresponds to the work done, that is, the energy.



With purely resistive loads, voltage and current are always in phase. Power is the product of voltage times current.

7.5.2 Reactive power

Power that cannot be used is called reactive power. It is said to be “blind” because mechanical devices cannot be operated with it. However, reactive power is not useless because it is used to create the magnetic field in coils or to charge capacitors. In an ideal inductive load, that is, without losses, the current follows the voltage by 90° (or π/2). During the time when current and voltage have the same sign, the instantaneous power also turns out to be positive. The magnetic field can then be produced at this stage. When the current and voltage have opposite signs, the instantaneous power becomes negative, which is equivalent to a reduction in the magnetic field. The power, therefore, simply oscillates between the inductance and the voltage source. The average value is zero.

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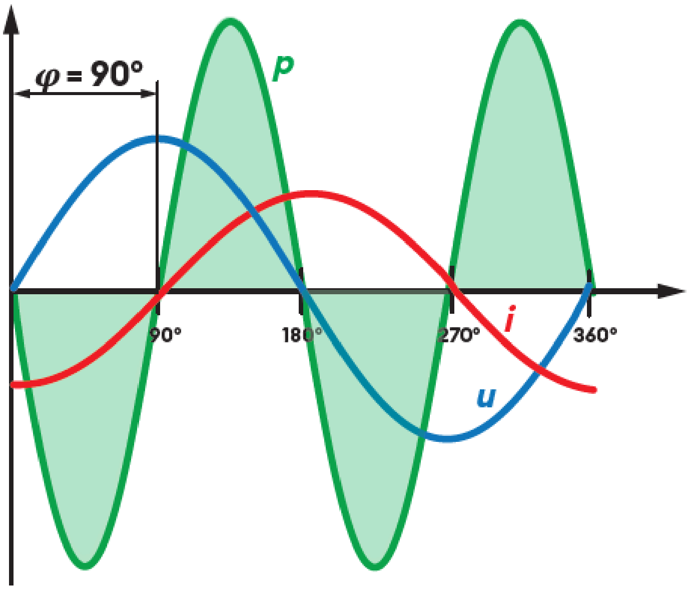
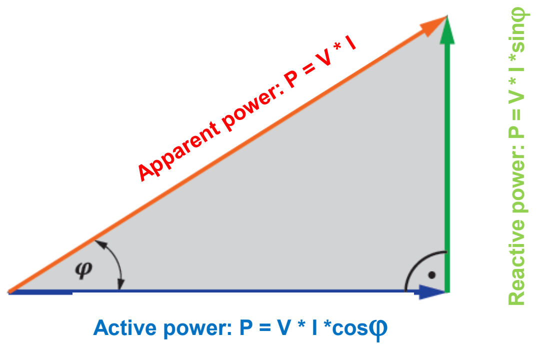


In an ideal inductive load, the alternating current power fluctuates between positive and negative values at twice the frequency with respect to voltage and current. The power input and the power output are identical.

In principle, the same thing that happens with an inductive load also happens with a capacitive load. Since current now anticipates voltage by 90° (or π/2), only the sign changes. Reactive power is needed to create the electric field. During decay, the same amount of power is released again. The energy then fluctuates again between positive and negative values, while the average value is zero. If the reactive power Q = V x I x sinϕ is greater than zero, the load absorbs reactive power, which is referred to as inductive behavior. If it is less than zero, the load supplies reactive power to the source (capacitive behavior). To clearly distinguish reactive power from active power, its unit of measurement is not Watt [W] but reactive Volt-Ampere (var).

7.5.3 Apparent power

In fact, both the coil and the capacitor and their leads always have an associated resistive load, which is noticeable by overheating. This overheating is caused by the active power. In addition to reactive power, we therefore always have active power. Electrical devices and also cables must therefore be designed for the combination of both powers. The power that takes into account both reactive and active power is called apparent power. It can be calculated using the right triangle according to the relationship: S^2 = P^2 + Q^2.



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The power triangle shows the relationship between active, reactive and apparent power, depending on the phase shift angle ϕ. Apparent power is a calculated quantity, which has no direct physical meaning and is specified with the unit Volt-Ampere [VA].

7.5.4 Power factor

The ratio of active power to apparent power is the power factor λ. For sinusoidal AC voltages, this is also called the effective factor and corresponds to $\cos\phi$. For nonsinusoidal AC voltages, harmonics are present, leading to the absence of a uniform phase shift.

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8 Firmware upgrade

It is possible to update the device firmware via KNX, using the Ekinex Firmware Updater tool.

Consult the specific guide of the update software and consult the Ekinex website of the product to always have the latest versions available.

9 Application program for ETS

In the following chapters, there is the list of folder, parameters and communication objects of the application program.

Every channel, and every input or input pair under a channel, offers the same set of communication objects and parameters, but they may all be independently configured.

Hereafter, all channel-specific settings are listed grouped by channel; a generic channel number is referenced as “x” (where x = 1…4), while a generic input is referenced as “xx” (xx = 1A, 1B, 2A, ... 4B).

i	The parameter values highlighted in bold represent the default value.

The device settings are divided in two main groups: the *general* settings and the *channel-specific* settings. The settings are grouped in folders. The following figure shows the tree structure of the application program, with the main folders:

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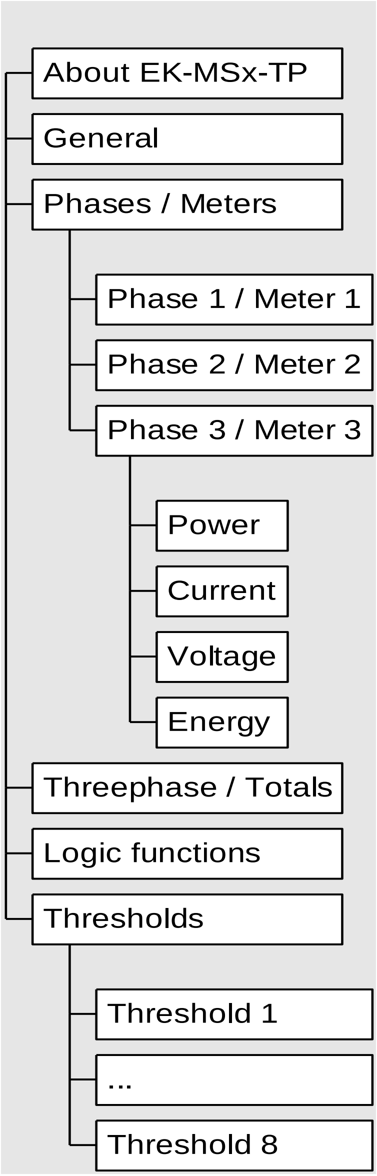

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9.1 About EK-MSx-TP

The folder About **EK-MSx-TP** is for information purposes only and does not contain parameters to be set. The information given is:

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Application software for ETS5 and ETS6
Version 1.0
EK-MS1-TP and EK-MS2-TP – KNX SUBMETERS series

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9.2 General

The board allows basic choices for the measurement application of electrical quantities:

- Model of the device to be configured: you can select either the panel-mounted product that has 3 independent measurement channels with direct insertion EK-MS1-TP (integrated CT) or the product in compact housing with 2 independent measurement channels via current transformers EK-MS2-TP (external CT)
    - For the EK-MS1-TP (integrated CT) device, measurement of 1 three-phase power line or measurement of up to 3 independent single-phase power lines can be configured
    - For the EK-MS2-TP (external CT) device in compact housing, it is possible to select the current transformer model (Ekinex® catalog products are recommended) to be used in the application, with automatic configuration, during download of the application program, of the scaling parameters of the measured electrical quantities
- Enabling calculation of power and reactive energy: useful when measuring power lines with inductive component
- Submeter function: possibility of displaying group objects with indication of power and energy produced or consumed or both components both produced and consumed

Parameter name	***Conditions***	***Values***
Device model		**EK-MS1-TP-20D (internal CT)** EK-MS1-TP-TA (external CT) EK-MS2-TP TA (external CT)
CT type	Device model = EK-MS1-TP (internal CT) or EK-MS2-TP (external CT)	CT 0-5 CT 0-20 CT 0-60 CT 0-120
Measuring method	Device model = EK-MS1-TP (internal CT)	**Threephase** Single meters

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Parameter name	Conditions	Values
Delay at bus on		**00:00:00 hh:mm:ss** [range 00:00:00 … 02:00:00]
	Time interval after which telegram transmission activity on the bus is started after power is restored. The delay concerns both the transmission of a telegram when an event occurs and cyclic transmission. Regarding the latter, the counting of the retransmission pause time begins at the end of the initial delay time.	
Delay after download		**00:00:00 hh:mm:ss** [range 00:00:00 … 02:00:00]
	Time interval after which telegram transmission activity on the bus is started after downloading the application program. The delay concerns both the transmission of a telegram when an event occurs and cyclic transmission. Regarding the latter, the counting of the retransmission pause time begins at the end of the initial delay time after download.	
[…]		
Reactive energy		**disabled** enabled
[…]		
Submeter function		Consumption Generation **Both consumption and generation**
Measures communication objects	Submeter function = both consumption and generation	**Unique** Separated Both unique and separated

Object name	Conditions	Dim.	Flags	DPT	Comm. Obj. No.
Serial number		14 byte	CR-T-	[16.0] DPT_String_ASCII	3
Frequency (Hz)		4 bytes	CR-T-	[14.033] DPT_Value_Frequency	76
Power supply voltage alarm		1 bit	CR-T-	[1.005] DPT_Alarm	232
	The alarm is triggered when the sampled voltage falls below an internally set threshold. For the panel-mounted device EK-MS1-TP, the voltage on channel 1 is evaluated; for the compact device EK-MS2-TP, the only voltage measurement input is evaluated instead. In the presence of the alarm, data transmission on KNX bus is interrupted and updating of all internal total and partial counters is suspended. *The alarm returns and the submeter resumes processing of electrical quantities when the sampled voltage exceeds the internally set threshold by a hysteresis factor.*				

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9.2.1 Phases / Meters

The sheets are activated with the designation *Single Phases* if *Measuring method* = *Three-Phase* has been activated on the General tab. If the meter is used with independent channels (Measuring method = Single Meters), the sheets are activated with the designation Meter (n).

8.3.1 Phase (n) / Meter (n)

The sheet allows the positive direction of the current to be defined.

Parameter name	Conditions	Values
Current direction		**Not inverted** Inverted

8.3.2 Power

The tab contains the following parameters:

- Type of datapoint for the group object: 2-byte floating point or 4-byte floating point
- Sending mode on the bus: on variation and/or cyclically
- Filter on detection of electrical quantity

Parameter name	Conditions	Values
Datapoint type		DPT 14.056 - 4 byte floating point **DPT 9.024 - 2 byte floating point**
Unit of measure		W **kW**
Send on change		**No** Yes
Hysteresis	Send on change = yes	**0** [W] [range 0 … 65535 W]
	(0 means no value sent on change)	
Cyclic sending on the bus		**No** Yes
Send cyclically interval	Cyclic sending on the bus = yes	**5 min** [other values in range 5 min … 24 h]
Power filter		**No** Yes
	Activation of the filter allows the threshold below which, the electrical power and the corresponding independent phase/channel current is not processed and is therefore set to zero. Below the set threshold value, the power data is not integrated into the overall energy.	

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Parameter name	Conditions	Values
Filter cut off	Power filter = yes	**5** [W] [range 5 … 65535 W]
	Threshold value in W.	

Object name	Conditions	Dim.	Flags	DPT	Comm. Obj. No.
L(n) – Power active overall (kW)	Datapoint type = DPT 9.024 - 2 byte floating point, Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	2 byte	CR-T-	[9.24] DPT_Power	5, 23, 41
	(n)=1, 2, 3				
L(n) – Power active overall (W)	Datapoint type = DPT 14.056 - 4 byte floating point, Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	4 byte	CR-T-	[14.056] DPT_Value_Power	5, 23, 41
	(n)=1, 2, 3				
L(n) - Power active consumed (kW)	Datapoint type = DPT 9.024 - 2 byte floating point, Submeter function = consumption oppure both consumption and generation	2 byte	CR-T-	[9.24] DPT_Power	6, 24, 42
	(n)=1, 2, 3				
L(n) - Power active consumed (W)	Datapoint type = DPT 14.056 - 4 byte floating point, Submeter function = consumption oppure both consumption and generation	4 byte	CR-T-	[14.056] DPT_Value_Power	6, 24, 42
	(n)=1, 2, 3				
L(n) - Power active produced (kW)	Datapoint type = DPT 9.024 - 2 byte floating point, Submeter function = generation oppure both consumption and generation	2 byte	CR-T-	[9.24] DPT_Power	7, 25, 43
	(n)=1, 2, 3				
L(n) - Power active produced (W)	Datapoint type = DPT 14.056 - 4 byte floating point, Submeter function = generation oppure both consumption and generation	4 byte	CR-T-	[14.056] DPT_Value_Power	7, 25, 43
	(n)=1, 2, 3				

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Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*Comm. Obj. No.*
L(n) - Power reactive overall (kVAR)	Datapoint type = DPT 9.024 - 2 byte floating point, Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	2 byte	CR-T-	[9.24] DPT_Power	8, 26, 44
	(n)=1, 2, 3				
L(n) - Power reactive overall (kVAR)	Datapoint type = DPT 14.056 - 4 byte floating point, Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	4 byte	CR-T-	[14.056] DPT_Value_Power	8, 26, 44
	(n)=1, 2, 3				
L(n) - Power reactive consumed (kVAR)	Datapoint type = DPT 9.024 - 2 byte floating point, Submeter function = consumption oppure both consumption and generation	2 byte	CR-T-	[9.24] DPT_Power	9, 27, 45
	(n)=1, 2, 3				
L(n) - Power reactive consumed (kVAR)	Datapoint type = DPT 14.056 - 4 byte floating point, Submeter function = consumption oppure both consumption and generation	4 byte	CR-T-	[14.056] DPT_Value_Power	9, 27, 45
	(n)=1, 2, 3				
L(n) - Power reactive produced (kVAR)	Datapoint type = DPT 9.024 - 2 byte floating point, Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	2 byte	CR-T-	[9.24] DPT_Power	10, 28, 46
	(n)=1, 2, 3				
L(n) - Power reactive produced (kVAR)	Datapoint type = DPT 14.056 - 4 byte floating point, Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	4 byte	CR-T-	[14.056] DPT_Value_Power	10, 28, 46
	(n)=1, 2, 3				
L(n) - Power apparent overall (kVA)	Datapoint type = DPT 9.024 - 2 byte floating point, Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	2 byte	CR-T-	[9.24] DPT_Power	11, 29, 47
	(n)=1, 2, 3				

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Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*Comm. Obj. No.*
L(n) - Power apparent overall (kVA)	Datapoint type = DPT 14.056 - 4 byte floating point, Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	4 byte	CR-T-	[14.056] DPT_Value_Power	11, 29, 47
	(n)=1, 2, 3				
L(n) - Power apparent consumed (kVA)	Datapoint type = DPT 9.024 - 2 byte floating point, Submeter function = consumption oppure both consumption and generation	2 byte	CR-T-	[9.24] DPT_Power	12, 30, 48
	(n)=1, 2, 3				
L(n) - Power apparent consumed (kVA)	Datapoint type = DPT 14.056 - 4 byte floating point, Submeter function = consumption oppure both consumption and generation	4 byte	CR-T-	[14.056] DPT_Value_Power	12, 30, 48
	(n)=1, 2, 3				
L(n) - Power apparent produced (kVA)	Datapoint type = DPT 9.024 - 2 byte floating point, Submeter function = generation oppure both consumption and generation	2 byte	CR-T-	[9.24] DPT_Power	13, 31, 49
	(n)=1, 2, 3				
L(n) - Power apparent produced (kVA)	Datapoint type = DPT 14.056 - 4 byte floating point, Submeter function = generation oppure both consumption and generation	4 byte	CR-T-	[14.056] DPT_Value_Power	13, 31, 49
	(n)=1, 2, 3				
L(n) - Power factor		4 byte	CR-T-	[14.057] DPT_Value_Power_Factor	14, 32, 50
	(n)=1, 2, 3				

8.3.3 Current

The tab contains the following parameters:

- Type of datapoint for the group object: 2-byte floating point or 4-byte floating point
- Sending mode on the bus: on variation and/or cyclically

Parameter name	*Conditions*	*Values*
Datapoint type		**DPT 14.019 - 4 byte floating point** DPT 9.021 - 2 byte floating point

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Parameter name	Conditions	Values
Unit of measure		**A** mA
Send on change		**No** Yes
Hysteresis	Send on change = yes	**0** [mA] [range 0 … 65535 mA]
	(0 means no value sent on change)	
Send cyclically		**No** Yes
Send cyclically	Send cyclically = yes	**5 min** [other values in range 5 min … 24 h]

Object name	Conditions	Dim.	Flags	DPT	Comm. Obj. No.
L(n) - Current overall (mA)	Datapoint type = DPT 9.021 - 2 byte floating point, Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	2 byte	CR-T-	[9.021] DPT_Value_Curr	15, 33, 51
	(n)=1, 2, 3				
L(n) - Current overall (A)	Datapoint type = DPT 14.019 - 4 byte floating point, Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	4 byte	CR-T-	[14.019] DPT_Value_Electric_Current	15, 33, 51
	(n)=1, 2, 3				
L(n) - Current produced (mA)	Datapoint type = DPT 9.021 - 2 byte floating point, Submeter function = generation oppure Funzione submeter = both consumption and generation	2 byte	CR-T-	[9.021] DPT_Value_Curr	16, 34, 52
	(n)=1, 2, 3				
L(n) - Current produced (A)	Datapoint type = DPT 14.019 - 4 byte floating point, Submeter function = generation oppure Funzione submeter = both consumption and generation	4 byte	CR-T-	[14.019] DPT_Value_Electric_Current	16, 34, 52
	(n)=1, 2, 3				

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Object name	Conditions	Dim.	Flags	DPT	Comm. Obj. No.
L(n) - Current consumed (mA)	Datapoint type = DPT 9.021 - 2 byte floating point, Submeter function = consumption oppure Funzione submeter = both consumption and generation	2 byte	CR-T-	[9.021] DPT_Value_Curr	17, 35, 53
	(n)=1, 2, 3				
L(n) - Current consumed (A)	Datapoint type = DPT 14.019 - 4 byte floating point, Submeter function = consumption oppure Funzione submeter = both consumption and generation	4 byte	CR-T-	[14.019] DPT_Value_Electric_Current	17, 35, 53
	(n)=1, 2, 3				

8.3.4 Voltage

The tab contains the following parameters:

- Sending mode on the bus: on variation and/or cyclically

Parameter name	Conditions	Values
Send on change		**No** Yes
Hysteresis	Send on change = yes	**0** [V] [range 0 … 65535 V]
	(0 means no value sent on change)	
Send cyclically		**No** Yes
Send cyclically interval	Send cyclically = Yes	**5 min** [other values in range 5 min … 24 h]

Object name	Conditions	Dim.	Flags	DPT	Comm. Obj. No.
L(n) - Voltage (V)		4 byte	CR-T-	[14.027] DPT_Value_Electric_Potential	18, 36, 54
	(n)=1, 2, 3				

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8.3.5 Energy

The sheet contains the following parameters:

- Independent phase/channel total energy meter. Mode of transmission to the bus: on variation and/or cyclically
- Independent phase/channel subtotal energy counter. Mode of transmission to the bus: on variation and/or cyclically

Parameter name	Conditions	Values
[Total]		
Send on change		**No** Yes
Hysteresis	Send on change = yes	**0** [kWh] [range 0 … 65535 kWh]
	(0 means no value sent on change)	
Cyclic sending on the bus		**No** Yes
Cyclic sending interval	Cyclic sending on the bus = Yes	**5 min** [other values in range 5 min … 24 h]
Enable subtotal		**No** Yes
[Subtotal]		
Send on change	Enable subtotal = Yes	**No** Yes
Hysteresis	Send on change = yes	**0** [kWh] [range 0 … 65535 kWh]
	(0 means no value sent on change)	
Cyclic sending on the bus	Enable subtotal = yes Send on change = yes	**No** Yes
Cyclic sending interval	Enable subtotal = Yes Cyclic sending on the bus = Yes	**5 min** [other values in range 5 min … 24 h]

Object name	Conditions	Dim.	Flags	DPT	Comm. Obj. No.
L(n) - Energy active overall (kWh)	Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	19, 37, 55
	(n)=1, 2, 3				
L(n) - Energy active overall (kWh)	Submeter function = generation oppure Funzione submeter = both consumption and generation	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	20, 38, 56
	(n)=1, 2, 3				

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Object name	Conditions	Dim.	Flags	DPT	Comm. Obj. No.
L(n) - Energy active consumed (kWh)	Submeter function = consumption oppure Funzione submeter = both consumption and generation	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	21, 39, 57
	(n)=1, 2, 3				
L(n) - Subtotal active energy overall (kWh)	Enable subtotal = yes, Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	190, 194, 198
	(n)=1, 2, 3				
L(n) - Subtotal active energy produced (kWh)	Enable subtotal = yes, Submeter function = generation oppure Funzione submeter = both consumption and generation	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	191, 195, 199
	(n)=1, 2, 3				
L(n) - Subtotal active energy consumed (kWh)	Enable subtotal = yes, Submeter function = consumption oppure Funzione submeter = both consumption and generation	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	192, 196, 200
	(n)=1, 2, 3				
L(n) – Reset subtotal energy counter	Enable subtotal = yes	1 bit	C-W--	[1.15] DPT_Reset	193, 197, 201
	(n)=1, 2, 3				

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9.3 Threephase / Totals

The sheet is activated with the designation *Threephase* if the *Measuring method* = *Threephase* has been activated in the *General* tab: in this case, the overall power, energy, current and voltage quantities on the 3 phases L1, L2 and L3 are provided.

In this configuration, other overall quantities, typical of three-phase lines, are also acquired and processed, such as:

- System voltage
- System current
- System neutral current
- System voltage V1-V2
- System voltage V1-V3
- System voltage V2-V3

If the *Measuring method* = *Single Meters* has been activated on the *General* tab, the sheet is displayed under the name *Total* and contains the data obtained as an algebraic sum of the 2-3 independent measurement channels.

9.3.1 Power

The sheet contains the following parameters:

- Type of datapoint for the group object: 2-byte floating point or 4-byte floating point
- Sending mode on the bus: on variation and/or cyclically

Parameter name	*Conditions*	*Values*
Datapoint type		DPT 14.056 - 4 byte floating point **DPT 9.024 - 2 byte floating point**
Unit of measure		W **kW**
Send on change		**No** Yes
Hysteresis	Send on change = yes	**0** [W] [range 0 … 65535 W]
	(0 means no value sent on change)	
Cyclic sending on the bus		**No** Yes
Send cyclically interval	Cyclic sending on the bus = yes	**5 min** [other values in range 5 min … 24 h]

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Object name	Conditions	Dim.	Flags	DPT	Comm. Obj. No.
Total - Power active overall (kW)	Datapoint type = DPT 9.024 – 2 byte floating point, Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	2 byte	CR-T-	[9.24] DPT_Power	58
Total - Power active overall (W)	Datapoint type = DPT 14.056 – 4 byte floating point, Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	4 byte	CR-T-	[14.056] DPT_Value_Power	58
Total - Power active consumed (kW)	Datapoint type = DPT 9.024 – 2 byte floating point, Submeter function = consumption oppure Funzione submeter = both consumption and generation	2 byte	CR-T-	[9.24] DPT_Power	59
Total - Power active consumed (W)	Datapoint type = DPT 14.056 – 4 byte floating point, Submeter function = consumption oppure Funzione submeter = both consumption and generation	4 byte	CR-T-	[14.056] DPT_Value_Power	59
Total - Power active produced (kW)	Datapoint type = DPT 9.024 – 2 byte floating point, Submeter function = generation oppure Funzione submeter = both consumption and generation	2 byte	CR-T-	[9.24] DPT_Power	60
Total - Power active produced (W)	Datapoint type = DPT 14.056 – 4 byte floating point, Submeter function = generation oppure Funzione submeter = both consumption and generation	4 byte	CR-T-	[14.056] DPT_Value_Power	60

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Object name	Conditions	Dim.	Flags	DPT	Comm. Obj. No.
Total - Power reactive overall (kVAR)	Datapoint type = DPT 9.024 – 2 byte floating point, Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	2 byte	CR-T-	[9.24] DPT_Power	61
Total - Power reactive overall (kVAR)	Datapoint type = DPT 14.056 – 4 byte floating point, Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	4 byte	CR-T-	[14.056] DPT_Value_Power	61
Total - Power reactive consumed (kVAR)	Datapoint type = DPT 9.024 – 2 byte floating point, Submeter function = consumption oppure Funzione submeter = both consumption and generation	2 byte	CR-T-	[9.24] DPT_Power	62
Total - Power reactive consumed (kVAR)	Datapoint type = DPT 14.056 – 4 byte floating point, Submeter function = consumption oppure Funzione submeter = both consumption and generation	4 byte	CR-T-	[14.056] DPT_Value_Power	62
Total - Power reactive produced (kVAR)	Datapoint type = DPT 9.024 – 2 byte floating point, Submeter function = generation oppure Funzione submeter = both consumption and generation	2 byte	CR-T-	[9.24] DPT_Power	63
Total - Power reactive produced (kVAR)	Datapoint type = DPT 14.056 – 4 byte floating point, Submeter function = generation oppure Funzione submeter = both consumption and generation	4 byte	CR-T-	[14.056] DPT_Value_Power	63

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Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*Comm. Obj. No.*
Total - Power active overall (kVA)	Datapoint type = DPT 9.024 – 2 byte floating point, Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	2 byte	CR-T-	[9.24] DPT_Power	64
Total - Power active overall (kVA)	Datapoint type = DPT 14.056 – 4 byte floating point, Submeter function = both consumption and generation, Measures communication objects = unique or both unique and separated	4 byte	CR-T-	[14.056] DPT_Value_Power	64
Total - Power active consumed (kVA)	Datapoint type = DPT 9.024 – 2 byte floating point, Submeter function = consumption oppure Funzione submeter = both consumption and generation	2 byte	CR-T-	[9.24] DPT_Power	65
Total - Power active consumed (kVA)	Datapoint type = DPT 14.056 – 4 byte floating point, Submeter function = consumption oppure Funzione submeter = both consumption and generation	4 byte	CR-T-	[14.056] DPT_Value_Power	65
Total - Power active produced (kVA)	Datapoint type = DPT 9.024 – 2 byte floating point, Submeter function = generation oppure Funzione submeter = both consumption and generation	2 byte	CR-T-	[9.24] DPT_Power	66
Total - Power active produced (kVA)	Datapoint type = DPT 14.056 – 4 byte floating point, Submeter function = generation oppure Funzione submeter = both consumption and generation	4 byte	CR-T-	[14.056] DPT_Value_Power	66
Total - Power factor		4 byte	CR-T-	[14.057] DPT_Value_Power_Factor	67

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9.3.2 Current

The sheet contains the following parameters:

- Type of datapoint for the group object: 2-byte floating point or 4-byte floating point
- Sending mode on the bus: on variation and/or cyclically

Parameter name	*Conditions*	*Values*
Datapoint type		**DPT 14.019 - 4 byte floating point** DPT 9.021 - 2 byte floating point
Unit of measure		**A** mA
Send on change		**No** Yes
Hysteresis	Send on change = yes	**0** [mA] [range 0 … 65535 mA]
	(0 means no value sent on change)	
Cyclic sending on the bus		**No** Yes
Send cyclically	Send cyclically = yes	**5 min** [other values in range 5 min … 24 h]

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*Comm. Obj. No.*
System current [mA]	Datapoint type = DPT 9.021 - 2 byte floating point	2 byte	CR-T-	[9.021] DPT_Value_Curr	202
System current [A]	Datapoint type = DPT 14.019 - 4 byte floating point	4 byte	CR-T-	[14.019] DPT_Value_Electric_Current	202
System current neutral [mA]	Datapoint type = DPT 9.021 - 2 byte floating point	2 byte	CR-T-	[9.021] DPT_Value_Curr	203
System current neutral [A]	Datapoint type = DPT 14.019 - 4 byte floating point	4 byte	CR-T-	[14.019] DPT_Value_Electric_Current	203

8.3.3 Voltage

The sheet contains the following parameters:

- System voltage. Mode of transmission to the bus: on variation and/or cyclically
- System frequency. Mode of transmission to the bus: on variation and/or cyclically

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Parameter name	***Conditions***	***Values***
[Voltage]		
Send on change		**No** Yes
Hysteresis	Send on change = yes	**0** [V] [range 0 … 65535 V]
	(0 means no value sent on change)	
Cyclic sending on the bus		**No** Yes
Send cyclically interval	Cyclic sending on the bus = Yes	**5 min** [other values in range 5 min … 24 h]
[Frequency]		
Send on change		**No** Yes
Hysteresis	Send on change = yes	**0** [Hz] [range 0 … 65535 Hz]
	(0 means no value sent on change)	
Cyclic sending on the bus		**No** Yes
Send cyclically interval	Cyclic sending on the bus = Yes	**5 min** [other values in range 5 min … 24 h]

Object name	***Conditions***	***Dim.***	***Flags***	***DPT***	***Comm. Obj. No.***
System voltage [V]		4 byte	CR-T-	[14.027] DPT_Value_Electric_Potential	204
System voltage V1-V3 [V]		4 byte	CR-T-	[14.027] DPT_Value_Electric_Potential	205
System voltage V2-V3 [V]		4 byte	CR-T-	[14.027] DPT_Value_Electric_Potential	206
System voltage V1-V2 [V]		4 byte	CR-T-	[14.027] DPT_Value_Electric_Potential	207

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8.3.4 Energy

The sheet contains the following parameters:

- Total energy meter. Sending mode on the bus: on variation and/or cyclically
- Partial energy counter. Mode of transmission to the bus: on change and/or cyclically

Parameter name	***Conditions***	***Values***
[Total]		
Send on change		**No** Yes
Hysteresis	Send on change = yes	**0** [kWh] [range 0 … 65535 kWh]
	(0 means no value sent on change)	
Cyclic sending on the bus		**No** Yes
Cyclic sending interval	Cyclic sending on the bus = Yes	**5 min** [other values in range 5 min … 24 h]
Enable subtotal		**No** Yes
[Subtotal]		
Send on change	Enable subtotal = Yes	**No** Yes
Hysteresis	Send on change = yes	**0** [kWh] [range 0 … 65535 kWh]
	(0 means no value sent on change)	
Cyclic sending on the bus	Enable subtotal = yes Send on change = yes	**No** Yes
Cyclic sending interval	Enable subtotal = Yes Cyclic sending on the bus = Yes	**5 min** [other values in range 5 min … 24 h]

Object name	***Conditions***	***Dim.***	***Flags***	***DPT***	***Comm. Obj. No.***
Total - Reset all energy counter		1 bit	C-W--	[1.15] DPT_Reset	68
Total - Active energy overall (kWh)	Submeter function = both consumption and generation, Measures communication objects = unique or both	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	69
Total - Active energy produced (kWh)	Submeter function = generazione oppure Funzione submeter = both consumption and generation	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	70

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Object name	Conditions	Dim.	Flags	DPT	Comm. Obj. No.
Total - Active energy consumed (kWh)	Submeter function = consumption oppure Funzione submeter = both consumption and generation	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	71
Total - subtotal active energy overall (kWh)	Enable subtotal = yes, Submeter function = both consumption and generation, Measures communication objects = unique or both	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	186
Total - subtotal active energy produced (kWh)	Enable subtotal = yes, Submeter function = generazione oppure Funzione submeter = both consumption and generation	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	187
Total - subtotal active energy consumed (kWh)	Enable subtotal = yes, Submeter function = consumption oppure Submeter function = both consumption and generation	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	188
Total - Reset subtotal energy counter	Enable subtotal = yes	1 bit	C-W--	[1.15] DPT_Reset	189
Total - Energy reactive overall (kVARh)	General ⇒ Reactive energy = enabled, Submeter function = both consumption and generation, Measures communication objects = unique or both	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	226
Total - Energy reactive produced (kVARh)	General ⇒ Reactive energy = enabled, Submeter function = generation oppure Funzione submeter = both consumption and generation	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	227
Total - Energy reactive consumed (kVARh)	General ⇒ Reactive energy = enabled, Submeter function = consumption oppure Submeter function = both consumption and generation	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	228
Total - Subtotal reactive partial energy overall (kVARh)	General ⇒ Reactive energy = enabled, Submeter function = both consumption and generation, Measures communication objects = unique or both	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	229

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Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*Comm. Obj. No.*
Total - Subtotal reactive partial energy produced (kVARh)	General ⇒ Reactive energy = enabled, Submeter function = generation oppure Submeter function = both consumption and generation	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	230
Total - Subtotal reactive partial energy consumed (kVARh)	General ⇒ Reactive energy = enabled, Submeter function = consumption oppure Submeter function = both consumption and generation	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	231

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9.4 Logic functions

The submeter allows to use some useful logic functions (AND, OR, NOT, exclusive OR, NOR and NAND) in order to implement complex functions in the building automation system.

It is possible to configure up to:

- 8 logical functions
- 8 inputs for each channel

Each object value, if desired, can be individually inverted by inserting a NOT logic operator.

For each function, a parameter *Delay after bus voltage recovery* is available: this parameter represents the time interval between the bus voltage recovery and the first reading of the input communication objects for evaluating the logic functions.

Parameter name	***Conditions***	***Values***
Logic function		**disabled** / enabled
Delay after bus voltage recovery	Logic function = enabled	**00:00:04.000 hh:mm:ss.fff** [range 00:00:00.000 … 00:10:55.350]
	Time interval between the bus voltage recovery and the first reading of the input communication objects for evaluating the logic functions	
Logic operation	Logic function = enabled	**OR** / AND / XOR / NOR / NAND
	XOR (eXclusive OR)	
[…]		
Logic object x	Logic function = enabled	**disabled** / enabled
	x = 1, 2, 3, 4	
Logic object x - Negated	Logic function = enabled Logic object x = enabled	**no** / yes
	Negando lo stato logico dell'ingresso corrispondente, è possibile realizzare logiche combinatorie articolate. Esempio: Output=(NOT(Oggetto logico 1) OR Oggetto logico 2). x = 1, 2, 3, 4	

Object name	***Conditions***	***Dim.***	***Flags***	***DPT***	***Comm. Obj. No.***
Logic function X, Input 1	Logic function X = enabled Logic object 1 = enabled	1 bit	CRWTU	[1.1] DPT_Switch	111, 120, 129, 138, 147, 156,165, 174
	X = 1, …, 8				
Logic function X, Input 2	Logic function X = enabled Logic object 2 = enabled	1 bit	CRWTU	[1.1] DPT_Switch	112, 121, 130, 139, 148, 157,166, 175
	X = 1, …, 8				
Logic function X, Input 3	Logic function X = enabled Logic object 3 = enabled	1 bit	CRWTU	[1.1] DPT_Switch	113, 122, 131, 140, 149, 158,167, 176
	X = 1, …, 8				
Logic function X, Input 4	Logic function X = enabled Logic object 4 = enabled	1 bit	CRWTU	[1.1] DPT_Switch	114, 123, 132, 141, 150, 159,168, 177
	X = 1, …, 8				
Logic function X, Input 5	Logic function X = enabled Logic object 5 = enabled	1 bit	CRWTU	[1.1] DPT_Switch	115, 124, 133, 142, 151, 160,169, 178
	X = 1, …, 8				

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Object name	Conditions	Dim.	Flags	DPT	Comm. Obj. No.
Logic function X, Input 6	Logic function X = enabled Logic object 6 = enabled	1 bit	CRWTU	[1.1] DPT_Switch	116, 125, 134, 143, 152, 161,170, 179
	X = 1, …, 8				
Logic function X, Input 7	Logic function X = enabled Logic object 7 = enabled	1 bit	CRWTU	[1.1] DPT_Switch	117, 126, 135, 144, 153, 162,171, 180
	X = 1, …, 8				
Logic function X, Input 8	Logic function X = enabled Logic object 8 = enabled	1 bit	CRWTU	[1.1] DPT_Switch	118, 127, 136, 145, 154, 163,172, 181
	X = 1, …, 8				
Logic function X, Output	Logic function X = enabled At least one Logic object = enabled	1 bit	CR-T-	[1.1] DPT_Switch	119, 128, 137, 146, 155, 164,173, 182
	X = 1, …, 8				

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9.5 Thresholds

The sheet enables a maximum of 8 threshold comparison channels, either on electrical quantities acquired or processed internally by the device or on values set externally from the bus, via group objects.

Parameter name	Conditions	Values
Threshold 1		**Disabled** Enabled
Threshold 2		**Disabled** Enabled
Threshold 3		**Disabled** Enabled
Threshold 4		**Disabled** Enabled
Threshold 5		**Disabled** Enabled
Threshold 6		**Disabled** Enabled
Threshold 7		**Disabled** Enabled
Threshold 8		**Disabled** Enabled

8.6.1 Threshold (n)

The sheet exposes the parameters needed to properly configure each threshold comparator. The output status of the comparator channel is exposed via group object. The configurable parameters are:

- Type of threshold: internal or external
- Acquired or processed internally variable by the sub-meter: power, energy, voltage and current of each independent phase or channel or the total power, energy, voltage and current can be selected
- External variable via group object: 2-byte or 4-byte floating-point datapoint type can be selected
- Reference value (setpoint) for comparison
- Type of logical operator to be applied to the comparison channel: greater than (>) the setpoint or less than (<) the setpoint
- Hysteresis for state switching
- Minimum detection time
- Minimum trigger time

The Threshold(n) sheet is activated if the corresponding channel on the Threshold sheet has been enabled.

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Parameter name	*Conditions*	*Values*
Threshold type		**Value from bus** Internal value
Threshold	Threshold type = Value from bus	**Current (mA) - DPT 9.021** Current (A) - DPT 14.019 Voltage (V) - DPT 14.027 Power (kW) - DPT 9.024 Power (W) - DPT 14.056 Power factor - DPT 14.057 Energy (kWh) - DPT 13.013
Internal type	Threshold type = Internal value	**L1 - Power** L1 - Current L1 - Voltage L1 - Energy L2 - Power L2 - Current L2 - Voltage L2 - Energy L3 - Power L3 - Current L3 - Voltage L3 - Energy Total - Power overall Total - Power consumed Total - Power produced Total - Energy
Current value	Threshold type = Value from bus Threshold = Current (mA) - DPT 9.021	**0** [mA] [range -670760 … 670760 mA]
Current value	Threshold type = Value from bus Threshold = Current (A) - DPT 14.019 or Threshold type = Internal value Internal type = L1 - Current, L2 - Current, L3 - Current	**0** [A] [range -1,17549E-38 … 3,40282E+38 A]
Voltage value	Threshold type = Value from bus Threshold = Voltage (V) - DPT 14.027 or Threshold type = Internal value Internal type = L1 - Voltage, L2 - Voltage, L3 - Voltage	**0** [V] [range -1,17549E-38 … 3,40282E+38 V]
Power value	Threshold type = Value from bus Threshold = Power (kW) - DPT 9.024 or Threshold type = Internal value Internal type = L1 - Power, L2 - Power, L3 - Power, Total - Power overall Total - Power consumed Total - Power produced	**0** [kW] [range -670760 … 670760 kW]
Power value	Threshold type = Value from bus Threshold = Power (W) - DPT 14.056	**0** [W] [range -1,17549E-38 … 3,40282E+38 W]
Power factor value	Threshold type = Value from bus Threshold = Power factor - DPT 14.057	**0** [range -1,17549E-38 … 3,40282E+38]

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Parameter name	*Conditions*	*Values*
Energy value	Threshold type = Value from bus Threshold = Energy (kWh) - DPT 13.013 or Threshold type = Internal value Internal type = L1 - Energy, L2 - Energy, L3 - Energy, Totale - Energy	**0** [kWh] [range -2147483648 … 2147483647 [kWh]
Logic operator		**Greater than (>)** Lesser than (<)
Hysteresis		**0** [%] [range 0 … 15 %]
Minimum time of trigger		**00:00:00 hh:mm:ss** [range 00:00:00 … 02:00:00]
	Minimum time in which the internal or external variable is below or above the reference value before the logical operator is evaluated and the output status of the comparison channel is updated.	
Minimum time of activation		**00:00:00 hh:mm:ss** [range 00:00:00 … 02:00:00]
	Minimum time during which the output of the comparison channel remains active, before the reference value and hysteresis is re-evaluated with respect to the logic operator used.	

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*Comm. Obj. No.*
Threshold (n) - Input (mA)	Threshold (n) = enabled Threshold type = value from bus Threshold = Current (mA) - DPT 9.021	2 byte	C-W--	[9.021] DPT_Value_Curr	95, 97, 99, 101, 103, 105, 107, 109
	(n) from 1 to 8				
Threshold (n) - Input (A)	Threshold (n) = enabled Threshold type = value from bus Threshold = Current (A) - DPT 14.019	4 byte	C-W--	[14.019] DPT_Value_Electric_Current	95, 97, 99, 101, 103, 105, 107, 109
	(n) from 1 to 8				
Threshold (n) - Input (V)	Threshold (n) = enabled Threshold type = value from bus Threshold = Voltage (V) - DPT 14.027	4 byte	C-W--	[14.027] DPT_Value_Electric_Potential	95, 97, 99, 101, 103, 105, 107, 109
	(n) from 1 to 8				
Threshold (n) - Input (kW)	Threshold (n) = enabled Threshold type = value from bus Threshold = Power (kW) - DPT 9.024	2 byte	C-W--	[9.24] DPT_Power	95, 97, 99, 101, 103, 105, 107, 109
	(n) from 1 to 8				
Threshold (n) - Input (W)	Threshold (n) = enabled Threshold type = value from bus Threshold = Power (W) - DPT 14.056	4 byte	C-W--	[14.056] DPT_Value_Power	95, 97, 99, 101, 103, 105, 107, 109
	(n) from 1 to 8				
Threshold (n) - Input (pfact)	Threshold (n) = enabled Threshold type = value from bus Threshold = Power factor - DPT 14.057	4 byte	C-W--	[14.057] DPT_Value_Power_Factor	95, 97, 99, 101, 103, 105, 107, 109
	(n) from 1 to 8				

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Object name	Conditions	Dim.	Flags	DPT	Comm. Obj. No.
Threshold (n) - Input (kWh)	Threshold (n) = enabled Threshold type = value from bus Threshold = Energy (kWh) - DPT 13.013	4 byte	C-W--	[13.013] DPT_ActiveEnergy_kWh	95, 97, 99, 101, 103, 105, 107, 109
	(n) from 1 to 8				
Threshold (n) - Output flag	Threshold (n) = enabled	1 bit	CR-T-	[1.2] DPT_Bool	96, 98, 100, 102, 104, 106, 108, 110
	(n) from 1 to 8				

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10 Appendix

10.1 Summary of KNX communication objects

The following list contains the KNX communication objects for all corresponding Data Point Types (DPT) defined by the application program according to the performed configurations.

The list is ordered by object number; if the same object is linked to different inputs, the first input or rocker is referenced.

Object name	Size	Flags	DPT	No. Comm. Obj.
Serial number	14 byte	CR-T-	[16.0] DPT_String_ASCII	3
L1 - Power active overall (kW)	2 byte	CR-T-	[9.24] DPT_Power	5
L1 - Power active overall (W)	4 byte	CR-T-	[14.056] DPT_Value_Power	5
L1 - Power active consumed (kW)	2 byte	CR-T-	[9.24] DPT_Power	6
L1 - Power active consumed (W)	4 byte	CR-T-	[14.056] DPT_Value_Power	6
L1 - Power active produced (kW)	2 byte	CR-T-	[9.24] DPT_Power	7
L1 - Power active produced (W)	4 byte	CR-T-	[14.056] DPT_Value_Power	7
L1 - Power reactive overall (kVAR)	2 byte	CR-T-	[9.24] DPT_Power	8
L1 - Power reactive overall (kVAR)	4 byte	CR-T-	[14.056] DPT_Value_Power	8
L1 - Power reactive consumed (kVAR)	2 byte	CR-T-	[9.24] DPT_Power	9
L1 - Power reactive consumed (kVAR)	4 byte	CR-T-	[14.056] DPT_Value_Power	9
L1 - Power reactive produced (kVAR)	2 byte	CR-T-	[9.24] DPT_Power	10
L1 - Power reactive produced (kVAR)	4 byte	CR-T-	[14.056] DPT_Value_Power	10
L1 - Power apparent overall (kVA)	2 byte	CR-T-	[9.24] DPT_Power	11
L1 - Power apparent overall (kVA)	4 byte	CR-T-	[14.056] DPT_Value_Power	11
L1 - Power apparent consumed (kVA)	2 byte	CR-T-	[9.24] DPT_Power	12
L1 - Power apparent consumed (kVA)	4 byte	CR-T-	[14.056] DPT_Value_Power	12
L1 - Power apparent produced (kVA)	2 byte	CR-T-	[9.24] DPT_Power	13
L1 - Power apparent produced (kVA)	4 byte	CR-T-	[14.056] DPT_Value_Power	13
L1 - Power factor	4 byte	CR-T-	[14.057] DPT_Value_Power_Factor	14
L1 - Current overall (mA)	2 byte	CR-T-	[9.021] DPT_Value_Curr	15
L1 - Current overall (A)	4 byte	CR-T-	[14.019] DPT_Value_Electric_Current	15
L1 - Current produced (mA)	2 byte	CR-T-	[9.021] DPT_Value_Curr	16
L1 - Current produced (A)	4 byte	CR-T-	[14.019] DPT_Value_Electric_Current	16
L1 - Current consumed (mA)	2 byte	CR-T-	[9.021] DPT_Value_Curr	17
L1 - Current consumed (A)	4 byte	CR-T-	[14.019] DPT_Value_Electric_Current	17
L1 - Voltage (V)	4 byte	CR-T-	[14.027] DPT_Value_Electric_Potential	18
L1 - Energy active overall (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	19
L1 - Energy active produced (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	20
L1 - Energy active consumed (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	21
L2 - Power active overall (kW)	2 byte	CR-T-	[9.24] DPT_Power	23
L2 - Power active overall (W)	4 byte	CR-T-	[14.056] DPT_Value_Power	23
L2 - Power active consumed (kW)	2 byte	CR-T-	[9.24] DPT_Power	24
L2 - Power active consumed (W)	4 byte	CR-T-	[14.056] DPT_Value_Power	24
L2 - Power active produced (kW)	2 byte	CR-T-	[9.24] DPT_Power	25
L2 - Power active produced (W)	4 byte	CR-T-	[14.056] DPT_Value_Power	25
L2 - Power reactive overall (kVAR)	2 byte	CR-T-	[9.24] DPT_Power	26
L2 - Power reactive overall (kVAR)	4 byte	CR-T-	[14.056] DPT_Value_Power	26

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Object name	Size	Flags	DPT	No. Comm. Obj.
L2 - Power reactive consumed (kVAR)	2 byte	CR-T-	[9.24] DPT_Power	27
L2 - Power reactive consumed (kVAR)	4 byte		[14.056] DPT_Value_Power	
L2 - Power reactive produced (kVAR)	2 byte	CR-T-	[9.24] DPT_Power	28
L2 - Power reactive produced (kVAR)	4 byte		[14.056] DPT_Value_Power	
L2 - Power apparent overall (kVA)	2 byte	CR-T-	[9.24] DPT_Power	29
L2 - Power apparent overall (kVA)	4 byte		[14.056] DPT_Value_Power	
L2 - Power apparent consumed (kVA)	2 byte	CR-T-	[9.24] DPT_Power	30
L2 - Power apparent consumed (kVA)	4 byte		[14.056] DPT_Value_Power	
L2 - Power apparent produced (kVA)	2 byte	CR-T-	[9.24] DPT_Power	31
L2 - Power apparent produced (kVA)	4 byte		[14.056] DPT_Value_Power	
L2 - Power factor	4 byte	CR-T-	[14.057] DPT_Value_Power_Factor	32
L2 - Current overall (mA)	2 byte	CR-T-	[9.021] DPT_Value_Curr	33
L2 - Current overall (A)	4 byte		[14.019] DPT_Value_Electric_Current	
L2 - Current produced (mA)	2 byte	CR-T-	[9.021] DPT_Value_Curr	34
L2 - Current produced (A)	4 byte		[14.019] DPT_Value_Electric_Current	
L2 - Current consumed (mA)	2 byte	CR-T-	[9.021] DPT_Value_Curr	35
L2 - Current consumed (A)	4 byte		[14.019] DPT_Value_Electric_Current	
L2 - Voltage (V)	4 byte	CR-T-	[14.027] DPT_Value_Electric_Potential	36
L2 - Energy active overall (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	37
L2 - Energy active produced (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	38
L2 - Energy active consumed (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	39
L3 - Power active overall (kW)	2 byte	CR-T-	[9.24] DPT_Power	41
L3 - Power active overall (W)	4 byte		[14.056] DPT_Value_Power	
L3 - Power active consumed (kW)	2 byte	CR-T-	[9.24] DPT_Power	42
L3 - Power active consumed (W)	4 byte		[14.056] DPT_Value_Power	
L3 - Power active produced (kW)	2 byte	CR-T-	[9.24] DPT_Power	43
L3 - Power active produced (W)	4 byte		[14.056] DPT_Value_Power	
L3 - Power reactive overall (kVAR)	2 byte	CR-T-	[9.24] DPT_Power	44
L3 - Power reactive overall (kVAR)	4 byte		[14.056] DPT_Value_Power	
L3 - Power reactive consumed (kVAR)	2 byte	CR-T-	[9.24] DPT_Power	45
L3 - Power reactive consumed (kVAR)	4 byte		[14.056] DPT_Value_Power	
L3 - Power reactive produced (kVAR)	2 byte	CR-T-	[9.24] DPT_Power	46
L3 - Power reactive produced (kVAR)	4 byte		[14.056] DPT_Value_Power	
L3 - Power apparent overall (kVA)	2 byte	CR-T-	[9.24] DPT_Power	47
L3 - Power apparent overall (kVA)	4 byte		[14.056] DPT_Value_Power	
L3 - Power apparent consumed (kVA)	2 byte	CR-T-	[9.24] DPT_Power	48
L3 - Power apparent consumed (kVA)	4 byte		[14.056] DPT_Value_Power	
L3 - Power apparent produced (kVA)	2 byte	CR-T-	[9.24] DPT_Power	49
L3 - Power apparent produced (kVA)	4 byte		[14.056] DPT_Value_Power	
L3 - Power factor	4 byte	CR-T-	[14.057] DPT_Value_Power_Factor	50
L3 - Current overall (mA)	2 byte	CR-T-	[9.021] DPT_Value_Curr	51
L3 - Current overall (A)	4 byte		[14.019] DPT_Value_Electric_Current	
L3 - Current produced (mA)	2 byte	CR-T-	[9.021] DPT_Value_Curr	52
L3 - Current produced (A)	4 byte		[14.019] DPT_Value_Electric_Current	
L3 - Current consumed (mA)	2 byte	CR-T-	[9.021] DPT_Value_Curr	53
L3 - Current consumed (A)	4 byte		[14.019] DPT_Value_Electric_Current	

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Object name	Size	Flags	DPT	No. Comm. Obj.
L3 - Voltage (V)	4 byte	CR-T-	[14.027] DPT_Value_Electric_Potential	54
L3 - Energy active overall (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	55
L3 - Energy active produced (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	56
L3 - Energy active consumed (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	57
Total - Power active overall (kW)	2 byte	CR-T-	[9.24] DPT_Power	58
Total - Power active overall (W)	4 byte		[14.056] DPT_Value_Power	
Total - Power active consumed (kW)	2 byte	CR-T-	[9.24] DPT_Power	59
Total - Power active consumed (W)	4 byte		[14.056] DPT_Value_Power	
Total - Power active produced (kW)	2 byte	CR-T-	[9.24] DPT_Power	60
Total - Power active produced (W)	4 byte		[14.056] DPT_Value_Power	
Total - Power reactive overall (kVAR)	2 byte	CR-T-	[9.24] DPT_Power	61
Total - Power reactive overall (kVAR)	4 byte		[14.056] DPT_Value_Power	
Total - Power reactive consumed (kVAR)	2 byte	CR-T-	[9.24] DPT_Power	62
Total - Power reactive consumed (kVAR)	4 byte		[14.056] DPT_Value_Power	
Total - Power reactive produced (kVAR)	2 byte	CR-T-	[9.24] DPT_Power	63
Total - Power reactive produced (kVAR)	4 byte		[14.056] DPT_Value_Power	
Total - Power apparent overall (kVA)	2 byte	CR-T-	[9.24] DPT_Power	64
Total - Power apparent overall (kVA)	4 byte		[14.056] DPT_Value_Power	
Total - Power apparent consumed (kVA)	2 byte	CR-T-	[9.24] DPT_Power	65
Total - Power apparent consumed (kVA)	4 byte		[14.056] DPT_Value_Power	
Total - Power apparent produced (kVA)	2 byte	CR-T-	[9.24] DPT_Power	66
Total - Power apparent produced (kVA)	4 byte		[14.056] DPT_Value_Power	
Total - Power factor	4 byte	CR-T-	[14.057] DPT_Value_Power_Factor	67
Total - Reset all energy counter	1 bit	C-W--	[1.15] DPT_Reset	68
Total - Apparent energy apparent (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	69
Total - Apparent energy produced (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	70
Total – Apparent energy consumed (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	71
Frequency (Hz)	4 byte	CR-T-	[14.033] DPT_Value_Frequency	76
Threshold 1 - Input (mA)	2 byte	C-W--	[9.021] DPT_Value_Curr	95
Threshold 1 - Input (A)	4 byte		[14.019] DPT_Value_Electric_Current	
Threshold 1 - Input (V)	4 byte		[14.027] DPT_Value_Electric_Potential	
Threshold 1 - Input (kW)	2 byte		[9.24] DPT_Power	
Threshold 1 - Input (W)	4 byte		[14.056] DPT_Value_Power	
Threshold 1 - Input (pfact)	4 byte		[14.057] DPT_Value_Power_Factor	
Threshold 1 - Input (kWh)	4 byte		[13.013] DPT_ActiveEnergy_kWh	
Threshold 1 - Output flag	1 bit	CR-T-	[1.2] DPT_Bool	96
Threshold 2 - Input (mA)	2 byte	C-W--	[9.021] DPT_Value_Curr	97
Threshold 2- Input (A)	4 byte		[14.019] DPT_Value_Electric_Current	
Threshold 2 - Input (V)	4 byte		[14.027] DPT_Value_Electric_Potential	
Threshold 2 - Input (kW)	2 byte		[9.24] DPT_Power	
Threshold 2 - Input (W)	4 byte		[14.056] DPT_Value_Power	

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Object name	Size	Flags	DPT	No. Comm. Obj.
Threshold 2 - Input (pfact)	4 byte		[14.057] DPT_Value_Power_Factor	
Threshold 2 - Input (kWh)	4 byte		[13.013] DPT_ActiveEnergy_kWh	
Threshold 2 - Output flag	1 bit	CR-T-	[1.2] DPT_Bool	98
Threshold 3 - Input (mA)	2 byte	C-W--	[9.021] DPT_Value_Curr	99
Threshold 3- Input (A)	4 byte		[14.019] DPT_Value_Electric_Current	
Threshold 3 - Input (V)	4 byte		[14.027] DPT_Value_Electric_Potential	
Threshold 3 - Input (kW)	2 byte		[9.24] DPT_Power	
Threshold 3 - Input (W)	4 byte		[14.056] DPT_Value_Power	
Threshold 3 - Input (pfact)	4 byte		[14.057] DPT_Value_Power_Factor	
Threshold 3 - Input (kWh)	4 byte		[13.013] DPT_ActiveEnergy_kWh	
Threshold 3 - Output flag	1 bit	CR-T-	[1.2] DPT_Bool	100
Threshold 4 - Input (mA)	2 byte	C-W--	[9.021] DPT_Value_Curr	101
Threshold 4- Input (A)	4 byte		[14.019] DPT_Value_Electric_Current	
Threshold 4 - Input (V)	4 byte		[14.027] DPT_Value_Electric_Potential	
Threshold 4 - Input (kW)	2 byte		[9.24] DPT_Power	
Threshold 4 - Input (W)	4 byte		[14.056] DPT_Value_Power	
Threshold 4 - Input (pfact)	4 byte		[14.057] DPT_Value_Power_Factor	
Threshold 4 - Input (kWh)	4 byte		[13.013] DPT_ActiveEnergy_kWh	
Threshold 4 - Output flag	1 bit	CR-T-	[1.2] DPT_Bool	102
Threshold 5 - Input (mA)	2 byte	C-W--	[9.021] DPT_Value_Curr	103
Threshold 5- Input (A)	4 byte		[14.019] DPT_Value_Electric_Current	
Threshold 5 - Input (V)	4 byte		[14.027] DPT_Value_Electric_Potential	
Threshold 5 - Input (kW)	2 byte		[9.24] DPT_Power	
Threshold 5 - Input (W)	4 byte		[14.056] DPT_Value_Power	
Threshold 5 - Input (pfact)	4 byte		[14.057] DPT_Value_Power_Factor	
Threshold 5 - Input (kWh)	4 byte		[13.013] DPT_ActiveEnergy_kWh	
Threshold 5 - Output flag	1 bit	CR-T-	[1.2] DPT_Bool	104
Threshold 6 - Input (mA)	2 byte	C-W--	[9.021] DPT_Value_Curr	105
Threshold 6- Input (A)	4 byte		[14.019] DPT_Value_Electric_Current	
Threshold 6 - Input (V)	4 byte		[14.027] DPT_Value_Electric_Potential	
Threshold 6 - Input (kW)	2 byte		[9.24] DPT_Power	
Threshold 6 - Input (W)	4 byte		[14.056] DPT_Value_Power	
Threshold 6 - Input (pfact)	4 byte		[14.057] DPT_Value_Power_Factor	
Threshold 6 - Input (kWh)	4 byte		[13.013] DPT_ActiveEnergy_kWh	
Threshold 6 - Output flag	1 bit	CR-T-	[1.2] DPT_Bool	106
Threshold 7 - Input (mA)	2 byte	C-W--	[9.021] DPT_Value_Curr	107
Threshold 7- Input (A)	4 byte		[14.019] DPT_Value_Electric_Current	
Threshold 7 - Input (V)	4 byte		[14.027] DPT_Value_Electric_Potential	
Threshold 7 - Input (kW)	2 byte		[9.24] DPT_Power	
Threshold 7 - Input (W)	4 byte		[14.056] DPT_Value_Power	

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Object name	Size	Flags	DPT	No. Comm. Obj.
Threshold 7 - Input (pfact)	4 byte		[14.057] DPT_Value_Power_Factor	
Threshold 7 - Input (kWh)	4 byte		[13.013] DPT_ActiveEnergy_kWh	
Threshold 7 - Output flag	1 bit	CR-T-	[1.2] DPT_Bool	108
Threshold 8 - Input (mA)	2 byte	C-W--	[9.021] DPT_Value_Curr	109
Threshold 8- Input (A)	4 byte		[14.019] DPT_Value_Electric_Current	
Threshold 8 - Input (V)	4 byte		[14.027] DPT_Value_Electric_Potential	
Threshold 8 - Input (kW)	2 byte		[9.24] DPT_Power	
Threshold 8 - Input (W)	4 byte		[14.056] DPT_Value_Power	
Threshold 8 - Input (pfact)	4 byte		[14.057] DPT_Value_Power_Factor	
Threshold 8 - Input (kWh)	4 byte		[13.013] DPT_ActiveEnergy_kWh	
Threshold 8 - Output flag	1 bit	CR-T-	[1.2] DPT_Bool	110
Logic function X, input 1	1 bit	CRWTU	[1.1] DPT_Switch	111, 120, 129, 138, 147, 156,165, 174
Logic function X, input 2	1 bit	CRWTU	[1.1] DPT_Switch	112, 121, 130, 139, 148, 157,166, 175
Logic function X, input 3	1 bit	CRWTU	[1.1] DPT_Switch	113, 122, 131, 140, 149, 158,167, 176
Logic function X, input 4	1 bit	CRWTU	[1.1] DPT_Switch	114, 123, 132, 141, 150, 159,168, 177
Logic function X, input 5	1 bit	CRWTU	[1.1] DPT_Switch	115, 124, 133, 142, 151, 160,169, 178
Logic function X, input 6	1 bit	CRWTU	[1.1] DPT_Switch	116, 125, 134, 143, 152, 161,170, 179
Logic function X, input 7	1 bit	CRWTU	[1.1] DPT_Switch	117, 126, 135, 144, 153, 162,171, 180
Logic function X, input 8	1 bit	CRWTU	[1.1] DPT_Switch	118, 127, 136, 145, 154, 163,172, 181
Logic function X, output	1 bit	CR-T-	[1.1] DPT_Switch	119, 128, 137, 146, 155, 164,173, 182
Total - Subtotal active energy overall (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	186
Total - Subtotal active energy produced (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	187
Total - Subtotal active energy consumed (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	188
Total - Reset subtotal energy counter	1 bit	C-W--	[1.15] DPT_Reset	189
L1 – Subtotal active energy overall (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	190
L1 - Subtotal active energy produced (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	191
L1 - Subtotal active energy consumed (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	192
L1 – Reset subtotal energy counter	1 bit	C-W--	[1.15] DPT_Reset	193
L2 – Subtotal active energy overall (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	194
L2 - Subtotal active energy produced (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	195
L2 - Subtotal active energy consumed (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	196
L2 – Reset subtotal energy counter	1 bit	C-W--	[1.15] DPT_Reset	197
L3 – Subtotal active energy overall (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	198

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Object name	Size	Flags	DPT	No. Comm. Obj.
L3 - Subtotal active energy produced (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	199
L3 - Subtotal active energy consumed (kWh)	4 byte	CR-T-	[13.013] DPT_ActiveEnergy_kWh	200
L3 – Reset subtotal energy counter	1 bit	C-W--	[1.15] DPT_Reset	201
System current [mA]	2 byte	CR-T-	[9.021] DPT_Value_Curr	202
System current [A]	4 byte		[14.019] DPT_Value_Electric_Current	
System current neutral [mA]	2 byte	CR-T-	[9.021] DPT_Value_Curr	203
System current neutral [A]	4 byte		[14.019] DPT_Value_Electric_Current	
System voltage [V]	4 byte	CR-T-	[14.027] DPT_Value_Electric_Potential	204
System voltage V1-V3 [V]	4 byte	CR-T-	[14.027] DPT_Value_Electric_Potential	205
System voltage V2-V3 [V]	4 byte	CR-T-	[14.027] DPT_Value_Electric_Potential	206
System voltage V1-V2 [V]	4 byte	CR-T-	[14.027] DPT_Value_Electric_Potential	207
L1 - Energy reactive overall (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	208
L1 - Energy reactive produced (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	209
L1 - Energy reactive consumed (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	210
L1 - Subtotal reactive partial energy overall (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	211
L1 - Subtotal reactive partial energy produced (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	212
L1 - Subtotal reactive partial energy consumed (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	213
L2 - Energy reactive overall (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	214
L2 - Energy reactive produced (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	215
L2 - Energy reactive consumed (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	216
L2 - Subtotal reactive partial energy overall (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	217
L2 - Subtotal reactive partial energy produced (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	218
L2 - Subtotal reactive partial energy consumed (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	219
L3 - Energy reactive overall (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	220
L3 - Energy reactive produced (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	221
L3 - Energy reactive consumed (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	222
L3 - Subtotal reactive partial energy overall (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	223
L3 - Subtotal reactive partial energy produced (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	224
L3 - Subtotal reactive partial energy consumed (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	225
Total - Energy reactive overall (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	226
Total - Energy reactive produced (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	227
Total - Energy reactive consumed (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	228

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Object name	Size	Flags	DPT	No. Comm. Obj.
Total - Subtotal reactive partial energy overall (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	229
Total - Subtotal reactive partial energy produced (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	230
Total - Subtotal reactive partial energy consumed (kVARh)	4 byte	CR-T-	[13.015] DPT_ReactiveEnergy_kVARh	231
Power supply voltage alarm	1 bit	CR-T-	[1.005] DPT_Alarm	232

Table A1. Dimensions e DPT for C.O.s with independent inputs:

Size	*DPT*
1 bit	[1.001] switch
2 bit	[2.*] 1-bit controlled
1 byte unsigned value	[4.*] character [5.*] 8-bit unsigned value [20.*] 1-byte
1 byte percentage	[4.*] character [5.*] 8-bit unsigned value [20.*] 1-byte
1 byte signed value	[6.*] 8-bit signed value
2 bytes unsigned value	[7.*] 2-byte unsigned value
2 bytes signed value	[8.*] 2-byte signed value
2 bytes floating value	[9.*] 2-byte float value

Table A10. Dimensions e DPT for C.O.s Numeric Button value (m):

Dimens.	*DPT*
1 bit - 1.002 - boolean	[1.002] DPT_Bool
1 bit - 1.003 - enable	[1.003] DPT_Enable
1 bit - 1.008 - up/down	[1.008] DPT_UpDown
1 bit - 1.009 - open-close	[1.009] DPT_OpenClose
2 bit - 2.001 - switch control	[2.001] DPT_Switch_Control
1 byte - 5.010 - counter pulses (0..255)	[5.010] DPT_Value_1_Ucount
1 byte - 6.010 - counter pulses (-128..127)	[6.010] DPT_Value_1_Count
1 byte - 5.001 - percentage (scaling)	[5.001] DPT_Scaling
1 byte - 20.102 - HVAC mode	[20.102] DPT_HVACMode
2 byte - 7.001 - pulses (0..65535)	[7.001] DPT_Value_2_Ucount
2 byte - 8.001 - pulses (-32768..32768)	[8.001] DPT_Value_2_Count
2 byte - 9.001 - temperature (°C)	[9.001] DPT_Value_Temp
2 byte - 9.004 - lux (Lux)	[9.004] DPT_Value_Lux
2 byte - 9.007 - humidity (%)	[9.007] DPT_Value_Humidity
2 byte - 9.006 - pressure (Pa)	[9.006] DPT_Value_Pres
2 byte - 9.008 - air quality (ppm)	[9.008] DPT_Value_AirQuality
2 byte - 9.008 - air quality (ppb)	[9.008] DPT_Value_AirQuality
2 byte - 9.020 - voltage (V)	[9.020] DPT_Value_Volt
2 byte - 9.020 - voltage (mV)	[9.020] DPT_Value_Volt
2 byte - 9.021 - current (A)	[9.021] DPT_Value_Curr
2 byte - 9.021 - current (mA)	[9.021] DPT_Value_Curr
2 byte - 9.024 - power (W)	[9.024] DPT_Power

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Dimens.	***DPT***
2 byte - 9.024 - power (kW)	[9.024] DPT_Power
4 byte - 14.056 - power (W)	[14.056] DPT_Value_Power
4 byte - 14.056 - power (kW)	[14.056] DPT_Value_Power
3 byte - 10.001 - time of day	[10.001] DPT_TimeOfDay
3 byte - 11.001 - date	[11.001] DPT_Date

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10.2 Warning

- Installation, electrical connection, configuration and commissioning of the device can only be carried out by qualified personnel.
- Opening the housing of the device causes the immediate end of the warranty period.
- 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.

10.3 Other information

- This application manual 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
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