MET-3C

GW650300

Programming manual

ingenium

www.besknx.com

Index

1 General description

The Bes device ref. GW650300 is an electric meter with 3 channels. These 3 channels allow knowing the electrical consumption of the circuits associated with them. These circuits are connected through current transformers (like Bes references GW650040 or GW650060, of 40A and 60A respectively) to the terminals blocks intended for that purpose.

Characteristics:

- 3 independent measurement channels.
- Measures of instant current and instant power
- Measure of total energy
- Calculation of the expenditure in monetary units according to the tariff
- Alarms and energy rationalizer to assure greater energy savings in each channel
- Up to one week accumulated consumption
- Intuitive logical arithmetic unit (ALU) with timers, counters and the possibility of implementing complex arithmetic logic operations.

2 Technical information

Supply	29 Vdc from KNX
Consumption	10 mA from KNX (equivalent to 2 BUS devices)
Mounting	DIN rail
Size	2 modules
Connections	KNX connecting terminal bus Screw terminal block for current transformers
Enviroment temperatura range	Funcionamiento: -10 ºC / 55 ºC Almacenamiento: -30 ºC / 60 ºC Transporte: -30 ºC / 60 ºC
Regulation	According to the directives of electromagnetic compatibility and low voltage. EN 50090-2-2 / UNE-EN 61000-6-3:2007 / UNE-EN 61000-6-1:2007 / UNE-EN 61010-1

3 Programming

3.1 Catalogue application ETS information

Catalogue: Bes-Ingenium (manufacturer) / MET-3C (name)

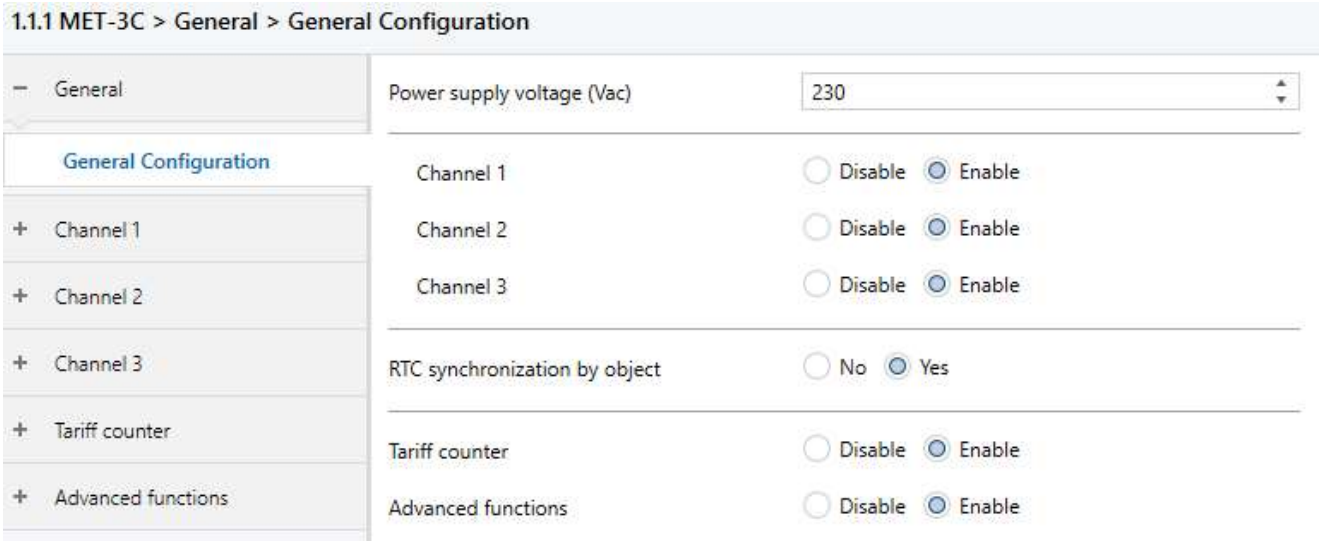
Catalogue version: 1.0

Maximum number of communication objects: 256.

Maximum number of assignments: 256.

Minimum ETS version: 4.1.8

The parameters of the device are configured through a parameter window.



3.2 Individual address assignment

The device has a programming button, which is placed in the front of the device, to establish the individual KNX address.

A red LED close to the programming button illuminates when it is manually pressed or when the device is remotely forced to programming mode.

The LED switches off immediately if ETS has assigned correctly an individual address, if programming button is pressed manually again or if it is directly switched off by diagnostic functions

El proceso de asignación de la dirección individual se realiza mediante el ETS como con cualquier otro dispositivo KNX.

3.3 General parameters

In the "General" tab you can find the parameters that affect the global behaviour of the device or that enable or disable functions. These are the following:

Name	Power supply voltage (Vac)
Values	0…255
Description	Parameter in which you introduce the voltage to calculate the power according to the measured current. By default, the voltage is 230V.
Name	**Channel X**
Values	Disable / Enable
Description	Through these parameters you can enable the channels that the consumption meter will use. When you press the "Enable" option, configuration tabs for each channel will appear on the left side of the parameter menu.
Name	**RTC synchronization by object**
Values	No / Yes
Description	Through this parameter two writing communication objects are enabled. Through these objects, date and time are received, allowing the device to know the measure time in order to calculate the consumed energy
Name	**Tariff counter**
Values	Disable / Enable
Description	When you press the "Enable" option, configuration tabs will appear on the left side of the parameter menu to configure the tariffs associated to the different measurement channels
Name	**Advanced functions**
Values	Disable / Enable
Description	When you press the "Enable" option , a new tab will appear in the left side of the parameter menu to configure the ALU and the timers.

3.4 General communication objects

The parameters described in the previous section enable the following communication objects:

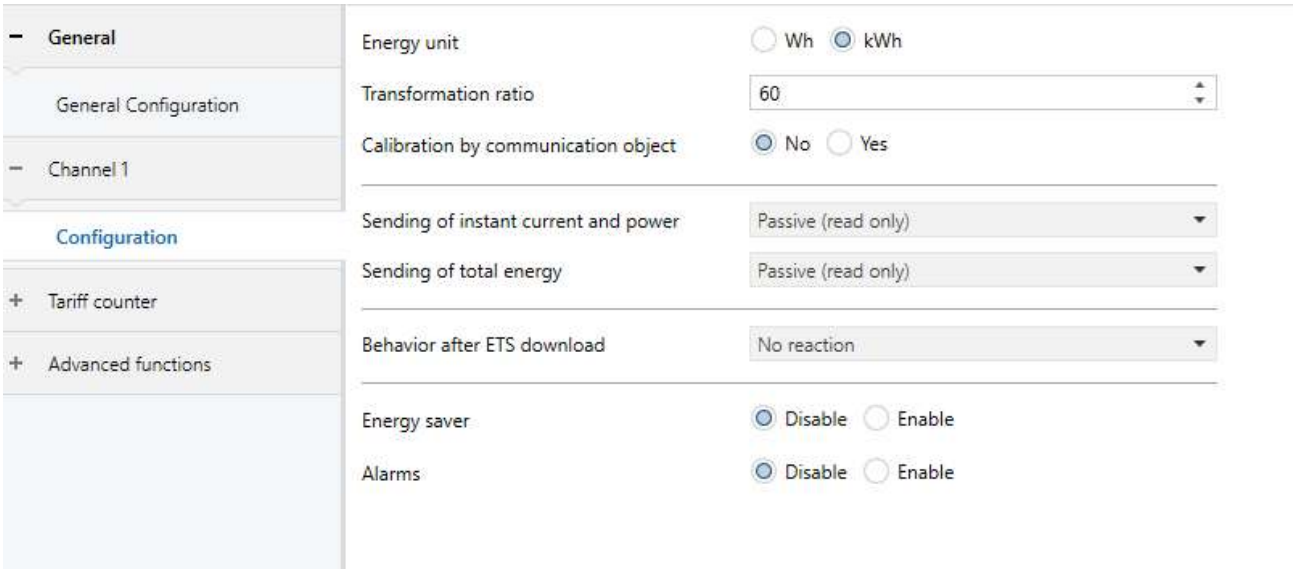
Number	Name	Object Function	Length	C	R	W	T	U	Data type
253	RTC synchronization	Date	3 bytes	C	-	W	-	-	Date
254	RTC synchronization	Time of day	3 bytes	C	-	W	-	-	Time of day

Name	Objet 253: RTC synchronization - Date
Function	3 byte communication object to receive the system date
Description	This object allows the synchronization of the current date.

Name	Objet 254: RTC synchronization – Time of day
Function	3 byte communication object to receive the system time
Description	This object allows the synchronization of the current time.

3.5 Parameters of each channel

When you select the channels that you want to use in the consumption measure, the configuration tabs of the selected channels are enabled. In this tabs, you can find the parameters described in this section.



Name	Energy unit
Value	Wh / KWh
Description	In this parameter you can choose the unit of energy with which the measurement will be notified to the bus
Name	**Transformation ratio**
Value	1…255
Description	This parameter indicates the value of the current transformer ratio. For example, if you have a current transformer 60A / 1V, the parameter value must be 60.
Name	**Calibration by communication object**
Value	No / Yes
Description	This parameter enables a communication object. Through this communication object you can calibrate the channel in case of desviation introducing the correct measurement that the meter should be measuring.
Name	**Sending of instant current and power**
Value	Passive (read only) / Ciclically / On change / Ciclically and on change
Description	Through this parameter you select the type of notification for instant current and instant power
	Passive (read only): It only notifies the BUS when the correspondent communication object is read.

	Ciclically: It notifies the bus cyclically. You can select the cycle time with parameters: “Time base” to indicate if the introduced time is in seconds or minutes and “Time” to indicate the time between two notifications,
	On change: it notifies the BUS when between the actual measure and the previous measure there is a greater difference than the selected on the parameters: “Minimum change of instant current” and “Minimum change of instant power”.
	Ciclically and on change: It notifies the bus if there has been a major change to the one defined in the parameter indicated in the previous option or if the established time interval has passed.
Name	**Sending of total energy**
Value	Passive (read only) / Ciclically / On change / Ciclically and on change
Description	Through this parameter you select the type of notification for consumed energy. You can choose between the same options of the previous parameter
Name	**Behaviour after ETS download**
Value	No reaction / Reset energy / Set energy
Description	Through this parameter the device behaviour after a ETS programming is set No reaction: the consumption values in the device memory don´t change Reset energy: the energy measure resets and it starts from 0. Set energy: the energy measure resets and it starts from the value selected in the parameter “Value” (Kwh)
Name	**Energy saver**
Value	Disable / Enable
Description	Enable or disable the energy rationalizer option.
Name	**Alarms**
Value	Disable / Enable
Description	Enable or disable the alarm option

3.6 Communication objects for each channel

In this section, you can find the communication objects for the first channel which are equivalents for all device channels.

Number	Name	Object function	Length	C	R	W	T	U	Data type
0	Channel 1: Measurement	Reset	1 bit	C	-	W	-	-	Switch
1	Channel 1: Measurement	Total energy (kWh / Wh)	4 bytes	C	R	-	T	-	Active energy (kWh / Wh)
2	Channel 1: Measurement	Instant power (kW)	2 bytes	C	R	-	T	-	Power (kW)
3	Channel 1: Measurement	Instant current (mA)	2 bytes	C	R	-	T	-	Current (mA)
80	Channel 1: Calibration	Calibration (mA)	2 bytes	C	-	W	-	-	Current (mA)

Next, these communication objects are briefly explained:

Name	Channel X: Measurement - Reset
Description	Writing a “1” through this object you make a reset in the consumed energy value.
Name	**Channel X: Measurement – Total energy (kWh / Wh)**
Description	Through this object you can read or notify the energy consumption of the channel. It can be notified in kWh or Wh, as selected in the parameter destined for that purpose
Name	**Channel X: Measurement – Instant power (kW)**
Description	Through this object you can read or notify the power measure of the cannel. It is notified in kW.
Name	**Channel X: Measurement – Instant current (mA)**
Description	Through this object you can read or notify the current measure of the cannel. It is notified in mA.
Name	**Channel X: Calibration – Calibration (mA)**
Description	Through this object you can calibrate the channel. You must enter the value that should be measured in the channel and the meter will calculate the difference with the measured value and subtract or add this difference to the following measures to give the exact value of consumption.

3.7 Energy rationalizer

This option available for each channel allows energy saving by establishing a limit. The device allows you to configure four different limits using parameters and, through a communication object (see “3.7.2. Communication objects of the energy rationalizer”) you can select which limit of the four configured you want to set. If the instantaneous consumption exceeds the established limit there is the possibility of sending to the bus certain configurable values through parameters. There are communication objects of different sizes in order to link the group addresses of these objects to those of lights, thermostats and other KNX devices to reduce the consumption to the desired limits.

In addition, when the established limit is exceeded, an alarm will be sent to the bus.

3.7.1 Parameters of the energy rationalizer

Name	Threshold X
Values	-629145….629145
Description	Parameter in which the value of the four avaiable power limits is established in KW
Name	**Switch object**
Values	Disable / Enable
Description	Enable or disable the 1-bit communication object through which the value selected in the “Value“ parameter is sent when the instantaneous consumption exceeds the limit established at that moment.
Name	**Value object**
Values	Disable / Enable
Description	Enable or disable the byte communication object through which the value selected in the “Value“ parameter is sent when the instantaneous consumption exceeds the limit established at that moment.

Name	Dimming object
Values	Disable / Enable
Description	Enable or disable the 4-bits communication object through which the value selected in the “Value“ parameter is sent when the instantaneous consumption exceeds the limit established at that moment.
Name	**Scene object**
Values	Disable / Enable
Description	Enable or disable the byte communication object through which the value selected in the “Value“ parameter is sent when the instantaneous consumption exceeds the limit established at that moment.
Name	**Temperature**
Values	Disable / Enable
Description	Enable or disable the 2 bytes communication object through which the value selected in the “Value“ parameter is sent when the instantaneous consumption exceeds the limit established at that moment.

3.7.2 Communication objects of the energy rationalizer

In this section, you can find the communication objects for the first channel which are equivalents for all device channels.

Number	Name	Object function	Length	C	R	W	T	U	Data type
5	Channel 1: Energy saver	Set limit (1-4)	1 byte	C	R	W	-	-	Counter pulses (0..255)
6	Channel 1: Energy saver	Alarm	1 bit	C	-	-	T	-	Switch
7	Channel 1: Energy saver	Value object	1 byte	C	-	-	T	-	Counter pulses (0..255)
8	Channel 1: Energy saver	Dimming object	4 bit	C	-	-	T	-	Dimming control
9	Channel 1: Energy saver	Temperature	2 bytes	C	-	-	T	-	Temperature (°C)
10	Channel 1: Energy saver	Switch object	1 bit	C	-	-	T	-	Switch
11	Channel 1: Energy saver	Scene object	1 byte	C	-	-	T	-	Scene number

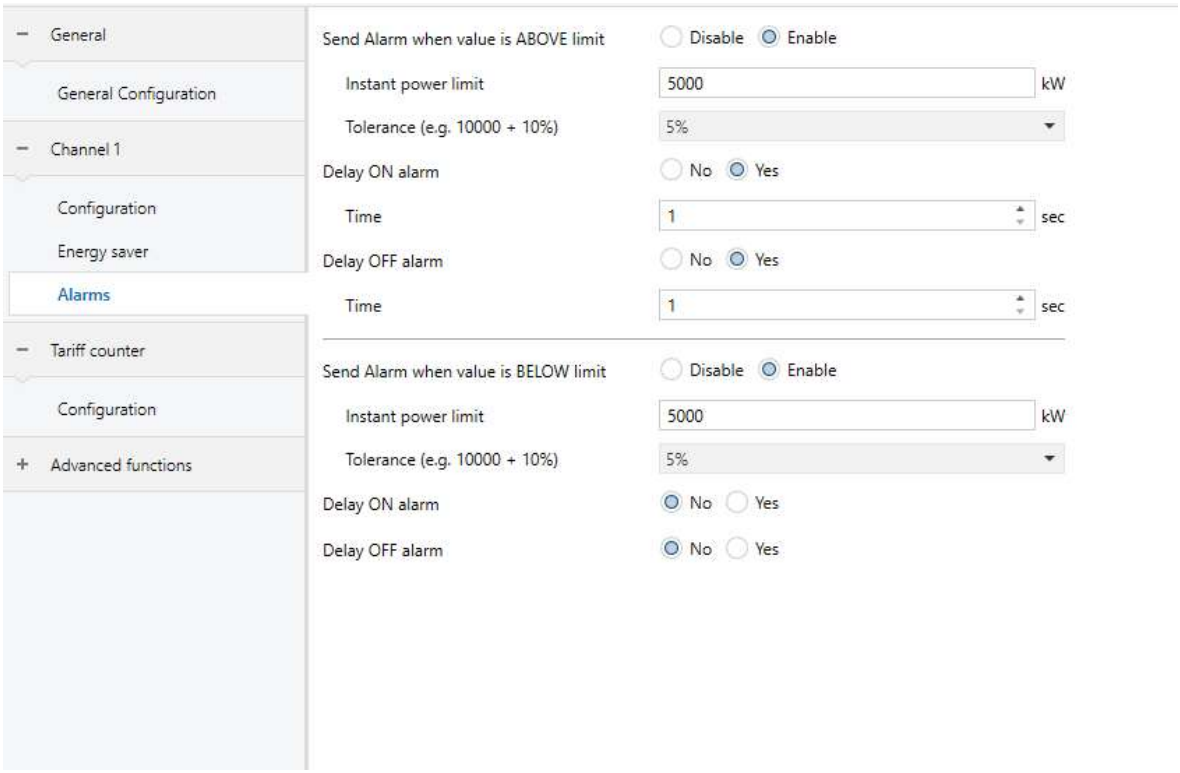
Next, these communication objects are briefly explained.

Name	Channel X: Energy saver - Set limit (1-4)
Description	Through this communication object. the current consumption limit is stablished.
Name	**Channel X: Energy saver - Alarm**
Description	Through this 1-bit communication object, the device sends a “1” when the limit is exceeded and a “0” when it goes back below it.

Name	Channel X: Energy saver – Value object
Description	1-byte communication object through which the value established in the parameter destined for this purpose is sent
Name	**Channel X: Energy saver – Dimming object**
Description	4-bits communication object through which the value established in the parameter destined for this purpose is sent
Name	**Channel X: Energy saver – Temperature**
Description	2-bytes communication object through which the value established in the parameter destined for this purpose is sent
Name	**Channel X: Energy saver – Switch object**
Description	1-bit communication object through which the value established in the parameter destined for this purpose is sent
Name	**Channel X: Energy saver – Scene object**
Description	1-byte communication object through which the value established in the parameter destined for this purpose is sent

3.8 Alarms

The alarm function in the channels allows to notify the bus when a maximum and a minimum consumption limit is exceeded.



3.8.1 Alarm parameters

The parameters of the alarm function are the following:

Name	Send Alarm when value is ABOVE limit
Value	Enable / Disable
Description	This parameter allows to enable the alarm warning when the power consumed exceeds the threshold set in the parameter Instant power limit (kW). There is also a hysteresis for the limit and a delay value in the sending, both when sending the alarm activation warning ('1' for the corresponding communication object) and deactivating it ('0' by the corresponding communication object). The alarm will be activated when the instantaneous power value is greater than the sum of the limit value and the hysteresis.
Name	**Send Alarm when value is BELOW limit**
Value	Enable / Disable
Description	This parameter allows to enable the alarm warning when the power consumed is lower than the minimum threshold established in the parameter Instant power limit (kW). There is also a hysteresis for the limit and a delay value in the sending, both when sending the alarm activation warning ('1' for the corresponding communication object) and deactivating it ('0' by the corresponding communication object). The alarm will be activated when the instantaneous power value is lower than the subtraction of the limit value and the hysteresis.

3.8.2 Alarm communication objects

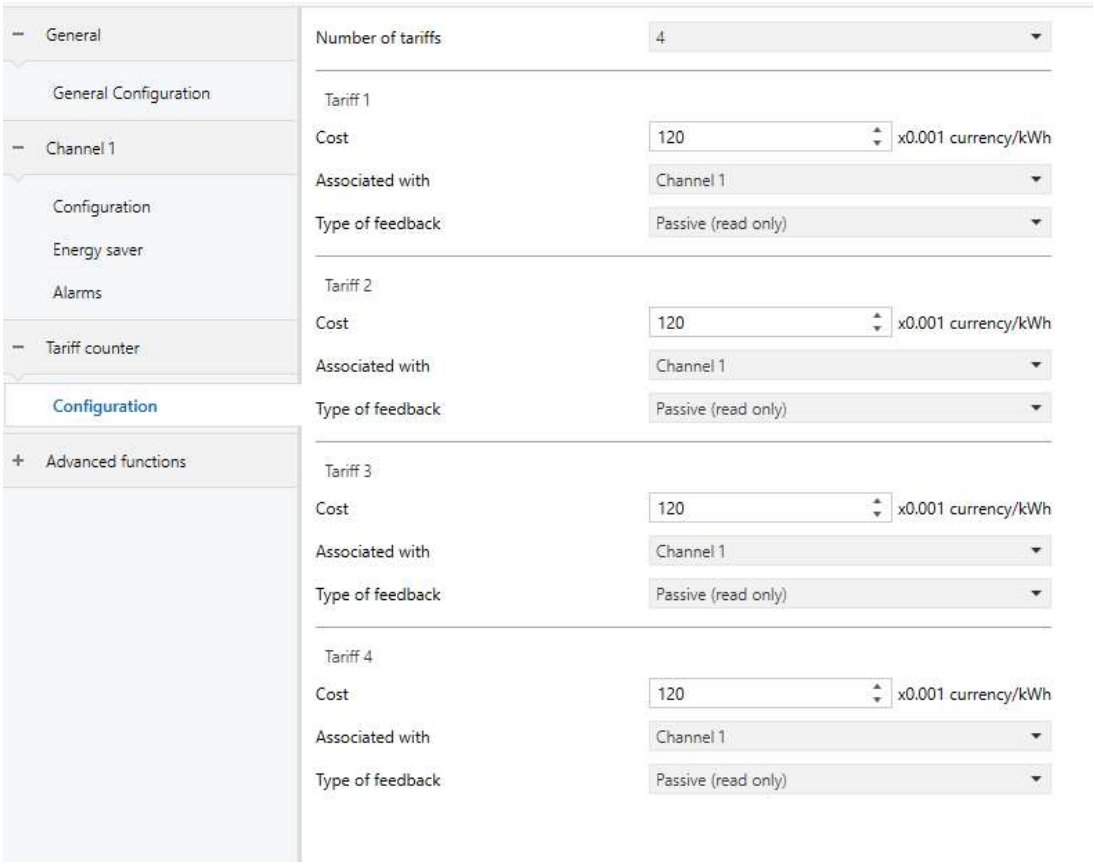
In this section, you can find the communication objects corresponding to alarm function for the first channel which are equivalents for all device channels.

Number	Name	Object function	Length	C	R	W	T	U	Data type
12	Channel 1: Alarm	Consumption above limit	1 bit	C	-	-	T	-	Alarm
13	Channel 1: Alarm	Consumption below limit	1 bit	C	-	-	T	-	Alarm

Name	Channel X: Alarm - Consumption above limit
Description	Through this 1-bit object the consumption meter sends a “1” to the bus with the alarm activation and a “0” with the alarm deactivation.
Name	**Channel X: Alarm - Consumption below limit**
Description	Through this 1-bit object the consumption meter sends a “1” to the bus with the alarm activation and a “0” with the alarm deactivation.

3.9 Tariffs

The device allows to configure up to 4 different rates, notifying the bus in monetary units the expense associated with the consumption of the selected channels.



3.9.1 Tariff parameters

Each tariff has the following parameters:

Name	Number of tariffs
Values	None / 1 / 2 / 3 / 4
Description	Allows the selection of the number of tariffs that you wish to configure.
Name	**Cost**
Values	0…255
Description	In this object you introduce the Kwh cost in the contracted tariff.
Name	**Associated with**
Values	Channel 1 / Channel 2 / Channel 3 / Channel combination
Description	In this parameter the channel or the combination of channels associated to the tariff are selected.
Name	**Type of feedback**
Values	Passive / Ciclically / On change / Ciclically and on change
Description	Through this object it is selected how the cost is notified to the BUS

	Passive (read only): It notifies the BUS only when the correspondent communication object is read
	Ciclically: It notifies the BUS every certain minutes defined in the “Time” parameter that is displayed for this purpose.
	On change: : It notifies the BUS when between the previous calculation and the current calculation, there has been a greater change than the one defined in the parameter “Minimum value”
	Ciclically and on change: It notifies the bus if there has been a major change to the one defined in the parameter indicated in the previous option or if the established time interval has passed.

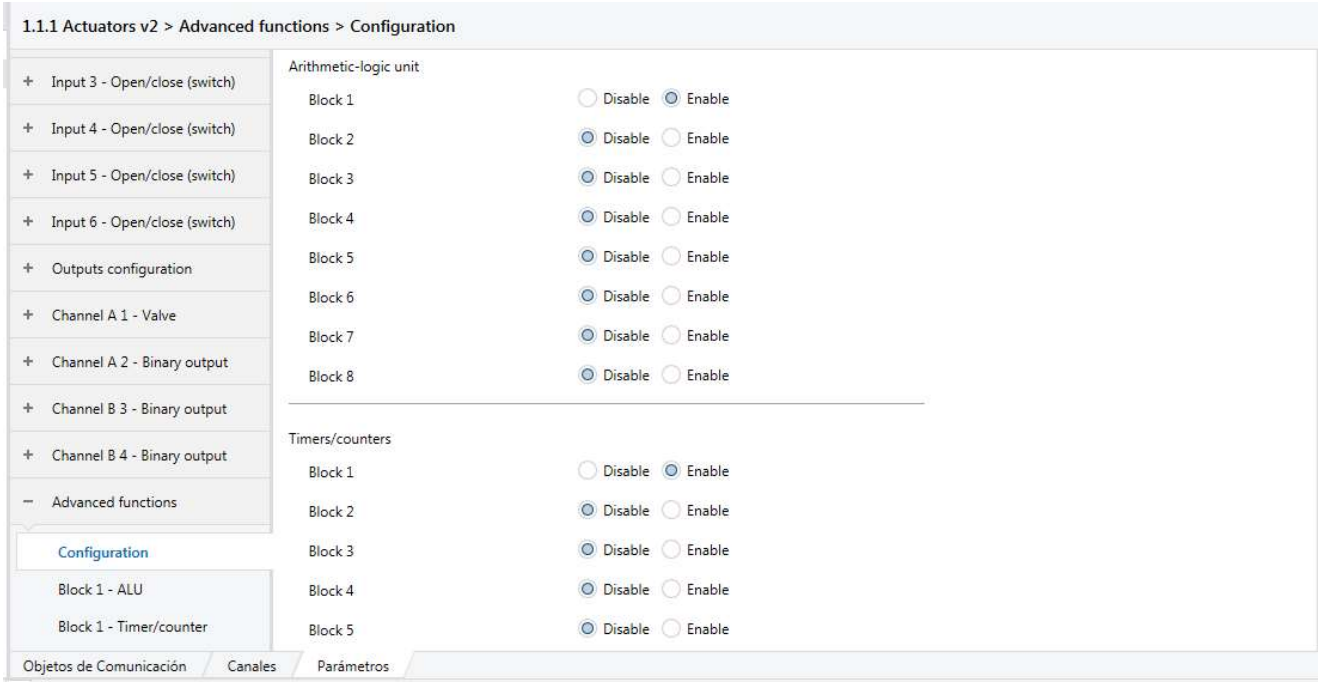
3.9.2 Tariff communication objects

Number	Name	Object function	Length	C	R	W	T	U	Data type
53	Tariff counter 1	Cost (currency/kWh)	2 bytes	C	R	-	T	-	2-byte float value

Name	Tariff counter X - Cost (currency)
Description	Communication object of the cost in monetary units

3.10 Advanced functions

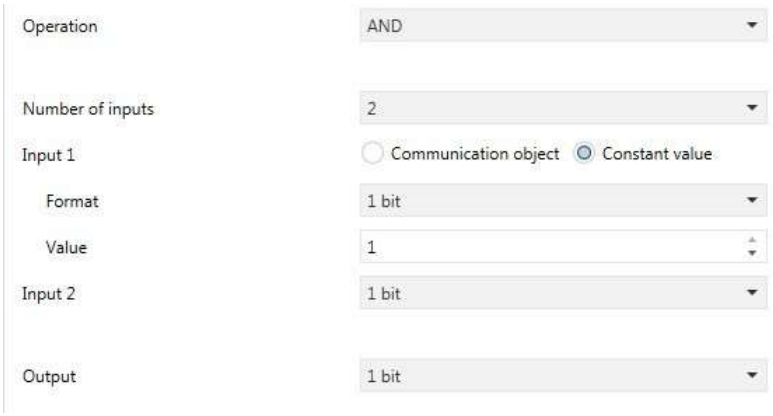
When the advanced functions of the device are enabled in the “General” section, a new tap menu appears on the left.



In this menu you can choose what arithmetic-logic blocks or timer/counter blocks you want to enable.

Name	Logic Block X
Values	Enable / disable
Description	Allows to enable or disable each block of the logic unit
Name	timer / counter Block
Values	Enable / disable
Description	Allows to enable or disable each block of the timers / counters

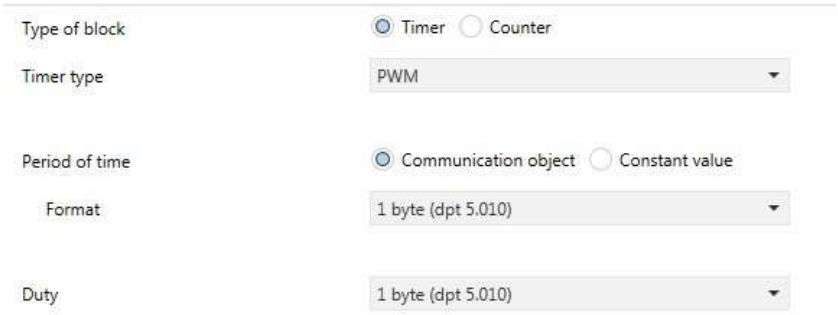
3.10.1 Bloque Aritmético-Lógico (ALU)



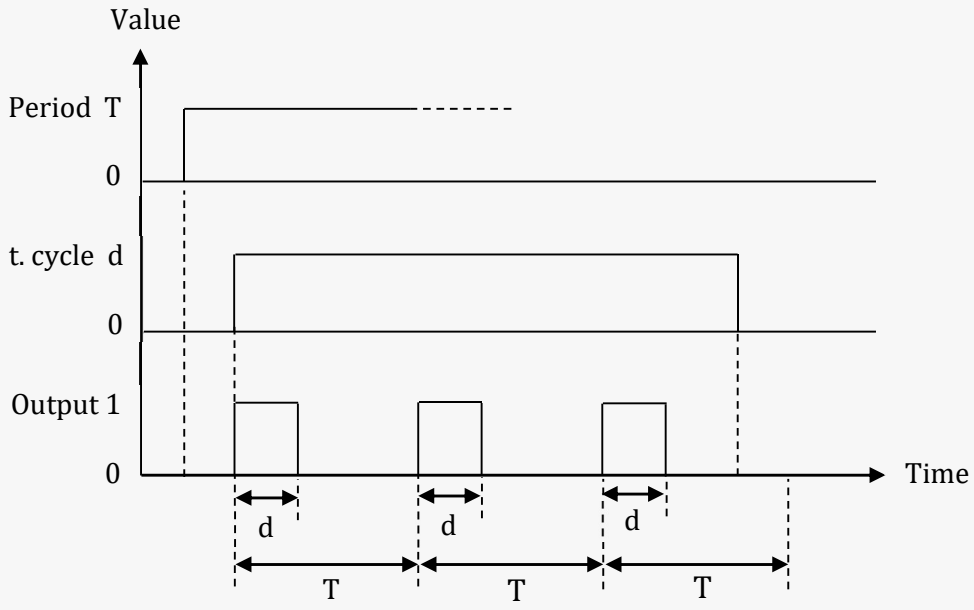
Name	Operation
Values	AND, NAND, OR, NOR, XOR, XNOR, NOT, BUFFER, ==, != , <, > , <= , >= , + , - , *, / .
Description	Allows to select the logic operation, arithmetic operation or comparative operation that you desire to do between the followings: Logic operations: - AND: Logical product - NAND: Logical product denied - OR: Logical sum - NOR: logical sum denied - XOR: exclusive logical sum - XNOR: exclusive logical sum denied - NOT: Negation - BUFFER: It stores at the output the input value Comparative operations: - == : equality - != : inequality - < : smaller than - > : bigger than - <= : smaller or equal to - >= : bigger or equal to Arithmetic operations: - + : sum - - : subtraction - * : multiplication - / : division

Name	Number of inputs
Values	From 2 to 4
Description	It allows to select the number of inputs. Depending on the operation to make you can choose two or more inputs.
Name	input 1
Values	Communication object / Constant
Description	Through this parameter the input 1 type is decided. It can be a constant value or it can receive a value through a communication object
Name	Format
Values	1 bit, 1 byte without sign (dpt 5.001), 1 byte without sign (dpt 5.010), 1 byte with sign (6.*), 2 bytes without sign (dpt 7,*), 2 bytes with sign (dpt 8,*), 2 bytes floating point (dpt 9,*).
Description	It allows to select through a drop-down menu the size and the format of the input 1. Depending on the type of operation it allows some formats or others.
Name	Inputs 2/3/4
Values	1 bit, 1 byte without sign (dpt 5.001), 1 byte without sign (dpt 5.010), 1 byte with sign (6.*), 2 bytes without sign (dpt 7,*), 2 bytes with sign (dpt 8,*), 2 bytes floating point (dpt 9,*).
Description	It allows to select through a drop-down menu the size and the format of the other inputs. Depending on the type of operation it allows some formats or others. This inputs can only receive values through communication objects.
Name	Output
Values	1 bit, 1 byte without sign (dpt 5.001), 1 byte without sign (dpt 5.010), 1 byte with sign (6.*), 2 bytes without sign (dpt 7,*), 2 bytes with sign (dpt 8,*), 2 bytes floating point (dpt 9,*).
Description	It allows to select through a drop-down menu the size and the format of the input object. Depending on the type of operation it allows some formats or others. It receives the values of his communication object.

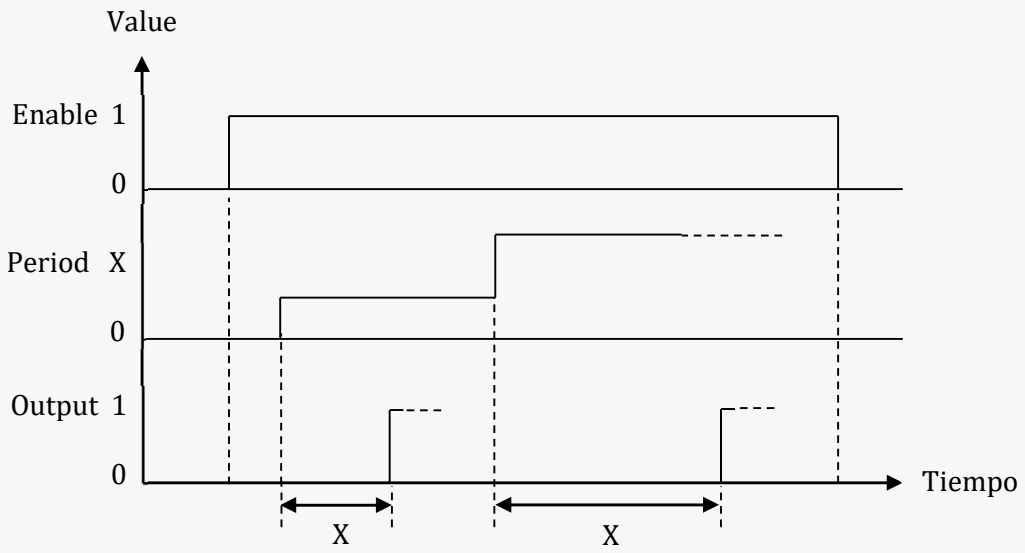
3.10.2 Timer/Counter block



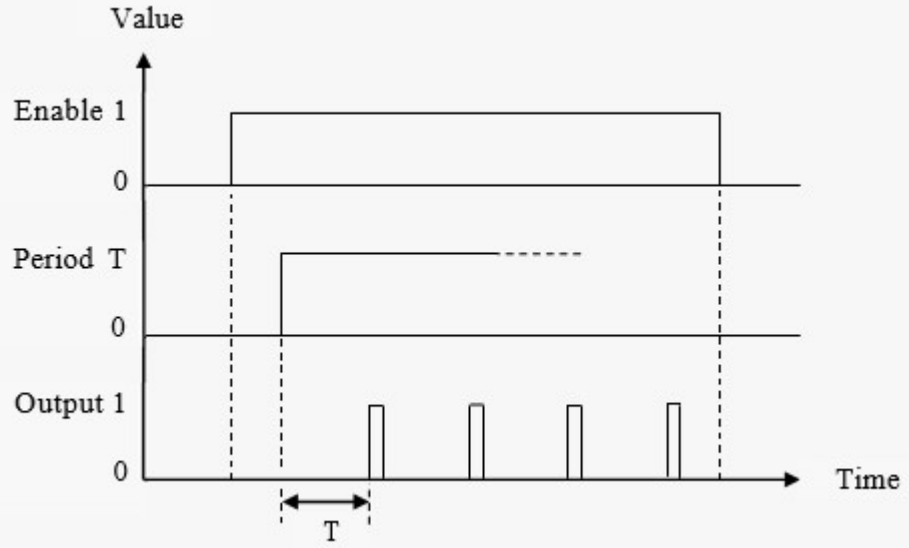
Name	Timer type
Values	PWM, Limit o Cycle
Description	PWM: It sends a signal modulated in pulse width according to the period and the work cycle.



Limit: Sends a "1" bit telegram to the bus when a limit value is exceeded

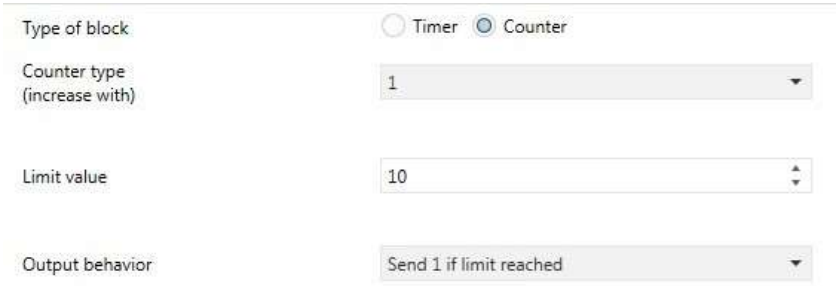


Cycle: sends a “1” bit telegram each time the value is exceeded cyclically



Name	Time period
Values	Communication object / Constantvalue
Description	It is the counter time of the timer. It can be configured as a constant value or as a value received through the bus with one of the followings formats of the communication object: 1 byte (dpt 5.010): Value from 0 to 255 (x 100 ms) 2 bytes (7.004): Value from 0 to 6553500 ms 2 bytes floating point (9.010): Value from 0 to 670760 s

Name	Work cycle
Values	1 byte (dpt 5.010), 2 bytes (7.004) or 2 bytes floating point (9.010)
Description	Only visible if the type of timer selected is PWM. It is the time that the generated signal is in high level ("1") inside the period of time. The value is received by the bus with one of the following formats of communication objects: 1 byte (dpt 5.010): Value from 0 to 255 (x 100 ms) 2 bytes (7.004): Value from 0 to 6553500 ms 2 bytes floating point (9.010): Value from 0 to 670760 s



Name	Event type
Values	Rising edge, falling edge, 1 o 0.
Description	It is the change that the counter must detect in the "event" object to increase his count
Name	Limit value
Values	From 0 to 65535
Description	Is the chosen value as a threshold for the counting.
Name	Output behavior
Values	Send "1" when it reaches the limit, send the count value (dpt 5.010), sent count value (dpt 7.001)
Description	This parameter allows to choose the format and the value of the counter output. The output can send "1" when it reaches the limit value of the count or send the count value each time it receives an event

4 Installation

Alimente las líneas de bajo voltaje (bus y entradas) en conductos separados de la alimentación a 230 V con el objetivo de asegurar que existe el suficiente aislamiento y evitar así interferencias.

No conecte el voltaje principal de 230 V o cualquier otro voltaje externo a ningún punto del bus ni a las entradas.

KNX products by ingenium

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