EIB-KNX Applications

Manual

Version 2.0

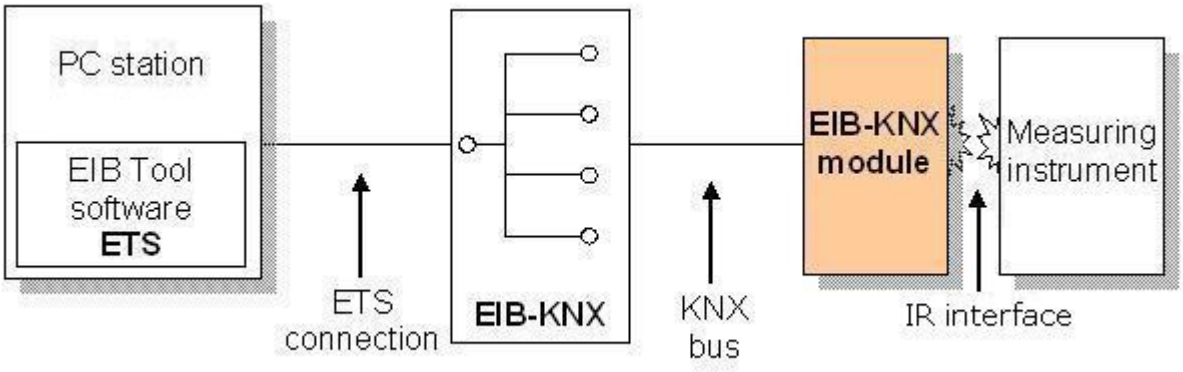
1. Index

2. Preface

2.1. System description

This document describes the two application programs that can be used with the DIN rail mount KNX/EIB interface:
-"*Single phase models profile*" is the application program to be downloaded to the interface when it is used in combination with single phase meters
-"*Three phase models profile*" is the application program to be downloaded to the interface when it is used in combination with three phase meters

Both applications share the general features. The main differences are in the number of communication objects supported: the application for single phase supports only a subset of the objects supported by the three phase counterpart.
The description applies to both applications, the differences are highlighted when necessary.



2.2. Hardware Requirements

To use this system you need at least:

- one EIB-KNX module connected to
- one electronic counter
- a KNX-Bus
- a Windows PC
- one connection PC/KNX-bus RS 232 or USB

The module must be installed side by side with the counter.

2.3. Software Requirements

The minimal requirements are:

- Operating systems: MS Windows 98 / ME / 2000 / NT 4 / XP
- EIB-KNX tool software **ETS3**

3. Functional description

Using these application programs it is possible to read via KNX bus the measurements of electricity meters.
Additional communication objects are also available, for:
• remote reset of the energy registers of the meter (this feature is available only for some models of meters).
• information on the type of the load (inductive/capacitive, energy import/export)
• warnings in case of range overflow, trespassing of voltage limits adjustable via parameters, loss of infrared communication between interface and meter, wrong connection of the meter.
In order to use successfully the present application, we assume that you are working with a system like the one introduced in the paragraph 2.1. Then be sure that:

- All the physical links are operating
- The KNX bus, the communication module and the counter are powered-on

4. Communication objects - Three phase

The device provides 70 communication objects
The following pictures show the appearance of the objects in ETS3 for three phase application program.

• objects 78 and 81 (commands for resetting energy registers) are hidden when the parameter "Reset of energy registers allowed" is set to "No"
• objects related to T2 (tariff 2) are hidden when the parameter "Dual Tariff meter" is set to "No"

- 0: Active Energy 1st phase T1, imp (Wh) - output, value
- 1: Active Energy 2nd phase T1, imp (Wh) - output, value
- 2: Active Energy 3rd phase T1, imp (Wh) - output, value
- 3: Active Energy Sum T1, imp (Wh) - output, value
- 4: Active Energy 1st phase T2, imp (Wh) - output, value
- 5: Active Energy 2nd phase T2, imp (Wh) - output, value
- 6: Active Energy 3rd phase T2, imp (Wh) - output, value
- 7: Active Energy Sum T2, imp (Wh) - output, value
- 8: Active Power 1st phase (kW) - output, value
- 9: Active Power 2nd phase (kW) - output, value
- 10: Active Power 3rd phase (kW) - output, value
- 11: Active Power Sum (kW) - output, value
- 16: Active Energy 1st phase T1, exp (Wh) - output, value
- 17: Active Energy 2nd phase T1, exp (Wh) - output, value
- 18: Active Energy 3rd phase T1, exp (Wh) - output, value
- 19: Active Energy Sum T1, exp (Wh) - output, value
- 20: Active Energy 1st phase T2, exp (Wh) - output, value
- 21: Active Energy 2nd phase T2, exp (Wh) - output, value
- 22: Active Energy 3rd phase T2, exp (Wh) - output, value
- 23: Active Energy Sum T2, exp (Wh) - output, value
- 24: Reactive Energy 1st phase T1, imp (varh) - output, value
- 25: Reactive Energy 2nd phase T1, imp (varh) - output, value
- 26: Reactive Energy 3rd phase T1, imp (varh) - output, value
- 27: Reactive Energy Sum T1, imp (varh) - output, value
- 28: Reactive Energy 1st phase T2, imp (varh) - output, value
- 29: Reactive Energy 2nd phase T2, imp (varh) - output, value
- 30: Reactive Energy 3rd phase T2, imp (varh) - output, value
- 31: Reactive Energy Sum T2, imp (varh) - output, value
- 32: Reactive Energy 1st phase T1, exp (varh) - output, value
- 33: Reactive Energy 2nd phase T1, exp (varh) - output, value
- 34: Reactive Energy 3rd phase T1, exp (varh) - output, value
- 35: Reactive Energy Sum T1, exp (varh) - output, value
- 36: Reactive Energy 1st phase T2, exp (varh) - output, value
- 37: Reactive Energy 2nd phase T2, exp (varh) - output, value
- 38: Reactive Energy 3rd phase T2, exp (varh) - output, value
- 39: Reactive Energy Sum T2, exp (varh) - output, value
- 40: Reactive Power 1st phase (kvar) - output, value
- 41: Reactive Power 2nd phase (kvar) - output, value
- 42: Reactive Power 3rd phase (kvar) - output, value
- 43: Reactive Power Sum (kvar) - output, value
- 44: L1-N Voltage (V) - output, value
- 45: L2-N Voltage (V) - output, value
- 46: L3-N Voltage (V) - output, value
- 47: L1-L2 Voltage (V) - output, value
- 48: L2-L3 Voltage (V) - output, value
- 49: L3-L1 Voltage (V) - output, value
- 50: Current 1st phase (A) - output, value
- 51: Current 2nd phase (A) - output, value
- 52: Current 3rd phase (A) - output, value
- 53: Apparent Power 1st phase (VA) - output, value
- 54: Apparent Power 2nd phase (VA) - output, value
- 55: Apparent Power 3rd phase (VA) - output, value
- 56: Apparent Power Sum (VA) - output, value
- 57: Power Factor cos phi 1st phase - output, value
- 58: Power Factor cos phi 2nd phase - output, value
- 59: Power Factor cos phi 3rd phase - output, value
- 60: Power Factor cos phi Sum - output, value
- 61: Frequency (Hz) - output, value
- 65: Status Byte2, adjustable V limits alarms - output, status byte
- 66: Status bit3, connection error alarms - output, status bit
- 67: Status Byte4, range overflow alarms - output, status byte
- 68: Status Byte5, load info, 1st phase - output, status byte
- 69: Status Byte6, load info, 2nd phase - output, status byte
- 70: Status Byte7, load info, 3rd phase - output, status byte
- 78: Command: Active Energy reset all - input, command
- 81: Command: Reactive Energy reset all - input, command
- 90: GENERIC WARNING bit - output, status bit
- 91: IR PORT WARNING bit - output, status bit
- 92: Running Tariff bit - output, status bit
- 126: Product ID - output, string

4.1. Objects 0..61

Measurements, Type: 4octet float or integer values, Flags: C,R,T

The name of the objects 0..61 is self-explaining, taking in account that:
•0..3 -> Active energy imported tariff1 (1^{st}, 2^{nd}, 3^{rd} phase and Σ)
•4..7 -> Active energy imported tariff2 (1^{st}, 2^{nd}, 3^{rd} phase and Σ)
•8..11 -> Active power (1^{st}, 2^{nd}, 3^{rd} phase and Σ)
•16..19 -> Active energy exported tariff1 (1^{st}, 2^{nd}, 3^{rd} phase and Σ)
•20..23 -> Active energy exported tariff2 (1^{st}, 2^{nd}, 3^{rd} phase and Σ)

- •24..27 -> Reactive energy imported tariff1 (1^{st}, 2^{nd}, 3^{rd} phase and Σ)
- •28..31 -> Reactive energy imported tariff2 (1^{st}, 2^{nd}, 3^{rd} phase and Σ)
- •32..35 -> Reactive energy exported tariff1 (1^{st}, 2^{nd}, 3^{rd} phase and Σ)
- •36..39 -> Reactive energy exported tariff2 (1^{st}, 2^{nd}, 3^{rd} phase and Σ)
- •40..43 -> Reactive power (1^{st}, 2^{nd}, 3^{rd} phase and Σ)
- •44..49 -> Voltage (1^{st}, 2^{nd}, 3^{rd} phase, 1^{st}- 2^{nd} phase, 2^{nd}- 3^{rd} phase and 3^{rd}- 1^{st} phase)
- •50..52 -> Current (1^{st}, 2^{nd}, 3^{rd} phase)
- •53..56 -> Apparent power (1^{st}, 2^{nd}, 3^{rd} phase and Σ)
- •57..60 -> Power factor cosφ (1^{st}, 2^{nd}, 3^{rd} phase and Σ)
- •61 -> Frequency

• T1 (T2) identifies the energy registers that account the energy consumption when tariff 1 (tariff2) is active in the meter.
• imp (exp) identifies the energy registers that account the energy imported (exported) by the installation.
• 1st, 2nd, 3rd phase and Sum identifies respectively the measurements related to phase 1, 2, 3, and Sum of the three phases

4.2. Objects 65 and 67..70

Status bytes, Type: 8 bit unsigned values, Flags: C,R,T

Obj n° 65, adjustable voltage limit alarms

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
N.U.	N.U.	V3H	V3L	V2H	V2L	V1H	V1L

The value of each bit field of this byte is:
0 in case of normal voltage connected to the meter
1 in case the voltage is out of the adjustable limits.
Example: value of field V1H is 1 if voltage on phase 1 is higher than the upper limit. Value of V1L is 1 if voltage is lower than the lower limit. Value of both V1H and V1L are 0 if voltage is included in the limits. The limits can be adjusted via parameters by the installer.

Obj n° 67, range overflow alarms

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
N.U.	N.U.	OFV3	OFI3	OFV2	OFI2	OFV1	OFI1

Voltage and Current Range overflow (in respect of instrument's max. range)
The value of each bit field of this byte is:
0 in case of normal voltage or current
1 in case the voltage or current related to the bitfield exceeds the range of the meter

Obj n° 68, load info 1st phase

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
N.U.	N.U.	N.U.	N.U.	Act IMP	Act EXP	React IND	React CAP

Type of energy currently stored
The bitfields contain information concerning the type of the active and reactive component of the load connected to the meter: capacitive, inductive, exported or imported. Example:
00001001
means that the installation is IMPorting active energy, and the type of the load is CAPacitive

Obj n° 69, Info 2nd phase
Similar to 68, but 2nd phase

Obj n° 70, Info 3rd phase
Similar to 68, but 3rd phase

4.3. Objects 78,81

Energy reset commands, Type: 1 bit, Flags: C,R,W,T)

Commands for resetting Energy. These communication objects are write enabled; the instrument polls their value. If one of them has been set to 1 via KNX bus, the instrument resets the proper energy registers, then resets the command object to 0. These objects are hidden by default. They can be enabled by the installer setting a parameter via ETS

Obj n° 78, command: Active energy reset all
It is a bit object. Its value can be written and read via bus.
It must be set to 1 via bus in order to reset all the active energy registers. After a few seconds the meter reacts to the command resetting the energy, and restores to 0 the value of the bit, as a confirmation that the command has been executed.

Obj n° 81, command: Reactive energy reset all
It works similarly to object 78, but it is for resetting Reactive energy.

4.4. Objects 66, 90, 91, 92

Warning and information bits, Type: 1 bit, Flags: C,R,T

Obj n° 66, connection error alarm
the value of this object is set to 1 in case of reversed phase sequence in the three phase system connected to the meter.

Obj n° 90, generic warning bit:
the value of this object is set to 1, and automatically sent over the bus, when one (or more than one) warning is active in object 65, 66 and 67. Such bytes can be checked in order to find out more about the reason of the warning. The object value is reset to 0 and automatically sent over the bus when the warning ceases. Moreover the object can be read at any time.

Obj n° 91, IR warning bit:
This warning bit is connected to the serial port timeout supervision. The serial IR supervision sets this object to 1 when timeout occurs (and send it on the bus) and clear to 0 (and send it on the bus) when IR communication resumes.
the value of this object is set to 1, and automatically sent over the bus, in case the KNX interface doesn't receive data from the meter via InfraRed port. This situation can occur for instance if the meter has been switched off, or the InfraRed beam of the meter for any reason cannot reach the interface.
The object value is reset to 0 and automatically sent over the bus when the warning ceases. Moreover the object can be read at any time.

Obj n° 92, Running Tariff bit:
This object and the other objects pertaining to optional "dual tariff" feature are hidden by default. They can be enabled by the installer setting a parameter via ETS. The other objects connected to the same parameter are 4,5,6,7,20,21,22,23,28,29,30,31,36,37,38,39.

0 : tariff1 is active
1 : tariff2 is active

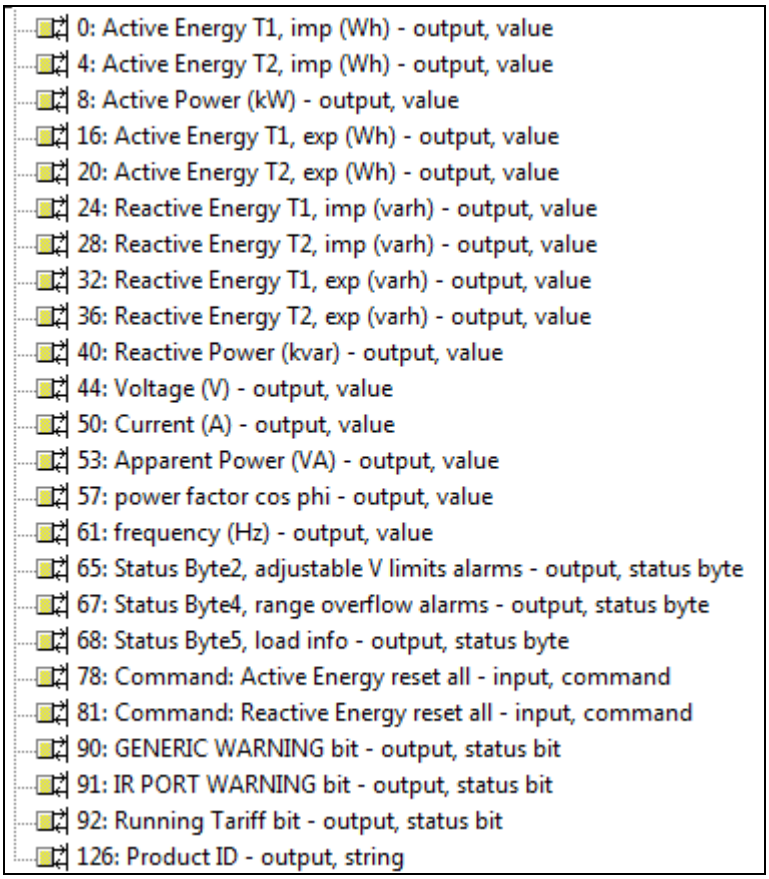
4.5. Object 126

Product ID

14 bytes used for the product identification of the meter.
For example: "13157H7F0012"
2 bytes used for char (");
4 bytes (1315) are used for HW and SW version (HW 1.3 and SW 1.5);
8 bytes (7H7F0012) are used for serial number of the instrument

5. Communication objects - Single phase

The device provides 24 communication objects
The following picture shows the appearance of the objects in ETS3 for single phase application program.
• objects 78 and 81 (commands for resetting energy registers) are hidden when the parameter "Reset of energy registers allowed" is set to "No"
• objects related to T2 (tariff 2) are hidden when the parameter "Dual Tariff meter" is set to "No"



5.1. Objects 0..61

Measurements, Type: 4octet float or integer values, Flags: C,R,T
The name of the objects 0..61 is self-explaining, taking in account that:
•0 -> Active energy imported tariff1
•4 -> Active energy imported tariff2
•8 -> Active power
•16 -> Active energy exported tariff1
•20 -> Active energy exported tariff2
•24 -> Reactive energy imported tariff1
•28 -> Reactive energy imported tariff2
•32 -> Reactive energy exported tariff1
•36 -> Reactive energy exported tariff2
•40 -> Reactive power
•44 -> Voltage
•50 -> Current
•53 -> Apparent power
•57 -> Power factor cosφ
•61 -> Frequency

• T1 (T2) identifies the energy registers that account the energy consumption when tariff 1 (tariff2) is active in the meter.
• imp (exp) identifies the energy registers that account the energy imported (exported) by the installation.

5.2. Objects 65, 67, 68

Status bytes, Type: 8 bit unsigned values, Flags: C,R,T

Obj n° 65, adjustable voltage limit alarms

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
N.U.	N.U.	N.U.	N.U.	N.U.	N.U.	VH	VL

The value of each bit field of this byte is:
0 in case of normal voltage connected to the meter
1 in case the voltage is out of the adjustable limits.
Example: value of field VH is 1 if voltage is higher than the upper limit. Value of VL is 1 if voltage is lower than the lower limit. Value of both VH and VL are 0 if voltage is included in the limits. The limits can be adjusted via parameters by the installer.

Obj n° 67, range overflow alarms

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
N.U.	N.U.	N.U.	N.U.	N.U.	N.U.	OFV	OFI

Voltage and Current Range overflow (in respect of instrument's max. range)
The value of each bit field of this byte is:
0 in case of normal voltage or current
1 in case the voltage or current related to the bitfield exceeds the range of the meter

Obj n° 68, Info phase

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
N.U.	N.U.	N.U.	N.U.	Act IMP	Act EXP	React IND	React CAP

Type of energy currently stored
The bitfields contain information concerning the type of the active and reactive component of the load connected to the meter: capacitive, inductive, exported or imported. Example:
00001001
means that the installation is IMPorting active energy, and the type of the load is CAPacitive

5.3. Objects 78,81

Energy reset commands, Type: 1 bit, Flags: C,R,W,T)

Commands for resetting Energy. These communication objects are write enabled; the instrument polls their value. If one of them has been set to 1 via KNX bus, the instrument resets the proper energy registers, then resets the command object to 0. These objects are hidden by default. They can be enabled by the installer setting a parameter via ETS

Obj n° 78, command: Active energy reset all
It is a bit object. Its value can be written and read via bus.
It must be set to 1 via bus in order to reset all the active energy registers. After a few seconds the meter reacts to the command resetting the energy, and restores to 0 the value of the bit, as a confirmation that the command has been executed.

Obj n° 81, command: Reactive energy reset all
It works similarly to object 78, but it is for resetting Reactive energy.

5.4. Objects 90, 91, 92

Warning and information bits, Type: 1 bit, Flags: C,R,T

Obj n° 90, generic warning bit:
the value of this object is set to 1, and automatically sent over the bus, when one (or more than one) warning is active in object 65 and 67. Such bytes can be checked in order to find out more about the reason of the warning. The object value is reset to 0 and automatically sent over the bus when the warning ceases. Moreover the object can be read at any time.

Obj n° 91, IR warning bit:
This warning bit is connected to the serial port timeout supervision. The serial IR supervision sets this object to 1 when timeout occurs (and send it on the bus) and clear to 0 (and send it on the bus) when IR communication resumes.
the value of this object is set to 1, and automatically sent over the bus, in case the KNX interface doesn't receive data from the meter via InfraRed port. This situation can occur for instance if the meter has been switched off, or the InfraRed beam of the meter for any reason cannot reach the interface.
The object value is reset to 0 and automatically sent over the bus when the warning ceases. Moreover the object can be read at any time.

Obj n° 92, Running Tariff bit:
This object and the other objects pertaining to optional "dual tariff" feature are hidden by default. They can be enabled by the installer setting a parameter via ETS. The other objects connected to the same parameter are 4,20,28,36.

0 : tariff1 is active
1 : tariff2 is active

5.5. Object 126

Product ID

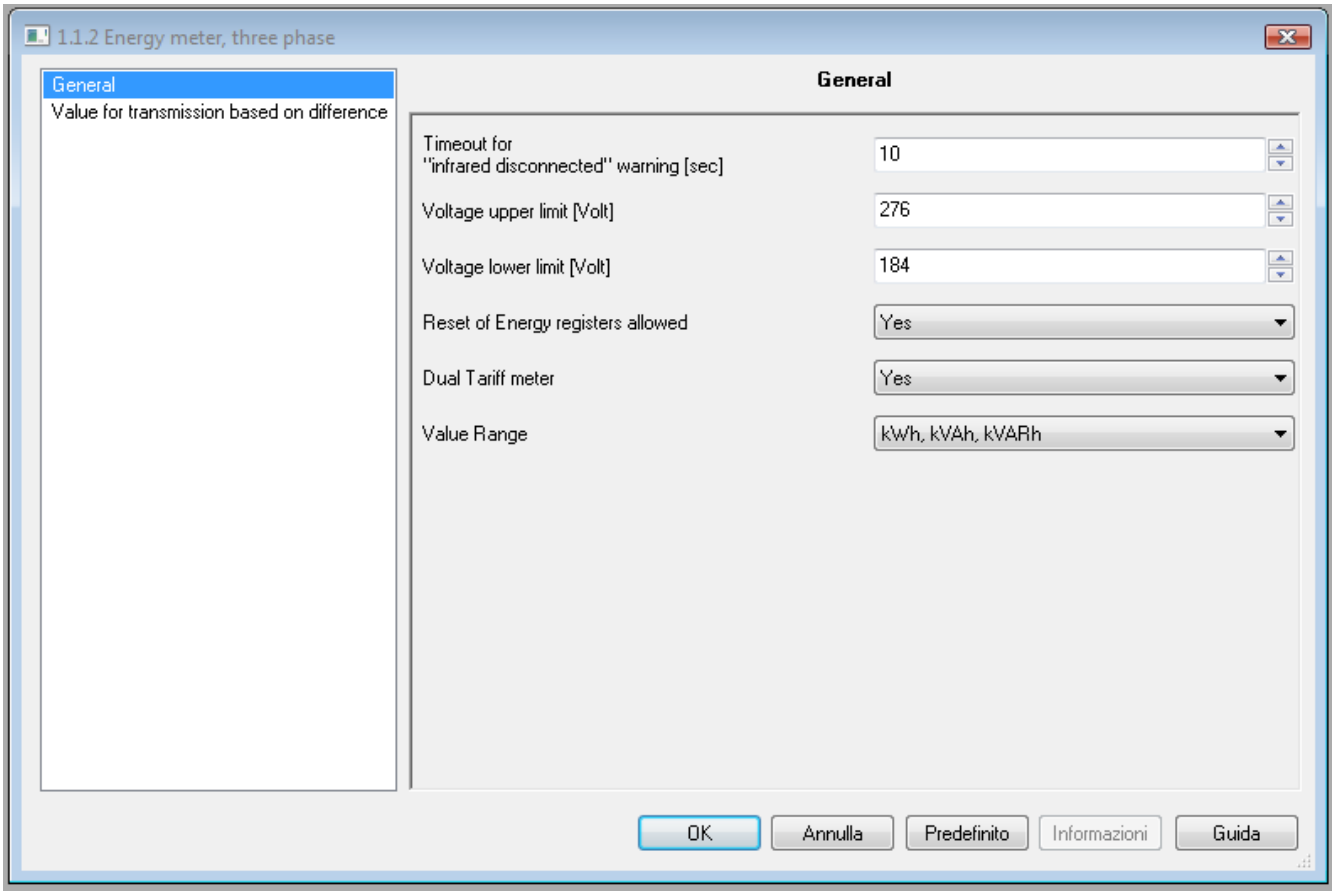
14 bytes used for the product identification of the meter.
For example: "13157H7F0012"
2 bytes used for char (");
4 bytes (1315) are used for HW and SW version (HW 1.3 and SW 1.5);
8 bytes (7H7F0012) are used for serial number of the instrument

6. Send mode

• All the measurements and the status bytes can be read via "read request".
• Automatic send triggered by the differential in the measurement is available, in addition to read request, for the most important measurements (objects 0 ...11); it can be enabled via parameters (refer to paragraph "Parameters" for more details)
• Warning and information bits are automatically sent "on change". In addition they can be read via "read request" .
• Energy reset commands can be read and written

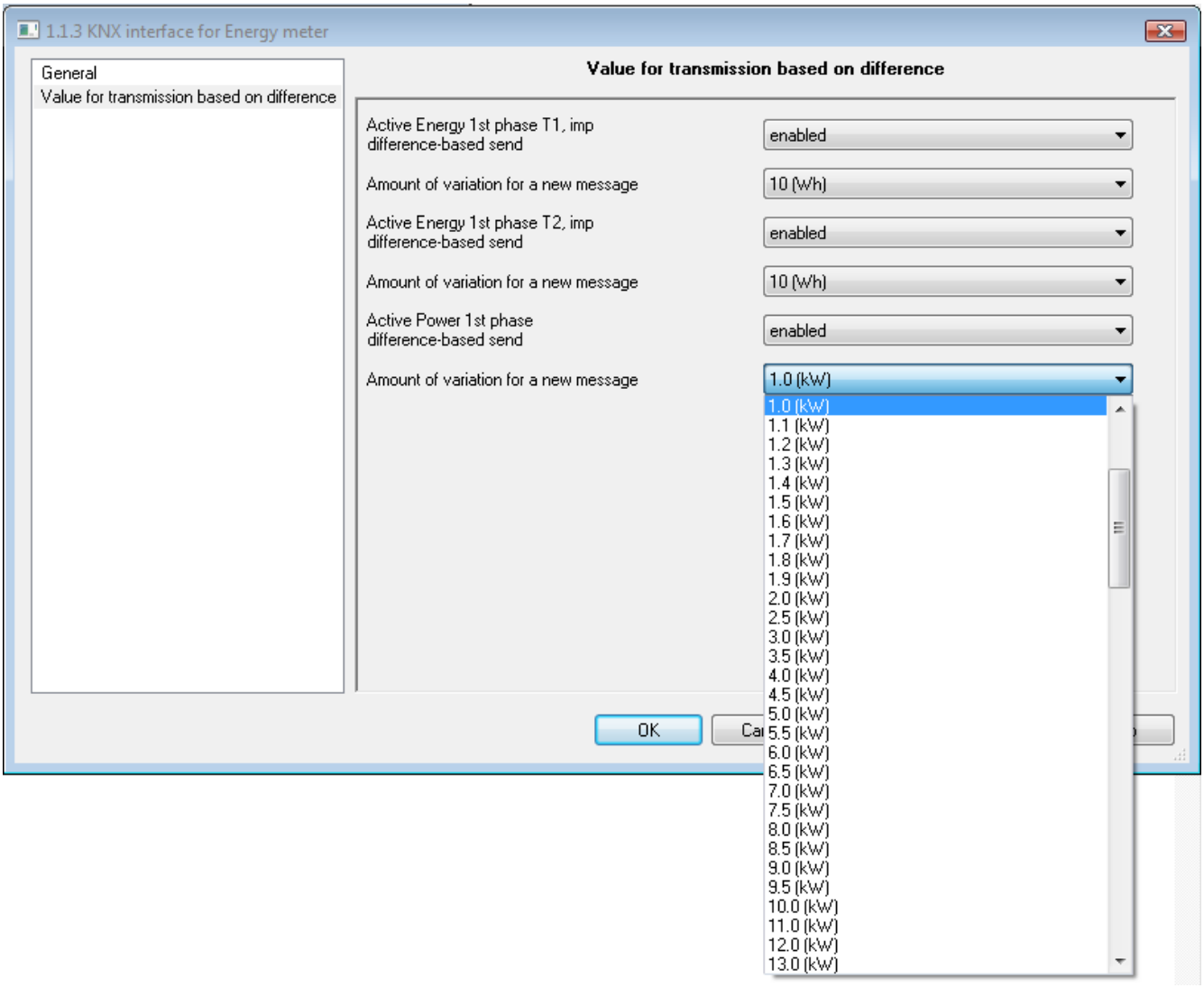
7. Parameters

7.1. General



• Timeout for "infrared disconnect" warning: it allows to adjust the timeout connected to object 91. By default the warning occurs in case of loss of infrared communication for more than 10 seconds
• Voltage upper limit and Voltage lower limit: if the voltage connected to the meter trespasses these adjustable limits, the value of the relevant bitfields in "status byte2, adjustable V limits alarms" is set to 1, and a GENERIC WARNING occurs
• Reset of energy reset allowed: set this parameter to "yes" if the KNX interface is used in combination with a meter enabled to energy reset feature. Set it to "no" (default) if the meter hasn't this feature or you don't want to display and use the objects 78 and 81, that will be hidden.
• Dual tariff meter: set this parameter to "yes" if the KNX interface is used in combination with a Dual tariff meter, otherwise set it to "no", and the objects related to tariff2 will be hidden.
• Value Range: This parameter selects the unit of measure used in transmission of energy from the interface (Active and Reactive).

7.2. Value for transmission based on difference



The parameters above allow to enable the transmission based on the differential in the energy measurements. Each object 0..11 can be enabled or disabled, and the value of the energy increment or power increment/decrement that triggers the automatic transmission can be adjusted independently.