

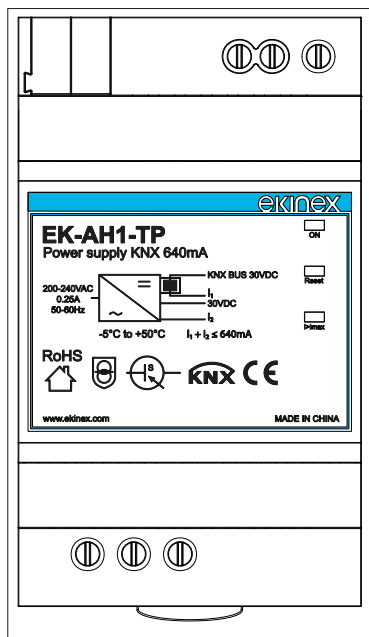
KNX bus 640 mA power supply with 30 Vdc auxiliary output

Product code: EK-AH1-TP



Datasheet STEKAH1TP_EN

KNX device with function of power supply for a bus line with auxiliary output. It has to be used in KNX installations for control of homes and buildings.



REA/EKAH1TP

Description

The ekinex® EK-AH1-TP AC-DC switching power supply is a KNX device for panel mounting which produces and monitors the 30 Vdc voltage necessary for the operation of the bus system, capable of delivering a maximum current of 640 mA. It also has an additional 30 Vdc output which can be used for the auxiliary power supply of other SELV safety extra low voltage devices. In the KNX part, a coil integrated in the device provides for the decoupling between the output current and the information on the bus line. A maximum of 64 KNX bus devices can be connected on a KNX bus line. The output has overload, short circuit, and overvoltage protections. The total current supplied by the two outputs (KNX bus and auxiliary) cannot exceed 640 mA. The device is able to support short mains voltage interruptions (max 200 ms at full load). It also features LED indicators for operating conditions and offers a wide operating temperature range for use in a variety of applications: smart-home, building automation, lighting control, curtain and blind control, heating systems and air conditioning, safety monitoring systems, etc.

Functions

- 30 Vdc SELV power supply for a KNX bus line with max 64 connected devices (depending on the current consumption of each device)
- Auxiliary power supply 30 Vdc

- Reset of the connected bus line with a dedicated pushbutton
- LED indicators for normal operation, bus reset and bus overload
- Protections: overload, short circuit, overvoltage
- High I/O insulation test voltage up to 4000 Vac
- Low standby power consumption, high efficiency
- Cooling by free air convection

Main functional characteristics

- Housing in plastic material
- Mounting on 35 mm rail (according to EN 60715)
- Protection degree IP20 (installed device)
- Isolation class I
- Safety class II
- Overvoltage category III (according to EN 61558)
- Switching frequency: 45 kHz (min.), 50 kHz (typical), 55 kHz (max.)
- 3 modular units (1 UM = 18 mm)
- Dimensions 52 x 90 x 58.2 mm (WxHxD)
- Weight: 196 g

Environmental conditions

- Operating temperature: - 30 ~ + 70 °C
- Storage temperature: - 40 ~ + 85 °C
- Working humidity: 20 ~ 95% RH not condensing
- Storage humidity: 10 ~ 95% RH not condensing

Technical data

Power supply

- Mains voltage range 180 ~ 264 Vac, 254 ~ 370 Vdc
- Frequency range 47 ~ 63 Hz
- Power consumption 20 W
- Temperature derating: 2 %/°C between +50 °C and +70 °C
- Input AC current (typical) 0.25 A @ 230 Vac
- Inrush current (max.): cold start 45 A @ 230 Vac
- MTBF >300,000 h according to MIL-HDBK-217F @25 °C

Outputs

- Bus line voltage: 30 Vdc SELV
- Auxiliary voltage: 30 Vdc SELV
- Rated current (total outputs): 640 mA
- Output Power: 19.2W
- Efficiency @ 230 Vac: 86 % (typical, measured on AUX)
- Max capacitive load: 2000 µF
- Line regulation (nominal load): ±1% (typical)
- Load regulation (typical): ±6% (primary output), ±4% (secondary output)
- Ripple and noise, measured at 20 MHz bandwidth (peak-to-peak): 90 mV (typical), 100 mV (max)
- Hold-up time @ 230 Vac: 150 ms (min.), 200 ms (typical)
- Auxiliary output connection: dedicated screw terminal block



Note. The "Tip and barrel method" is used for ripple and noise test, please refer to AC-DC Converter Application Notes for specific information. When the working temperature is -30 °C to -5 °C, the ripple and noise will be ±5% of the output voltage.

Protections

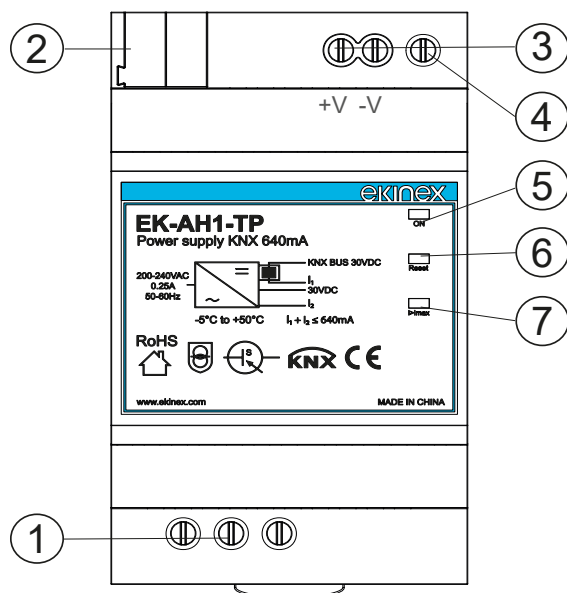
- Short circuit: constant current limitation. Automatic reset <5s after the disappearance of the short circuit.
- Overcurrent (at room temperature): 205% - 235% of output current, self-recovery after fault removal
- Overvoltage: 33 ~ 35V (self-locking, restart to recovery). Automatically recovers after the fault condition is removed.

Safety and EMC

- Safety standards: EN 62368, EN 61558-2-16/ IEC63044-3:2018
- Emissions CE/RE: CISPR22/EN55022 Class B, EN 50491-5-2:2010
- ESD immunity: IEC/EN 61000-4-2 Contact ± 4 kV/Air ± 8 kV, performance criteria A
- RS Immunity: IEC/EN 61000-4-3 10V/m, perf. criteria A
- EFT Immunity: IEC/EN 61000-4-4 ± 2 kV, perf. criteria A
- Surge immunity: IEC/EN 61000-4-5 ± 1 kV/ ± 2 kV, perf. criteria A
- CS Immunity: IEC/EN 61000-4-6 3 Vr m s, perf. criteria A
- Immunity to voltage dips, short interruptions and voltage variations: IEC/EN61000-4-11 0%, 95%, perf. Criteria A
- Isolation test: electric strength test for 1 min., leakage current <10 mA: 2000 Vac (input/GND), 4000 Vac (input/output), 1250 Vac (output/GND)
- Insulation Resistance: 100M Ω (input/GND and input/output) @Temp. ambient 25 $\pm$ 5 °C @ RH < 70% @ 500 Vdc

Switching, display and connection elements

The device is equipped with a reset pushbutton, 3 LEDs and terminal blocks for mains voltage 180 ~ 264 Vac (or 254 ~ 370 Vdc), KNX bus line and auxiliary output.



- 1) Terminal blocks for input power supply 180 ~ 264 Vac, 254 ~ 370 Vdc
- 2) Terminal blocks for KNX bus line
- 3) Terminal blocks for auxiliary 30 Vdc output
- 4) Reset pushbutton
- 5) KNX output voltage LED (green)
- 6) Reset LED (red)
- 7) Output current LED (red)

The LEDs behaviour is as follows:

LED	Type	LED color / display	Meaning
5	KNX bus output voltage, V_{bus}	Green / solid	Normal operation
6	KNX reset	Red / solid	KNX bus restart
7	Output current, $I > I_{max}$	Red / solid	$I > 640$ mA

Planning

Planning a KNX bus installation, the use of a 640 mA power supply unit requires to take into account the following guidelines:

- the maximum number of bus devices connected is 64;
- the maximum length of a line segment is 350 m, measured along the line between the power supply and the furthest bus device;
- the maximum distance between two bus devices cannot exceed 700 m;
- the maximum length of a bus line is 1000 m, keeping into account all segments.

At the same bus line can be connected not more than two power supplies. A second power supply may be necessary when the installation in distribution boards requires a particular concentration of the bus devices (typically more than 30 units installed within 10 m). In this case a power supply has to be installed near the group of devices. Between two power supplies installed on the same bus line a minimum distance of 200 m is required, measured along the line.

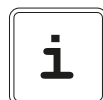
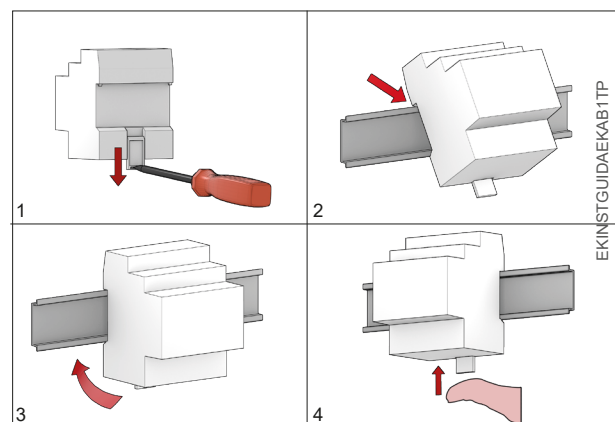


Warning! In order to supply the KNX bus lines use only KNX bus power suppliers. The use of other power supplies can compromise the communication and damage the devices connected to the bus.

Mounting

The device has degree of protection IP20, and is therefore suitable for use in dry interior rooms. The housing is made for rail mounting according to EN 60715 in boards or cabinets for electrical distribution. The installation is in horizontal position, the correct position is when the terminals for KNX bus line and auxiliary output are located at the bottom and the terminals for mains power supply 230 Vac are located at the top. For the installation of the device on the rail proceed as follows:

- with the aid of a tool bring the locking device in the fully lowered position (1);
- place the upper edge of the rear inner profile on the upper edge of the rail (2);
- rotate the device towards the rail (3);
- push the locking device upward until it stops (4).



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

Before removing the device, be sure the bus terminals have been extracted from their slots. Use a screwdriver to slide down the locking device and remove the device from the rail.



Note. It is recommended that the installation of the device always ensure the full accessibility of the front side to allow the display of the LEDs and access to the RESET button.

INSTALLATION TECHNICAL NOTES

- **WARNING Risk of electric shock!**
- After shut down AC or DC input, the power supply should remain disconnected at least 1 minute before any operation.
- When installing the input wire of the power supply, please connect the Ground terminal first, and then connect the L wire and N wire.
- When removing the input wire, please remove the L wire and N wire first, and then remove the GND wire.
- Please make sure that no objects fall into the power supply during installation and uninstallation.
- Please pay attention to high temperature.
- After the power supply works in high-temperature environment, please wait for its casing to cool down before any operation.
- This product needs to be installed by professionals and needs to be used with other equipment.



Electrical connections

The connection to the input main supply 180 ~ 264 Vac, 254 ~ 370 Vdc is made with screw terminals (⏏, L, N) located on the lower front of the device. Characteristics of the terminal blocks:

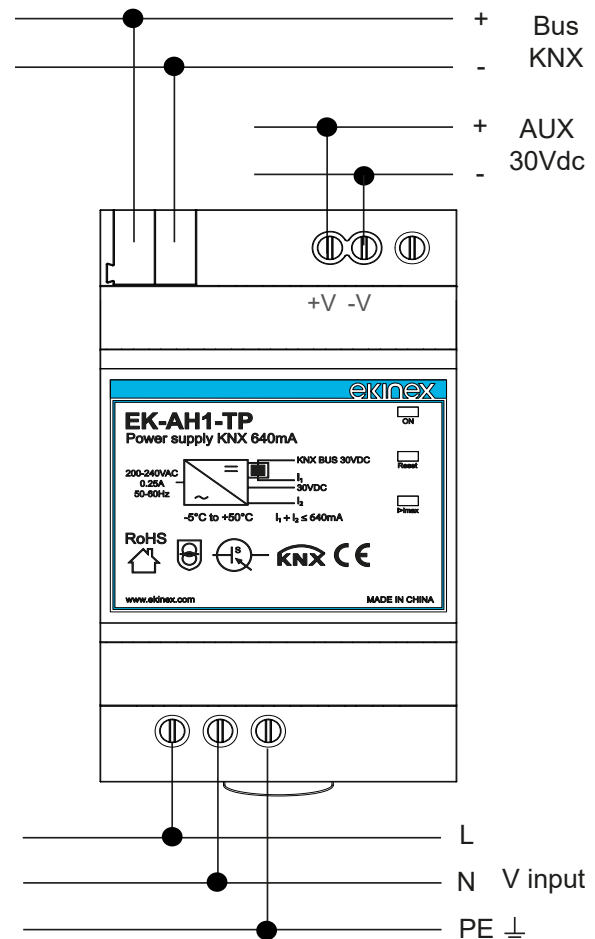
- screw clamping of conductors (use a slotted screwdriver 2.5*0.4-3.5*0.6)
- Conductor wiring size: 0.5 ~ 4.0 mm solid core or 0.5 ~ 2.5 mm finely stranded
- recommended wire stripping approx. 6 mm
- torque max 0.8 Nm



Warning! The electrical connection of the device can be carried out only by qualified personnel. The incorrect installation may result in electric shock or fire. Before making the electrical connections, make sure the power supply has been turned off.



Warning! The power supply line to which the device is connected must be equipped with an easily accessible disconnecting device with minimum separation distance between contacts of 3 mm.



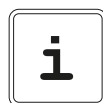
Note. The internal L line and N line of the power supply have been connected in series with a 250V 2A fuse. For better protection, it is recommended that customers use a circuit breaker not higher than 2A (enhanced protection, non-essential requirements).

KNX bus line

The connection to the KNX bus line is made with the terminal block (black/red) included in delivery and inserted into the slot located on the upper left part of the front. The bus output has a choke near the output terminal. At any output voltage, the maximum output current and power must not exceed the rated/specified value. The output current must not exceed the maximum output current value.

Characteristics of the KNX terminal block:

- spring clamping of conductors
- 4 seats for conductors for each polarity
- terminal suitable for KNX bus cable with single-wire conductors and diameter between 0.6 and 0.8 mm (20 ~ 22AWG)
- recommended wire stripping approx. 5 mm
- color codification: red = + (positive) bus conductor, black = - (negative) bus conductor



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

Auxiliary output

The 30 Vdc auxiliary output has a dedicated connection with screw terminal block. The auxiliary output has no choke. When the auxiliary circuit is loaded, it is necessary to ensure that the sum of the current of main circuit and auxiliary circuit does not exceed the maximum output current value.

Characteristics of the terminal block for the auxiliary output:

- 2-pin solder terminal, the center distance is 5.0mm
- screw clamping of conductors
- conductor wiring size: solid 0.5 ~ 4.0 mm² or stranded 0.5 ~ 2.5 mm² (12 ~ 26AWG)
- recommended wire stripping approx. 6 mm
- torque max 0.8 Nm

For the connection of the auxiliary output and the powered devices it is recommended to use a cable with a sheath of a different color than the cable connecting the KNX bus line.

Configuration and commissioning

Configuration

The device does not require any configuration with ETS® (Engineering Tool Software) tool. The application software APEKAH1TP##.knxprod (## = version) is available in order to add the power supply to an ETS project.

Commissioning

For the commissioning of the device turn on the input mains power supply to which the device is connected. The LED marked "ON" solid green indicates the device operating in the normal range.

Reset

The power supply has a reset button, which is a 4-pin tactile switch; if the button is pressed, the device is not powered and the connected bus devices are restored to their initial condition. The red reset LED remains on as long as the reset button is pressed. By holding down the button for 20 seconds, the reset LED goes off, the "ON" LED lights green, and the power supply works normally.

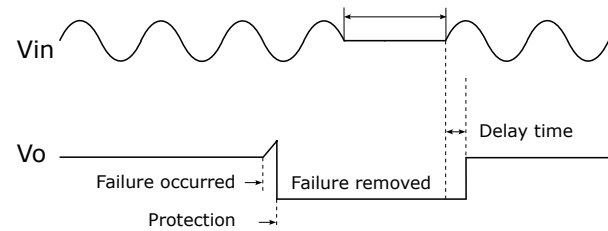
Failure

When the LED labeled "I > I_{max}", is turned on solid red, this means that the KNX output is overloaded or short-circuited. The problem can be solved by removing the cause of the short circuit or by reducing the number of KNX devices connected to the line. After the removal of the problem only the green LED "ON" is turned on, at this time it is recommended to reset the line.

Protections

Over-voltage protection

The over voltage protection is to shut down main circuit output when output voltage reaches the protected voltage. When the main circuit overvoltage protection occurs, the main circuit output voltage of power supply is shut down. The main circuit output will recover automatically after failure is removed.



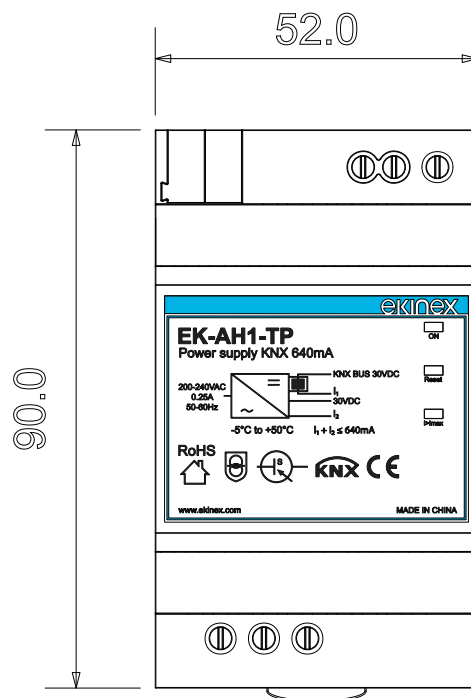
Over-current protection

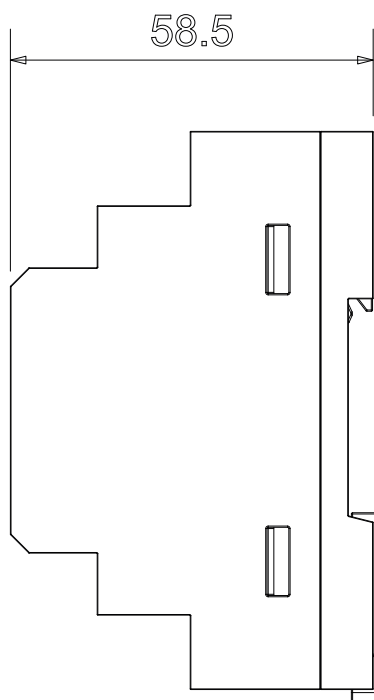
Under normal temperature, when the sum of the output current of main circuit and auxiliary circuit exceeds 205% of the rated output current, the DC output is turned off. After failure removed, the output will resume.

Short circuit protection

When output is short-circuited, the power supply output is in constant current output mode, which can be a long-term protection. When short-circuited status disappears, power supply will resume normal output within 3 seconds.

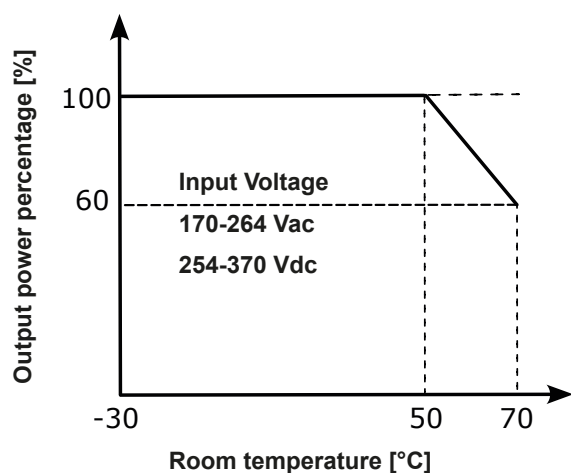
Dimensions [mm]



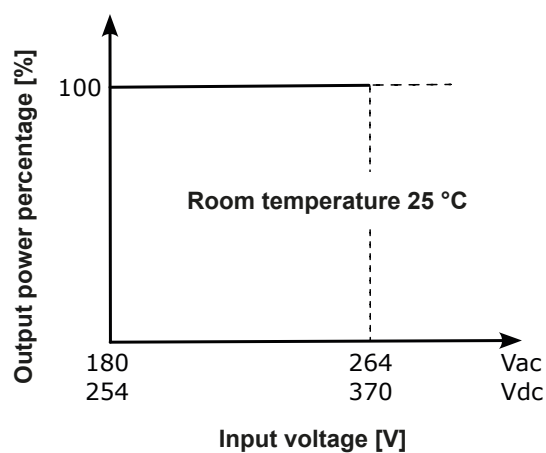


Characteristic curves

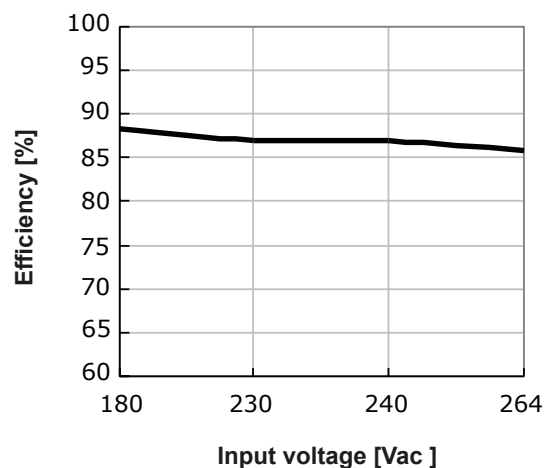
Temperature derating curve



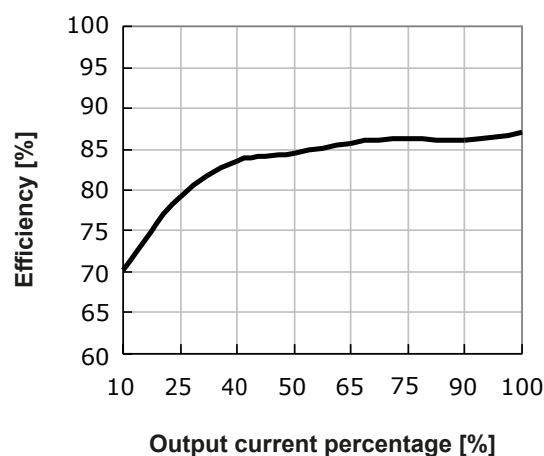
Input Voltage derating curve



Efficiency vs Input voltage (full load)



Efficiency vs Output load (Vin=230 Vac)



Marks

- KNX
- CE: the device complies with the Low Voltage Directive (2014/35/EU), the Electromagnetic Compatibility Directive (2014/30/EU) and the RoHS II Directive (2011/65/EU). Tests carried out according to EN 62368-1:2014+A11:2017, EN 55032:2012+AC:2013, EN 55035:2017, IEC 62321:2008

Maintenance

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

Disposal



At the end of its useful life the product described in this datasheet is classified as waste from electronic equipment in accordance with the European Directive 2002/96/EC (WEEE), and cannot be disposed together with the municipal undifferentiated solid waste.



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

Documentation

This datasheet refers to the release A1.0 of the ekinex® device EK-AH1-TP, and is available for download at www.ekinex.com as a PDF (Portable Data Format) file.

File name	Device release	Updating
STEKAH1TP_EN.pdf	A1.0	10 / 2023

Warnings

- Installation, electrical connection, configuration and commissioning of the device can only be carried out by qualified personnel in compliance with the applicable technical standards and laws of the respective countries
- Opening the housing of the device causes the immediate end of the warranty period
- In case of tampering, the compliance with the essential requirements of the applicable directives, for which the device has been certified, is no longer guaranteed
- ekinex® KNX defective devices must be returned to the manufacturer at the following address: EKINEX S.p.A. Via Novara 37, I-28010 Vaprio d'Agogna (NO) Italy.

Other information

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