DATA CONCENTRATOR

CAM65

The data concentrator (further also as CAM65) is a fully programmable device used in automated meter management (AMM) systems and used to collect data from meters. The control core is based on an industrial mono-board computer with the Linux operating system. Via its communication interface, the concentrator ensures connection to meters, reads the data from them and controls them. Data collection tasks are programmed and run automatically according to an internal calendar. Data obtained are processed, stored in internal storage and provided to the master system - HES. The key functionality is the support of direct HES access to individual electricity meters.
The data concentrator may communicate with hundreds of electricity meters. The specific number is determined by the extent of data collection and the communication technology used. The modular structure allows for the implementation of new hardware as well as protocol modules.

In the direction of electricity meters it is possible e.g.:

- to read electricity meter registries,,
- to read electricity meter alarms and incidents,
- to transfer commands to the electricity meter,
- to transfer parametrization information to the electricity meter,
- to change the firmware in the electricity meter.

In the direction of HES it is possible e.g.:

- to transfer the data read,,
- to transfer alarms and incidents from electricity meters and CAM65,
- to transfer data relating to communication success and communication records,
- to receive commands for parametrization of electricity meters and CAM65 přijímat povely pro parametrizaci elektroměrů a CAM65,
- to receive new CAM65 and electricity meter firmware.

CAM65 does not include any meter, it is purely an IT device.

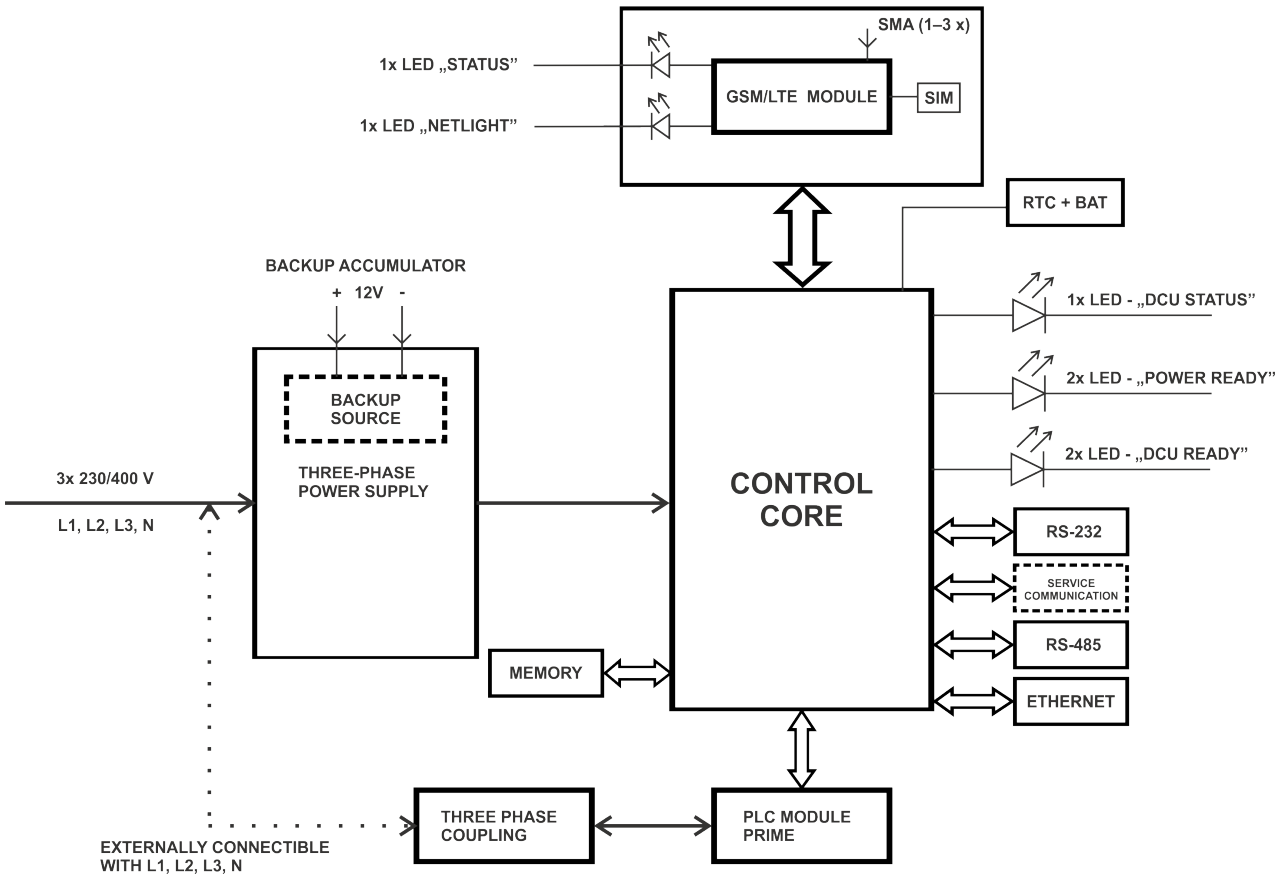
TECHNICAL DATA

Basic data	
Nominal supply voltage (U_n)	3 x 230/400 V
Operating voltage range	0.75 U_n to 1.15 U_n
Own consumption at U_n	6.5 W/15 VA typ., 32 W/55 VA max.
Nominal frequency (f_n)	50 Hz, 60 Hz
Protection class	2
Electrical insulation input - output	minimum 4 kV/50 Hz/60 s
Power supply	
Supply terminals L1, L2, L3, N	Supplied by each phase
Terminal diameter	5.6 mm
Maximum conductor cross section	20 mm^2
Screw type in supply terminals	SL - PZ (combined thread - posidrive, size 2 according to ISO 4757)
Ancillary terminal type	Screw terminals and standardized connecters RJ-45, RJ-11
Protection against contact with live parts	Strengthened insulation. Terminal block designed to prevent any short-circuit possibility during two-pole voltage test according to EN 61243-2
Backup possibility	Maintenance-free accumulator VRLA (SLA) 12 V, min. 1.2 Ah
Control core	
Operating system	Linux, Debian 9
Processor	1 GHz AM3358 ARM® Cortex-A8
RAM	512 MB DDR3L
Internal storage	4 GB
Outputs and inputs	
Ethernet port/LAN	1 x RJ-45, 10/100 Mb
RS-232	1 x RJ-11, 6 positions, 6 contacts
RS-485	A, B, GND - plugin connector with screw terminal. Half duplex.
Service connector	Service pin connector
GSM radio - WAN	2 G, 2.5 G, 4 G according to configuration, EU frequency
Ambient impact	
Operating temperature	–40 °C to +70 °C
Storage temperature	–40 °C to +70 °C
Operating humidity	According to standard ČSN EN 50470-1
IP Code	IP53 according to ČSN EN 60529
Weight and dimensions	
Weight	1.7 kg
Width	183 mm
Height	280 mm
Depth	82 mm
Basic functions	
Hardware watchdog	
Internal storage	Example for 4 GB microSD card: 200 meters, 15 minute profile = 3-6 months of history 200 meters, daily profile = 2-5 year history Real history length depends on the number of read registries and incidents
Communication code	Direct (gateway – direct communication with meters) or indirect (concentrator – data collection)
Automatic tasks in indirect mode	Readings, meter search, exports, meter settings
Allocation of electricity meters to concentrator	Automatic (standard) or manual (white list / black list)
Configuration via the web interface	
Interface to meters	
Physical and link layer	PLC PRIME – passive link, distribution into all phases
Physical layer	RS-485, RS-232
Application protocol	DLMS, M-BUS, Flag (IEC1107), MODBUS, PROFIBUS, DLT645 and others (added continuously)
Data safety	DLMS Security Suite 0

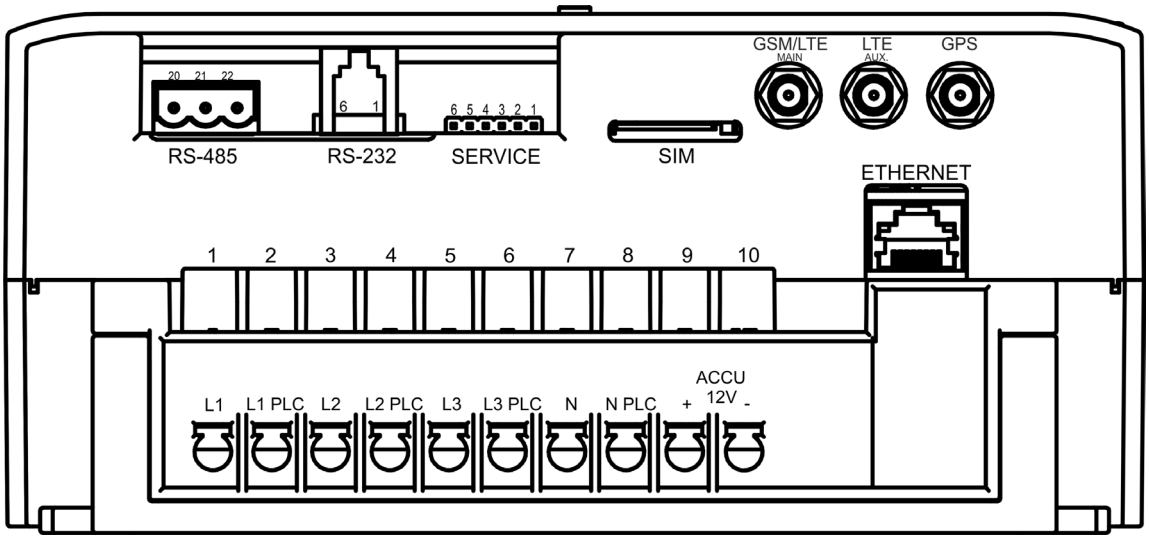
Interface to HES/MDMS	
Physical and link layer	GSM/LTE, Ethernet, possible to connect any Ethernet router for connection to the mobile network
Network layer	Supports IPv4, IPv6 DLMS, SOAP
Application layer	Any selection of registries or incidents, profiles, consumption, max. data. Data export to CSV or XML according to need HES, ZIP compression possible, ČR OTE formats, MultiSpeak, CIM and others (added continuously). Spontaneous alarms, may be sent to FTP or SMTP (e-mail).
Data safety	Security Suite 0, or possibly 1, HTTPS

Electromagnetic compatibility selected standards		
Resistance	Úroveň	Criterion
ČSN EN 61000-4-2	8 kV	B
ČSN EN 61000-4-3	10 V/m	A
ČSN EN 61000-4-4	4 kV	B
ČSN EN 61000-4-5	4 kV napájení, 2 kV RS-485	B
ČSN EN 61000-4-6	3 V or 10 V depending on configuration	A
Emissions		
ČSN EN 55032	Class B device	

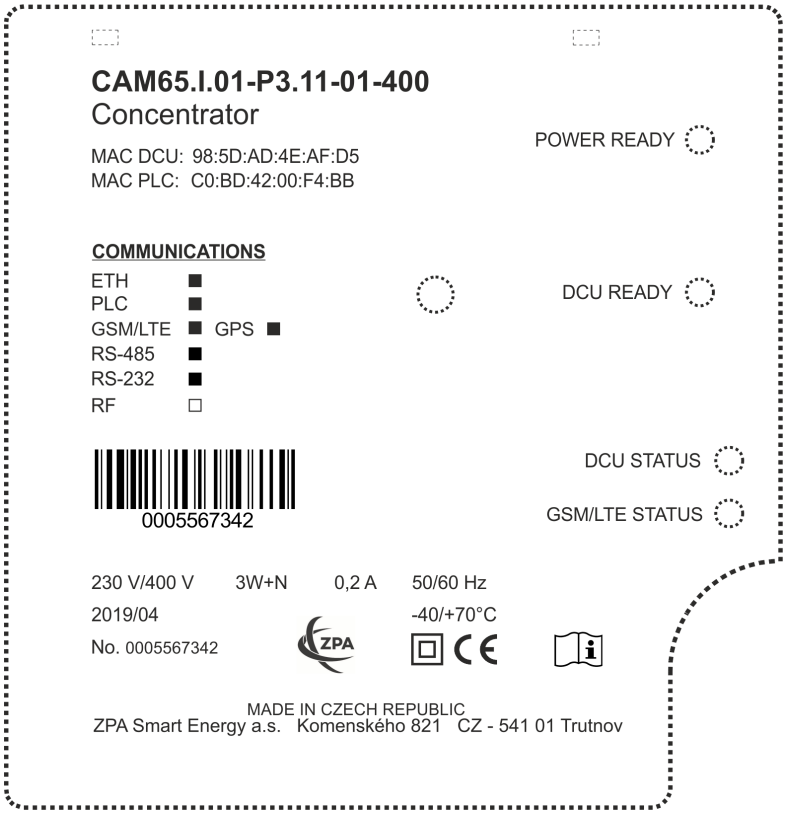
BLOCK SCHEME:



COMMUNICATION PORT STRUCTURE, SUPPLY TERMINALS::

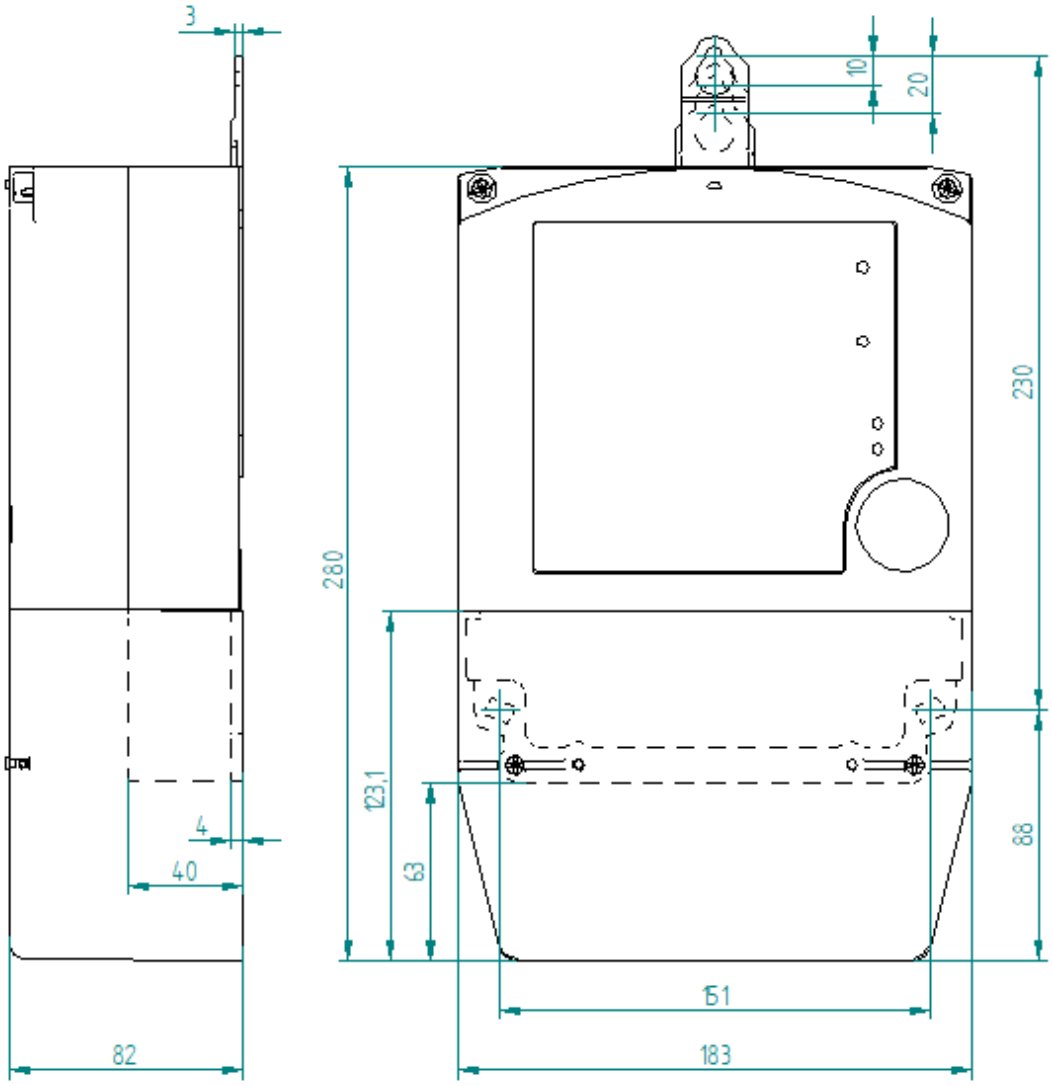


LABEL DESCRIPTION:



A number of LED's are used to signal operational status of the data concentrator:	
POWER READY	Green and yellow LED
DCU READY	Red and white LED
DCU STATUS	Blue LED
GSM/LTE STATUS	Green and yellow LED

DIMENSIONAL SCHEME:



MODEL MARKING OF DATA CONCENTRATOR CAM65:

CAM 6	#	.	#	.	#	#	-	#	#	.	#	#	-	#	#	.	#	#	#
Finish																			
cover AM365	5																		
Connection																			
terminal box of indirect electricity			I																
Insulation																			
double insulation, overvoltage category III.					0														
double insulation, overvoltage category IV.					1														
Supply																			
U_n = 230 V						0													
U_n = 230 V, backup accumulator support						1													
PLC																			
without PLC								0											
PRIME								P											
GSM																			
without GSM communication									0										
2G/2.5G - HSCDS, GPRS									1										
2.5G - EDGE									2										
4G - LTE (including 2G, 2.5G)									3										
RS-485																			
without RS-485											0								
standard - internal supply not provided externally											1								
RS-232																			
without RS-232												0							
standard - internal supply not provided externally												1							
USB																			
without USB														0					
USB A (host) for external flash disk														1					
internal USB for flash disk (storage extension)														2					
RF/GPS																			
without RF/GPS															0				
GPS (only with 4G - LTE)															1				
Version																			
format 1, 2, 3, 4 etc.																	4		
Modification: no client modifications																		0	0

Standard concentrator variant:
CAM65.I.01-P0.11-00-400

Further available variants:

CAM65.I.01-P0.00-00-400
CAM65.I.01-00.11-00-400
CAM65.I.01-P3.11-00-400
CAM65.I.01-P3.00-00-400
CAM65.I.01-03.11-00-400
CAM65.I.01-P3.11-01-400
CAM65.I.01-P3.00-01-400
CAM65.I.01-03.11-01-400

NORMS AND STANDARDS:

SAFETY

EN 60950-1 ed. 2 - Information technology equipment. Safety. General requirements

ELECTROMAGNETIC COMPATIBILITY (EMC) - IMUNITY

EN 55024 - Information technology equipment - Immunity characteristics - Limits and methods of measurement
EN 50065-2-3 – Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148,5 kHz Part 2-3: Immunity requirements for mains communications equipment and systems operating in the range of frequencies 3 kHz to 95 kHz and intended for use by electricity suppliers and distributors
EN 61000-6-2 ed. 3 – Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments
EN 61000-4-2 ed. 2 – Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test
EN 61000-4-3 – Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-4 – Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
EN 61000-4-5 – Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
EN 61000-4-6 – Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-8 ed. 2 – Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test
EN 61000-4-11 – Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests

ELECTROMAGNETIC COMPATIBILITY (EMC) - EMISSION

EN 61000-3-2 ed. 4 – Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase), chapter 7 – limits for devices with input 75W and les are not specified
EN 55032 – Electromagnetic compatibility of multimedia equipment – Emission requirement
EN 50065-1 – Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148,5 kHz. General requirements, frequency bands and electromagnetic disturbances
EN 61000-3-3 – Electromagnetic compatibility (EMC). Limits. Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

ELECTROMAGNETIC COMPATIBILITY AND RADIO SPECTRUM MATTERS (ERM)

EN 301 489-1 V1.9.2 – Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements

MANUFACTURER WARNINGS:

The manufacturer warns of the risk of possible danger resulting from incorrect handling or incorrect use of the product as follows:

- Installation and maintenance must be performed by a personnel with the corresponding electro-technical qualification and adequately trained, that shall inform the operator on conditions of safe operation;
- The product shall not be used for purposes other than those it was manufactured for;
- The product shall not be willfully modified contrary to the type design;
- The product shall not be operated with voltage, current or frequency other than those it was produced or professionally modified for;
- The product shall be located and secured so as to complicate or disable handling by persons with no electro-technical qualification, especially children;
- Before every new putting to operation, e.g. after repair, maintenance etc., Ingress Protection shall be restored in full, all safety measures taken and inspection done by a designated electrical inspector;
- During operation, premises where the product is installed, shall be free of danger of fire or explosion in case of development of gases, vapors of inflammable liquids and occurrence of inflammable dust,
- The product shall be handled by a qualified and adequately trained person only, and handling shall be performed without voltage with the exception of measurement by measuring meter with insulated tips;
- The product shall not be operated under conditions or in an environment not ensuring safe operation (e.g. location on flammable base, cover from inflammable material, insufficient protection from penetration of foreign elements, water or other liquids);
- The product shall be located and operated in an indoor environment, i.e. in places providing additional protection against effects of external environment (e.g. inside a building or cabinet).
- The product shall not be operated in an environment with major vibrations and oscillations or under such conditions.

Failure of the user to observe any of the aforesaid warnings renders the manufacturer not being liable for a defect occurring as an incidental consequence of this failure. Non-observance of storage, operation and safety conditions recommended in article Care And Maintenance can have an adverse effect on the product service life.

Jestliže uživatel nebude respektovat některé ze shora uvedených upozornění a jestliže v příčinné souvislosti s tímto nedodržením vznikne závada, odpovědnost výrobce za vadu nevzniká. Nedodržení doporučených skladovacích a provozních podmínek zařízení může mít negativní vliv na životnost zařízení.

RESPONSIBILITY

The owner of the product is responsible for ensuring that all persons engaged in working and handling the product:

- Are knowledgeable and qualified as per national regulations;
- Have read and understood corresponding parts of this document;
- Strictly observe safety regulations and operation data stipulated in its individual articles.

The owner of the product is further responsible for:

- Protection of persons;
- Prevention of damage to material;
- Personnel training.

SAFETY INSTRUCTIONS

The following safety instructions shall be observed under all circumstances:

- Wires the product is connected to shall be powered neither during installation nor replacement. Powered contacts pose a life threat. For this reason, until the work is finished, the corresponding power supply fuses shall be removed and stored in a place, safeguarding against unnoticed reinstallation by a person holding no responsibility;
- Prior to installation, the product shall be disconnected from the power supply. Simultaneously, undesirable power (re)connection by other parties shall be precluded. Prior to installation, testing or a metering instrument shall prove that no power supply is really present. The same applies for product replacement;
- Local safety regulations shall be observed. The product installation shall be executed solely by qualified and trained personnel;
- During installation, the product shall be firmly held or secured against falling and causing injury,
- Dropped product shall not be installed even if showing no visible signs of damage. They shall be returned for inspection either to designated repair office or directly to manufacturer. Internal damage can cause functional failures or a short circuit,
- The product shall by no means be cleaned under running water or by high-pressure equipment. Water penetration can cause a short circuit. It is necessary to respect ingress protection of the device.

MAINTENANCE AND STORAGE

The product is a maintenance-free product with a specified minimum service life according to the Product Specification. For possible cleaning of the outside surface from dust and other impurities, the manufacturer does not recommend using organic solvents, aggressive chemicals and abrasive cleaning agents. Prescribed storage temperatures shall be complied with: failure to do so can result in shortening of electronic components service life. The product shall be protected against wet and humid conditions. It is designed for internal use, i.e. it may be used only in places providing additional protection against the effects of external environment (e.g. in a building or cabinet). Precipitation, humidity and liquids containing minerals can cause corrosion of electric circuits if the device becomes wet. The product shall not be placed on and dried by a source of heat or inserted into a source of heat (e.g. microwave oven, classic oven or radiator / heater) as it can overheat and some of its parts explode. It shall not be exposed to excessive heat as it can lead to deformation of case / cover. The product shall not be stored in cold premises, especially with subsequent warming-up (to nominal operation temperature). Humidity can condensate inside and damage electronic components or isolation properties of the product can deteriorate.

DISPOSAL

As per certificate ISO 14001 data, the components used in the product are mostly separable and so can be disposed of or recycled accordingly. At the end of its service life, the product shall be handed over to specialized companies dealing in used material separation and consequent recycling. An unused product shall be disposed of ecologically as per the Waste Act.
The product contains no radioactive, carcinogenic or other materials having an adverse effect either on human health or the environment.
All plastic materials can be recycled.
Packing is recyclable and at the end of its service life shall be handed over to specialized companies as a source of secondary raw materials or energy.

SERVICE

Service shall be ensured by: ZPA Smart Energy a.s., Komenskeho 821, Stredni Predmesti, 541 01 Trutnov, Czech Republic, Trademark Smart Energy, Tel. + 420 499 907 111, E-mail zpa@zpa.cz, www.zpa.cz.

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