

OUTDOOR CABINETS

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GENERAL INFORMATION



In the period of last few years, the increase of telephone-users and density of ducts surrounding cities which are endangered on easy damage, forces the manufacturers of telecommunication links to work out and use ducts under the earth-surface. Together with the increase of transferring wider frequency band, it appeared that there are some difficulties with providing appropriate quality of transmission with using copper wires. Wider pass bands in fast networks, like Gbit Ethernet or ATM, means necessity of assistance the copper wires with complicated electronic systems. That is the reason why fibre optics became alternative solution to copper wires.

Not mentioning creation of brand-new networks, one of the biggest tasks for telecommunication network is protection of already made investments and re-usage of the biggest possible part of already existing cable-networks. This possibility is given by access systems. Access systems enable gradual changing distributive copper wires with fibre optics. This solution allows using existing exchange lines not only for transmission telephone and ISDN services, but also for transmission 2Mb/s flux with using digital exchange line technology.

The technology of access exchange guarantees updating existing transmission network with usage of valuable electronic equipment. In order to lower the costs of modernisation, the most common solution is joining old part of installation (copper wires) with new one (fibre optic cables) in outdoor access cabinets (like SZD).



The main task of outdoor access cabinet is full protection of installed equipment. The cabinet fulfils the requirements of protection against negative influence of environment (rain and snow falls, sun, dust etc) and vandalism. Another very important task of SZD cabinets is providing specified climatic conditions which depend on installed equipment.

The construction of SZD cabinet enables optional arrangement of inside equipment. It makes possible to use SZD cabinets not only in access systems, but also in each case where the protection of outdoor equipment working in extreme conditions is very important. SZD cabinets produced by ZPAS have been already used in telecommunication industry, on ships, platforms, stamping press and intermediate pumping gas stations, heat and power stations, power industry plants, refineries, cement plants, for protection of machinery for outdoor lightning operating etc.

GENERAL INFORMATION



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General information OUTDOOR CABINETS
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ZPAS 237

DESIGN



TECHNICAL DATA

Material

- Cabinets framework - aluminium profile,
- Side panels and doors - aluminium profile,
- Roof (internal mantle) - 1.5 mm thick aluminium sheet,
- Roof (external mantle) - alternatively stainless steel sheet, Al-Zn coated (aluzinc) steel sheet or aluminium sheet.
- and plinth

Surface finishing

- Aluminium profiles of the framework and aluminium frames of side panels and doors: Anodised (in EMC version chromate coated and powder painted in RAL 7035)
 - Aluminium profiles of side panels and doors: Chromate coated and powder painted in RAL 7035
 - Internal mantle of the roof: Natural aluminium
 - Plinth and external mantle of the roof: Powder painted in RAL 7035
- In EMC version of the cabinet conductivity between each elements of the construction is ensured.

Protection Degree

Standard cabinets have got protection degree IP 54 in accordance with EN 60529. If required it can be increased up to IP 55.

Note:

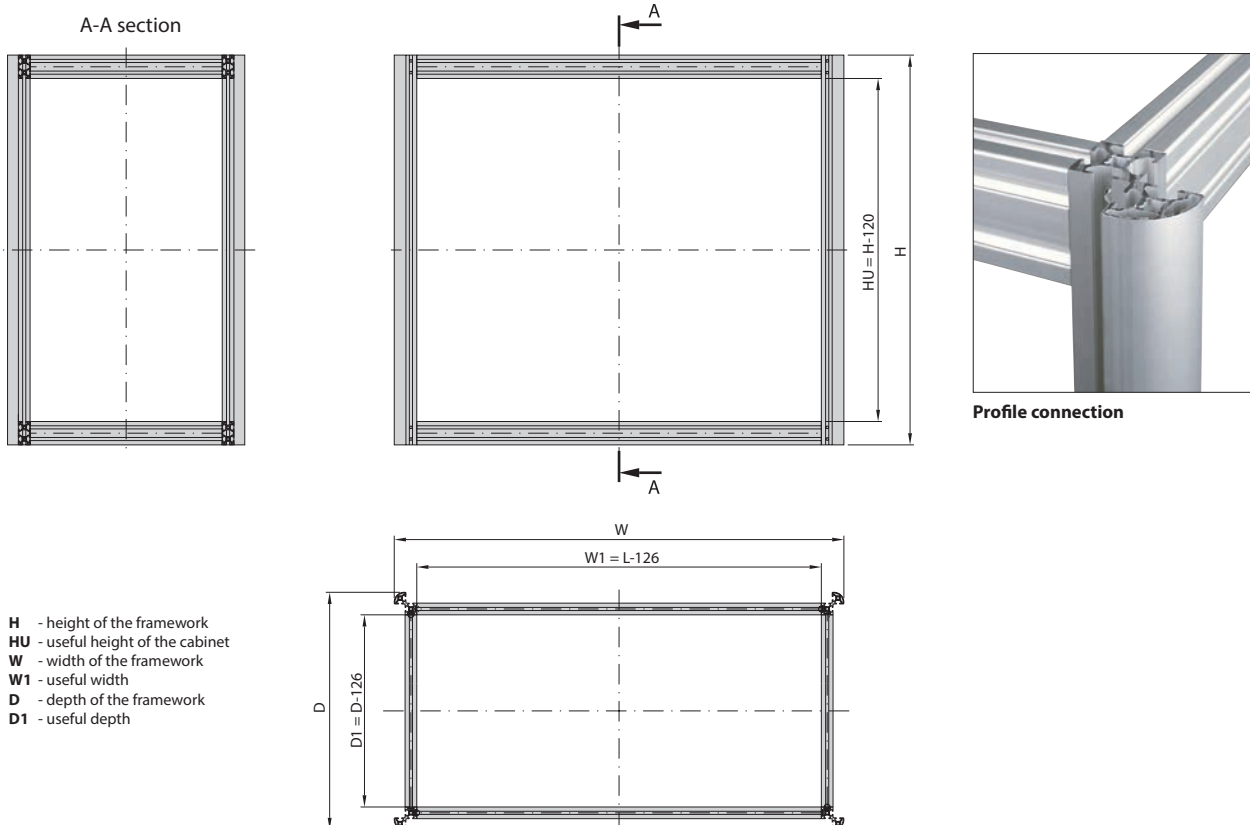
ZPAS reserves the rights to implement changes in construction. All technical solutions used in construction of SZD cabinets are reserved in Patent Office of Poland.

Framework

Supporting structure of the cabinet is the framework made of aluminium profiles, which are joint together by adaptors. In profiles there are special ducts, which enable the assembly of swing frame or optional creation of supporting structure for mounting equipment. The framework of the cabinet is in standard set on the plinth. The height of the plinth depends on customer's request: from 40 to 300 mm.



Framework of SZD cabinet set on the plinth



DESIGN



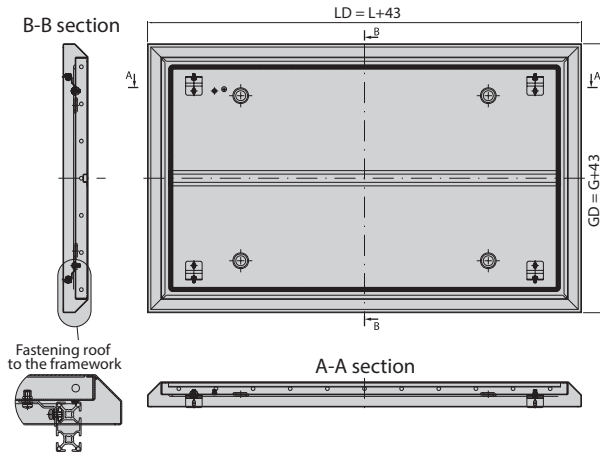
Doors, side panels

Doors and side panels of SZD cabinets are made of aluminium rail-profiles which are fastened together. The aluminium profiles make double ventilation wall. In the cabinet there are mounted two-point rod-latch locks. The door handle is made of zinc and aluminium alloy. On customer's request it is possible to have optional type of patent insert (ABLOY, KABA, EMKA, etc). It is possible to make special opening for temporary cable entry (e. g. from outside power supply unit).



Standard roof for SZD

Standard roof for SZD cabinets is made of two mantles of 1.5 mm thick sheet steel. Between the mantles there is a gap, which enables to carry away accumulated condensation water.



Roof in special configuration

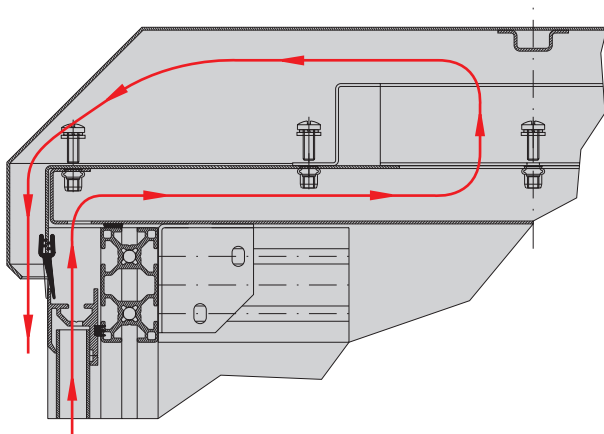
When it is necessary to cool the cabinet not only by ventilating through side panels and doors but also additional cooling system, it is possible to use special roof made of three mantles of sheet steel. This solution creates two air chambers in one of them it is possible to fasten fan units which increase the airflow.

Applying two-chambers roof causes, that the total height of the cabinet is increased by 100 mm.

Additionally, it is possible to fix lifting eyes into the roof.



A part of roof in special configuration



DESIGN



Dimensions of SZD cabinets

The SZD cabinet has a modular design. The main part of the cabinet is made of panels (which are fastened by latches) and aluminium profiles. Both panels and profiles can be cut to any length. This type of design makes it possible to achieve the desired cabinet dimensions. **Every cabinet is designed and manufactured on individual request (together with interior installation – it is possible to create all types of partitions and supporting structures of the cabinet).**

As a standard, the technology allows for the manufacture of cabinets with single or double leaf doors.



STANDARD DIMENSIONS OF CABINETS WITH SINGLE LEAF DOOR

External width W [mm]	Internal width W1 [mm]	External depth D [mm]	Internal depth D1 [mm]
409	283	409	283
509	383	509	383
609	483	609	483
709	583	709	583
809	683	809	683
1009	883	1009	883



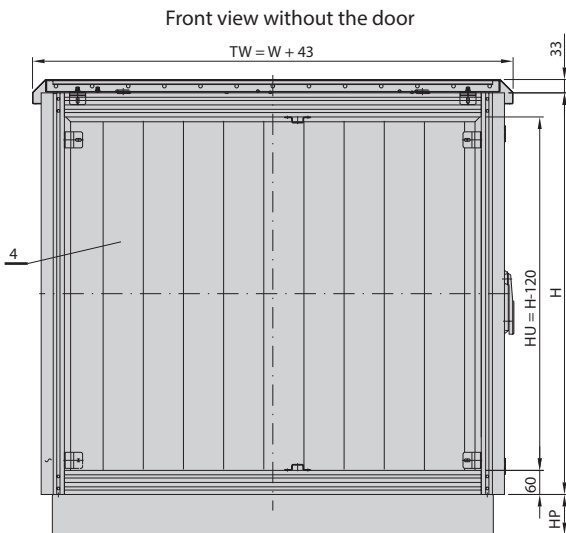
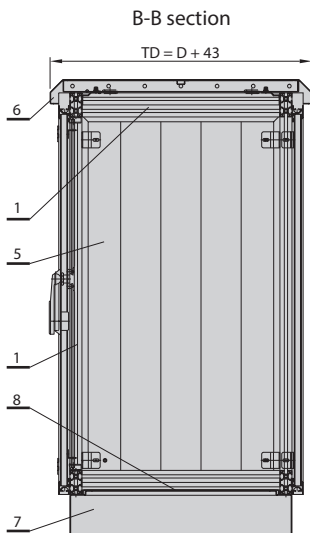
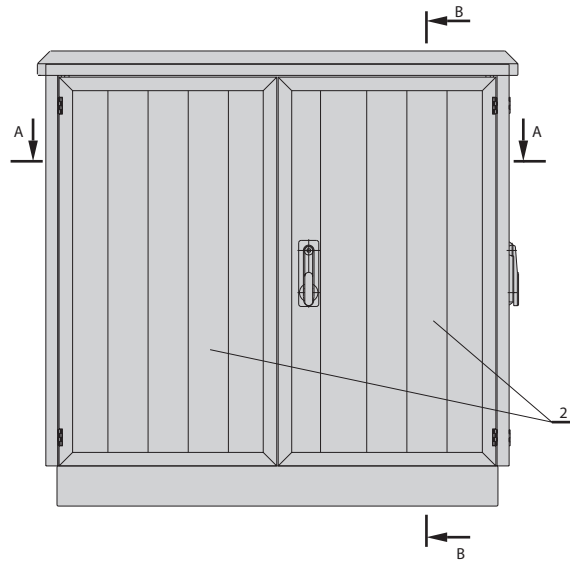
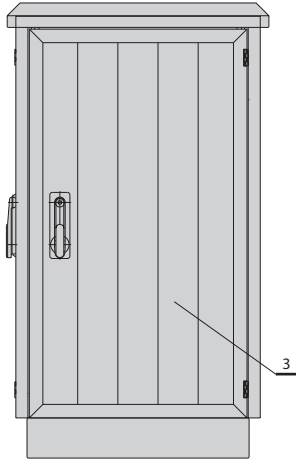
STANDARD DIMENSIONS OF CABINETS WITH DOUBLE LEAF DOOR

External width W [mm]	Internal width W1 [mm]	External depth D [mm]	Internal depth D1 [mm]
1154	1028	409	283
1254	1128	509	383
1354	1228	609	483
1453	1328	709	583
1554	1428	809	683
1654	1528	1009	883



MULTI-DOOR CABINETS

On request, we can deliver multi-door cabinets.



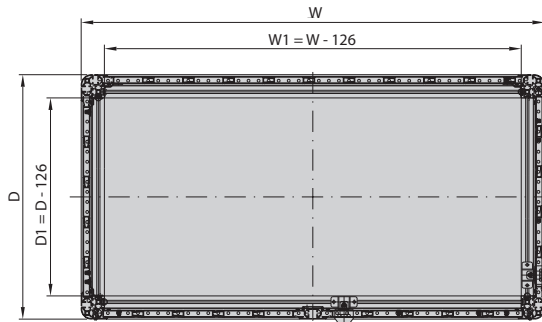
Height of the plinth HP - by customer's needs

DESIGN

- 1. Framework
- 2. Double-leaf front door
- 3. Side door
- 4. Rear panel
- 5. Side panel
- 6. Roof
- 7. Plinth
- 8. Bottom plate

- TD** - total depth of the cabinet
- D** - depth of the framework
- D1** - useful depth of the cabinet
- TW** - total width of the cabinet
- W** - width of the framework
- HP** - height of the plinth
- W1** - useful width of the cabinet

A-A section



Note:

The cabinets are available in any height.

For non-standard cabinet sizes, the way of calculating external dimensions is shown in the illustration.

VENTILATION

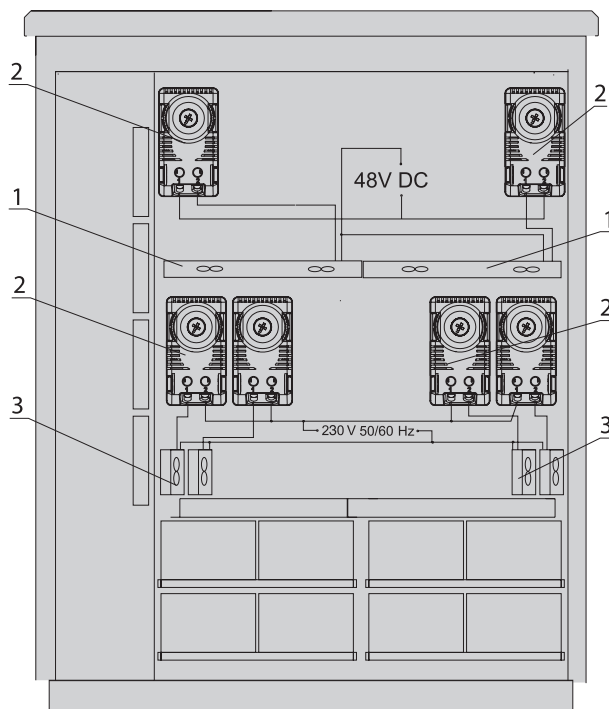


Fan unit with three cooling fans and thermostat

Ventilation with forced internal and free external air circulation

Fan units are mounted inside SZD cabinet in order to shorten time of carrying away heat dissipation emitted by equipment installed in the cabinet. Fan units cause faster air movement inside the cabinet and in the cabinet's walls. In case of low temperature the system of heaters joint with thermostats is applied. Above solutions enable failure-free operation of access systems.

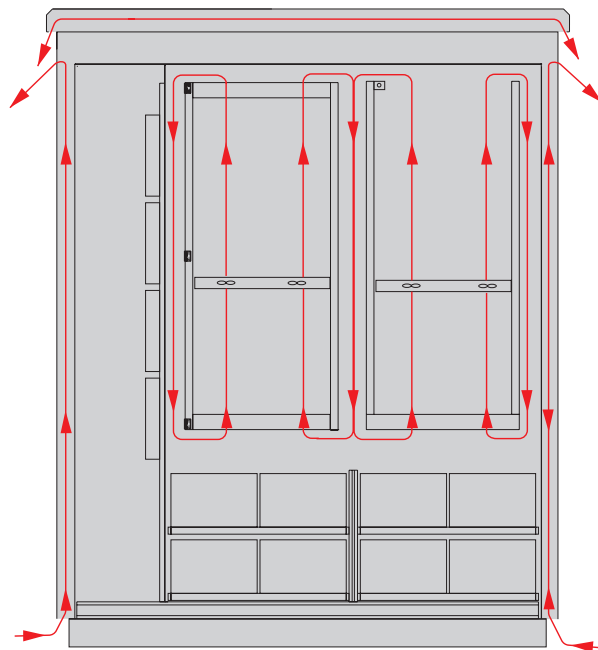
PICTORIAL DIAGRAM OF SUPPLYING FAN UNITS AND HEATERS



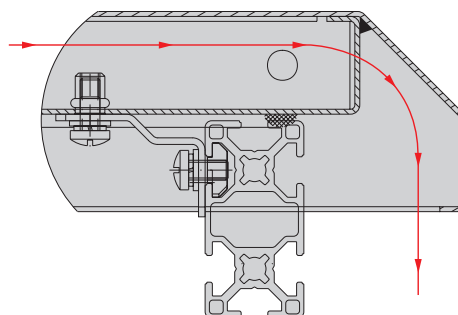
DESIGN

- 1. Fan unit
- 2. Thermostats
- 3. 400 W heaters with fan 220 V, 50/60 Hz

DIAGRAM OF AIR FLOW



AIR FLOW IN STANDARD ROOF



VENTILATION

Ventilation with forced internal and external air circulation

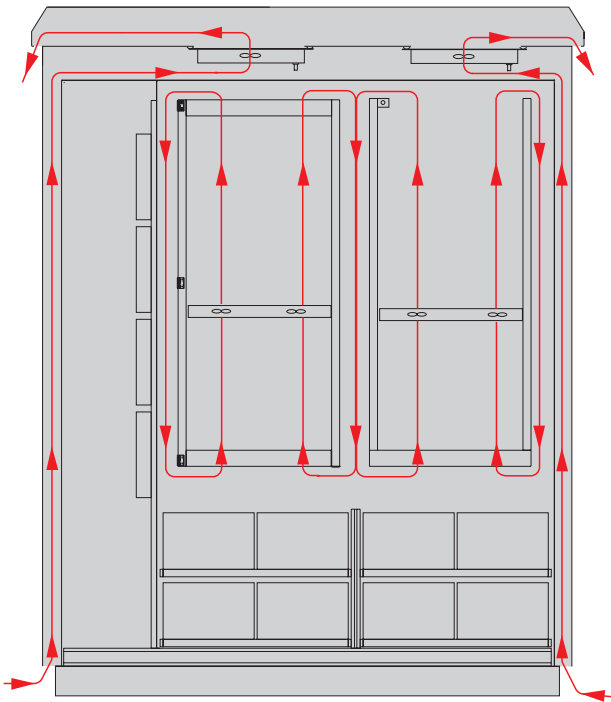
In cabinets which are endangered of strong solar radiation, it is recommended to use ventilation with double air circulation. In this solution, air circulates inside the cabinet and additionally flows between the double walls of the cabinet. Moreover, circulation of external air is forced by fan units mounted in the roof. In case of low temperature the system of heaters joint with thermostats is applied. Above solutions enable failure-free operation of access systems.



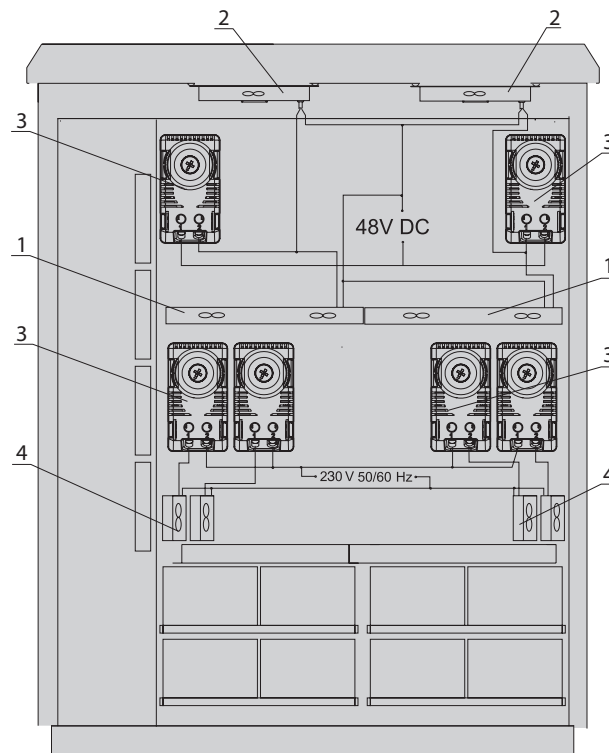
Fan unit with four cooling fans



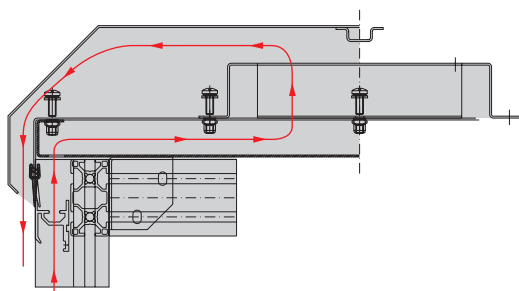
DIAGRAM OF AIR FLOW



PICTORIAL DIAGRAM OF SUPPLYING FAN UNITS, ROOF VENTILATORS AND HEATERS



AIR FLOW IN NON-STANDARD ROOF



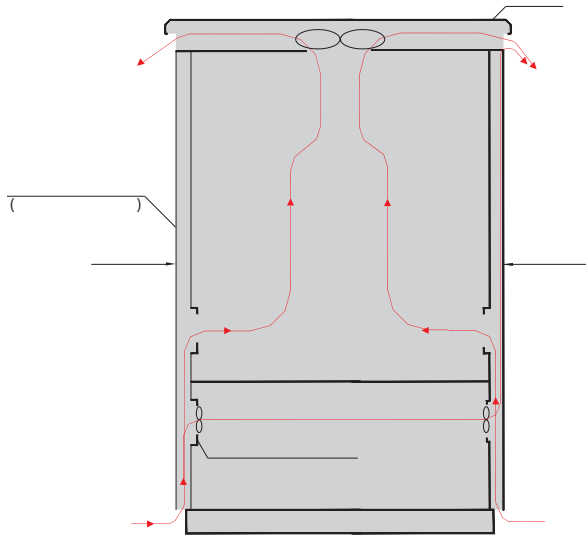
DESIGN

- 1. Fan unit
- 2. Roof ventilators
- 2. Thermostats
- 3. 400 W heaters with fan 220 V, 50/60 Hz

VENTILATION



PICTORIAL DIAGRAM OF AIR CIRCULATION IN THE CABINET WITH DIRECT VENTING

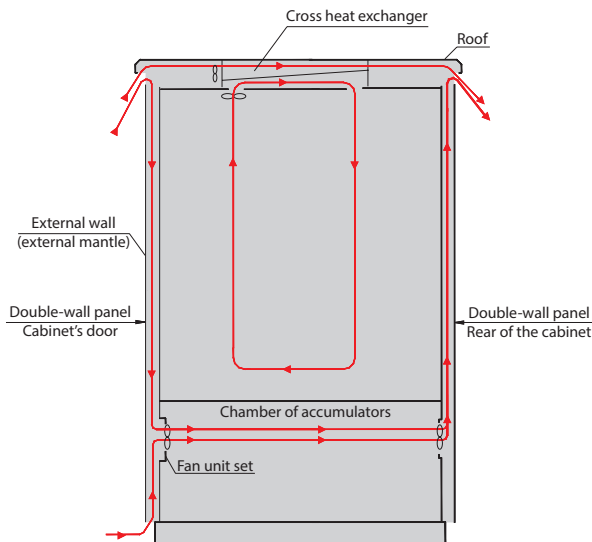


Ventilation based on use of heat exchanger and direct venting

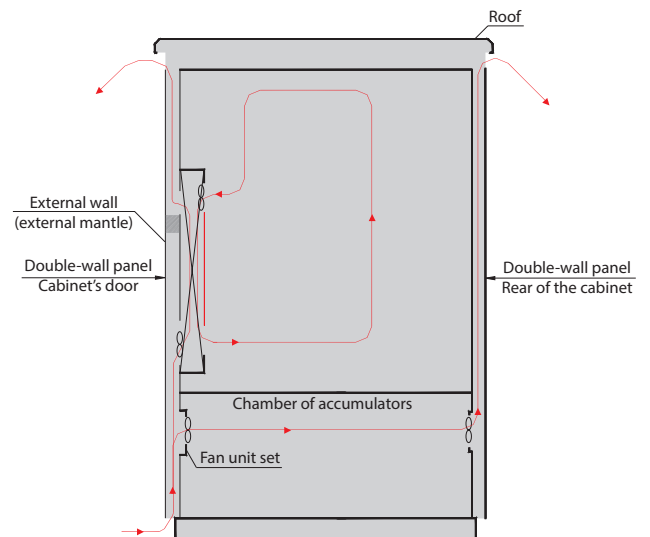
In order to intensify the cooling process in cabinets with installed equipment with high heat dissipation, there is solution based on cross heat exchanger. Heat exchanger is a type of radiator, where there are two air flows: warm from the inside of the cabinet (radiator's plates collect heat) and second from the outside of the cabinet (cooled by exchanger). Cross system of the heat exchanger enables to retain tightness of the cabinet and external and internal air flows do not mix together.

Another solution is direct venting of the cabinet, which is used when it is necessary to carry away lots of heat dissipation. In cabinet's roof or on the door there are mounted fans which pull external air (through double wall and filters system). External air goes through appliances which emit heat and is carried away outside by roof or perforations on the doors.

PICTORIAL DIAGRAM OF AIR CIRCULATION IN THE CABINET WITH HEAT EXCHANGER MOUNTED ON THE ROOF



PICTORIAL DIAGRAM OF AIR CIRCULATION IN THE CABINET WITH HEAT EXCHANGER MOUNTED ON THE DOOR



VENTILATION

Cabinet with heat exchanger mounted in the door



Cabinet with heat exchanger mounted in the roof



Cabinet with direct venting



AIR-CONDITIONING



Air conditioner partially flush into the cabinet

Air conditioned SZD cabinets

Air conditioners are used when the required temperature inside of the cabinet is lower than ambient temperature. The power of air conditioners is selected according to pre-set climatic conditions, heat dissipation by active equipment and dimensions of the cabinet. On individual customer's request the air conditioners can be fixed inside or outside of the cabinet. In case of inside installation, they are usually fixed on the doors or side panels, what enables easy service access.



Air conditioners fixed inside of the cabinet

AIR-CONDITIONING



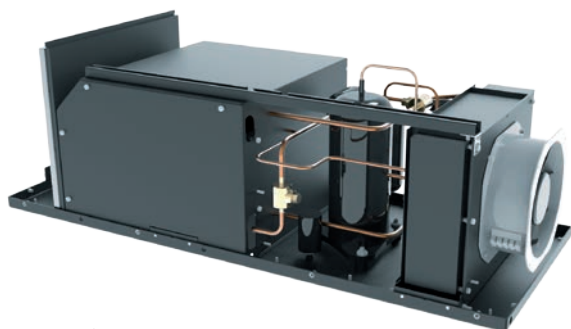
Air conditioners fixed outside of the cabinet

Cabinets air-conditioned with a reversible air heat pump

Unlike conventional air conditioning units, the reversible air heat pump can run in either cooling or heating mode. Thanks to this, it can maintain a set temperature and humidity in the cabinet all year round, while allowing lower energy consumption than when using an air conditioner or electric heaters.

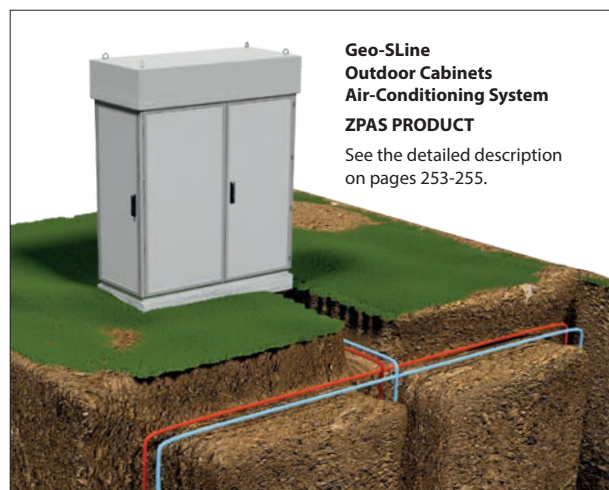
Cabinets air-conditioned with ground heat exchanger

Outdoor cabinets air-conditioning system using soil properties and involving heat accumulation. This accumulation works all year round in two modes:
 - summer, when it serves as a cool source,
 - winter, when it serves as a heat source.



AHP_35_Ti
Reversible Air Heat Pump
ZPAS PRODUCT

See the detailed description on pages 250-252.



Geo-SLine
Outdoor Cabinets
Air-Conditioning System
ZPAS PRODUCT

See the detailed description on pages 253-255.

AHP_35_Ti REVERSIBLE AIR HEAT PUMP



This unit has been created as a response to market needs for maintaining working conditions in outdoor data communication cabinets and power cabinets.

The operational principle is based on thermodynamic transformation which allows for a modern, maintenance-free, highly efficient source of cold and heat to be built.

The unit's operational algorithm is determined on the basis of temperature and humidity measurement inside the data communication cabinet. The unit is so efficient that it can maintain the set temperature from 10 to 40 °C and a relative humidity from 32 to 72 % beyond the point of condensation. With the reversing valve, the summer season's cooling can be easily switched to heating for the winter.

The unit periodically forces air circulation in order to reduce high temperature areas (annihilation of hot spots) caused by different device installation densities inside the cabinet.



Optionally, the unit can be protected against loss of primary 230 V power supply. Thanks to the inverter and the capability to switch to 48 V backup power from the cabinet's power station (if installed), the unit can continue cooling by switching to the heat exhaust mode without using a compressor. This solution eliminates the use of external valves, dampers or louvers which compromise the cabinet's integrity.

This unique use of thermodynamic transformation is patented for ZPAS.

The unit uses a microprocessor system for remote control and monitoring in order to achieve high cooling and heating efficiency in continuous operation with a follow-up adjustment of operational factors while minimizing energy and maintenance costs.



The unit ensures proper operation in ambient conditions from -33 to +50 °C. Power reserve allows for short-term operation should basic parameters be momentarily exceeded. The control and measurement system informs the user about the unit's status and associated alarms online. It also allows for changing the parameters remotely and certain on-off service operations. Operating parameters are stored in the unit's internal memory in the form of characteristics up to one year.

Benefits of using a reversible air heat pump

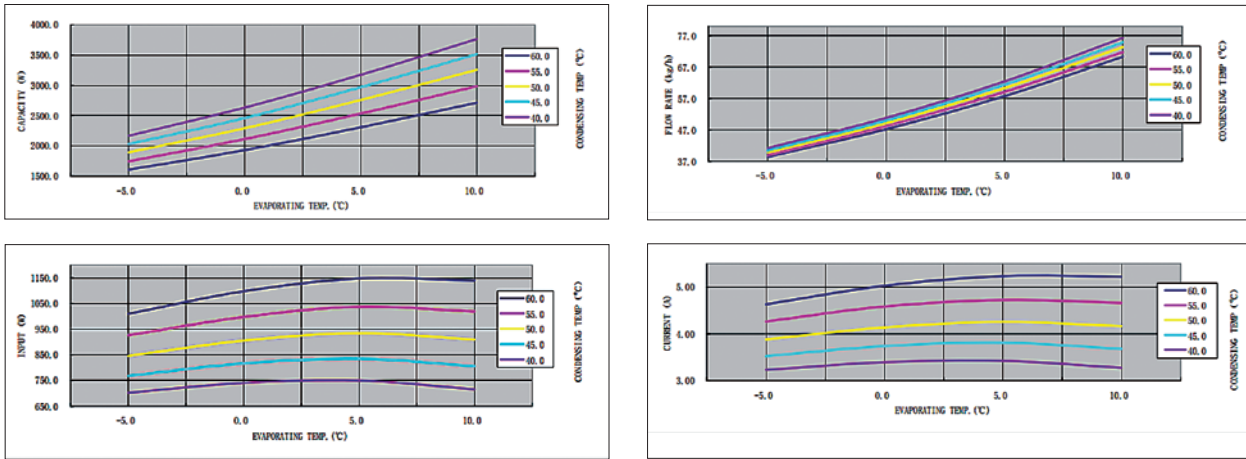
- a single device for year-round maintenance of desired temperature and humidity inside the cabinet while using very little electricity of about 1200 kWh a year;
- ensure optimal thermal conditions inside the cabinet after the primary power outage until power comes back by switching to passive cooling with minimum power consumption of 55 W – the "small passive" process – the innovation patented for ZPAS;
- smooth stabilization of temperature and humidity control above the dew point for cooling power up to 6 kW;
- high energy efficiency ratio $COP \leq 5$ for heating and cooling;
- IP 55 protection ensured without the need for external intermediary devices such as dampers and louvers;
- total reduction of the cost of ownership through complete remote control and monitoring.



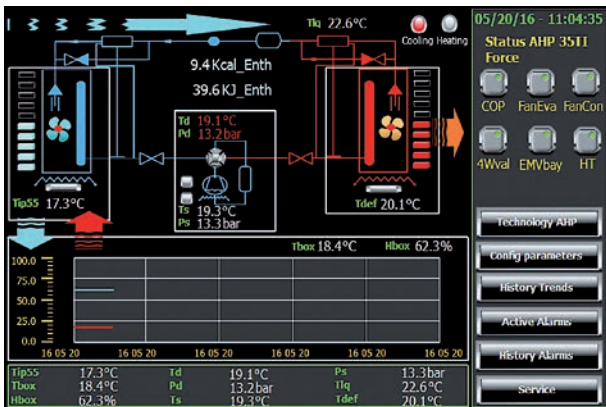
See the video:
zpas.pl/qr/f14

REVERSIBLE AIR HEAT PUMP **AHP_35_Ti**

Characteristics of efficiency, power, flow and current as a function of the evaporation temperature

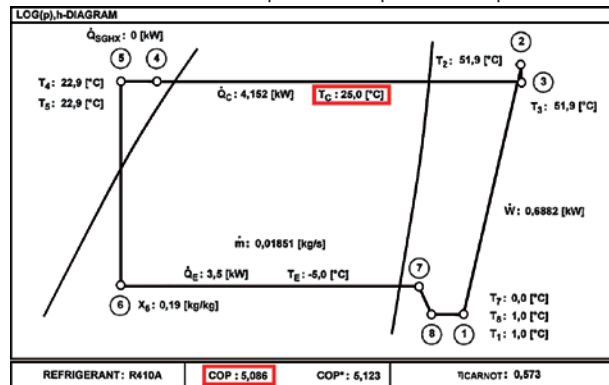


An example of remote unit monitoring

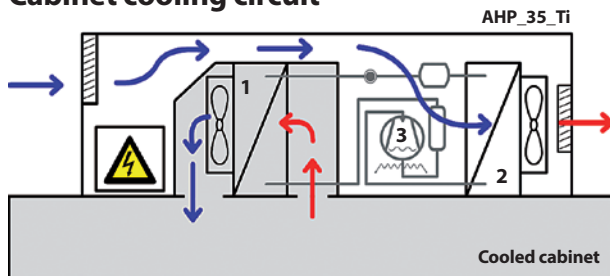


PH diagram for the system working at the cabinet temperature of 25 °C

Imaging of working parameters on the suction and condensation side in the imposed envelope of the compressor area

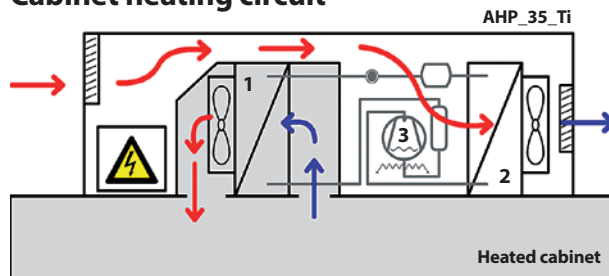


Cabinet cooling circuit



1 - heat exchanger as a vaporiser, 2 - heat exchanger as a condenser, 3 - compressor

Cabinet heating circuit



1 - heat exchanger as a condenser, 2 - heat exchanger as a vaporiser, 3 - compressor

Basic working parameters

Outdoor temperaturefrom -33 to +50 °C
 Outdoor humidityfrom 20 to 90 %
 Heating power6.6 kW (heating mode)
 Cooling power 3.5 kW (cooling mode)

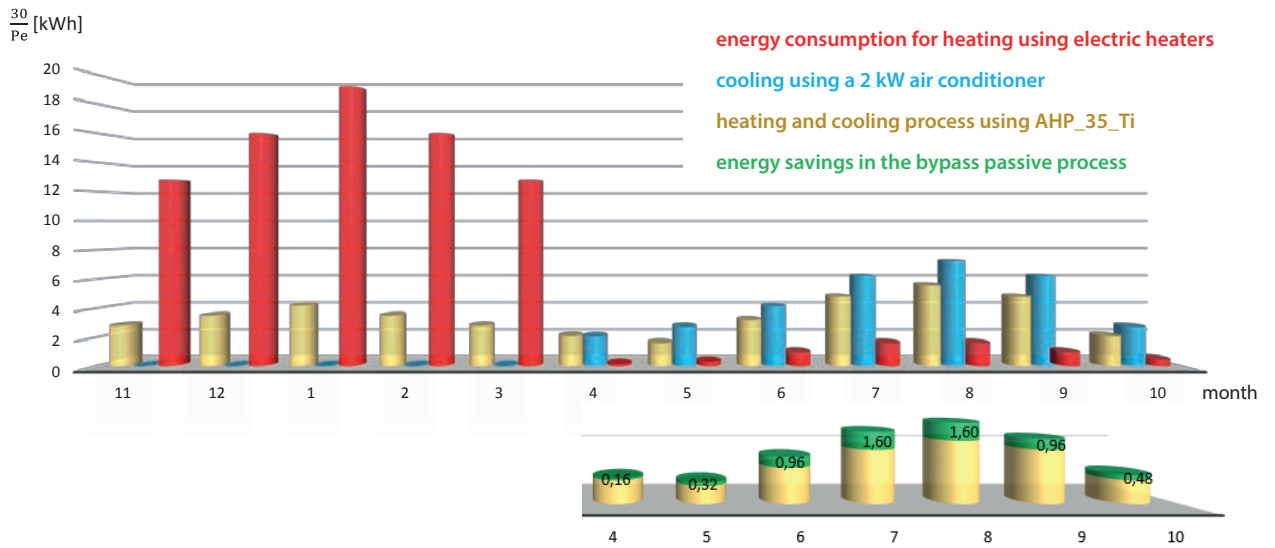
Average sound pressure level (L_{pfa}, 50/100%) 56/65 dBA
 Power consumption800-1000 W
 COP3-5 (depending on the operating conditions)

AHP_35_Ti REVERSIBLE AIR HEAT PUMP

Comparison of the annual electricity consumption for heating and cooling an outdoor cabinet using a standard solution (heater + air conditioner) and the AHP_35_Ti system

STANDARD (electric heaters and an air conditioner)
 $Pe_s = 3219 \text{ kWh} = 2506 \text{ kWh} + 713 \text{ kWh}$
 electric heaters + air conditioner

SYSTEM AHP_35_Ti (reversible heat pump)
 $Pe_{AHP} = 1206 \text{ kWh}$



Acoustic test results for SZD outdoor cabinet with AHP_35_Ti



GROUND HEAT EXCHANGER **Geo-SLine**

Air conditioning of outdoor cabinets using ground heat exchanger

Geo-SLine is the first-of-its-kind solution that uses renewable energy for heating and cooling outdoor cabinets. The system consists of a heat exchanger placed on top of the cabinet and a pipe coil embedded in the ground. Depending on the time of year, the coil gives up thermal energy to the ground or absorbs the energy from it.

Geo-SLine can prolong life of devices that are installed in outdoor cabinets, significantly improve their efficiency and reduce failure resulting from excessive temperature and humidity. This maintenance-free system runs continuously, and does not require any additional expenditure.

Its biggest advantage is energy efficiency. It allows you to significantly reduce the cabinets maintenance cost with minimal energy input. For telecommunications networks with multiple outdoor cabinets this makes a considerable sum. The system can be easily installed in already installed enclosures.

How it works

The Geo-SLine Outdoor Cabinets Air-Conditioning System leverages soil property of heat accumulation. This accumulation works year-round in two modes:

- summer, when it serves as a cold source,
- winter, when it serves as a heat source.

The system comprises two heat exchangers:

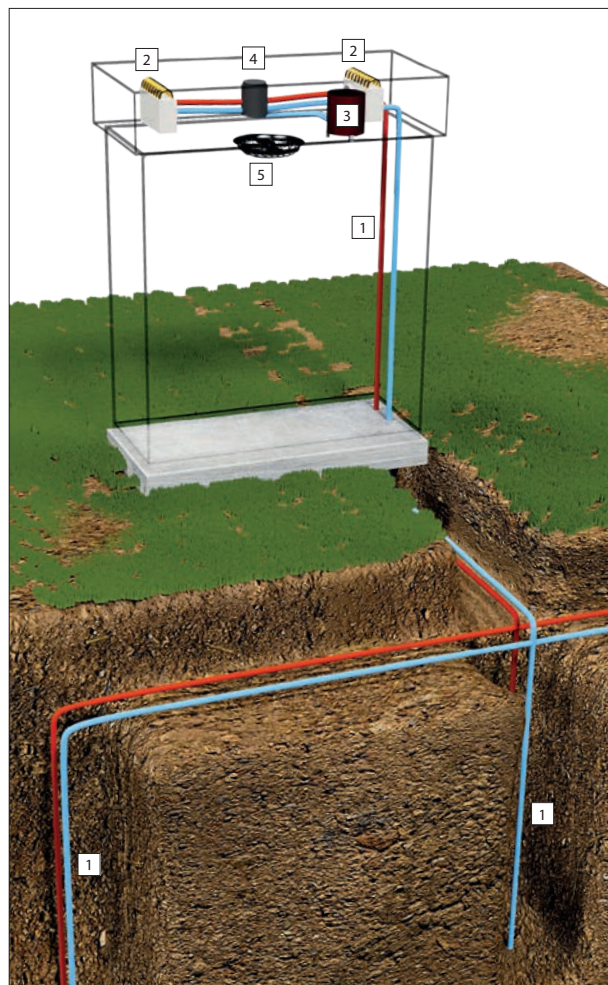
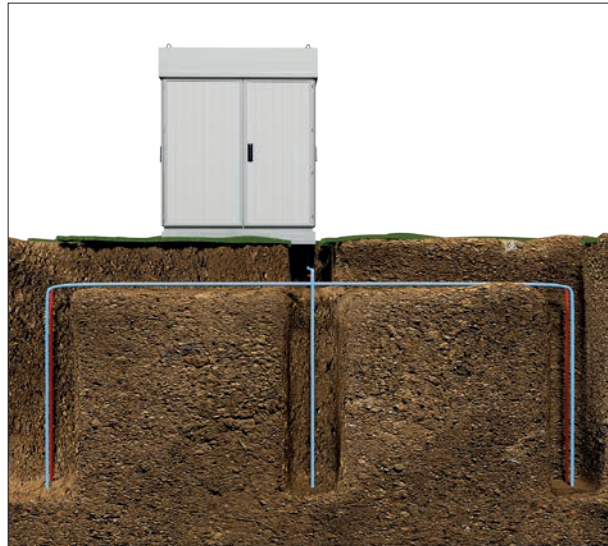
- ground-air heat exchanger (coil placed below the surface),
- air-glycol heat exchanger located on top of the cabinet.

Heat transporting medium is 35% glycol; the system is a closed circuit. In summer, when the temperature inside the cabinet is higher than the soil temperature, heat energy is absorbed by the internal air-glycol heat exchanger, and fed back through the coil into the ground.

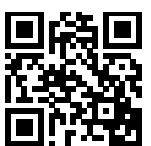
The heated earth is in turn a heat source when the temperature inside the structure drops below the temperature of the soil.

Design

Geo-SLine comes with some basic hydraulic components that are used in closed circuits: circulating pump, expansion vessel, valves, fittings and pressure gauge. It also has an electric control system which is designed to control the system operation by measuring the temperature inside the cabinet.



1 - glycol coil, 2 - cooler (air-glycol heat exchanger), 3 - expansion vessel, 4 - circulating pump, 5 - fan



See the video: zpas.pl/qr/f09

Outdoor cabinets air-conditioning systems	Geo-SLine Ground Heat Exchanger
	OUTDOOR CABINETS

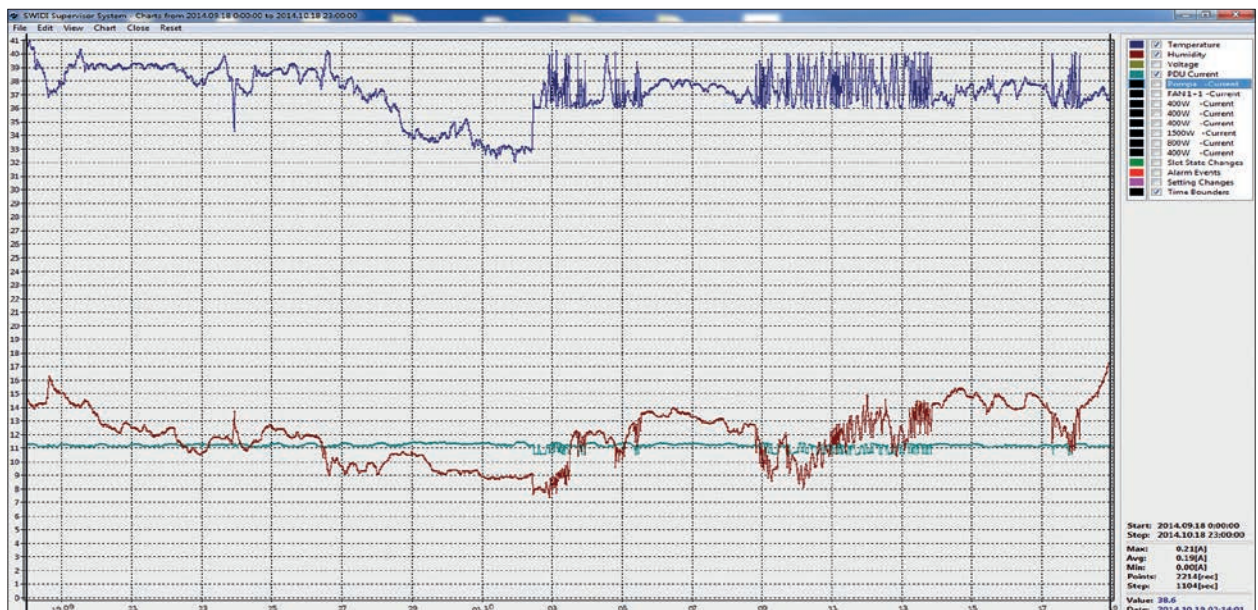
Geo-SLine GROUND HEAT EXCHANGER

Advantages

- **Silent.** No external fans, heat exchanged with the soil. Mechanical parts inside the roof include a liquid pump and a low-speed internal fan.
- **Cheap in use.** Maintenance-free, efficient, simple design. There is no compression/decompression; the circuit uses natural heat transfer.
- **Energy efficient.** In order to keep the temperature of 50°C in the cabinet in the summer with power dissipated by devices at 3 kW, you have to supply only 60 W (including 45 W to the internal fan and 15 W to the liquid pump).
- **Versatile.** With its compact design, the system is easily adaptable in existing cabinets without having to tamper inside them. You only replace the roof, and put the heat exchanger in the ground.
- **Stabilizes temperature and humidity inside the cabinet.** The cabinet interior is isolated from external weather conditions. Layers of earth stabilize the internal temperature to prevent it from rapid increase or decrease, which provides better working conditions for devices.
- **Environmentally friendly.** Reduces power consumption, and uses renewable energy sources. Thermal energy is accumulated in the soil so that it can be used to heat the cabinet interior in cold weather.
- **Innovative solution.** First-of-its-kind on the market.

Operating costs comparison

Outdoor cabinet with air-conditioner with 1400 W of cooling power	Outdoor cabinet with 150 W/K air-air heat exchanger	Outdoor cabinet with Geo-SLine heat exchanger
100 %	45 %	15 %



Example of temperature and humidity waveform for an outdoor cabinet using the Geo-SLine heat exchanger

GROUND HEAT EXCHANGER **Geo-SLine**

Example of implementation

Object description

Large access cabinet of a telecommunications operator, densely packed inside. Cabinet made of aluminium panels, cooled with air-to-air exchangers. Thermal output of installed equipment is 1.5 kW; in addition, the cabinet is exposed to direct sunlight from dawn to dusk.

Customer requirements

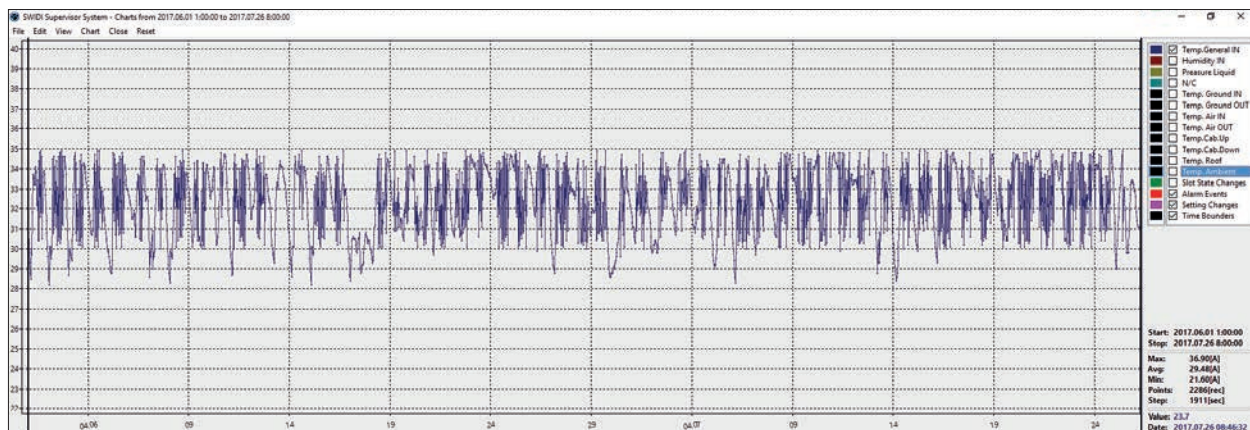
Keeping the temperature of 35°C inside, the maximum generated noise must not exceed 45 dB, a unit that does not require servicing, energy-saving due to having an uninterrupted power supply unit installed, the maximum power consumption of the cooling system is 150 W.

Problem description

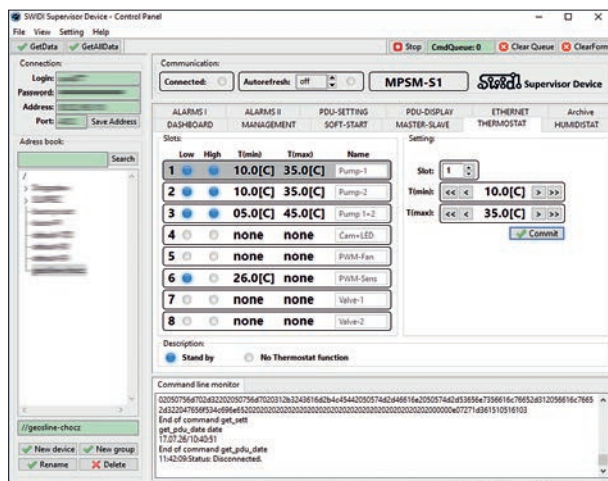
Devices installed inside the cabinet would fail due to overheating. The customer would incur the costs of replacing specialised equipment, provision of telecommunications services would also be interrupted.

Implemented solution

The Geo-SLine cooling system with a cooling capacity of 3 kW and a heating capacity of 800 W was proposed and then installed. Below is the waveform of temperature changes in June in the second year of operation. You can see how the system uses the soil potential to stabilize the temperature in the object. The system is controlled in such a way (figure below) that it switches on when the temperature inside the cabinet exceeds 35°C in summer, and also during the winter season when it drops below 10°C (in this case the Geo-SLine system transports heat from the ground to the inside of the cabinet). In many cases, additional cabinet heating with electrical heaters can be omitted.



Temperature changes in the cooled cabinet (June, second year of Geo-SLine operation)



Remote control panel for the Geo-SLine system



TESTS

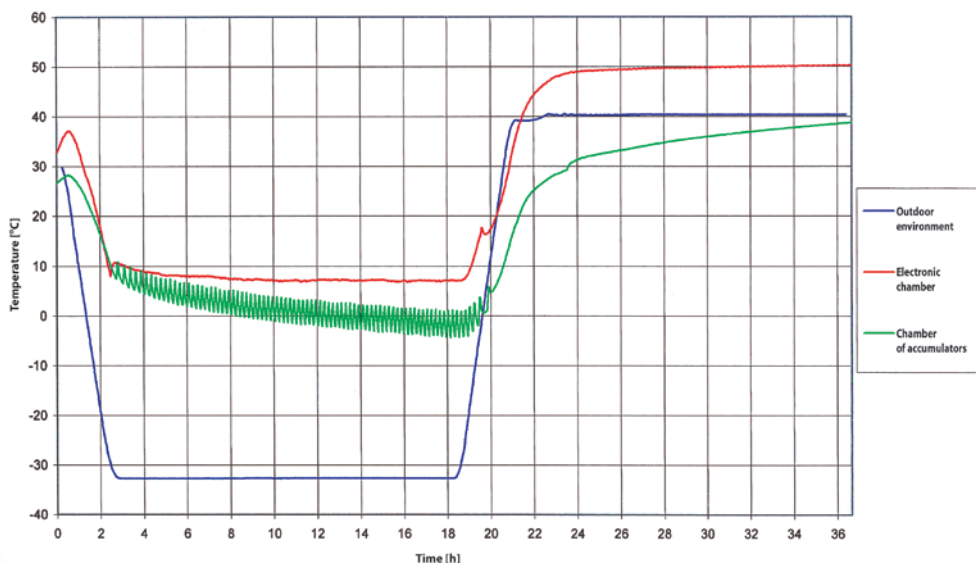


Climatic tests

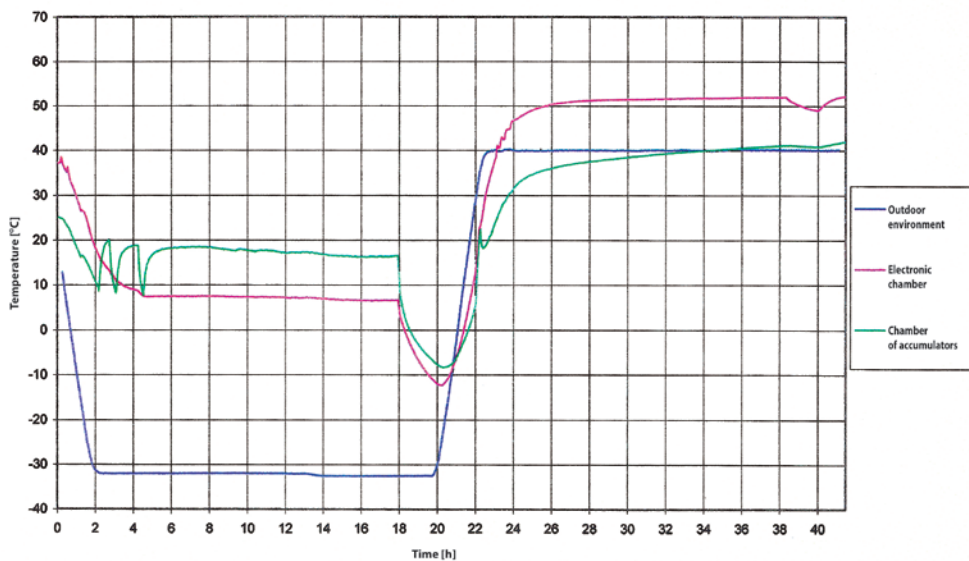
SZD cabinets equipped with access systems of different suppliers (Siemens, Ericsson, DGT, Ascom) have been climatic tested at Laboratory of Telecommunications Accessories and Devices Research in Szczecin. SZD cabinet was placed in climatic chamber, where it was first tested for 12 hours in temperature -33 °C and then for 12 hours in temperature +40 °C.

Below, there are some climatic diagrams.

AVERAGED TEMPERATURES IN ELECTRONIC CHAMBER AND CHAMBER OF ACCUMULATORS' BATTERY



AVERAGED RUN OF TEMPERATURE IN ELECTRONIC CHAMBER AND CHAMBER OF ACCUMULATORS' BATTERY WITH TESTS OF FAILURE POWER SUPPLY OF THE CABINET



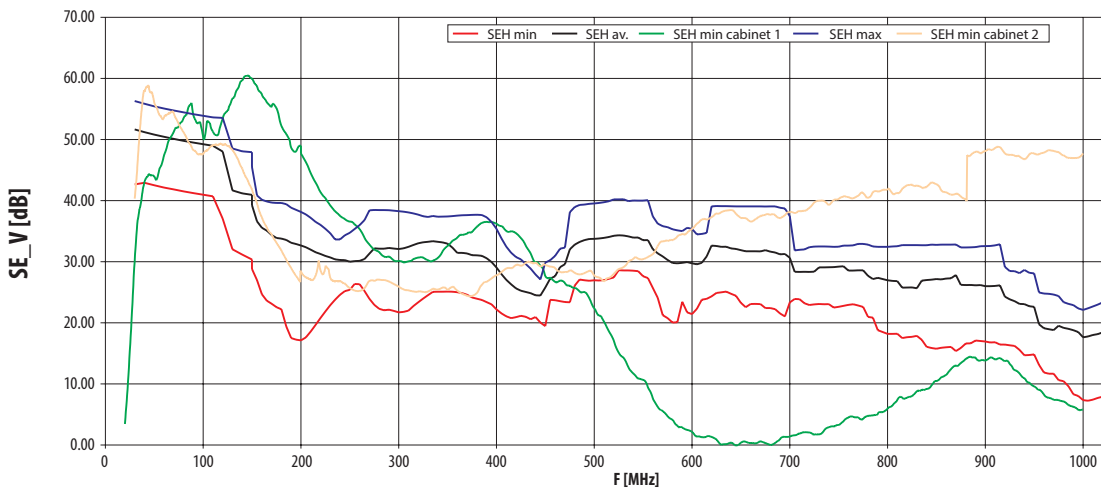
Screening efficiency tests

SZD cabinet was subjected to screening efficiency tests at the Telecommunication and Acoustic Laboratory of the Institute of Technology in Wrocław. On the basis of measurements, the cabinet's screening efficiency was specified in the magnetic field's frequency range of 100 kHz up to 1000 MHz:

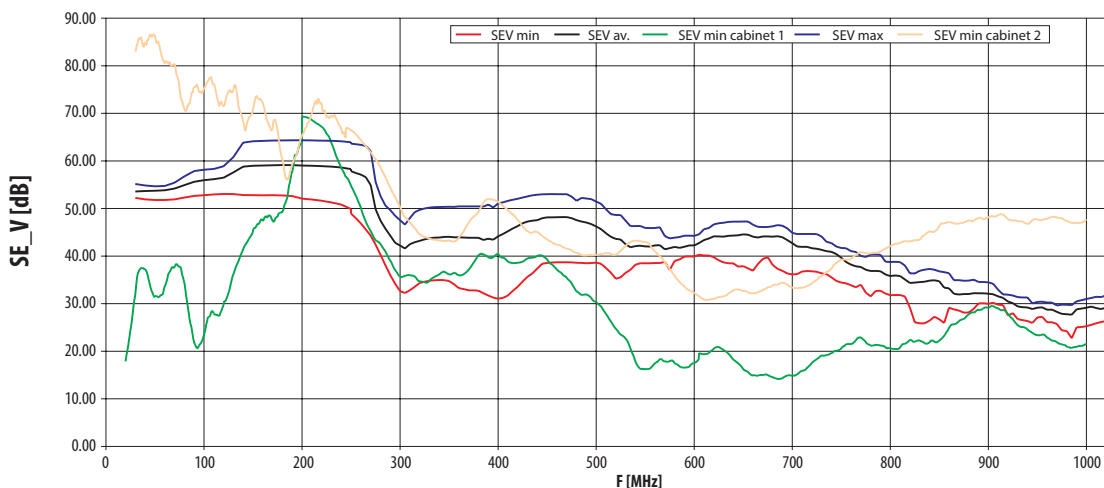


- a) Screening efficiency in the frequency range of 100 kHz up to 30 MHz
 - for horizontal polarisation is included in the following limits: from 15 dB to 26 dB (average value varies from 18 dB to 22 dB),
 - for vertical polarisation is included in the following limits: from 21 dB to 44 dB (average value varies from 32 dB to 40 dB).
- b) Screening efficiency in the frequency range of 30 MHz up to 1000 MHz
 - for horizontal polarisation is included in the following limits: from 55 dB to 5 dB (average value varies from 52 dB to 19 dB),
 - for vertical polarisation is included in the following limits: from 65 dB to 23 dB (average value varies from 59 dB to 29 dB).

CABINET'S SCREENING EFFICIENCY FOR THE HORIZONTAL COMPONENT OF THE ELECTRIC FIELD



CABINET'S SCREENING EFFICIENCY FOR THE VERTICAL COMPONENT OF THE ELECTRIC FIELD



TESTS

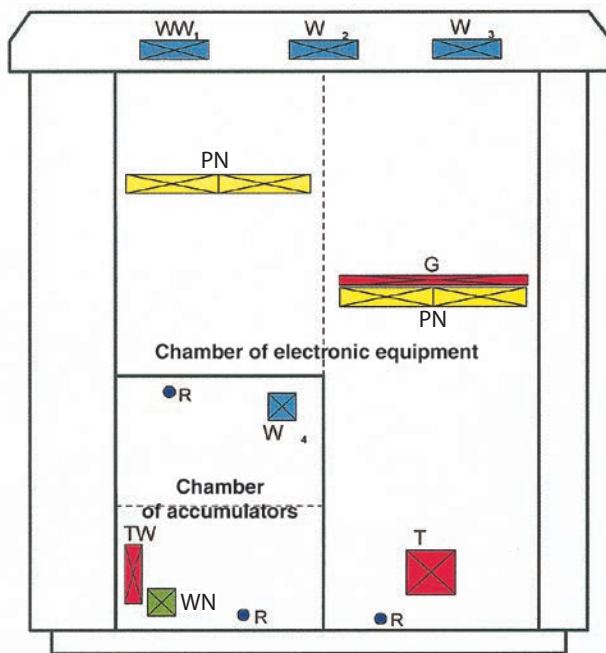


Acoustic tests

The SZD cabinet with specified quantity of fans and heaters (in accordance with the below drawing) have been tested for checking the noise emission of the cabinet.

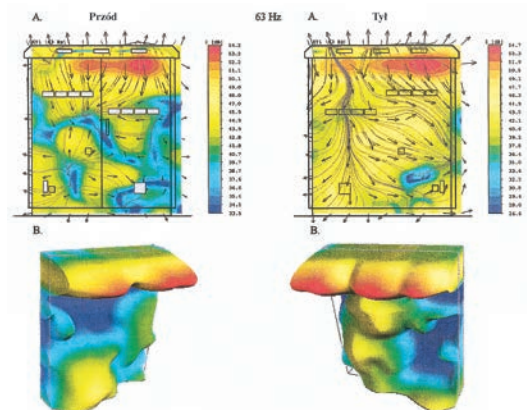
The diagrams below shows an example of the vector field distribution for sound intensity, and spatial radiation of acoustic energy in the front and rear of the cabinet.

PLACES OF FANS IN TESTED CABINET

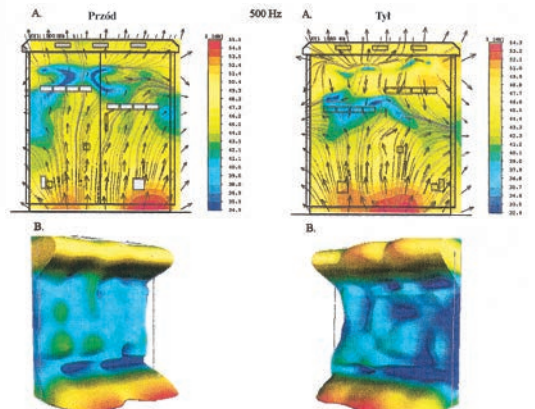


- WW₁, WW₂, WW₃** - exhaust fans, placed symmetrical in the upper part of the cabinet under the roof
- WW₄** - exhaust fan
- WN** - downcast fan
- PN** - fan units mixing air inside the cabinet
- TW** - thermo fans
- G** - heater of transmission shelf
- R** - temperature controllers

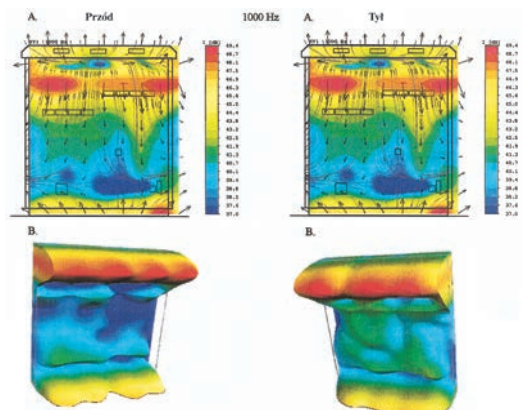
Sound diffusion for 63 Hz



Sound diffusion for 500 Hz



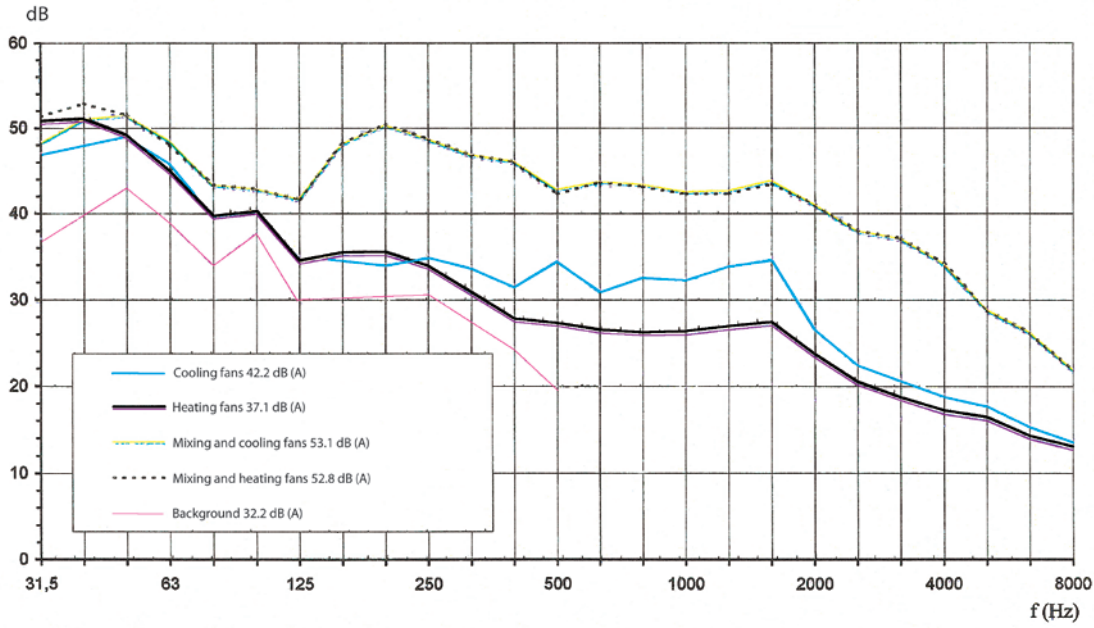
Sound diffusion for 1000 Hz



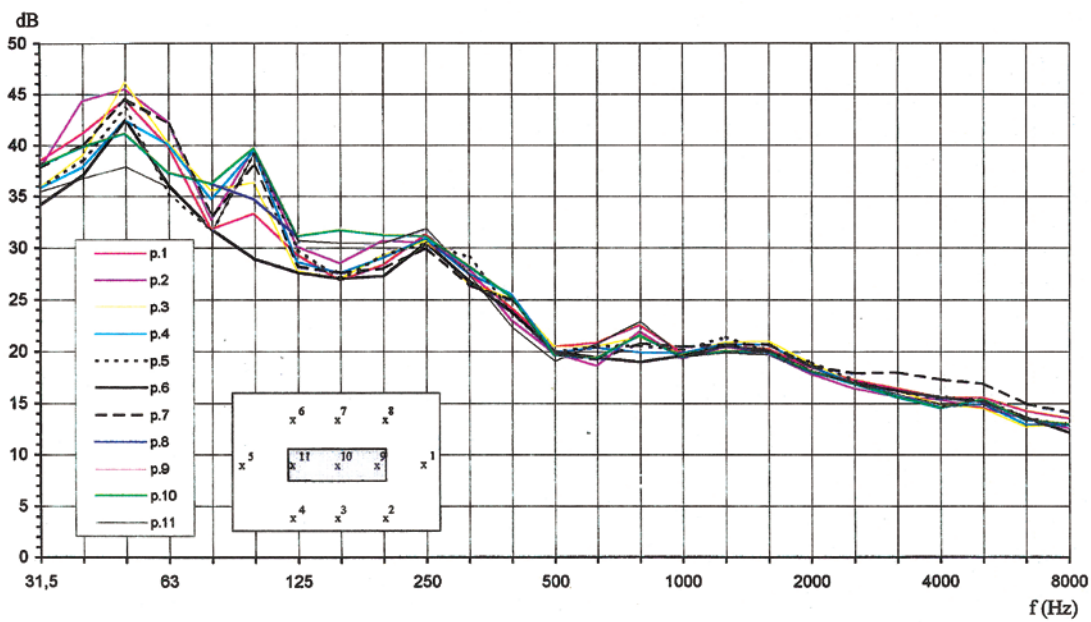
Acoustic tests



**THE LEVEL OF NOISE EMITTED BY TESTED SZD CABINET
(AVERAGE VALUES FROM 11 MEASURING POINTS)**



THE LEVEL OF BACKGROUND NOISE (THE CABINET SWITCHED OFF)

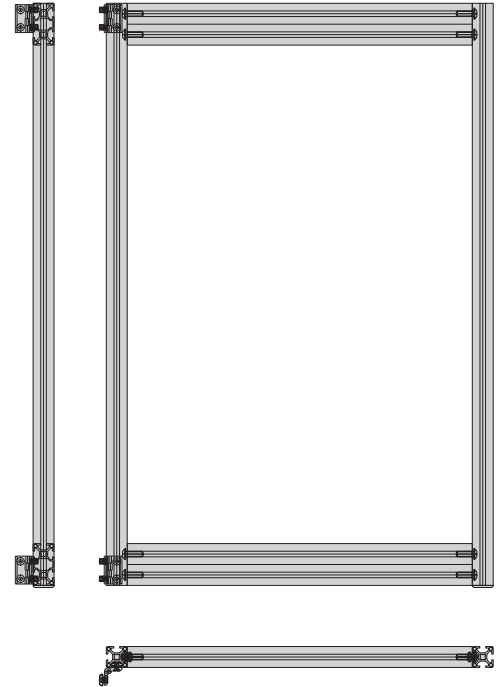
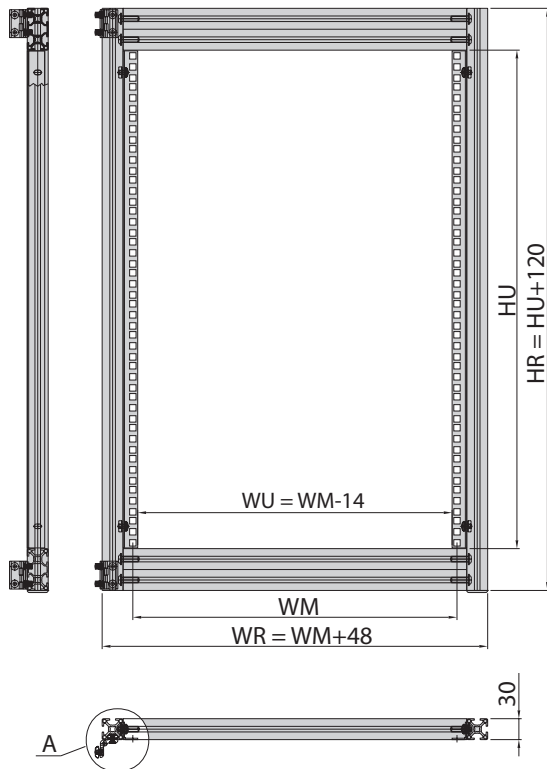


SUPPLEMENTARY ACCESSORIES

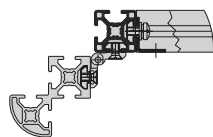


Swing frame

Double-section frame



Detail A:
frame fastening



WM = 456 (19") or 515 (21") - mounting width
WU - useful width
HU - useful height

The frames can be manufacture as single-section or double-section.
In case of big loading there are used chest-like frame



Chest-like frame

SUPPLEMENTARY ACCESSORIES

Shelves

Shelves for mounting batteries of emergency power supply are made of stainless steel. Dimensions of shelf depend on quantity of mounted batteries are determined by customer's request.



Fixed and pull out shelf

SUPPLEMENTARY ACCESSORIES



Partition and cable entry

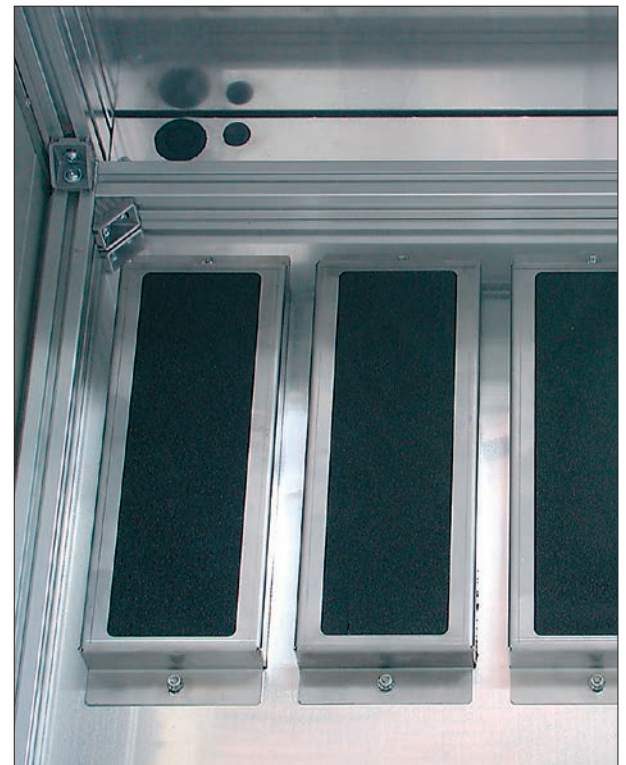
The partition divides the chambers of the cabinet. It is made of aluminium sheet. In the partition there can be different types of cable entries: foam cable openings, rubber gland seals, cable entries ROXTEC type.



Cable entry ROXTEC type



Cable entry made of rubber gland seals



Foam cable entry

SUPPLEMENTARY ACCESSORIES

Door switch and door stop

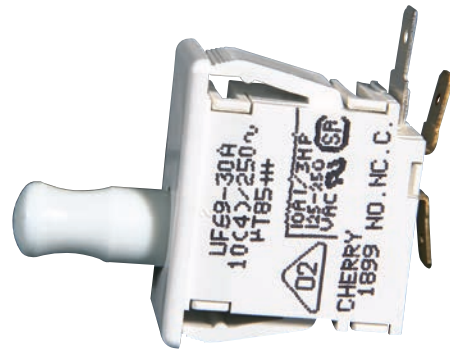
The 3-positioned door switch is mounted at cabinet's door, positions:

- pos. 1 - unstable pushed-in (door closed)
- pos. 2 - stable pushed out (door opened)
- pos. 3 - "service position", pushed in manually, stable (door opened)

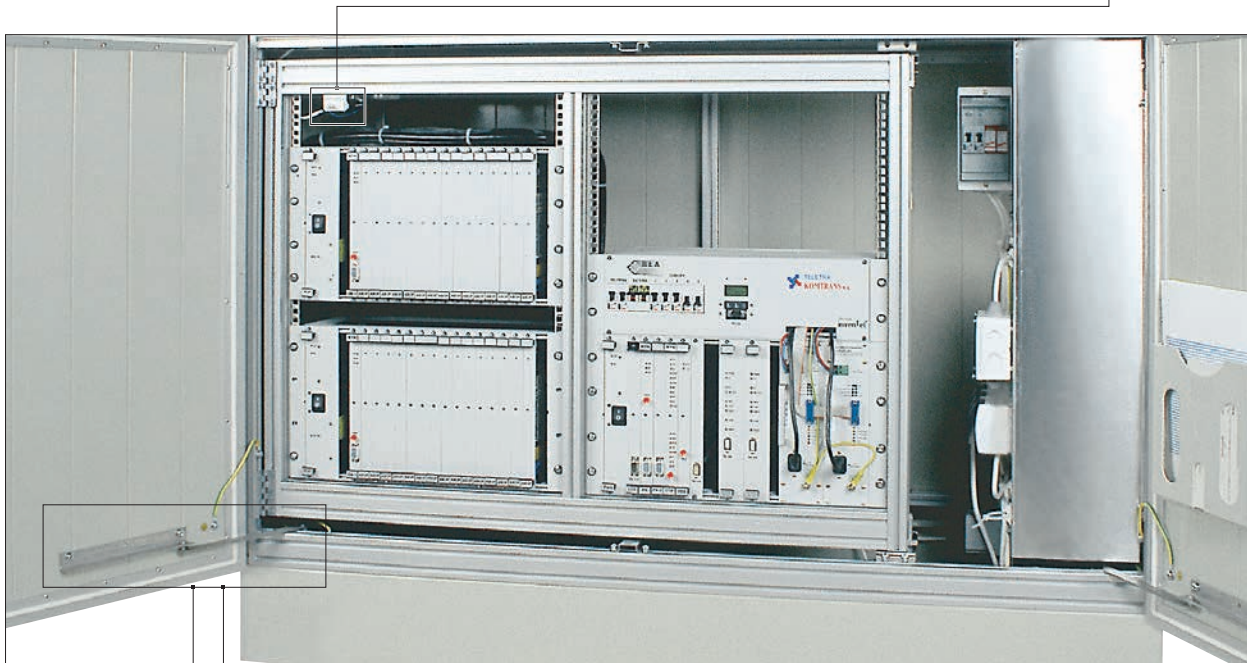
Use only in circuits with safe (extra-low) voltage.

Example:

1. Cabinet's door closed
 - option I - open circuit
 - option II - closed circuit
2. Cabinet's door opened
 - option I - closed circuit
 - option II - open circuit
3. Cabinet's door opened "service" position
 - option I - open circuit
 - option II - closed circuit



3-positioned door switch



Door stop and door switch in cabinet with equipment

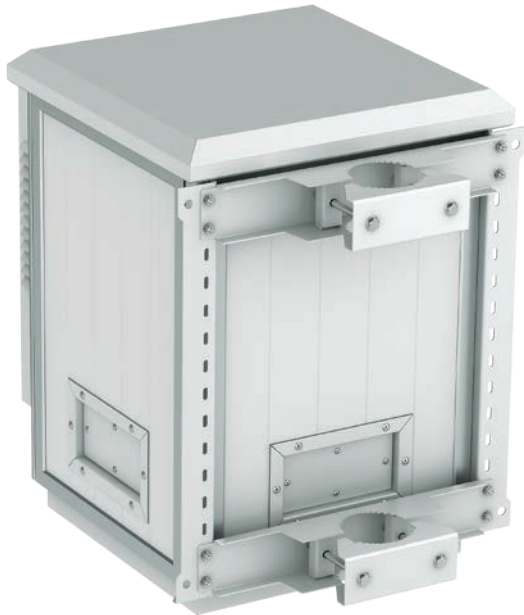


SUPPLEMENTARY ACCESSORIES



Handles for mounting of cabinet

Often, in case of small cabinets exists necessity to adaptation them to mounting directly on the wall or column. Then to the cabinet we mounted a special mounting handles.



Cabinet adapted for mounting on the column



Cabinet with wall mounting bracket

SUPPLEMENTARY ACCESSORIES

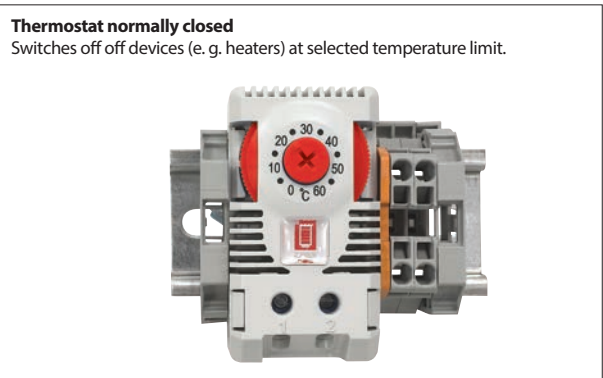
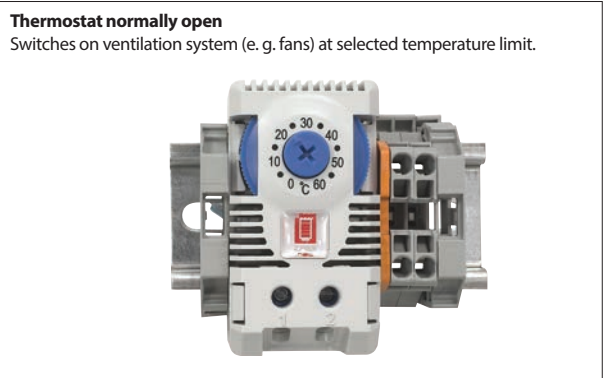
Thermostat

Thermostats are used for controlling fan units, heaters and heat exchangers, also can be used as a signal generator for monitoring the enclosure internal temperature.

TECHNICAL DATA

- Sensor element: thermal bimetal
- Temperature range: 0 - 60 °C, hysteresis ca. 7 K
- Contact types: snap action contact,
- Power carrying capacity: 6 A, 250 V AC
- Radio frequency interference: "N" (according to VDE 0875)

Connection diagram: see page 79



**MPSM-S1
Microprocessor Power Control Panel**

MPSM-S1 is a programmable 19" panel for power supply, control, monitoring, energy saving and recording. It measures voltage, current and power for each socket, as well as temperature and humidity. The device is equipped with an unparalleled set of features that make it indispensable in data communication infrastructure. It has an Ethernet communication module with software for Windows systems. The panel features 8 GB of internal memory (hardware database) that is used for recording measurements, events and alarms. The memory allows for up to 24 months of continuous recording.

MPSM-S1 panel is a Polish product that has been designed and manufactured in our company.

For detailed description of the MPSM-S1 panel see page 98.



SUPPLEMENTARY ACCESSORIES

POWER SUPPLY MAINTENANCE SYSTEMS



Systems of guaranteed power supply

ZPAS, a supplier of a full range of solutions, also offers complete systems of guaranteed power supply from highly reputed manufacturers: Telzas, Delta Energy Systems, Eltek Valere, etc. Power supply systems are designed for uninterruptible supply of direct current to consumers with the rated voltage of 48 V in direct full-float operating mode based on rectifiers and battery packs. The systems can be supplied in the Front Terminal version with all terminals and connectors located on the front panel of the system. In the basic version, the enclosure of the power supply system is suitable for installation in 19" cabinets (racks).



Application:

- professional telecommunications systems
- end-user telecommunications systems
- IT network systems
- industrial automation systems



**DC power supply systems
SDB 65 (SDB 65FT)**

Input parameters:

- Input voltage..... 3 x 230/400 V AC
(-23.5 %; +30.4 %)
- Frequency..... 45-65 Hz
- Maximum phase current..... 2 A (three-phase)
24 A (single-phase)
- Power factor..... ≈ 1

Output parameters:

- Range of voltage..... 48-58 V DC
- Characteristics..... UPI
- Stabilization of output voltage..... ±1 %
- Maximum output current..... 72 A
- Maximum output power..... 3200 W
- Output voltage ripples
(psophometric value)..... < 2 mV

General data:

- Range of ambient temperatures -33... +55 °C
- Cooling..... fan-cooled
- Efficiency..... ≥ 90 %
- Protection degree IP 20
- Electromagnetic compatibility..... PN-EN 300-386, class B
- Dimensions of the power supply system (H x W x D)..... 133 x 482 x 390 mm
- System weight without rectifier units..... ca. 11.0 kg
- Dimensions of the rectifier unit (H x W x D)..... 81 x 40 x 285 mm
- Weight of the rectifier 1.1 kg



**DC power supply systems
SDC 140**

Input parameters:

- Input voltage..... 3 x 230/400 V AC
(-23.5 %; +26 %)
- Frequency..... 45-65 Hz
- Maximum phase current 24 A
- Power factor..... ≈ 1

Output parameters:

- Range of voltage..... 48-58 V DC
- Characteristics..... UPI
- Stabilization of output voltage ±1 %
- Maximum output current 140 A
- Maximum output power 6800 W
- Output voltage ripples
(psophometric value) < 2 mV

General data:

- Range of ambient temperatures..... +5...+40 °C
- Cooling..... fan-cooled
- Efficiency..... ≥ 91 %
- Protection degree..... IP 20
- Electromagnetic compatibility..... PN-EN 300-386 PN-T-83101
- Dimensions of the power supply system (H x W x D) 134 (3U) x 483 x 300 mm
223 (5U) x 483 x 300 mm
311 (7U) x 483 x 300 mm
- System weight without rectifier units.. 27 kg
- Dimensions of the rectifier unit (H x W x D)..... 88 x 85.5 x 273 mm
- Weight of the rectifier..... 2.4 kg

SUPPLEMENTARY ACCESSORIES

POWER SUPPLY MAINTENANCE SYSTEMS

Complete rectifier power supply systems with modules DPS 600B-48-2 19IN-1U

- Max power: 2 x 600 W
- 19" enclosure, 1 U height
- Load protection: 1 x MCB (max 16 A)
- Battery protection: 2 x MCB
- Optionally 5 x fuse protection devices: 2 battery and 3 load protective devices instead of 3 MCB
- PSC3 or PSC1 controller
- Low voltage disconnect (LVD) in the battery circuit



Complete rectifier power supply systems with modules DPS 600B-48-4 19IN-2U

- Max power: 4 x 600 W
- 19" enclosure, 2 U height
- Battery protection: 2 x MCB
- Load protection: 3 x MCB, 5 x fuse
- PSC3 or PSC1 controller
- Low voltage disconnect (LVD) in the battery circuit



Complete rectifier power supply systems with modules DPR 1600B-48

- Max power: 4 x 1600 W
- 19" enclosure, 3 U height
- Load protection: 9 x MCB
- Battery protection: 2 x MCB ≤ 125 A
- PSC3 or PSC1 controller
- Low voltage disconnect (LVD) in the battery circuit



Power supply unit 48 V

Switched-mode power supply from 230 V AC to 48 V DC in 1U Rack 19" housing, used for telecom purpose.

Electrical parameters

Input: $U_n = 230 \text{ V AC}, 50 \text{ Hz}$ $I_n = 10 \text{ A (230 V AC)}$
 Output: $U_{in} = 48 \text{ V DC}$ $I_{out} = 3.2 \text{ A}$
 Power: $W = 153.6 \text{ W}$

Dimensions

Height: 1 U (44.45 mm)
 Depth: 202 mm



Package	Colour	Catalogue number
1 pc.	RAL 9005	WN-8021-01-00-161

SUPPLEMENTARY ACCESSORIES



Insulating base

For additional cold and humidity protection, the cabinet can be set on insulating base filled with foam. The insulating frame shall be ordered separately.



Voltage distribution panels

Cabinets can be equipped with power distribution panels configured according to customers' request.



Heater

Compact heating device including heating element and fan.

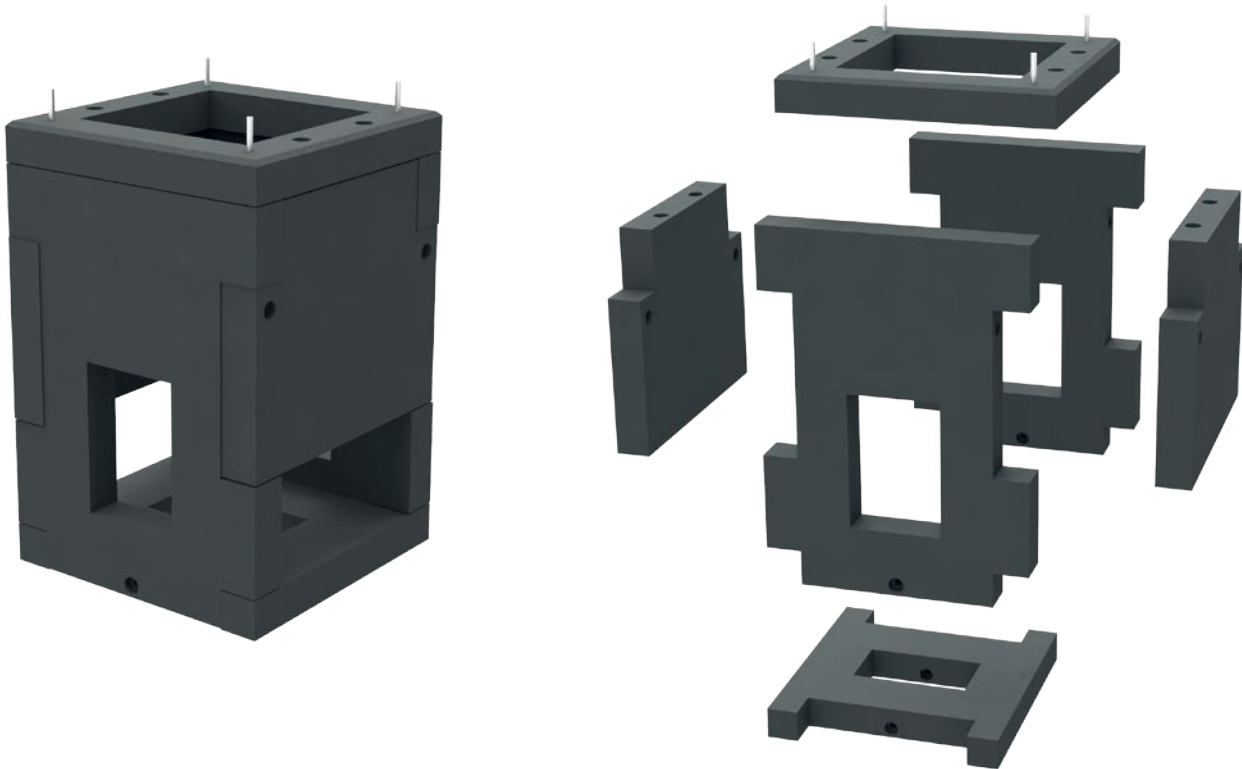
TECHNICAL DATA

- voltage rating 230 V AC 50-60 Hz
- heating power (2 levels) 200/400 W
- fan capacity 10 m³ /h
- protection degree IP 20
- dimensions 71 x 70 x 95 mm
- mounting bracket for DIN rail mounting

SUPPLEMENTARY ACCESSORIES

Concrete foundations

In order to provide a complete range of services, ZPAS also offers concrete foundations. These are prefabricated elements either with a monolithic design or connected by means of M10 bolts. In the upper part of the foundations there are M12 anchor bolts welded to the reinforcement. The spacing of the bolts is adjusted to the plinth size of different outdoor cabinets. All parts are moisture-protected. Openings on both sides of the foundations serve as cable entries.

**Frame for concrete**

Foundation frame for concrete to be placed under SZD cabinet.
Equipped with positioning handles and templates for laying conduit pipes.



SUPPLEMENTARY ACCESSORIES



Plinth base

Foundation frame for the SZD outdoor cabinet, made of stainless steel.
Designed to be filled with concrete or backfilled with soil.

Plinth with height-adjustable base

A 600 mm high aluminium plinth for the SZD outdoor cabinet, with an extendable stainless steel foundation frame to be filled with concrete or backfilled with soil.



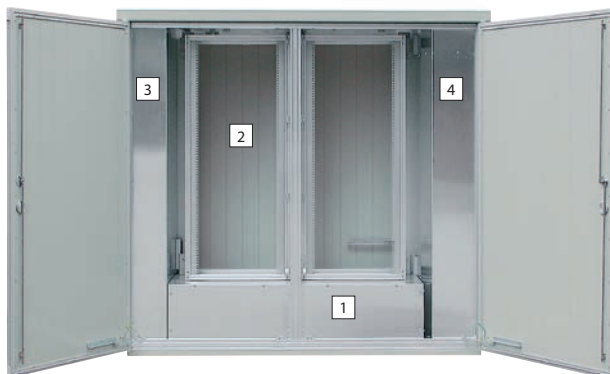
SZD CABINETS IN ACCORDANCE WITH EMC STANDARD

EMC shielded cabinets

EMC shielded cabinets are used when devices which are mounted inside the cabinet require protection in electromagnetic compatibility. Aluminium profiles used in the cabinet are additionally chromated. Special current conductive gasket is used in order to provide conductivity between each element of the cabinet (roof, plinth, side panels, door).



APPLIANCES IN SUBSCRIBERS' ACCESS SYSTEMS



Division of cabinet's interior

In the cabinet's construction there are four autonomous sections:

- 1) Battery section
- 2) Chamber of devices
- 3) MDF section
- 4) Energy section



Battery section

In standard, it is placed in the bottom part of the cabinet and is designed for installing temporary emergency power supply of the system. For additional lower of temperature in summer season, there are used two solutions:

- thermal battery,
- ventilating fans - ventilation of the section through the cabinet's mantle.



APPLIANCES IN SUBSCRIBERS' ACCESS SYSTEMS

Chamber of devices

In standard, it is placed in the central part of the cabinet and equipped with mounting bars in 19" or 21" standard or the swing frame. This section is designed for mounting active devices of subscribers' access system (service of optical fibre and patch panels).



APPLIANCES IN SUBSCRIBERS' ACCESS SYSTEMS



Distribution section

This section is designed for operator. It is equipped with teletechnical links (instillation of copper cables). Additionally, the section can be equipped with support moveable construction which adapts to each type of terminal blocks.



Energy section

This section is intended for power industry plants and designed for input of power supply. It has got fuses and a socket to plug in standby diesel generator in case of energy failure. In this section it is also possible to mount electricity meter and additional a special sight-glass, which enables reading of the meter without opening the cabinet's door.



OUTDOOR CABINETS FOR POWER INDUSTRY

SZD Cabinets are used as an enclosure for measuring systems and energy distribution. Enclosures of this type require a special organization of the cabinet interior. Applied in earlier solutions, mounting bars were replaced by mounting boards or systems of special cross bars. Often, on the outside of the cabinets, an energy terminal socket is additionally installed.



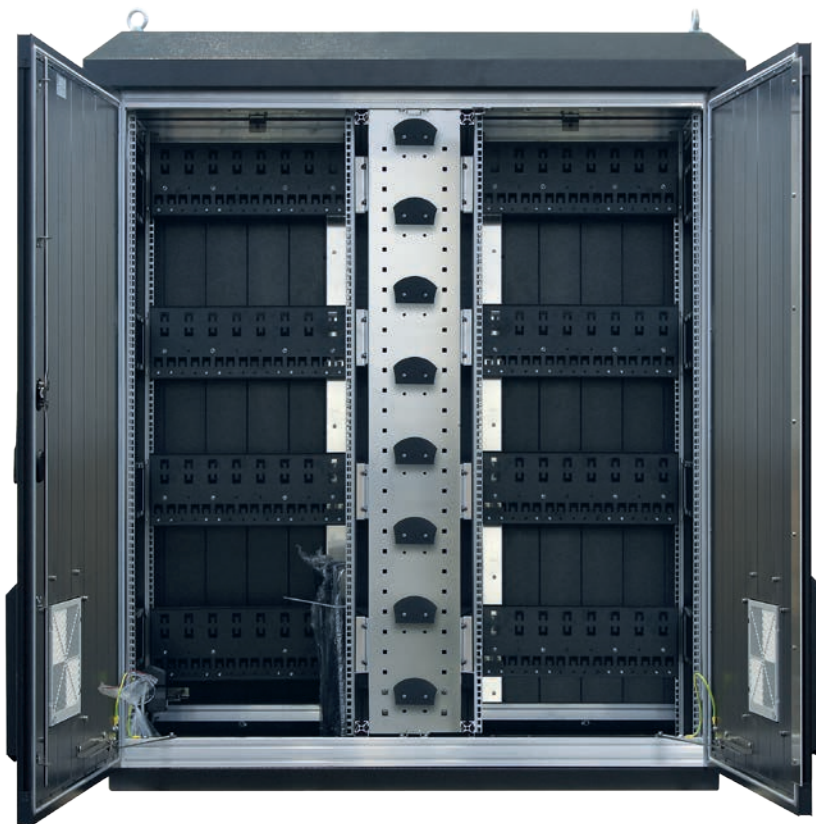
FS wiring cabinet
For more information see page 287



Outdoor cabinet for lighting control



OUTDOOR CABINETS ADAPTED FOR FIBER OPTIC SYSTEMS



SZD cabinets can be equipped with special elements to lay and organize fibre optic cables.

The pictures show sample solutions – cabinets equipped with fibre optic cable tube distributors (mounted on 19" mounting profiles) and a vertical organizer with reserve reels.

It is possible to configure the cabinet for individual customer needs.

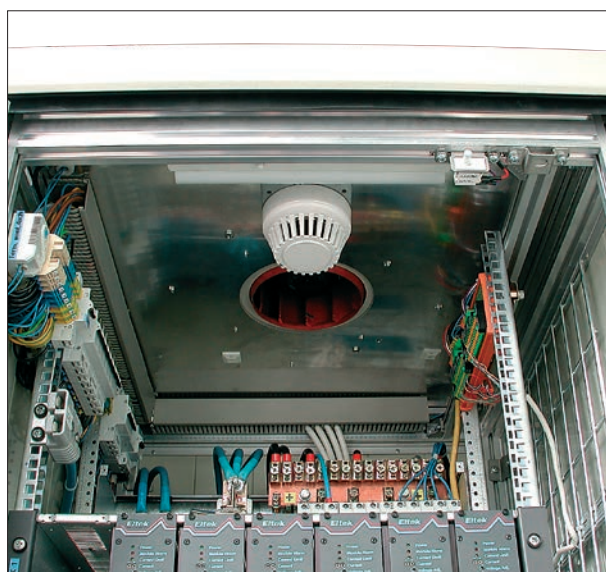


OUTDOOR CABINETS ADAPTED FOR POWER SUPPLY SYSTEMS

SZD cabinets are also used for outdoor installation of amplifiers for cordless power supply of telecommunication devices. Cabinet's interior is divided into two autonomous parts: battery section (bottom part of the cabinet) and devices section (upper part of the cabinet). Additionally, on customer's request, it is possible to manufacture a special type of roof intended to assembly of electric accessories.

Inside the cabinets there are mounted telecommunication amplifiers with high power, what is consequence of big power losses (heat dissipation). Direct venting, by means of two fans (which capacity is 510 m³/h each) mounted on the roof or on the cabinet's door, provides specific climatic conditions inside the cabinet.

Additionally, the system of fans' control can be used. It is able to switch on the roof fans on pre-set inside temperature threshold. Fans' rotation is lineal regulated and depends on temperature of modems installed inside of the cabinet.



EXTENSION OF OUTDOOR CABINETS

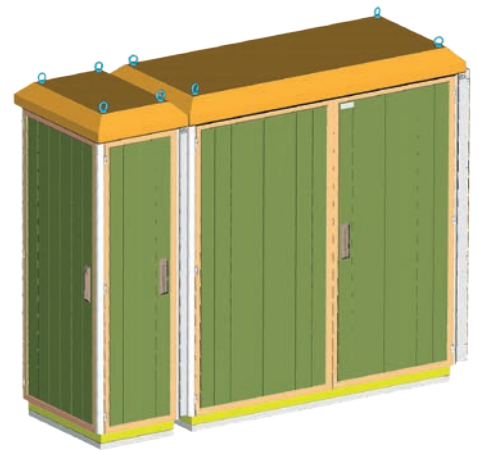
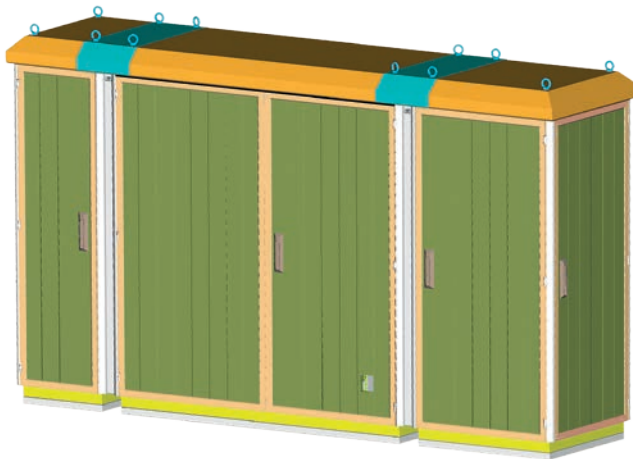


Often after several years since moment of installing the cabinet appears a necessity of installation in enclosures a new equipment. With way on fact that space in cabinets was already used earlier, it state a serious problem for fitters. Going out to opposite of requirement ZPAS company worked out three ways of increasing existing cabinet:



Cabinet before extension

1) Extension of cabinet on sides – This solution consists on attaching to existing cabinet extension parts which can be used as f. ex. MDF section, battery section, chamber of devices, power section etc.



Idea of outdoor cabinets Extensions



The cabinet after extension



EXTENSION OF OUTDOOR CABINETS

2) Cover plate on cabinet – the solution consists on disassembly of doors and side panels in old cabinet and putting on from top, new larger enclosure. It covers so far installed equipment and it allows on adding new one. This variant does not require stopping work of installed equipment on time of exchange enclosure.



Cabinet before extension



Cabinet during extension

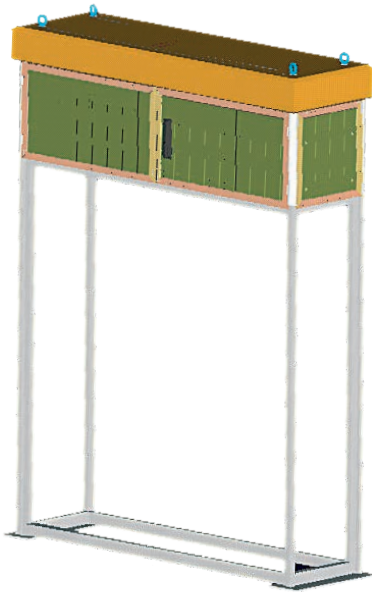


The cabinet after extension

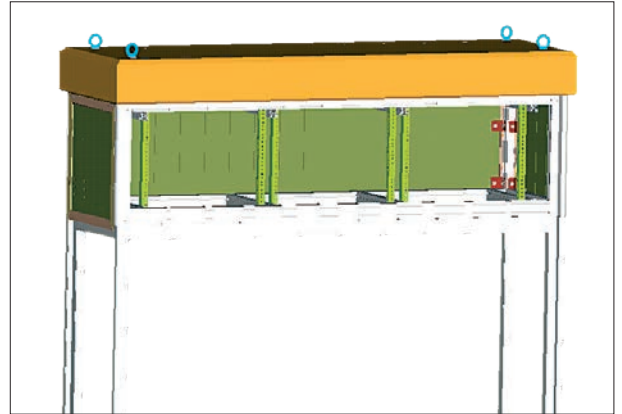


The cabinet after extension

EXTENSION OF OUTDOOR CABINETS



3) Extension upwards – the solution consists on disassembly of external mantle and internal roof then putting on and installing top extension part.



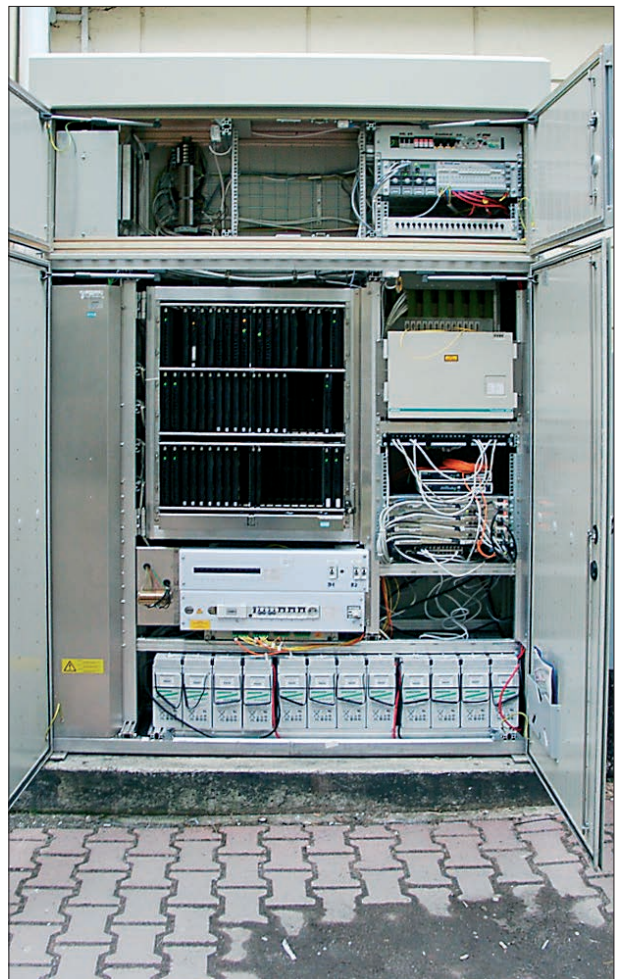
Idea of outdoor cabinets extensions



The Cabinet after extension



The cabinet after extension



The cabinet after extension

CUSTOM SOLUTIONS



SZD cabinets with a glass panel in the door



Mobile cabinet



CUSTOM SOLUTIONS



SZD cabinets with a glass panel in the door, mounting plate, swing frame and air conditioner



SZD cabinet for battery charger



Cabinet based on standard SZD type; aluminium doors and side panels were replaced by aluminium sheet.

OUTDOOR CABINETS MADE OF ALUMINIUM SHEETS

Outdoor cabinets made of aluminium sheets come in two types:

Single-wall cabinet – made of sheet metal with a thickness of 2 mm

Double-wall cabinet – outer jacket and metal sheet frame with a thickness of 2 mm, metal sheet inner cladding with a thickness of 1 mm or 1.5 mm (depending on the cabinet size).

All outdoor cabinets are custom-made. You can order a cabinet in size, with partition of cabinet's interior and supporting structure of your choice.



To ensure appropriate climatic conditions inside an enclosure, we use various types of heat removal systems (ventilating fans, heat exchangers, air conditioners), and the right number of heaters, depending on your needs.

To improve insulation, the cabinet's interior can also be lined with insulating foam.

The cabinets have IP 54 protection degree.

OUTDOOR CABINETS MADE OF STAINLESS STEEL SHEET

