



## 5.30 Distribution nodes - Technical room of low-current systems

Amended: 2017-03-30

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This internal technical standard defines the basic conditions and describes the installation and operation of technical rooms.

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Therefore, we strongly recommend that everybody checks the ITS regularly. These documents become valid on the date of their last update. For concluded contracts, the validity of the ITS at the time of the order is decisive.

Note: In case of any differences between the Czech, English or German language versions of this ITS, the Czech version takes precedence. The Czech version is available at <http://cts.skoda-auto.com/>.

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2.		
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## 1. Introductory information

## Technical requirements:

The construction of technical rooms of low-current systems (TM) and the installation of facilities located in the respective distribution node must be performed in accordance with the ČSN regulations stated below and the related guidelines, including annexes.

## 1.1 Basic concepts and abbreviations

LCS	Low-current systems
TR	Technical room of WCS
MTR	Main technical room of WCS
ATR	Auxiliary technical room of WCS
MTE (ME)	Main telephone exchange (Main exchange)
PoE	Power over Ethernet
F/T/W 30 to 90	Category of fire resistance based on fire resistance measured in minutes
1U	Rack Unit (less often also RU) a measurement unit used in IT to define the height of the equipment intended for fitting in a rack 19 or 23 inches wide.
UPS	Uninterruptible Power Supply
HVAC	Heating, ventilation and air conditioning
AFFES	Automatic fixed fire extinguishing systems
EFS	Electric fire signalization
VoIP	Voice over internet protocol (IP Telephony)
Technical room	Technical room distributor
Distributor	
ZuBeSY	Access control system (Zutrittsberechtigungssystem)
FSS	Fire safety solution for building
Channel unit - Split (system)	Wall air-conditioning unit consisting of one indoor and one outdoor unit which are linked by cooling pipes.

## 1.2 Related European standards and regulations

Must be done according to these regulations and standards.

## European standards:

2006/95/ES (LVD)	Low-voltage devices
2004/108/ES (EMC)	Electromagnetic compatibility
1999/5/ES (R&TTE)	Radio and telecommunication end devices

## Regulations:

ČSN 34 2300	Regulation of indoor mains of telecommunication lines
ČSN 33 2130 ed.3	Low-voltage electrical installations – Indoor electric mains
ČSN EN 50173-1 ed.3	Information technologies – Universal cable system – Part 1: General requirements
ČSN EN 50173-2	Information technologies – Universal cable systems - Part 2: Office spaces
ČSN EN 50173-3	Information technologies – Universal cable systems - Part 3: Industrial spaces
ČSN EN 50173-5	Information technologies – Universal cable systems - Part 5: Data centres
ČSN EN 50174-1 ed.2	Information technologies – Installing cable mains - Part 1: Quality specifications and assurance
ČSN EN 50174-2 ed.2	Information technologies – Installing cable mains - Part 2: Project preparation and construction in buildings



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ČSN EN 50131-1 ed.2	Alarm systems – Alarm security and emergency systems – Part 1: System requirements
ČSN EN 50132-7 ed.2	Alarm systems - CCTV supervision systems for use in security applications – Part 7: Instructions for applications
ČSN EN 50310 ed.3	Use of common system of connecting and grounding in buildings equipped with information technologies
ČSN 33 2000-1 ed.2	Low-voltage electric installations – Part 1: Key perspectives, defining key characteristics, definitions
ČSN 33-2000-4-41 ed.2	Low-voltage electric installations – Part 4-41: Protective measures ensuring safety – Protection against injuries caused by electric current
ČSN 33 2000-4-43 ed.2	Low voltage electrical installations – Part 4-43: Safety – Protection against overcurrent
ČSN 33 2000-5-54 ed.3	Low-voltage electric installations – Part 5-54: Selecting and building electrical facilities – Grounding and protective conductors
ČSN 33 2000-5-52 ed.2	Low-voltage electric installations – Part 5-52: Selecting and building electrical facilities – Electric mains
ČSN 33 2000-5-51 ed.3	Low-voltage electric installations – Part 5-51: Selecting and building electrical facilities – General regulations
ČSN EN 62305-1,2,3, ed.2	Set of regulations – Protection against lightning
ČSN EN 61439-1 ed.2	Low voltage distributors – Part 1: General provisions
ČSN 73 08XX	Fire safety of buildings
ČSN EN 62040-1	Sources of uninterrupted power supply (UPS) – Part 1: General and safety requirements for UPS
ČSN EN 62040-2	Sources of uninterrupted power supply (UPS) – Part 2: Requirements for electromagnetic compatibility (EMC)
ČSN EN 62040-3 ed.2	Sources of uninterrupted power supply (UPS) – Part 3: Method of determining requirements for function and testing
ČSN EN 62040-4	Sources of uninterrupted power supply (UPS) – Part 1: Environmental aspects – requirements and reports

## 1.3 Requirements for the producer of a work

Upon assembling the delivered products and facilities, the producer is obligated to follow the technological procedures of the assembly and adhere to the assembly instructions of individual manufacturers-

The producer of the work submits to the ordering party a written ES certificate of conformity, testing protocols or certificates on the item in question for products used for making the product which is among the products defined by the government, whose conformity with technical requirements must be assessed in accordance with the Government regulation no.163/2002 Sb., as amended, following Act no 22/1997 Sb. on technical requirements on the products and on change and completion of related acts.

Technical rooms of WCS are separate spaces serving to place WCS distributors and other facilities ensuring operation:

- a) IT low-current networks - DATA, TELEPHONY
- b) access systems - KV
- c) electronic attendance controls - e-Doch
- d) unified time distributors - JČ
- e) alert security and emergency systems - ASES
- f) electric fire signalization - EFS
- g) closed circuit TV – CCTV
- h) e-entrances, e-exits
- i) internal system for information and emergency calls – VSVTI
- j) uninterrupted power supply - UPS



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### 1.4 Documentation for TR

The documentation is supplied in Czech in two printed copies (paper, foil, etc.), on one data carrier, or as agreed by both the requesting party and supplier in writing.

The type of data format and carrier must be approved by the requesting party.

#### Documentation of the actual work

- WCS mains
- Low-voltage distributor and its connection scheme (in .pdf or .dwg format)

#### Electric review

- Backed-up inlet to the distributor in the TR
- Backed-up outlets to the distributor in the TR
- Non-backed-up inlet to the distributor in the TR
- Non-backed-up outlets in the distributor in the TR

#### Air-conditioning

- Air-conditioning handover protocol
- Record book of equipment with a cooler
- Operator's manual
- Electric inlet review
- Top view (drawing of placement of internal, external unit, electric connection, etc.)

#### UPS

- UPS handover protocol
- Electric review of UPS
- RUPS mains and distributor scheme
- Operator's manual

#### Temperature sensor (TS)

- TS handover protocol including its setting
- Operator's manual

#### Documentation of fire-resistant seals on WCS mains

## 2. Basic division of technical rooms

Technical rooms can be divided based on their significance and function:

### 2.1 LDRs (Local Data Rooms)

Location of active network components, servers.

Exceptions to server locations in technical IT spaces must be granted by the corresponding FIO department.

Exceptions can only be granted for the following servers:

- Commercially non-critical applications or data "hosten" (e.g., Printserver, Dynamic Host Configuration Protocol (DHCP) Server) and no virtual servers.
- Those that have a concept of data-security and recoverability that is not derived from this technical space.



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Requirements:

- Air-conditioned room with redundancy N+1 (with sufficient power and reserve)
- Separate electric inlet with a sufficient UPS back-up supply from a diesel generator
- Separate fire section
- Access of authorized persons via access control systems (ZuBeSy)
- ASES
- EFS
- AFFES
- Standard floor plan dimensions of LAN distributors 42U-46U (1200x800)
- Width of the entrance door for TR must be minimum 90cm

#### 2.2 Main technical room in an AREA/SHOP (MTR)

Closed space serving to place telecommunication devices, cable ends of backbone area mains in the building.  
(Spaces for placing building distributors in individual buildings)

In the MTR all distributors and devices of all WCS mains pertaining to the building are installed.

Requirements:

- Air-conditioned room
- Separate fire area
- Emergency airing of TR using VZT ventilators
- Separate electric inlet with a connection to the building's/shop's UPS (or to be handled locally).
- Access by authorized persons through access control system (ZuBeSy)
- ASES
- EFS
- Standard floor plan dimensions of LAN distributors are 800x800mm in height 42U-46U
- Width of the entrance door for TR must be minimum 90cm

Main technical room of an AREA/SHOP enables:

- Connecting backbone WCS networks between buildings in the area
- Ending WCS connectors of technical room networks (MTR type) – main inlets into buildings
- Mains of WCS networks to other ATR type technical rooms in the building (auxiliary and end distributors located on the surface of the production shops)
- WCS mains to end devices (users) in MTR type buildings
- Placement of user servers in the respective building upon approval from FIO management
- Placement of main central WCS devices (MTE, ME), incl. corresponding main distributors in the building
- Placement of the main central WCS devices of mobile operators, incl. the corresponding main distributors in the building (approved by FIO/3 section)

#### 2.3 UPS technical room

Separate room for placing UPS devices.

Closed space serving to place central uninterrupted power supply for data mains of a building or shop.

Requirements:

- Air-conditioned room with redundancy N+1 (with sufficient power and reserve)
- Separate fire area
- Emergency airing of the TR using VZT ventilators
- Separate electric inlet from diesel-powered network/first low-voltage switchgear after transformer
- Access by authorized persons through the general EOI key system
- ASES
- EFS
- Sufficient floor plan dimensions of the TR considering its equipment and maintenance



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- Width of the entrance door for TR must be minimum 100cm

#### 2.4 Auxiliary technical room in a building (ATR)

Closed space serving to place telecommunication devices, cable ends and switches of backbone building mains of horizontal mains cables in the building.

(Spaces for placing building distributors in individual buildings.)

In the MTR all distributors and devices of all WCS mains pertaining to the building are installed.

Requirements:

- Separate fire section is not required
- Access by authorized persons through the general FIO key system, ZuBeSy required based on the room's priority (determined by the respective FIO department, approved by FIO management)
- ASES required based on the room's priority (determined by the respective FIO department, approved by FIO management)
- EFS
- At least 1 to 2 distributors with a standard floor plan LAN dimensions of 800x800mm at height 42U - 46U
- Width of the entrance door for TR must be minimum 90cm
- If backed-up circuit cannot be led in, local UPS will be located in the TR.
- FIO designer accounts for space's thermal load and determines possible deployment of air-con unit. In case of installation of local UPS, air-con unit needs to be deployed in every case

Auxiliary technical room enables:

- Ending WCS connectors of technical room networks (MTR type)
- Mains of WCS networks to other technical rooms of ATR type in the building (auxiliary and end-distributors located on the surface of the production shops incl. wall distributors)
- WCS mains to end devices (users) in the building where the specific node is placed
- Placement of the main central WCS devices (MTE, ME), incl. corresponding main distributors in the building
- Placement of the main central WCS devices of mobile operators, incl. the corresponding main distributors in the building

#### 2.5 LAN BOX (End distribution node)

An end distribution node is only such distribution node where there is no likelihood that another distribution node will be connected to it.

In special exceptional cases we must count on the use of 19" closed cabinet data distributors in offices and/or in a shop where technical space cannot be constructed. The special provision applies exclusively to the installation of individual distributors.

Requirements:

- Circulation and outlet of hot air will be ensured by ventilators (supplied as part of the distributor). Ventilators will be suitably placed in view of the air circulation and so that they are accessible for maintenance.
- Minimum size 18U. Distributors must correspond to the safety category with a coverage of at least IP 54 (5=protection against dust, 4=protection against spraying water) and must be completely closed.
- Must be accessible from the front side and from one part from the side, mechanical barriers to prevent damage to the LAN box.
- Ended electric inlets, possibility of connection to backed-up and non-backed-up circuit (2x single-phase, minimum 16A)
- Grounding fastened (PE)

### 3. Selecting locations of technical rooms





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Providing autonomous technical spaces is necessary for placing centrally used IT components with respect to technical and organizational requirements and safety requirements.

Requirements following the guideline:

There should be at least one auxiliary technical room on the floor, art. 4.7.1 (ČSN EN 50173-1 ed.3) for every 1000m<sup>2</sup> of floor occupied by office space

On every floor there should be at least one auxiliary technical room, art. 4.7.1 (ČSN EN 50173-1 ed.3)

### 3.1 General section

- a) TRs are placed in buildings in such a way as to achieve optimum coverage of the building's space.
- b) Covering the TR space follows the guideline on adherence to the length of 90m for a cable terminating at the Patch panel of the defined data distributor on one side and in the corresponding data socket of the end user – TO – on the other side.  
As per art. 5.2.2.2 of the guideline (ČSN EN 50173-1 ed.3) the physical length of a metallic cable must not exceed 100m, of which the total physical length of the fixed horizontal cable must not exceed 90m.

Note. 10m is deducted from the total maximum length of the 100m data cable, defined by the guideline, for connecting mobile cables in the TR and from the socket to the end device.

- c) When designing the layout of the WCS technical room, individual procedures must be applied to each room. Optimizing the size of the surface actually covered in one TR depends on the physical dimensions of the building, location of the TR, placement of WCS routes and other parameters.

### 3.2 Placement of TRs in buildings

Main technical room of the building:

As a priority, main technical rooms in buildings are set up on the ground floor at the peripheral outdoor wall of the building, so that the room is immediately adjacent to the outdoor mains of the WCS infrastructure (cable ducts) and at the same time access by the service staff directly from the outside through a separate door without contact with other users of the building is enabled.

TRs in administration buildings:

In multiple-story buildings TRs are preferentially placed on the individual floors vertically one above the other. Technical rooms are interconnected by installation cores enabling individual technical rooms to be interconnected. Installation cores must enable fire division from the space of the technical rooms.

TRs in production shops:

Auxiliary TRs in large production shops are preferentially located in the centre of the attraction zones of the LAN data distributors' nodes, possibly in a square grid in order to ensure optimum coverage of the surface specified for networking the WCS networks.

ATRs are located on floors above the level of technological production spaces, on the second floor and other floors (so-called Penthouses).

In the case of this location of the TR the scope of coverage of the data network with mains on the production surface increases (size of the attraction zone of the data node with LAN distributors).

TRs of any type cannot be placed:

- a) In particular in spaces with a risk of flooding by water and other liquid media, e.g., under sanitary facilities, toilets, wash rooms, showers, cleaning rooms, kitchenettes, rooms for preparing meals, liquid storage tanks, under heating machine rooms, under hung-up water and hot-water piping in shops, and at insufficient distances from such piping.



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- b) In spaces where any piping is placed that do not directly serve for the operation of this TR. This includes, in particular, piping for drinking and industrial water, waste drains, sewage, rain water pipes, gas pipes, technical gases and liquids, compressed air, hot-water pipes, etc.  
Exceptions include lines that serve to cool data distributors, spaces or facilities (condensate conducting).
- c) In spaces where routes with high-voltage or low-voltage cables are installed, excluding high-current installations and low-voltage mains that are a part of the WCS TR.
- d) The station should not be placed close to machines, etc., so that operation free of vibrations is ensured.
- e) In wet, dusty and dirty spaces. (e.g., basements and cellars, etc.)  
Exceptions are cable spaces adjacent to outdoor infrastructure.
- f) In spaces exposed to high temperature loads, spaces neighbouring heat exchangers or located in the southern glazed facades of buildings, under roof portholes, etc.
- g) Close to sources of strong electromagnetic fields, e.g., close to power devices of high voltage and low voltage, close to broadcasting aerials of communication devices, etc.
- h) In spaces with an elevated risk of fire.
- i) In places where access to other spaces that do not belong to FIO would only be possible through the TR.
- j) The location of the WCS technical room must allow for sufficient installation of SPLIT air-conditioning equipment.
- k) In the Česana technical development area in spaces located in the flood zone under the hundred-year water level on the Jizera river.
- l) In spaces where the risk of natural disasters are higher (floods, etc.). If this is not technically possible, compensatory measures (flood barriers and barriers, etc.) must be considered.

## 4. Defining the requirement for the size of a TR

The size of the space needed for setting up a TR is defined based on the number of data distributors and other WCS system distributors including auxiliary devices serving to run the WCS that are supposed to be installed in the TR, so that the following conditions are met:

## 4.1 Number of distributors in the TR

- a) Number of distributors in the TR LDR or MTR is determined as the sum of:
  - number of backbone mains distributors
  - number of distributors of horizontal mains in the building
  - number of distributors for servers (if their placement in the node has been planned)
  - number of other distributors (e.g., camera system, radio, etc.)
- b) Number of distributors of horizontal mains in the building.  
Size of the distributor (42U – 46U) / maximum number of devices that may be placed with the distributor converted to the size of occupied positions of size 1U.  
The resulting value is modified by adding 0.5 to it and rounding it up to a whole number. The maximum number of sockets (ports) that may be served by one LAN data distributor is 384 ports. Fully equipped cabinet 800x800 – space sized 35U filled.
- c) Defining the number of Patch panels  
Maximum number of TO telecommunication outlets (data sockets, ports) / number of ports on one Patch panel (24)
- d) Defining the number of active elements - switches  
Maximum number of TO telecommunication outlets (data sockets, ports) / number of ports on one active element - switch (48)
- e) Defining the number of telephone Patch panels  
Maximum number of TO telecommunication outlets (ports) for connecting a telephone line /number of ports on one telephone Patch panel (50)  
The resulting value is modified by adding (1) one and rounding up to a whole number.



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Telecommunication outlet - TO

Each separate working area (connection point) must be served by at least two TOs (TO = socket = port) as per art. 4.7.5.1 of the regulation (ČSN EN 50173-1 ed.3)

Served surface of the working area for one user = 6m<sup>2</sup>.

Maximum number of TOs (sockets, ports) = 2x maximum number of users

Maximum number of Patch panels = Maximum number of TO outlets (sockets, ports).

- basic floor plan indoor dimensions of technical room type MTR and ATR for the installation of 1pc of LAN distributor are at least 2.50 x 3.20 m
- basic floor plan indoor dimensions of technical room type MTR and ATR for the installation of 2pcs of LAN distributor are at least 2.80 x 4.00 m
- basic floor plan indoor dimensions of technical room type MTR and ATR for the installation of 3pcs of LAN distributor are at least 3.50 x 4.50 m

## 5. Requirements for the spatial arrangement of WCS distributors in the TR

The dispositional arrangement of distributors and distributors in the TR is managed by the WCS designer.

- a) Standard floor plan dimensions of the LAN distributors are 800x800mm at a height of 42U – 46U.
- b) Maximum height of the LAN 2250mm distributor.
- c) Standard floor plan dimensions of server distributors are 1200x800x2000mm.
- d) The distributors must be accessible both from the front and the back.
- e) It is necessary to maintain space for service and maintenance operations. The minimum distance from the wall (or other facilities) in front of and behind the distributors must be at least 800 mm.
- f) The distributors may be placed in rows. The distributors are placed next to each other with their side walls. In this case, the distributors are assembled without front walls.
- g) Minimum distance from the wall (from other devices) on the sides of the distributors (or distributor rows set up as per point d), there must be at least 900mm on the side closer to the exit of the technical room and at least 400 mm on the opposite side.
- h) Distances as per point g) must be maintained with all rows of the distributors in one TR on one side, so as to enable one continuous wide alley to be set up on one side.
- i) With other facilities the same values of minimum distance apply as with the distributors (if the manufacturer does not define larger).

## 6. Requirements for the construction

- a) The entire technical room must be dustproof!
- b) Internal ceiling height in the main technical room (MTR) is 3.20 m at a minimum and internal ceiling height in an auxiliary technical room (ATR) is 2.60 m at a minimum.
- c) Dustproof surface of the walls and ceiling in the TR.



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- d) Walls in technical rooms must be made of materials with sufficient strength that enable anchoring components (dowel pins) of the distributors to be fitted and auxiliary carrier constructions of cable mains routes.
- e) When placing TRs in production shops or free spaces these will be completed with a waterproof roof.

## 6.1 Windows

Technical room without windows – safety requirements. If it cannot be prevented in terms of construction, it is necessary to consider corresponding protective measures as protection against the sun, view in (foil, blinds) and burglary (ASES).

## 6.2 Doors

The entry door to the TR should be fitted with respect to the dispositional placement of the TR and the equipment installed inside.

Door opening in the direction out of the TR. Secure the entry door against improper storage of materials or accidental damage by passing machinery.

Door at the entrance to the TR with fire resistance EI 15 DP1+C at a minimum.

- value EI – preventing fire, more expensive (among other things)
- value 15 – it must resist fire for 15 minutes before it spreads to the other side
- value DP1 – product made of steel, grenamat or other non-flammable materials
- value C – door equipped with automatic closing, for double-hung door a closing coordinator may be required in the fire report

## 6.3 Floors

The loading capacity of the floor is defined based on the type of technical room.

- for TRs type LDR, floor for a load of 1000 – 2000 kg/m<sup>2</sup>
- for TRs type MTR, floor for a load of 600 - 1000kg/m<sup>2</sup>
- for TRs type ATR, floor for a load of 600kg/m<sup>2</sup>

Floors in technical rooms of all types must be antistatic (with an antistatic, easy-to-maintain surface, e.g., PVC)

## 6.4 Access routes to distribution nodes – TRs

When placing TRs inside a building, the following requirements must be fulfilled:

In WCS technical rooms independent access by authorized FIO employees is required, year-round, 24hours a day, regardless of the presence of the user or building administrator.

If the requirement cannot be met, FIO requests the keys be provided (assignment of a code to ASES) from the access route to the TR.

In case of any failure to allow access, it is necessary to agree on a mode of operation in connection with the FIO section. Technical rooms are to be located so as to enable access directly from outdoor areas or the entrance room, main corridor, or from other commonly accessible and unlocked indoor areas. The area in front of the entrance to the TR will always be accessible, with no barriers or other obstacles in order to ensure trouble-free operation and maintenance in 24/7 mode.

The access road to the outdoor entrance to the WCS TR must be reinforced and adapted to winter maintenance, paved (bitumen). Safe movement of persons on the road must be ensured (with a protective railing, crash barriers).



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Routes on roofs must fulfil the parameters of an elevated overcrossing steel grid with a rail. The width of the external access route is to be 1.00 m at a minimum.

#### 6.5 Requirements for indoor equipment of the distribution node - TR

- 2 pcs service socket 230V; 50Hz
- ceiling light 300 lx (as per para. 10)
- EFS alarms in a number determined by a calculation
- temperature sensor in the TR enabling remote transfer (as per specifications of FIO section, Ethernet, SNMP, PoE, DHCP client according to ITS 1.05)
- air-conditioning (as per point 9)

Apart from data distributors, other WCS devices are to be installed in the technical rooms, e.g., phone distributors, unified time distributors, EFS, ASES, CCTV, ACS, etc.

All devices in the TR working in a 230V;50Hz network will be powered from an auxiliary low-voltage distributor placed in the respective TR.

#### 6.6 Fire protection

Before constructing the IT technical area, it is necessary to take into account the FSS of the building in which the technical area is to be set up.

#### 6.7 Equipment forbidden in the TR

It is forbidden to use sprinklers due to the risk of extensive material damage caused by the extinguishing medium upon random switching. This also applies to the passage of the line through the TR.

In the TR space connected devices which for the given TR space have no function must not be used (such as coffee makers, heating fans, immersion heaters, refrigerators, radio appliances, hot plates, copy machines, printers, mobile ventilators) It is not possible to place control and distribution panels for technology not operated by FIO.



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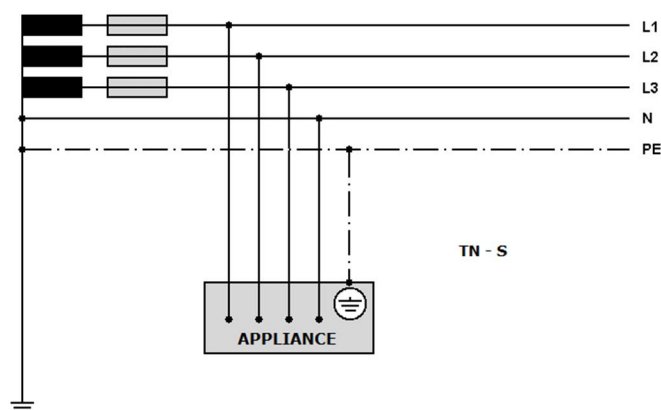
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## 7. Supplying power to WCS technical rooms – low-voltage mains

Requirements for the low-voltage electric installation designers:

Auxiliary distributor for supplying devices in the WCS technical room will be designed as a dual-system for supplying devices from non-backed-up and backed-up system.

All power supplies must be designed as a TN-S network (phase L1, L2, L3, separate neutral conductor N and protective conductor PE). Colour labelling to be applied as per ITS 1.11.



When proposing the dimensions of the energy supply to IT technical areas, the maximum input of the active components must be taken into consideration. At the same time, the assumption is that in the near future all participating connections will be operated with PoE components as per IEEE 802.3at and also every WLAN Access Point is to use the technology. The heat output resulting from this will be determined by an expert IT designer to measure individual cooling and energetic power for the technical area. When first determining the dimensions of the energy supply it is necessary to consider a power reserve of at least 30% for possible extensions in the future.

Circuit breakers of all appliances and the conductor's cross-section must be in keeping with all valid electric guidelines. All additional requirements of the user must be considered in the design.

Delivery and assembly of the electricity distributor is included in the realization of the low-voltage mains.

Supplying the non-backed-up section of the distributor is performed via a separate 5-fold cable type CYKY with the necessary cross-section, from the building's main distribution room or (floor) low-voltage distributor - this inlet cable is part of the building construction.

Supply to the RUPS distributor for the building's UPS from a non-backed-up distributor is performed via a five-fold CYKY cable with the necessary cross-section from the main distribution room of the building – this inlet cable is part of the building construction. Dimensions of the supply cable are defined by the size of the newly installed UPS.

In case of a power supply led to the RTM distributor through a back-up supply from the central UPS already installed in the building, the inlet cable will be connected to the RTM distributor in the same way as a cable of non-back-up supply. The individual supply systems must be clearly arranged and spatially separated in the distributor. Both supply systems must be properly labelled as prescribed in accordance with applicable guidelines (Warning, supplied from two locations; Warning, reverse current, etc.)

Only data distributors and WCS technologies are supplied from a back-up supply source.

In each WCS technical room a clamp box of the main protective connection must be installed to enable connecting all WCS distributors. Connecting this clamp box to the buildings grounding system is performed using the CYA 16 - 25mm<sup>2</sup> conductor – ensured by the building construction.

Other mains will be run in cable routes formed by wire metal conduits attached to the walls of the TR, or hung under the ceiling.



### 5.30 Distribution nodes - Technical room of low-current systems

Amended: 2017-03-30

Low-current distributors for WCS (RTM) technical rooms serve exclusively for supplying devices located in the TR.

RTM distributors to be fitted with fuse elements for supplying data distributors (LAN) next to surge voltage protectors, air-conditioning up to  $I_n=20A$ , socket outlets and lighting with fuse elements for supplying other WCS devices.

Low-voltage distributors in WCS technical rooms:

- outlets for supplies of LAN active elements – 2x 16A/C  
connected from the backed-up UPS circuit and protected against surge voltage; differentiated by colour from the others
- outlets for supplying active elements LAN – 1x 16A/C  
connected from a non-backed-up circuit and protected against surge voltage; differentiated by colour from the others
- socket outlet for supplying service sockets (maintenance) 16A/B  
connected from a non-backed-up circuit; differentiated by colour from the others

Do not use current conductors in the supply path for connecting IT devices!

In the low-voltage distributor there will be circuit breakers for the outlets in the non-backed-up system:

- 4 x 6A/B for devices EFS, ASES, CCTV and ACS
- 4 x 10A/B for devices EFS, ASES, CCTV and ACS

In the low-voltage distributor for WCS labelled as RTM a space reserve for circuit breakers must be left, both in the backed-up and non-backed-up distributor in numbers of approx. 3+3 pcs of single-phase circuit breakers. All socket strips in the distributors will be fitted with protection against surge voltage and be properly labelled.

Supply of data distributors (LAN) from low-voltage distributors is performed as a priority from top down in an autonomous route.

In direction A backed-up circuit – installation in the distributor (LAN) exclusively on the left.

In direction B non-backed-up circuit – installation in the distributor (LAN) exclusively on the right.

Supply cables for supplying data distributors (LAN) will be terminated in sockets 230V/16A placed in cable conduits of routes conducted above the distributors. For supplying data distributors in TRs CYKY 3Cx2.5mm<sup>2</sup> cables will be used. Socket strips, which are a part of the delivery of individual data distributors, will be connected with mobile inlets terminating in the corresponding plug. Power connection of data distributors (LAN) consists in pushing forks into the prepared connecting spots (sockets).

Socket distributors of TR service sockets will be designed in the DLP50x80 installation channel (DLP50x105) or installed under the plaster together with other low-voltage distributors, fitted at a height of 0.40 m above the floor.

Assembly and maintenance sockets in the TR will be fitted with respect to the size of the room. It is required to install at least one initial double-socket placed by the distributor.

Light distributions, socket mains type "C" and supply to the air-conditioning system are a part of the delivery of high-current mains in the building construction.





## 5.30 Distribution nodes - Technical room of low-current systems

Amended: 2017-03-30

### 8. Air-conditioning and HVAC of distribution nodes - TR

The air-conditioning units is designed based on the defined idle heat power of the installed device with a cooling reserve at least 30.

Wall air-conditioning (ceiling), (temperature maintained between 20 and 25°C).

Estimated idle heat power of the WCS device installed in the technical room for the air-conditioning concept is based on the configuration of the LAN active elements and sources of supply of the other WCS systems, which is processed by the WCS designers.

Only air-conditioning units in an industrial finish are allowed, SPLIT channel type with anti-corrosion surface finish and without plastic covers.

The air-conditioning system must meet the requirement of non-stop service 24/7/365 with automatic start function in the case of a black-out.

All types of air-conditioning will be connected to the FIO supervision system as per user's request. The units must be equipped with a module for monitoring the status of the air-conditioning unit. Monitoring is connected to the Ethernet network. A convertor for communication via the Ethernet network (see point 12.11).

Air-conditioning units are installed with respect to optimum cooling of the installed devices in the technical room. Pipes draining the condensate are to be conducted outside the space of the TR, not in proximity to FIO equipment. The air-conditioning unit must be fixed to a certified suspension system allowed by the air-conditioning system's manufacturer. Air-conditioning units are supplied from a non-backed up distributor (based on the used air-conditioning unit, one- or three-phase from the distributor of the relevant TR. In case of redundant configuration of air-conditioning units at least one must be supplied from a back-up distributor of this room.

In case of malfunctions of the air-conditioning it is necessary to ensure deairing of the room with VZT ventilators of a diameter of min. 150mm and ensure sufficient flow of the air. This emergency ventilation will be switched on automatically upon breakdown of the air-conditioning unit when the limit temperature set on a spatial thermostat. This emergency system must be connected to FIO monitoring (malfunction, ON/OFF state). If technically possible, supply to this system is to be ensured from a backed-up inlet.

### 9. UPS for TRs

For supplying FIO technology a back-up supply source (UPS) is used in the UPS online design with double conversion. The central UPS of the FIO section for ensuring power supply to more TR in one building will be dimensioned in battery operation for a minimum of 30 mins at full load. The required back-up time in battery operation for other UPS min. 10 mins at full load.

For covering the energy consumption of FIO technology to 3kVA, UPS in a rack shelf design may be used, provided that the prescribed back-up time is adhered to. Placement of UPS depends on the TR category or its significance in the ŠKODA AUTO a.s. data network.

All UPS will be connected to the FIO supervisory system based on the user's request.

UPS may be placed only in spaces air-conditioned) that will ensure a constant temperature and humidity in accordance with the operating conditions of the UPS and batteries.

### 10. Lighting mains nodes – TR

Mains of the lighting in the technical room will be supplied from a system of non-backed-up mains of the RTM distributor of the respective TR.

Lights will be placed so as to prevent any collision with data distributors and at the same time to ensure the minimum lighting value required.

Lighting of the technical room will be realized as economical (LED panels, fair-face and ceiling lights, fluorescent tubes). The required intensity of lighting in the TR is 300 lx at a minimum.

In the technical room, emergency lighting is installed according to the FSS of the building which is supplied from an independent source or connected to the building's central UPS (priority as LED). Operation is ensured by the administrator of the relevant building.





## 5.30 Distribution nodes - Technical room of low-current systems

Amended: 2017-03-30

### 11. Operating technical rooms at ŠA

#### 11.1 Security of technical rooms

Technical rooms are always secured against entry by unauthorized persons based on the category of the TR (described in detail in point 8).

Entrances to the TRs are approved by the zone owner (FIO manager). Permission to gain access is granted by the SO department (plant security).

Users with restricted access use the key deposit for borrowing the keys or MFA cards to these zones. Access to individual items in the deposit is approved by the zone owner (FIO manager). Permission to gain access is granted by the SO department (plant security).

If there is an ASES system in the technical room it is necessary that the person entering the TR has the authorization to unlock the TR or they should be accompanied by a person responsible for operating the TR.

Upon leaving, everyone is obligated to secure the room against access by unauthorized persons.

#### 11.2 Keeping the TR in order

Persons performing any work inside the TR are obligated to return the TR to such condition in which it had been provided to them. Handover of the TR is conducted in the presence of the person responsible for operating the TR. Objects that are not directly related to the TR's operation cannot be stored in the TR, in particular flammable materials!

#### 11.3 Cabling, cable bundles

In the TRs and distributors (racks) cables that are not directly related to the TR's operation can neither be left freely nor stored.

Cables must be laid in accordance with the rules set by FIO.

#### 11.4 Records of access to the TR

Access is recorded depending on the available technology located in the TRs, including access with an MFA card, key or MFA card issued from the key deposit. Every item in the key deposit is recorded in the K4 system.



## 5.30 Distribution nodes - Technical room of low-current systems

Amended: 2017-03-30

## 12. Materials and products released at ŠA

Equipment of electrical distributors (safety and switching elements, surge voltage protection, etc.) will be realized based on the list of released components as per ITS 1.11.

## 12.1 Cable routes

CES	Flexnet
Kopos	LEGRAND
OBO Bettermann	

## 12.2 Data distributors (Rack)

Rittal	Knürr
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## 12.3 Low voltage distributors of electric supply

ABB	Schrack
OEZ	

## 12.4 Fire seals

Intumex	Hilti
Promat	

## 12.5 Air-conditioning units

Toshiba	Samsung
Uniflair	

## 12.6 UPS up to 10kVA

Schrack	ABB
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## 12.7 UPS over 10kVA – modular system

Schrack	ABB
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## 12.8 Battery UPS

CSB Battery	Panasonic
C&D Dynasty	Yuasa
FG Forte	

## 12.9 Heat sensors

Poseidon (HW Group)	Comet
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## 12.10 Converter for communication via Ethernet

Poseidon (HW Group)
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