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# Isolated Power Systems VIT-AFSBY

with ATICS® changeover and monitoring device, insulation fault locator and bypass switch for operating theatres and intensive care units



**With energy efficient  
"Green Line"  
Transformer**



# Isolated Power Systems VIT-AFSBY

for operating theatres and intensive care units

with ATICS® changeover and monitoring device,  
insulation fault locator and bypass switch



## Device features

- Installations
  - Automatic changeover and monitoring device ATICS® including monitoring of i.e.:
    - Voltage of incoming supply
    - Output voltage
    - Correct operating times
    - Changeover times
    - Insulation resistance
    - Load current
    - Transformer temperature
  - Functional safety acc. IEC 61508 (SIL2)
  - Up to 12 or 24 outgoing circuits with circuit breakers, B16 A, 2 pole
  - Insulation fault monitoring device
  - New energy-efficient isolating transformer, (6300, 8000VA) Inrush current  $< 5 \times I_n$
- Uninterrupted testing and replacement with bypass switch
- Variable changeover time  $t \leq 0.5 \dots 15$  s
- Exchange of information by means of bus technology
- Connection for remote alarm and operator panels MK2430/CP305/CP9xx
- Short delivery times
- Cost and time savings thanks to ready-to-connect cabinets
- Sheet steel housing as to DIN VDE 0100-710
- Designed in accordance with the requirements of applicable standards
- Design verification according to new DIN EN IEC 61439-1, -2, VDE 0660-600-1, -2 and IEC 60364-7-710, DIN VDE 100-710
- Voluntary test of changeover module by the independent German technical service, testing and inspection organization (TÜV)

## Application

The isolated power systems of the VIT-AFSBY series supply electrical power to group 2 medical locations, e.g. operating theatres and intensive care units. For socket-outlet circuits for medical electrical equipment with nominal voltages exceeding AC 25 V or DC 60 V, the protective measure "Protection by insulation monitoring with indication in the IT system" is mandatory.

Furthermore, a changeover module is required to change over automatically from the safety power supply source to a second supply source in case of failure. An insulation fault locator is integrated in the VIT-AFSBY for quick localisation of insulation faults.

## Functional description

The IT system distribution cabinet in the VIT-AFSBY series contain an isolating transformer and a changeover and monitoring module UMA710-2-xx-ISO-... with bypass switch and with all the necessary monitoring equipment for IT systems in accordance with DIN VDE 100-710:

- Changeover modules with control function
- Insulation monitoring
- Load and temperature monitoring

The isolated power systems also contains an insulation fault location device for 12, 18 or 24 outgoing circuits. On the secondary side of the isolating transformer, 12, 18 or 24 circuit breakers (B16 A, 2 pole) are built in accordingly. The socket outlets of the group 2 room are connected to these circuit breakers.

To reduce noise pollution, the waste heat is dissipated by natural convection, even at 100 % transformer load

## Functions in accordance with DIN VDE 0100-710

- Voltage monitoring with adjustable control function on the preferred line and on the second line and at the output of the changeover device
- Variable changeover time  $t 0.5 \dots 15$  s to change over from normal power supply source to safety power supply source resp. from uninterruptible power supply source.
- Protection against wrong operation by mechanical and electrical multiple interlocking
- Cables are laid to resist short-circuits and earth faults
- Control circuit with single fault tolerance according to DIN VDE 0100-710
- Automatic return on voltage recovery
- Functional testing including checking of the operating times
- Insulation, load current and temperature monitoring for the IT system
- Monitoring of the system/PE connections of the insulation monitoring device
- Isolating transformer 6300 or 8000 VA for IT system with inrush current  $< 5 \times I_n$

## Further measures to increase the electrical safety

- Continuous monitoring of the actuation devices and automatic processes (coil, control contacts, connections).
- Monitoring for short-circuits upstream and at the output of the changeover device and the pre-defined switching behaviour
- Maximum reliability when switching:
  - due to patented switching system with mechanical and electrical interlocking
  - due to weld-free switching contacts with the mechanics of a circuit-breaker
  - resistant to e.g. voltage fluctuations or vibrations due to stable switching position and permanent contact pressure
- Preventive safety thanks to automatic reminders for prescribed tests, service times and number of switching operations
- Bypass switch for uninterrupted testing/maintenance
- Tested by the independent testing laboratory TÜV, Germany
- Tested functional safety in accordance with IEC 61508 (SIL2) of the ATICS® switch (Provide messages at two points at least)

### Changeover and monitoring module

In fault-free condition, the preferred supply line is switched on. If the voltage falls below the set value, a changeover to the second supply line will automatically take place. The changeover period can be set individually. In order to ensure operational readiness, the second line as well as the output of the changeover module (Line 3) are monitored too. On voltage recovery, return to the preferred supply line occurs automatically. Due to variable delay times (return transfer times or delay times), the changeover module meets the individual installation-specific requirements (e.g. coordination of several changeover modules, reduction of switching energy).

A bypass switch is provided for uninterrupted testing and maintenance of the changeover and monitoring device.

### Insulation, load and temperature monitoring

The insulation monitoring device continuously monitors the insulation resistance, load current and the temperature of the IT system transformer. If one or several response values have been reached (insulation resistance, load current, temperature), the alarm relay switches and a corresponding message occurs. The connections to the system and PE, as well as to the measuring current transformer and temperature sensor, are permanently monitored. In the event of wire breakage or short-circuit, a message will appear. The patented AMP measuring technique is used in order to exclude the possibility of insulation monitoring being impaired by DC components.

### Insulation fault location system (EDS system)

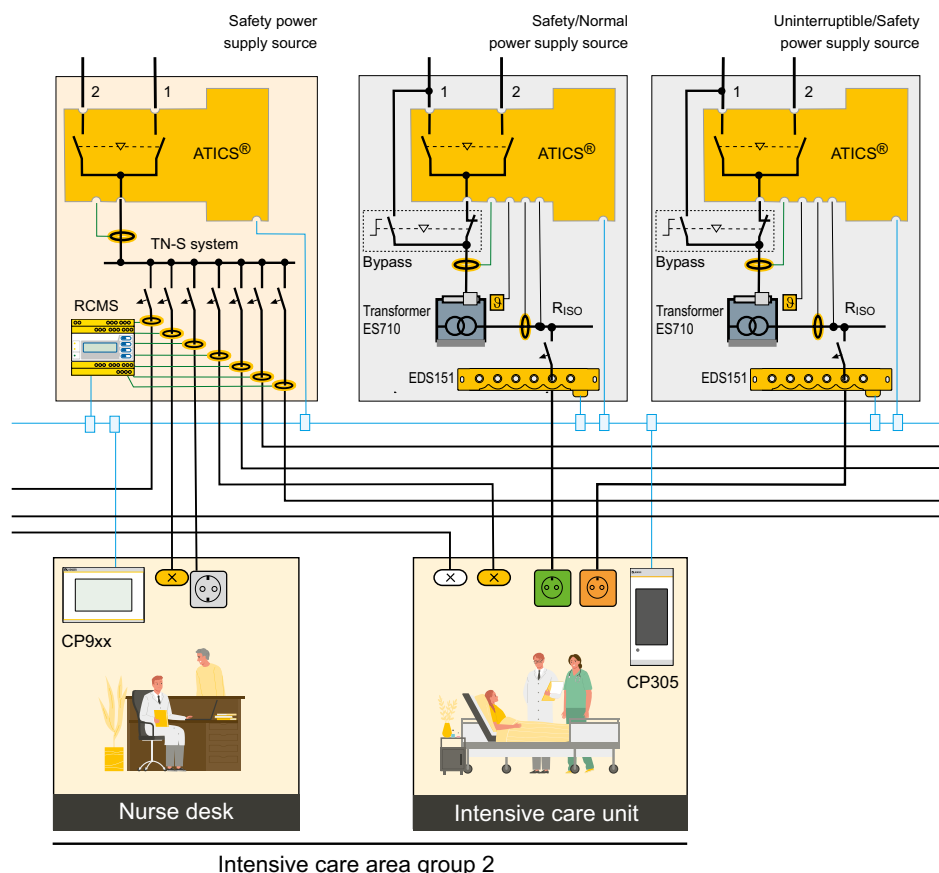
In medical used areas of room group 2, with many socket-outlet circuits or loads (e.g. intensive care units) it is often time-consuming and difficult for medical or technical personnel to locate circuit faults or loads. The EDS insulation fault location system solves this problem by automatically localising the insulation fault during operation. This has two major advantages: time- and cost-optimised fault localisation and availability, since the system remains in operation during the automatic fault search.

### Functionality of the EDS system

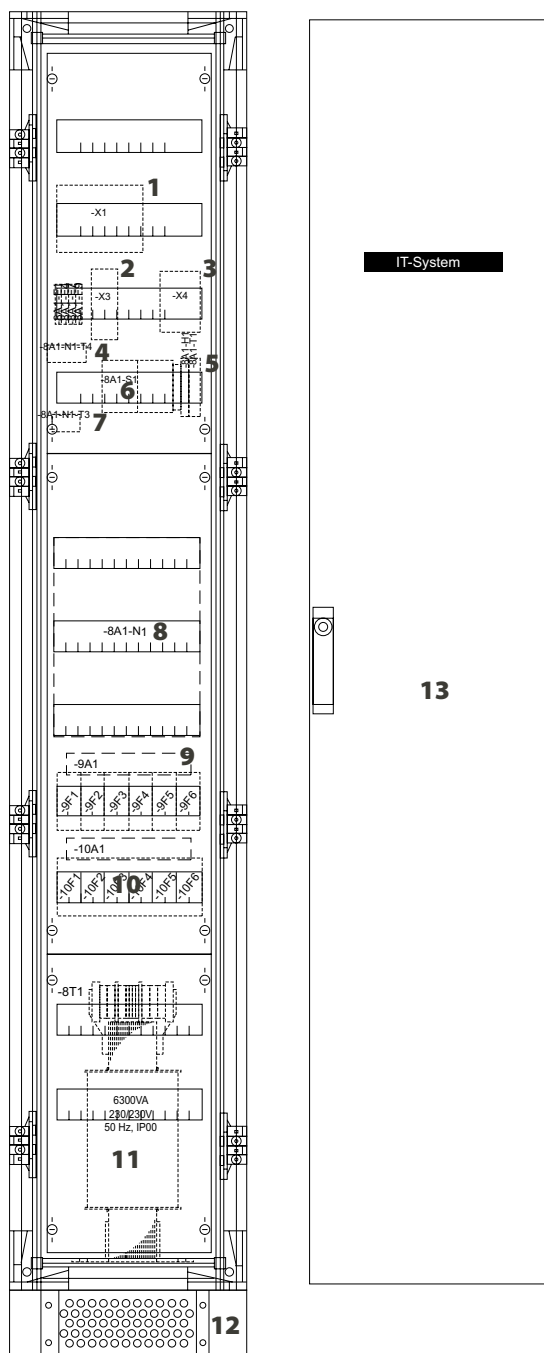
If the ATICS-2-xx-ISO changeover and monitoring device reports an insulation fault, the insulation fault location starts: The device generates a test current of max. 1 mA. This test current flows via the insulation fault location and via the earth cable (PE cable) back to the test device. The locating current is detected by the measuring current transformer in the fault path and signalled by the EDS insulation fault locator via the bus. The localisation of the faulted circuit or load is based on the assignment of the measuring current transformer/outgoing circuit to an individual text message, e.g. on a alarm and control panel CP9xx, on the alarm and test combination CP305 or MK2430.

### Messages displayed in plain text

The unique status, warning and fault messages are displayed in plain text, whereby the required alarm and test combination MK2430, CP305 or the alarm and control panel CP9xx must be provided in the medical area at a suitable location that is permanently monitored by the medical staff. A two-wire bus cable is required to connect the isolated power systems VIT-AFSBY to the alarm indicator panels.



## Design



- |                                                                                    |                                                      |
|------------------------------------------------------------------------------------|------------------------------------------------------|
| 1 - Terminals for the incoming conductors                                          | 6 - Bypass switch                                    |
| 2 - Terminals for the control connections                                          | 7 - Current transformer for current monitoring       |
| 3 - Terminals for the outgoing conductors                                          | 8 - Changeover and monitoring device ATICS® (3 rows) |
| 4 - Current transformer for load monitoring of the IT transformer                  | 9 - EDS151 insulation fault locator                  |
| 5 - Power supply unit for MK2430/CP305/CP9xx alarm indicator and test combinations | 10 - B1x A circuit breaker, 6 outputs per row        |
|                                                                                    | 11 - IT system transformer                           |
|                                                                                    | 12 - base, perforated                                |
|                                                                                    | 13 - front door                                      |

## Design details Isolated Power Systems

### Data Isolated Power Systems

|                      |                                                         |
|----------------------|---------------------------------------------------------|
| Cabinet range        | ABB – Striebel & John, Triline R                        |
| Cabinet type         |                                                         |
| VIT-AFSBY-112S-      | 1/8 R 4                                                 |
| VIT-AFSBY-114S-      | 1/10 R 4                                                |
| Degree of protection | IP21                                                    |
| Protection class     | SK I (earthed))                                         |
| Ventilation          | natural convection, ventilation openings                |
| Panel construction   | partition between the different types of supply systems |
| Cable entry          | incoming and outgoing cables from above                 |
| Doors and walls      | sheet steel 1.5...2 mm                                  |
| Doors/hinge          | right                                                   |
| Door lock            | Bar lock with 3 mm double-bit insert                    |
| Paint finish         | RAL 7035                                                |
| Plinth               | sheet steel, height 100 mm, RAL 7005                    |

### Installation data

|                        |                                            |
|------------------------|--------------------------------------------|
| Type of assembly       | floor-mounted cabinet with door and plinth |
| Type of installation   | free-standing                              |
| Ambient temperature    | max. 30 °C                                 |
| Dimensions (B x H x T) |                                            |
| VIT-AFSBY-112S-        | 374 x 2025 x 425 mm                        |
| VIT-AFSBY-114S-        | 374 x 2325 x 425 mm                        |

### Type of wiring

|                              |                                                        |
|------------------------------|--------------------------------------------------------|
| Klemmenraum                  | at the top                                             |
| Cable duct                   | none                                                   |
| Protective/neutral conductor | PE terminals, disconnect terminal ≤ 10 mm <sup>2</sup> |
| Busbars                      | none                                                   |
| Conductor colours            | acc. to DIN EN 60446 (VDE 0198), IEC 60446             |
| Conductors                   | halogen-free                                           |

### Labelling

|                        |                                              |
|------------------------|----------------------------------------------|
| Devices                | adhesive labels, DIN EN 61346-2, IEC 61346-2 |
| Isolated Power Systems | adhesive labels, black type on a white       |
| System type labelling  | according to DIN                             |

### System data

|                 |               |
|-----------------|---------------|
| Type of system  | IT system     |
| Nominal voltage | N/PE/AC 230 V |

## Technical data

### Insulation coordination acc. to IEC 60664-1 <sup>1)</sup>

|                                                                  |                 |
|------------------------------------------------------------------|-----------------|
| Rated insulation voltage                                         | AC 400 V        |
| Voltage test acc. to IEC 61010-18 (normal/protective separation) | 2.21 kV/3.54 kV |

### Power unit/switching elements <sup>1)</sup>

|                                               |                                               |
|-----------------------------------------------|-----------------------------------------------|
| Switching system                              | Patented mechanical/electrical locking system |
| Rated operational voltage $U_e$               | AC 230 V                                      |
| Operating range $U_e$                         | 0.8...1.15 x $U_e$                            |
| Frequency $f_e$                               | 50...60 Hz                                    |
| Rated operational current $I_e$ of the module | (AC-3) 63 A/80 A                              |
| Fuse                                          | 63 A/80 A gG                                  |
| Utilization category                          | AC-3                                          |
| Changeover period, adjustable                 | ≤ 0.5 s...15 s                                |
| Strom während des Umschaltvorgangs            | <17 A/<30 ms                                  |
| Circuit breaker (project-related)             | B 16 A                                        |

### Voltage monitoring/switching <sup>1)</sup>

|                                              |               |
|----------------------------------------------|---------------|
| Response values                              |               |
| undervoltage alarm 1 (1 V steps)             | 160...220 V   |
| overvoltage alarm 2 (1 V steps)              | 240...275 V   |
| Response time $t_{on}$ (50 ms steps)         | 50 ms...100 s |
| Return transfer time $t_{off}$ (50 ms steps) | 50 ms...100 s |
| Hysteresis (1 % steps)                       | 2...10 %      |
| Frequency measurement                        | 40...460 Hz   |
| Relative percentage error                    | ± 1 %         |

### Isolating transformer

|                              |                                       |
|------------------------------|---------------------------------------|
| Classification of insulation | $t_a$ 40/B                            |
| UL insulation system         | Class F                               |
| Insulation                   | double insulation                     |
| Ambient temperature          | ≤ 40 °C                               |
| Rated power                  | 3150...8000 VA                        |
| Rated frequency              | 50...60 Hz                            |
| Rated input voltage          | AC 230 V                              |
| Rated output voltage         | AC 230/115 V                          |
| Inrush current $I_e$         | < 5 x $I_n$                           |
| Leakage current              | ≤ 0.5 mA                              |
| No-load input current $i_0$  | ≤ 3 %                                 |
| Short-circuit voltage $U_k$  | ≤ 3 %                                 |
| Shielding                    | between primary and secondary winding |

### Current monitoring (output current) <sup>1)</sup>

|                                            |               |
|--------------------------------------------|---------------|
| Measuring range $I_n$ (true r.m.s.)        | 0...200 A     |
| Response value for message (1 A steps)     | 1...160 A     |
| Response value for short-circuit detection | 160 A         |
| Response delay $t_{on}$ (50 ms steps)      | 50 ms...100 s |
| Delay on release $t_{off}$ (50 ms steps)   | 50 ms...100 s |
| Hysteresis                                 | 5...30 %      |

### Insulation monitoring <sup>1)</sup>

|                                                                         |             |
|-------------------------------------------------------------------------|-------------|
| Measuring range                                                         | 10 k...1 MΩ |
| Response value $R_{an1}$ (alarm 1)                                      | 50...250 kΩ |
| Relative uncertainty                                                    | ± 15 %      |
| Hysteresis                                                              | ≤ 25 %      |
| Response time $t_{an}$ at $R_F = 0.5 \times R_{an}$ and $C_e = 1 \mu F$ | ≤ 3.5 s     |
| Measuring voltage $U_m$                                                 | ≤ DC 12 V   |
| Measuring current $I_m$ (at $R_F = 0 \Omega$ )                          | ≤ 120 μA    |
| Internal resistance DC $R_i$                                            | ≥ 240 kΩ    |
| Impedance $Z_i$ at 50 Hz                                                | ≥ 240 kΩ    |
| Permissible system leakage capacitance $C_e$                            | ≤ 1 μF      |

### Load current monitoring <sup>1)</sup>

|                                      |                 |
|--------------------------------------|-----------------|
| Measuring range, from response value | 10...110 %      |
| Response value (1A steps)            | 5...50 A (100A) |
| Hysteresis                           | 5...30 %        |

### Temperature monitoring <sup>1)</sup>

|                                 |                  |
|---------------------------------|------------------|
| Response value                  | 4 kΩ             |
| Release value                   | 1.6 kΩ           |
| Measuring time                  | ≤ 2s             |
| PTC resistors acc. to DIN 44081 | max. 6 in series |

### Insulation fault location <sup>1)</sup>

|                    |         |
|--------------------|---------|
| Test current $I_f$ | 1 mA    |
| Test cycle/pause   | 2 s/4 s |

### Interface <sup>1)</sup>

|                                                                                  |                     |
|----------------------------------------------------------------------------------|---------------------|
| Interface/protocol                                                               | RS-485/BMS          |
| Baud rate                                                                        | 9.6 kBit/s          |
| Cable length                                                                     | ≤ 1200 m            |
| Cable, recommended (twisted pairs, shielded, shield connected to PE on one side) | min. J-Y(St)Y 2x0.6 |
| Terminating resistor                                                             | 120 Ω (0.25 W)      |
| Device address                                                                   | 2...90              |
| Display, characters                                                              | graphic display     |
| History memory (messages)                                                        | 300 data records    |

### Switching elements (alarm contacts) <sup>1)</sup>

|                                                       |                                      |
|-------------------------------------------------------|--------------------------------------|
| Number                                                | 1 changeover contact, potential-free |
| Operating principle (N/C or N/O operation selectable) | N/C operation                        |
| Contact data                                          | AC 230V, 5 A/DC 30V, 5A              |
| Rated operational voltage $U_e$                       | AC 230 V/DC 220V                     |
| Electrical endurance                                  | 10.000 number of cycles              |
| Minimum contact rating                                | 10 mA at AC/DC > 5 V                 |

### Environment/EMC <sup>1)</sup>

|                                |              |
|--------------------------------|--------------|
| Monitoring device EMC immunity | EN 61000-6-2 |
| Monitoring device EMC emission | EN 61000-6-4 |

### Classification of climatic conditions acc. to IEC 60721

|                                       |              |
|---------------------------------------|--------------|
| Stationary use                        | 3K22         |
| Transport                             | 2K11         |
| Long-term storage                     | 1K22         |
| Operating temperature, Bender devices | -10...+55 °C |

### Classification of mechanical conditions acc. to IEC 60721

|                   |      |
|-------------------|------|
| Stationary use    | 3M11 |
| Transport         | 2M4  |
| Long-term storage | 1M12 |

### Terminals <sup>1)</sup>

#### Control section

|                       |                           |
|-----------------------|---------------------------|
| Connection            | Pluggable screw terminals |
| Connection properties |                           |
| rigid/flexible        | 0.14...1.5mm <sup>2</sup> |
| Stripping length      | 7mm                       |

#### Power section

|                       |                                                |
|-----------------------|------------------------------------------------|
| Connection            | Pluggable screw terminals                      |
| Connection properties |                                                |
| rigid/flexible        | 10...70mm <sup>2</sup> /6...50 mm <sup>2</sup> |
| Stripping length      | 15 mm                                          |

#### Outgoing section

|                                |                                                |
|--------------------------------|------------------------------------------------|
| Connection                     | cage clamp terminals                           |
| Connection properties          |                                                |
| rigid/flexible/Conductor sizes | 0.08...2.5 mm <sup>2</sup> / 4 mm <sup>2</sup> |
| Stripping length               | 6...7 mm                                       |

## Technical data (continued)

### Product standards

|                                 |                                                                  |
|---------------------------------|------------------------------------------------------------------|
| Insulation monitoring           | IEC 61557-8                                                      |
| Load and temperature monitoring | DIN VDE 0100-710<br>IEC 60364-7-710                              |
| Changeover device               | DIN VDE 0100-710, IEC 60364-7-710<br>IEC 60947-6-1               |
| Isolated Power Systems          | IEC/DIN EN 61439-1, -2, VDE 0660-600-1, -2                       |
| Isolating transformer           | DIN VDE 0100-710, IEC 60364-7-710<br>IEC 61558-1, IEC 61558-2-15 |

### Other

|                                   |                                                                                                |
|-----------------------------------|------------------------------------------------------------------------------------------------|
| Operating mode                    | continuous operation                                                                           |
| Mounting                          | vertical                                                                                       |
| Schematic diagram/circuit diagram | Documentation will be created according to project-specific and customer-specific requirements |
| Documentation number              | D00198                                                                                         |
| Weight/power consumption          | see "Variants"                                                                                 |

<sup>1)</sup> For more detailed technical information, please refer to the Technical Device Manual ATICS®, D00046.

## Variants

| Type                | Dimensions in mm |       |        | Circuit breaker | Transformer capacities | Dissipation loss <sup>1)</sup> | Weight     |
|---------------------|------------------|-------|--------|-----------------|------------------------|--------------------------------|------------|
|                     | Width            | Depth | Height |                 |                        |                                |            |
| VIT-AFSBY-112S-6300 | 374              | 425   | 2025   | max. 12 pieces  | 6300 VA                | ca. 253 W                      | ca. 150 kg |
| VIT-AFSBY-112S-8000 |                  |       |        |                 | 8000 VA                | ca. 298 W                      | ca. 160 kg |
| VIT-AFSBY-114S-6300 |                  |       | 2325   | max. 24 pieces  | 6300 VA                | ca. 253 W                      | ca. 160 kg |
| VIT-AFSBY-114S-8000 |                  |       |        |                 | 8000 VA                | ca. 298 W                      | ca. 170 kg |

<sup>1)</sup> Information on energy-efficient "Green Line" transformers.



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The specified standards take into account the edition valid until 04.2026 unless otherwise indicated.