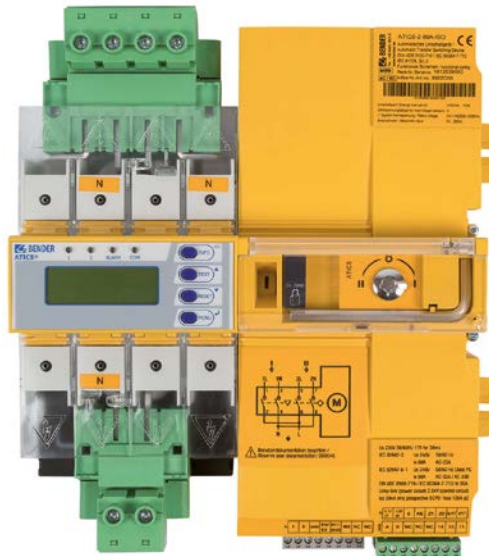




ATICS-2-63A-ISO ATICS-2-80A-ISO

Automatic transfer switching devices with monitoring functions for unearthed safety power supplies - Software version: D333 V1.3x, D334 V1.3x, D335 V1.0x, D308 V1.2x



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1 General instructions

1.1 How to use this manual



This manual is intended for qualified personnel working in electrical engineering and electron-

Part of the device documentation, in addition to this manual, are the enclosed "Safety instructions for Bender products".



Read the manual before mounting, connecting and commissioning the device. Always keep the manual within easy reach for future reference.

1.2 Indication of important instructions and information



DANGER! Indicates a high risk of danger that will result in death or serious injury if not avoided.



WARNING! Indicates a medium risk of danger that can lead to death or serious injury if not avoided.



CAUTION! Indicates a low-level risk that can result in minor or moderate injury or damage to property if not avoided.



Information can help to optimise the use of the product.

1.2.1 Signs and symbols



Disposal



Recycling



Temperature range



Protect from moisture



Protect from dust



RoHS directives

1.3 Training courses and seminars

www.bender.de/en -> [Know-how](#) -> [Seminars](#).

1.4 Delivery conditions

Bender sale and delivery conditions apply. These can be obtained from Bender in printed or electronic format.

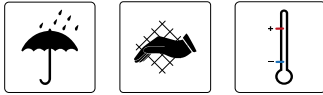
The following applies to software products:



"Software clause in respect of the licensing of standard software as part of deliveries, modifications and changes to general delivery conditions for products and services in the electrical industry."

1.5 Inspection, transport and storage

Check the shipping and device packaging for transport damage and scope of delivery. The following must be observed when storing the devices:



1.6 Warranty and liability

Warranty and liability claims in the event of injury to persons or damage to property are excluded in case of:

- Improper use of the device.
- Incorrect mounting, commissioning, operation and maintenance of the device.
- Failure to observe the instructions in this operating manual regarding transport, commissioning, operation and maintenance of the device.
- Unauthorised changes to the device made by parties other than the manufacturer.
- Non-observance of technical data.
- Repairs carried out incorrectly.
- Use of accessories and spare parts not recommended by Bender.
- Catastrophes caused by external influences and force majeure.
- Mounting and installation with device combinations not recommended by the manufacturer.

This operating manual and the enclosed safety instructions must be observed by all persons working with the device. Furthermore, the rules and regulations that apply for accident prevention at the place of use must be observed.

1.7 Disposal of Bender devices

Abide by the national regulations and laws governing the disposal of this device.



For more information on the disposal of Bender devices, refer to

[www.bender.de/en -> Service & support](http://www.bender.de/en->Service%20&%20support).

1.8 Safety

If the device is used outside the Federal Republic of Germany, the applicable local standards and regulations must be complied with. In Europe, the European standard EN 50110 applies.



DANGER! Risk of electrocution due to electric shock!

Touching live parts of the system carries the risk of:

- A fatal electric shock
- Damage to the electrical installation
- Destruction of the device

Before fitting the device and prior to working on the device connections, make sure that the power supply has been disconnected. Observe the rules for working on electrical installations.

1.9 General safety instructions

Bender devices are designed and built in accordance with the state of the art and accepted rules in respect of technical safety. However, the use of such devices may introduce risks to the life and limb of the user or third parties and/or result in damage to Bender devices or other property.

- Use Bender devices only:
 - as intended
 - in perfect working order
 - in compliance with the accident prevention regulations and guidelines applicable at the location of use
- Eliminate all faults immediately which may endanger safety.
- The device may not be opened.
- Do not make any unauthorised changes and only use replacement parts and optional accessories purchased from or recommended by the manufacturer of the devices. Failure to observe this requirement can result in fire, electric shock and injury.
- Reference signs must always be clearly legible. Replace damaged or illegible signs immediately.
- Make sure that the dimensions of the BSV (battery-supported safety power supply), the generator set and the whole wiring is adequate. Abide by the relevant, applicable national and international standards. In the event of an overload and short circuit, this is the only way to guarantee the necessary safety and to ensure that the safety devices respond selectively.
- If the device is overloaded by overvoltage or a short-circuit current load, it must be checked and replaced if necessary.
- The overvoltage protective device required by the standards VDE 0100-443 and VDE 0100-534 must be installed in the electrical installation or system.

1.10 Device-specific safety instructions



WARNING! Failure to adjust the settings may result in malfunction.

The settings must be changed in order to adapt the ATICS® automatic transfer switching and monitoring device to the existing equipment. When doing so, follow the instructions chapter „Design and Installation“ on p. 45.



WARNING! Functional safety according to IEC 61508 can only be guaranteed when used properly.

Please follow the instructions given in this operating manual and in the check list.

2 Intended use

Transfer switching devices are used everywhere there is dependence on high availability from the power supply. The ATICS® automatic transfer switching and monitoring device is intended for the application described in the chapter „System description“ on p. 13. When the preferred supply fails, the ATICS® automatically switches to the second supply.

Areas of application:

- Group 1 and 2 medical locations according to DIN VDE 0100-710 and IEC 60364-7-710
- Hospital main distribution boards (DIN VDE 0100-710)
- Locations open to the public (DIN VDE 0100-718)
- Emergency power supplies
- Heating, air conditioning, ventilation, cooling
- EDP, data centres
- Fire extinguisher and sprinkler systems

Several versions of the ATICS® are available. They differ for example by switching over from two- or four-pole systems or by the load current (see „ATICS® tasks“ on p. 15). Please heed the limits of the range of application indicated in the technical data.

In order to meet the requirements of applicable standards, customised parameter settings must be made on the equipment in order to adapt it to local equipment and operating conditions.

Intended use includes following all the instructions in the operating manual and complying with the test intervals.

Any use other than that described in this manual is regarded as improper.

3 System description

3.1 Properties

3.1.1 Product description

The ATICS® automatic transfer switching devices provide all functions for changeover between two independent power supplies and for monitoring unearthed power supplies. The integration of both the electronic system and the switching elements in one flat, compact device reduces space requirements in the switchgear cabinet, minimises the amount of wiring, and reduces the fault probability. For maximum reliability, ATICS® was designed in strict accordance with the guidelines for functional safety.

Connectors at all connecting wires, in combination with the optional bypass switch, enable the ATICS® to be tested or replaced during service works without interruption of the power supply. ATICS® considerably enhances the safety level particularly in intensive care units and in operating theatres.

3.1.2 Changeover

- Automatic changeover to the second (redundant) line on loss of the preferred supply or when the values are outside the permissible voltage range
- Voltage monitoring line 1/2 (input) and line 3 (output)
- Automatic return to the preferred line on voltage recovery
- Monitoring for short circuits at the output or at the distribution board downstream of the transfer switching device avoids damaging switching operations
- Manual operation, with optional locking by means of a padlock

3.1.3 IT system (unearthed power supply)

- Insulation monitoring
- Load and temperature monitoring IT system/transformer
- Optional insulation fault locator

3.1.4 Messages

- Status indication of operating, warning and alarm messages via the integrated graphic display and external indication on MK2430/MK800/TM800 or CP9xx alarm indicator and operator panels
- Automatic reminder for prescribed tests and service intervals
- History memory for events, messages, tests and parameter changes
- Exchange of information with alarm indicator and operator panels via BMS bus

3.1.5 Other functions

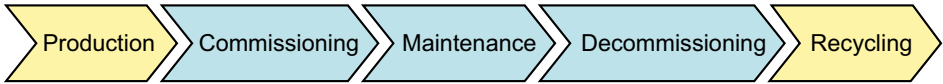
- Automatic monitoring of all programme and data storage as well as essential internal components and connecting wires for proper functioning
- Programmable relay output (alarm relay)
- Programmable digital input

3.2 Functional safety

Functional safety according to IEC 61508 guarantees safety from risks due to malfunction when used properly. The ATICS® is suitable for use in safety-related systems according to SIL2. SIL stands for "Safety Integrity Level".

3.2.1 Product life-cycle management

Safety must be guaranteed over the entire life cycle, from the time it is designed, developed, manufactured, commissioned, maintained to the time it is taken out of service. Responsibility during the life cycle:



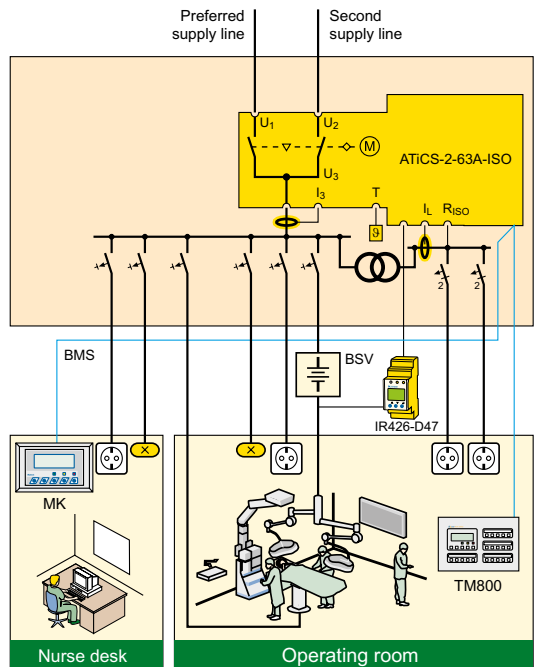
For detailed information refer to:

- Chapter „Commissioning, settings and testing“ on p. 45.
- chapter „Periodic verification and service“ on p. 89.

3.3 Application examples

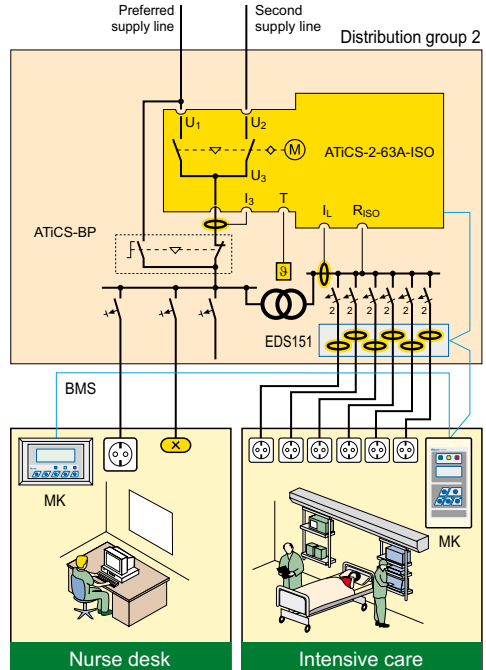
3.3.1 Application example operating theatre

- ATICS-2-63A-ISO: Changeover between the preferred and redundant line while monitoring the medical IT system with transformer load and temperature monitoring
- IR426-D47: Monitoring of the operating theatre light IT system (optional)
- MK2430/MK800/TM800/CP9xx: Alarm at at least two points with independent power supplies for functional safety



3.3.2 Application example intensive care unit

- ATICS-2-63A-ISO: Changeover between the preferred and redundant line while monitoring the medical IT system with transformer load and temperature monitoring
- EDS151: Insulation fault locator for fast insulation fault location (recommended)
- ATICS-BP: Bypass switch for uninterrupted test/maintenance (recommended)
- MK2430/MK800/TM800/CP9xx: Alarm at at least two points with independent power supplies for functional safety



3.4 ATICS® tasks

The ATICS® automatic transfer switching and monitoring device has the following tasks:

- Two-pole changeover of the power supply
- Voltage monitoring of the preferred supply (line 1)
- Voltage monitoring of the second supply (line 2)
- Voltage monitoring at the automatic transfer switching device output (line 3)
- Monitoring of the changeover switch for correct switch position
- Internal functional testing, including checking the switching times
- Monitoring of the insulation resistance in the IT system
- Monitoring of the IT system transformer load current
- Monitoring of the IT system transformer temperature
- Communication with remote MK... alarm indicator and test combinations, and with TM... or CP9xx... alarm indicator and operator panels via BMS bus
- Option for adjusting the time delay for the changeover process according to DIN VDE 0100-710 (VDE 0100 Part 710)
- Possible field of application in systems according to DIN VDE 0100-710 (VDE 0100 Part 710) with a changeover period ≤ 15 s or even ≤ 0.5 s

3.5 The ATICS® functions

3.5.1 The automatic transfer switching device

If the preferred supply fails, the ATICS® ensures that the power supply is switched over safely.

The switch contacts are arranged offset on a rotating shaft. This design prevents simultaneous switching of line 1 and line 2. The switch has three positions:

1 Line 1 is connected

0 Both lines are disconnected

2 Line 2 is connected

Either line 1 or line 2 can be set as the preferred line (setting described in „Settings menu 1: Changeover“ on p. 67 or chapter „Settings menu 6: Dig. input“ on p. 74).

1. In the normal operating condition (fault-free operation) the preferred supply is connected. The ATICS® switches to the redundant line if:
 - The preferred line fails
 - The "TEST" button is pressed
 - A digital input is configured to "TEST" and this input is enabled
 - The setting "Preferred line" is changed to the other line
2. The ATICS® switches from the redundant line back to the preferred line if
 - the voltage on the preferred line is restored and the return transfer delay time $t(2 \rightarrow 1)$ has elapsed and no switch-back lock is enabled
 - or immediately after pressing the "RESET" button or when the redundant line fails (even when the switch-back lock is enabled)
 - the setting "Preferred line" is changed to the other line
 - the digital input is configured to "TEST" and this input is reset
 - a test of the automatic transfer switching and monitoring device is active and the test period has elapsed
3. Only for "-ES" version of ATICS® with ATICS-ES energy storage device: ATICS® switches to position "0" and remains there if the following conditions are fulfilled simultaneously:
 - Line 1 and line 2 have failed
 - Automatic mode is active
 - There is no short circuit downstream the transfer switching device
 - The "Load disconn." setting is set to "on" and the external ATICS-ES energy storage device is connected



WARNING! Malfunction possible if delay times are not adjusted.

The response delay $t(on)$, the return transfer delay time $t(2 \rightarrow 1)$, the delay on release $t(off)$ and the dead time $t(0)$ of the ATICS® are adjustable and must be adjusted to the requirements of the specific case, the short-circuit calculation and the requirements of DIN VDE 0100-710 (VDE 0100-710) for automatic transfer switching devices (see chapter „Commissioning, settings and testing“ on p. 45).

The factory settings guarantee a changeover period of $t \leq 0.5$ seconds and switching back within 10 seconds when voltage is restored on the preferred supply. Therefore, the ATICS® can be used in IT systems with a requirement for a changeover period $t \leq 0.5$ s (IT systems with operating theatre lights, endoscopic field illumination in operating theatres or other essential sources of light, etc.).

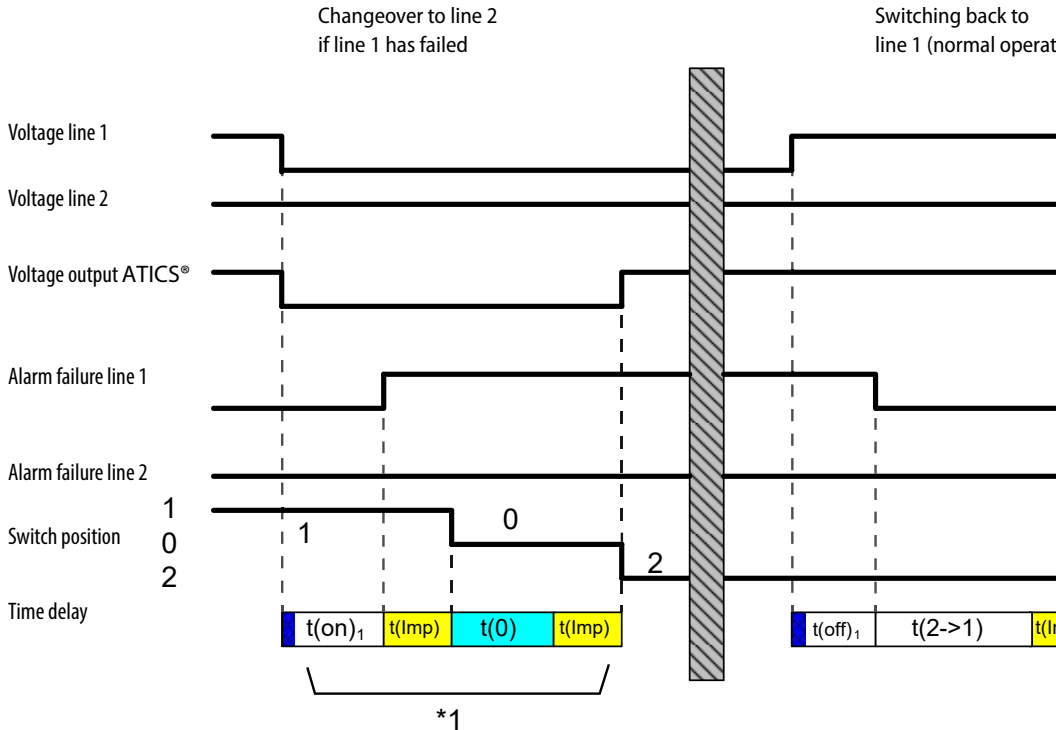
When there is a short circuit downstream of the automatic transfer switching device, the automatic transfer switching device must not continually change back and forth between the two lines. This can occur if the short-circuit current is small and the automatic transfer switching device switches faster than the short-circuit breaker trips. The ATICS® monitors the load current downstream of the automatic transfer switching device in order to detect a possible short circuit. If the preferred line fails and a short-circuit current is detected at the same time, the ATICS® does not switch over immediately but only once the circuit breaker has tripped.

If the ATICS® detects a supply failure or a fault, an alarm appears on the LCD, the "ALARM" LED lights up, the alarm relay trips (if set) and this alarm is forwarded to other Bender devices (such as an alarm indicator and test combination) via the BMS bus.

3.5.1.1 Time diagram: Changeover between preferred and redundant line

i Time diagrams: Times are not shown to scale.

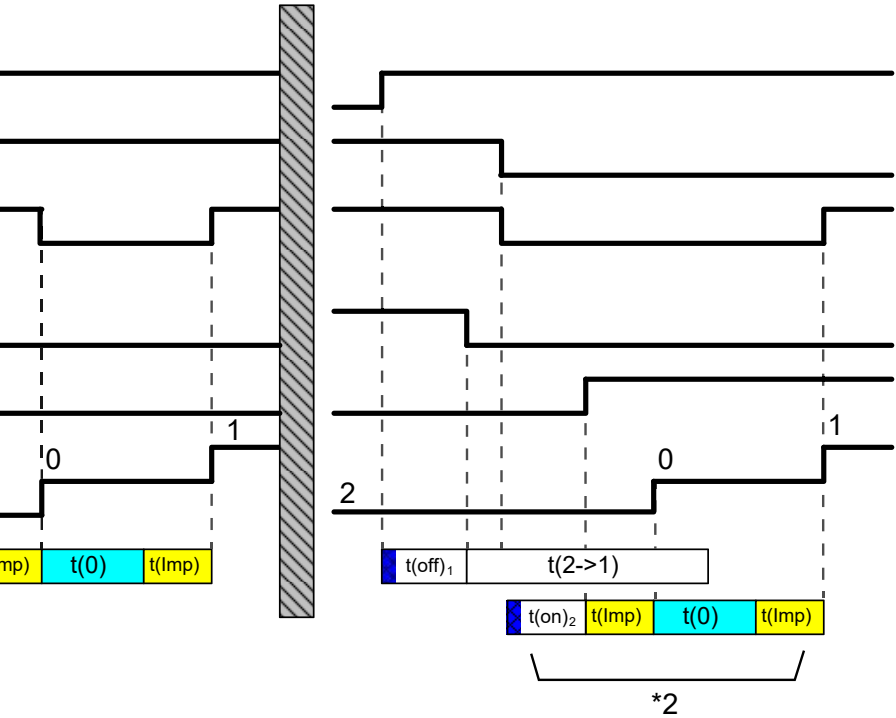
Example: Line 1 is set as preferred line.



| | | | |
|---------------------------|--|--|-------------------------------|
| t(pulse) | Pulse time: 15 ... 30 ms | | |
| t(0) | Dead time | | |
| t(on)₁ | Response delay ALARM failure voltage line 1 | | Measuring time: approx. 50 ms |
| t(off)₁ | Delay on release ALARM failure voltage line 1 | | Measuring time: approx. 50 ms |
| t(on)₂ | Response delay ALARM failure voltage line 2 | | Measuring time: approx. 50 ms |
| t(2->1) | Return transfer delay time | | |
| *1 | Changeover period t(1->2) indicated during a test | | |
| *2 | The return transfer delay time may differ from the changeover period (t(1->2)) | | |

ion with delay on release)

Switching back to line 1
(if line 2 has failed)



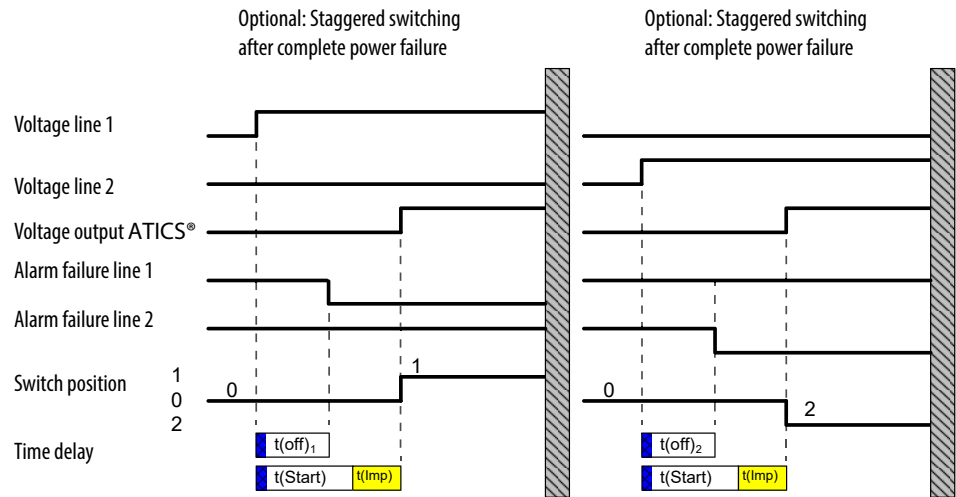
3.5.1.2 Time diagram: Staggered switching after complete power failure

Switching on at staggered intervals after a complete power failure (no voltage on either of the power supplies) prevents all loads from being switched on at the same time. For automatic switching on at staggered intervals, the ATICS® "-ES" version and the external ATICS-ES energy storage device (optional, see chapter „Ordering information“ on p. 102) are required. If there is no voltage on either of the power supplies, ATICS® switches to position "0".

When power is restored, the ATICS® switches on the supply again with the set delay time $t(\text{start})$.

Manual method: Switch the ATICS® to position "0" using an Allen key. When power is restored, the ATICS® switches on the supply again with the set delay time $t(\text{start})$.

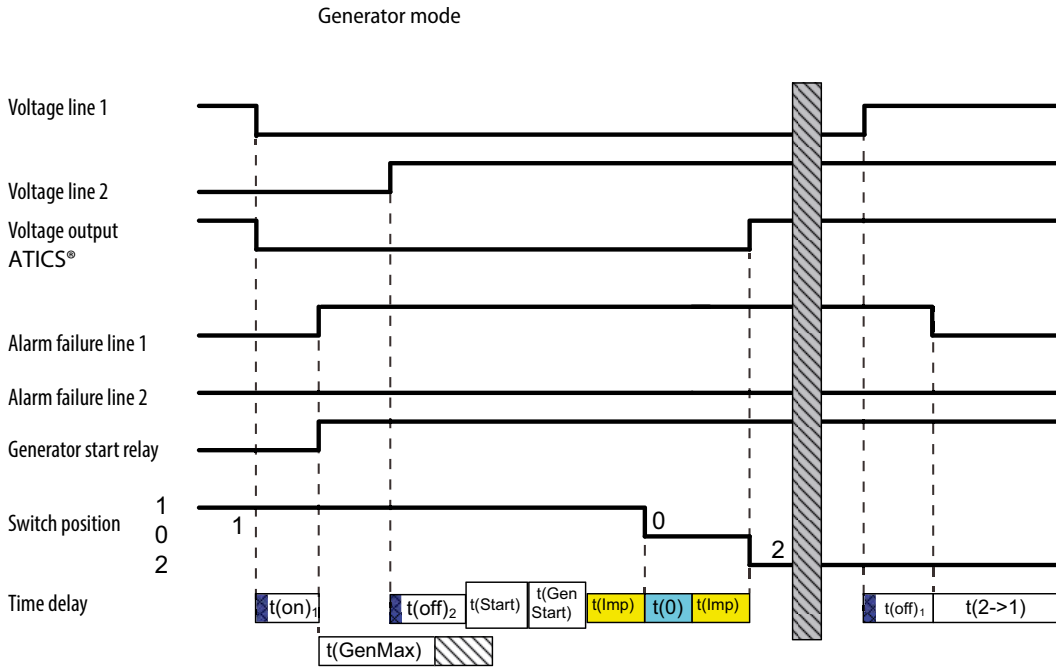
Example: Line 1 is set as the preferred line.



| | | | |
|---------------------------|--|--|-------------------------------|
| t(pulse) | Pulse time: 15 ... 30 ms | | |
| t(start) | Switch-on delay after complete power failure | | Measuring time: approx. 50 ms |
| t(off)₁ | Delay on release failure voltage line 1 | | Measuring time: approx. 50 ms |
| t(off)₂ | Delay on release failure voltage line 2 | | Measuring time: approx. 50 ms |

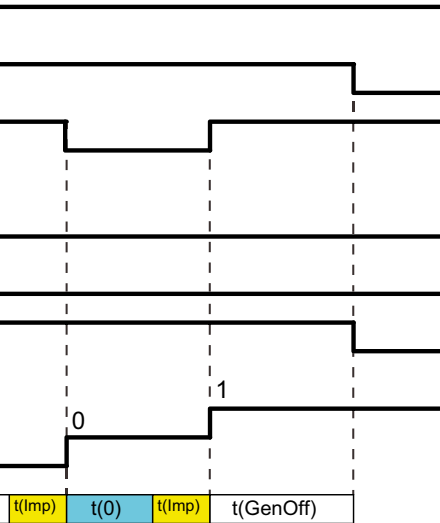
After a complete power failure and restart of the ATICS®, $t(\text{off})$ and $t(\text{start})$ start simultaneously. The time that is longer determines the behaviour. After switching on, the ATICS® performs a quick measurement of the voltage with $t(\text{off}) = 100 \text{ ms}$. If the voltage is within the permissible range, the set value of $t(\text{off})$ is ignored. If the voltage is too low, the ATICS® waits until the set time $t(\text{off})$ has elapsed.





3.5.1.3 Time diagram: Changeover to generator mode



| | |
|---------------------------|---|
| t(pulse) | Pulse time: 15 ... 30 ms |
| t(0) | Dead time |
| t(on)₁ | Response delay ALARM failure voltage line 1 |
| t(start) | Switch-on delay after complete power failure and restart of the ATICS® |
| t(off)₁ | Delay on release ALARM failure voltage line 1 |
| t(off)₂ | Delay on release ALARM failure voltage line 2* |
| t(2->1) | Return transfer delay time |
| t(GenStart) | Generator start-up delay, delayed changeover to generator. Measured from voltage line 2 ok |
| t(GenOff) | Generator disconnecting delay time, delayed switching-off of the generator |
| t(GenMax) | Generator start-up time. Time until generator supplies correct voltage. The message "Failure line |

Switching back to line 1
(normal operation with delay on release)



| | | |
|--|---|-------------------------------|
| | | |
| | | |
| |  | Measuring time: approx. 50 ms |
| |  | Measuring time: approx. 50 ms |
| |  | Measuring time: approx. 50 ms |
| |  | Measuring time: approx. 50 ms |
| 2 ⁿ is suppressed until then. | | |

* After switching on, the ATICS® performs a quick measurement of the voltage with $t(off) = 100$ ms. If the voltage is within the permissible range, the value set for $t(off)$ is ignored. If the voltage is too low, the ATICS® waits until the set time $t(off)$ has elapsed.

3.5.2 IT system monitoring

Insulation monitoring

The integrated insulation monitoring device measures the insulation resistance on AC IT systems, which may also contain DC voltage components. Adaptation to the system leakage capacitances occurs automatically. The measuring time increases as the system leakage capacitances increase.

Load current measurement

The load current on the IT system is measured using an STW2 measuring current transformer.

Temperature monitoring

The temperature in the transformer winding is measured via PTC thermistors.

Evaluation

If any of the measured values does not fall within the limits, an alarm is triggered. A message appears on the LCD, the "ALARM" LED lights up, the alarm relay trips (if set) and this alarm is forwarded to other Bender devices (such as an alarm indicator and test combination) via the BMS bus.

Locating current injector

When an insulation fault is detected in an IT system, the integrated locating current injector generates a defined locating current signal to locate the insulation fault. The locating current is limited to max. 1 mA. This function can be enabled or disabled (see chapter „Settings menu 4: IT system“ on p. 71).



CAUTION! *The locating current flowing between the IT system and earth can cause controller faults in sensitive parts of the system, such as PLC or relay. It must therefore be ensured that the locating current is compatible with the monitoring system.*

3.5.3 Monitoring the device functions

The control circuits are designed in such a way that, even though it is almost certain that a particular fault will occur, it cannot cause the power supply at the output of the automatic transfer switching device to fail.

ATICS® tests the position of the switch as well as coils 1 and 2 of the switch once a day at around 12:00 pm.

ATICS® also continuously monitors:

- Power supplies 1 and 2, which supply the electronics from the systems concerned
- Internal microcontrollers and memory modules
- Important connecting wires, such as:
 - Measuring current transformer connection
 - Temperature sensor connection
 - Power supply and PE connection
- For alarm and test combinations and alarm indicator and operator panels, device failure monitoring can also be programmed via the BMS bus (required for functional safety, see chapter „Setting parameters of indicator devices“ on p. 45).



WARNING for systems with generator: Complete power failure may occur.

If the preferred line fails, the ATICS® will start the generator connected to the redundant line. If the generator does not start, the line downstream of the transfer switching and monitoring device will be dead. When the generator is switched off, the ATICS® cannot check the redundant line. Test the generator at regular intervals and the transfer switching and monitoring device to make sure they are working properly (see checklist, included in the scope of delivery).

3.5.4 Power supply

The coils of the changeover switch are each supplied from the line which is not currently switched on. This ensures that it is possible to switch to the redundant line if the preferred line fails, for example.

The power supply of the electronic system is redundant from lines 1 and 2. This ensures constant supply to the electronic system even when one line fails.

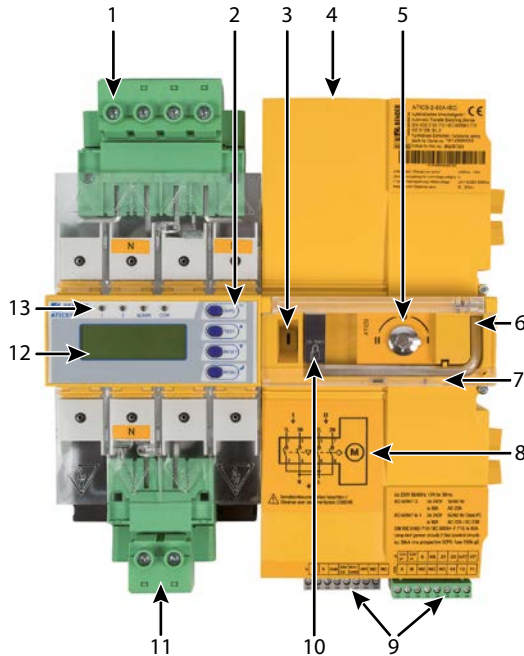
If both lines fail, the changeover switch remains in the last switch position. Switch the ATICS® to position "0" using an Allen key. When power is restored, the ATICS® switches on the supply again with the set delay time $t(\text{start})$. If several ATICS® are installed in one system, they can be switched to the preferred line one-by-one starting from switch position "0" on voltage recovery. This prevents the peak loads that would occur if the lines of several transfer switching devices were switched on simultaneously.

Optionally, the "-ES" version of ATICS® can be used with the external ATICS-ES energy storage device to supply the two coils as well as the electronics. This means that the switching to position "0" takes place automatically in the event of a failure of both supply lines.

3.5.5 Manual mode

In manual mode, changeover can be achieved using an Allen key. The switching device can be locked in switch position "0" with a padlock.

3.6 ATICS-2-ISO front view



Legend

| | |
|----|---|
| 1 | Green plug connector for line 1 and line 2 |
| 2 | Control buttons |
| 3 | Inspection window for switch position |
| 4 | Connection for ATICS-ES energy storage device (only for "-ES" version) / Connection for supply voltages (only for "-400" version) |
| 5 | Manual mode of the device, indicates the switch position |
| 6 | Allen key for manual mode |
| 7 | Transparent cover for changeover switch (manual mode), sealable |
| 8 | Wiring diagram for lines 1, 2 and 3 |
| 9 | Three coded connector plugs |
| 10 | Locking device for switch position 0 |
| 11 | Green plug connector for line 3 |
| 12 | LCD |
| 13 | Operating and alarm LEDs |

4 Mounting and connection



Risk of electrocution due to electric shock!

Touching live parts of the system carries the risk of electric shock. Before installing the device and prior to working on the device connections, make sure that the power supply has been disconnected. Observe the rules for working on electrical installations.



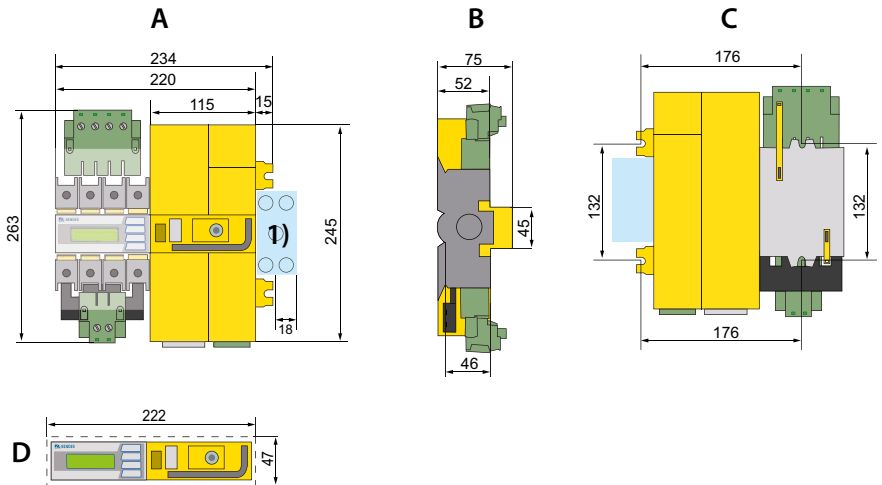
Disturbance due to loud switching noise! Install the ATICS® in a closed electrical operating area or in a sound-proof distribution board.

4.1 Mounting

ATICS® is suitable for DIN rail mounting or screw mounting on a plate. To guarantee protection against accidental contact, it must be installed behind a plastic cover.

4.1.1 Dimension diagram

| | |
|---|---|
| A | Front view |
| B | Side view |
| C | Rear view (dimensions for screw mounting on mounting plate) |



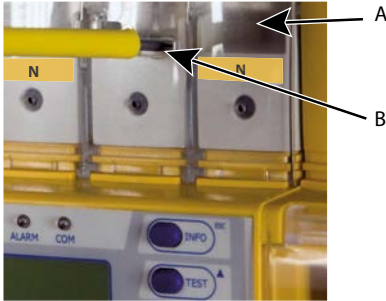
| | |
|----|---|
| D | Adapt the cutout to the terminal cover |
| 1) | Auxiliary contacts to be mounted optionally |

Required tools

Use the following tools to connect the power unit and the control cables:

- Torx® screwdriver T20 or 6.5 x 1.2 mm
- Screwdriver 2.5 x 0.4 mm
- Allen key 4 mm

4.1.2 Removing terminal cover

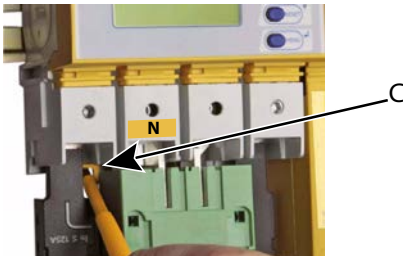


1. Push back the locking hook (B) in the middle of the top and bottom terminal cover (A) by using a screwdriver.
2. Remove the terminal cover.

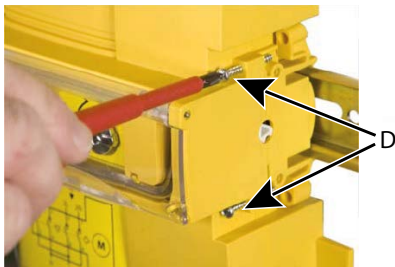
4.1.3 DIN rail mounting



CAUTION! Screws must be tightened, otherwise the vibrations generated during switching may damage the ATICS®.

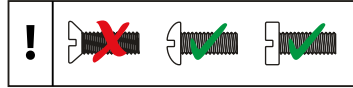


1. Place the ATICS® on the top edge of the rail.
2. Use a screwdriver to pull down the lower yellow slide lock (C) and snap the ATICS® into place with slight pressure. Check that the slide lock has properly snapped into position by pulling slightly the lower part of the enclosure.
3. Fix all terminals with Allen screws terminals. Tightening torque: 5 Nm.
4. Fasten the terminal covers.
5. Tighten screws (D) (PZ1, 8,8 lb-in, 1 Nm).

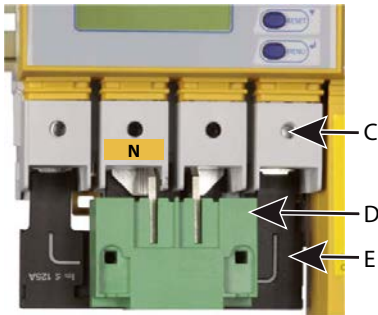


4.1.4 Screw mounting on plate

- i** • Observe dimension diagram of rear view.
- Use M5 mounting screws



CAUTION: Screw heads or washers reduce voltage clearances. Provide for sufficient clearance to live conductors (voltage clearance) by using mounting screws with flat screw heads and flat washers. If mounted on electrically conductive material: The mounting plate has to be earthed and the area under the terminals has to be covered with insulating material.



1. Undo the Allen screws of the terminals (C).
2. Remove the green plug connectors (D) top and bottom.
3. Remove the black bridge (E) bottom.
4. Fasten the ATICS® to the mounting plate with M5 mounting screws (22 lb-in, 2.5 Nm) (see dimension diagram).
5. Insert the black bridge (E), bottom.
6. Plug in the green plug connectors (D) top and bottom.
7. Fix all terminals (C) with Allen screws.
Tightening torque: 5 Nm.
8. Fasten the terminal covers.

4.2 Connection

4.2.1 Short-circuit protection

When choosing the fuses in the supply lines and outgoing feeders of the transfer switching devices, observe the requirements of DIN VDE 0100-710 (VDE 0100 Part 710).

- Transformers for the IT system: Where transformers, their primary supply conductor and secondary outgoing line are concerned, overcurrent protective devices are only permitted for short-circuit protection. The transformer supply line from the transfer switching device and the transformer outgoing line to the next distribution board section should be installed short-circuit and earth-fault proof: (Halogen-free, flexible single-core rubber cable NSHXAFö 1.8/3 kV).
- Protection of the cable system in group 2 medical locations: When choosing protective devices, it is essential to ensure that when the prospective short-circuit currents occur, the protective device upstream of a fault will selectively trip the protective devices which are further upstream.
- Connecting several load groups downstream of an automatic transfer switching device must not lead to all the load groups failing in the event of a fault.

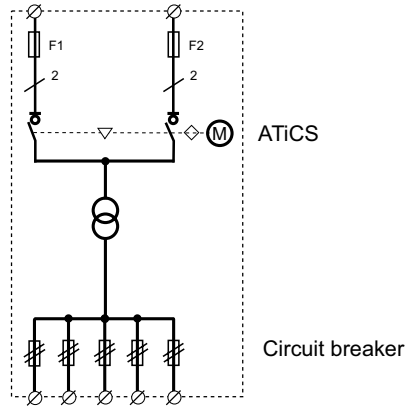
As a result, the choice of back-up fuses F should ensure both short-circuit protection for the transformer and the selectivity to overcurrent devices downstream of the IT systems.

When choosing back-up fuses, observe both the maximum permissible values in accordance with the applicable local regulations and national and international standards to make sure that the contacts are weld-free. The considerations presented below are based on the standard DIN VDE 0100-710 (VDE 0100-710).

Selecting a fuse for only one load:

The circuit has only one load, the "IT system transformer". Refer to the information provided by the transformer manufacturer for the minimum size of back-up fuses for the IT system transformer chosen.

The rated operational current of the ATICS® must be greater than or the same as the rated operational current of the transformer. Refer to the technical specifications of the ATICS® for the maximum size of back-up fuses F1 or F2.

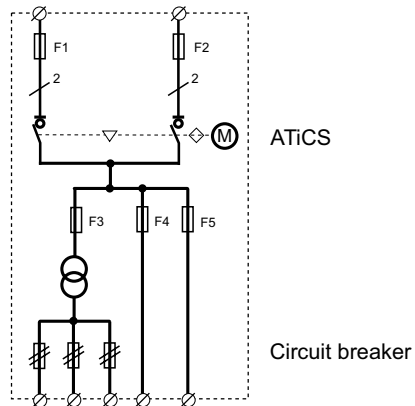


Selecting a fuse for several loads

This circuit branches into several load groups. This means that each fuse of each load group is moved downstream of the automatic transfer switching device. However, the maximum possible back-up fuse is calculated in the same way as described above.

The back-up fuse (F1 or F2) must match the back-up fuse F3 (and of course F4 and F5) so that selective shutdown is ensured. The back-up fuse specified by the manufacturer for the IT system transformer must therefore be at least two steps smaller than the back-up fuse determined for the ATICS® according to the above method.

Of course, the total current rating for the automatic transfer switching device must be calculated from the sum and simultaneity factor of all the load groups connected and the required or minimum rated current calculated according to the method above.



4.2.2 Connecting the ATICS® safely



Risk of electrocution due to electric shock!

If any of the supplies are switched on, some of the system parts which are not yet fully installed may be live.

Preventing unintended switch-on:



- Open the transparent cover
- Wait until "manual mode" appears on the display
- Set to switch position "0" using the Allen key
- Lock the device using a padlock



Risk of electrocution due to electric shock!

Connecting wires can come loose and fall out if the ferrules being used are too short, the wire ends are tinned or the connection screws have not been tightened enough.

Consider a stripping length of 20 mm and do not use ferrules when connecting lines 1, 2 and 3. Observe assignment of "ATICS® terminals". Note especially that the two supplies are always connected to the device from the top. Use a torque wrench to tighten the terminal screws. Check all the screws on a regular basis to make sure they are seated tightly.



DANGER! Caution when operating the "-ES" version of ATICS® without the external ATICS-ES energy storage device!

The enclosed dummy plug must be plugged into the energy storage device connection of the ATICS® as soon as no ATICS-ES is connected. This dummy plug (A370261) is used for touch protection against hazardous voltages.



CAUTION: Incorrect insulation measurement possible.

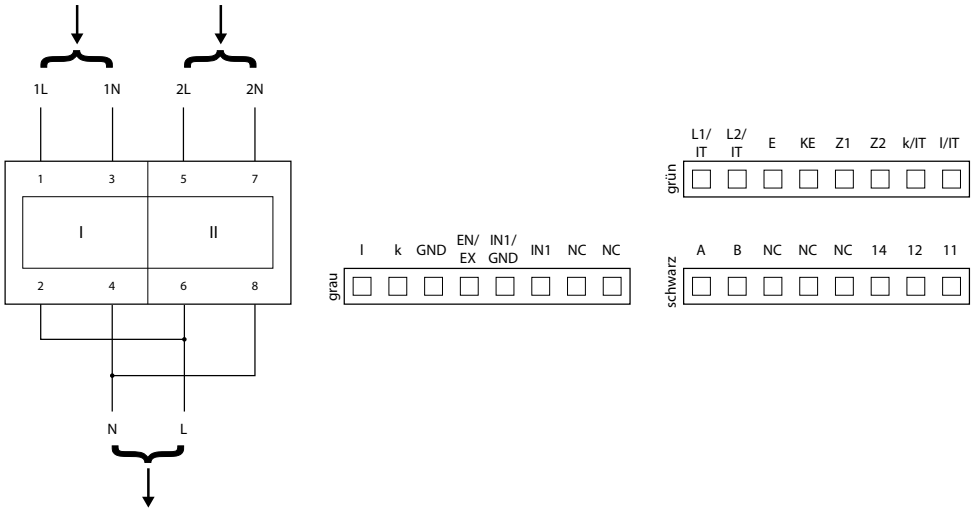
The ATICS® contains an insulation monitoring device. If another insulation monitoring device is connected, the devices will affect one another. This will lead to false measurements. Therefore, only connect one insulation monitoring device in each interconnected IT system!



Risk of destruction!

- While insulation and voltage tests are carried out. Disconnect the device from the mains for the duration of the test.
- If connected incorrectly. The terminals labelled GND must not be connected to PE.

ATICS® terminals



Legend

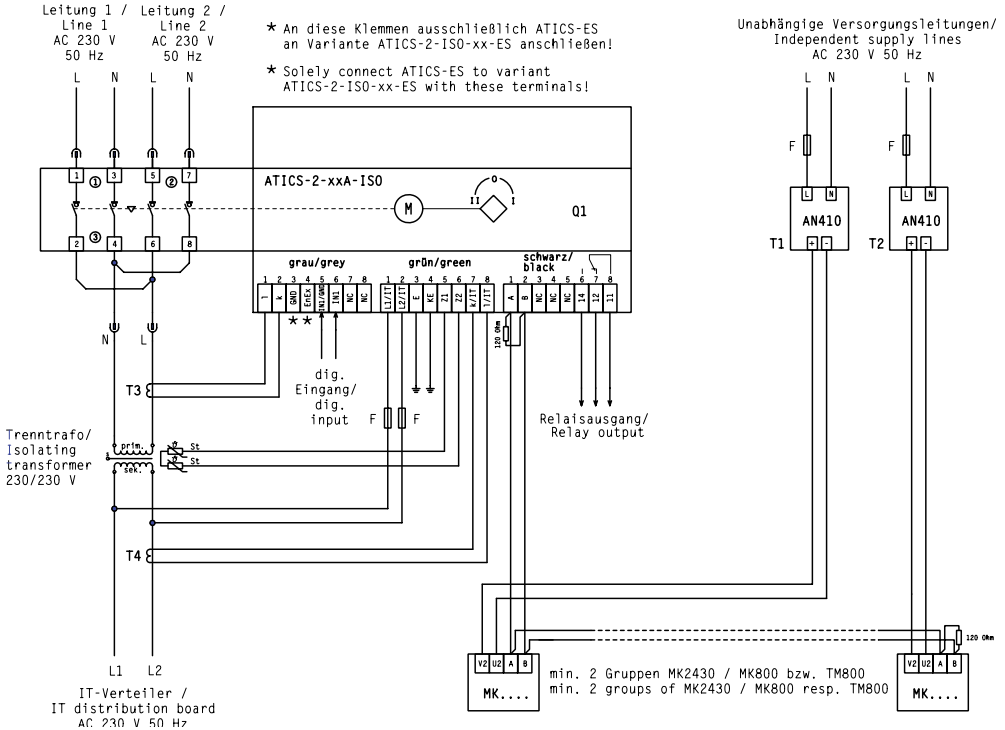
| | |
|----------------|---|
| 1L, 1N | Connection line 1 (input line) |
| 2L, 2N | Connection line 2 (input line) |
| L, N | Connection line 3 (output line) |
| I, k | Connection measuring current transformer T3 (STW3) for monitoring the load current downstream the transfer switching and monitoring device (short-circuit monitoring) |
| GND, En/Ex | Connection may only be used on ATICS-2-ISO-ES to connect ATICS-ES energy storage device. For all other variants, the connection is only intended for Bender-internal purposes (12 V). |
| IN1/GND, IN1 | Digital input, configurable (see chapter „Settings menu 6: Dig. input“ on p. 74) |
| NC | Not used |
| L1/IT, L2/IT | Connection to the IT system. Monitoring the insulation resistance. If an insulation fault exists: Feeding of a locating current for insulation fault location. Bipolar protection via 6 A back-up fuse. |
| E, EK | Connection of E and KE with two separate lines to PE |
| Z1, Z2 | Temperature monitoring of the IT system transformer |
| k/IT, I/IT | Connection for measuring current transformer STW2 to monitor the load current downstream of the IT system transformer (overload monitoring) |
| A, B | BMS bus connection |
| 14, 12, 11 | Alarm relay, programmable function |

4.2.3 ATICS® basic configuration



WARNING! Risk of destruction if connected incorrectly.

The terminals marked with "*" are intended for Bender-internal purposes only. If this is ignored, the ATICS® automatic transfer switching and monitoring device may be damaged.

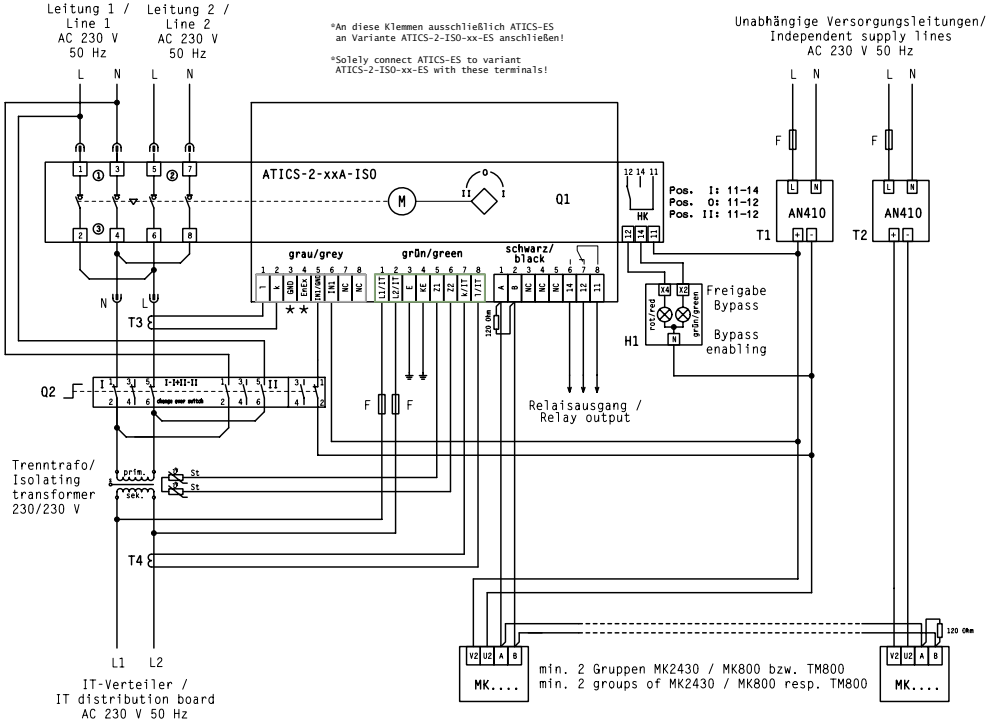


4.2.4 Connection example: ATICS® with bypass switch



WARNING! Risk of destruction if connected incorrectly.

The terminals marked with "*" are intended for Bender-internal purposes only. If this is ignored, the ATICS® automatic transfer switching and monitoring device may be damaged.

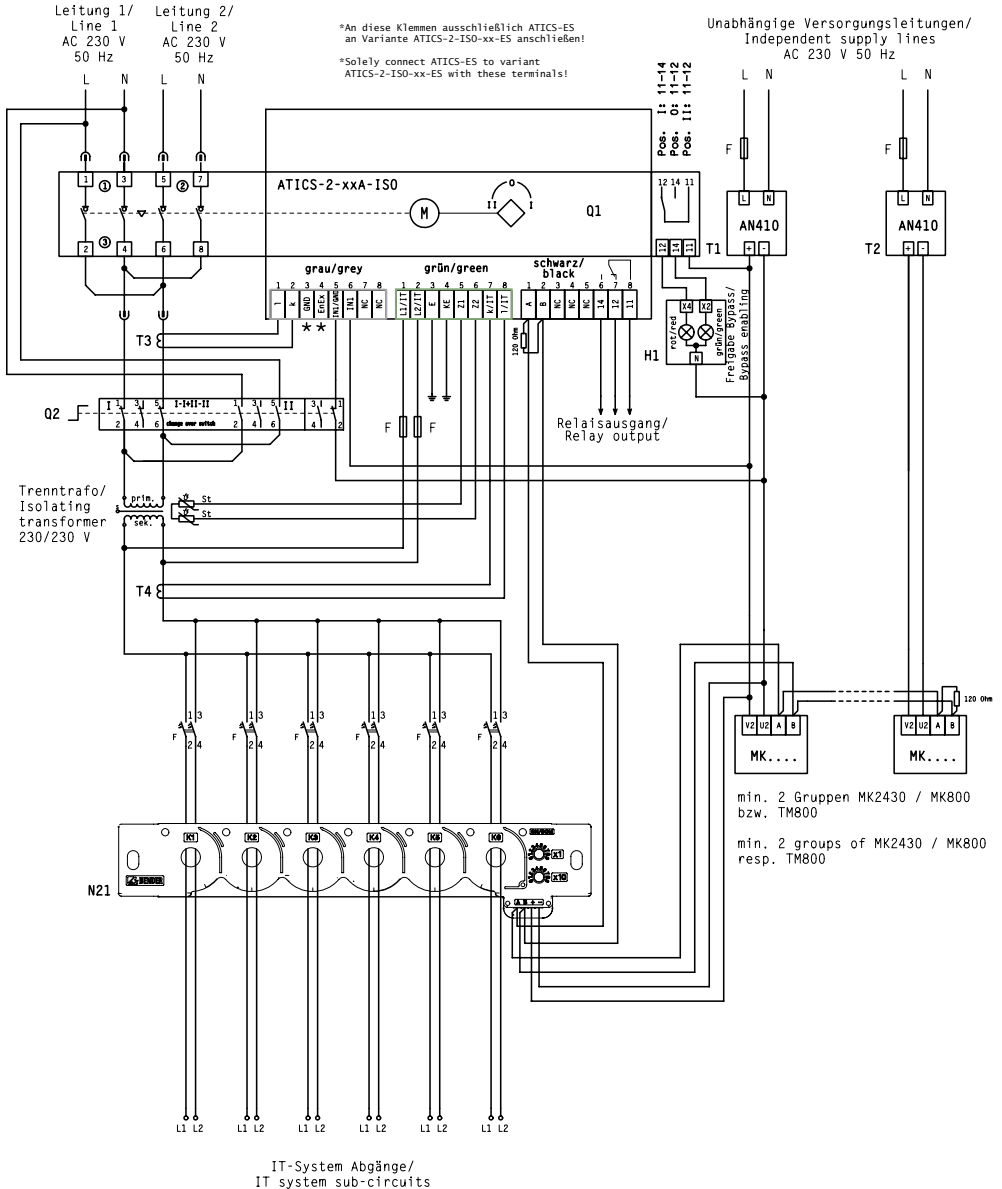


4.2.5 Connection example: ATICS® with bypass switch and EDS151



WARNING! Risk of destruction if connected incorrectly.

The terminals marked with "*" are intended for Bender-internal purposes only. If this is ignored, the ATICS® automatic transfer switching and monitoring device may be damaged.

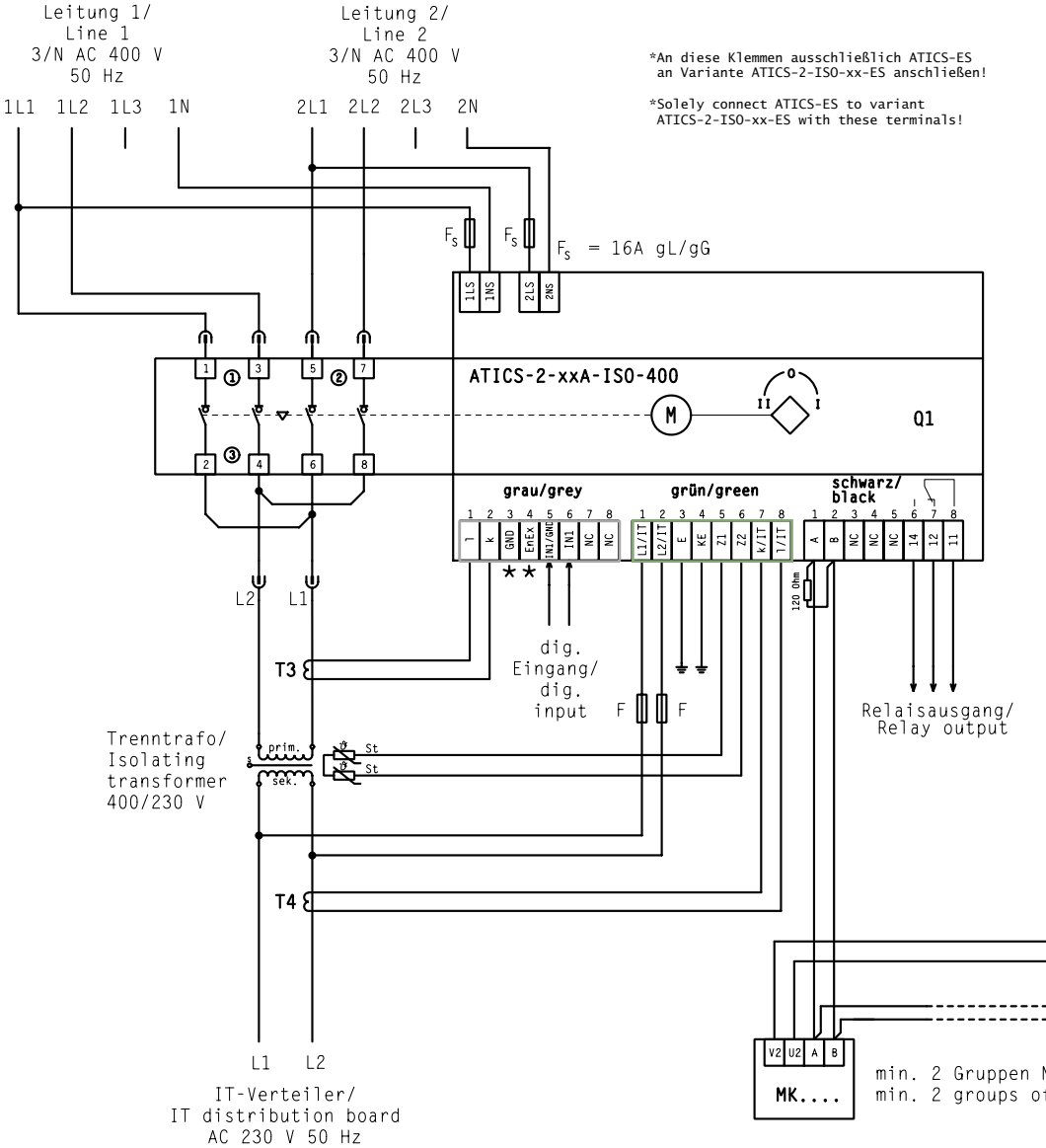


4.2.6 Connection example: ATICS® for 400-volt systems with N conductor



WARNING! Risk of destruction if connected incorrectly.

The terminals marked with "*" are intended for Bender-internal purposes only. If this is ignored, the ATICS® automatic transfer switching and monitoring device may be damaged.

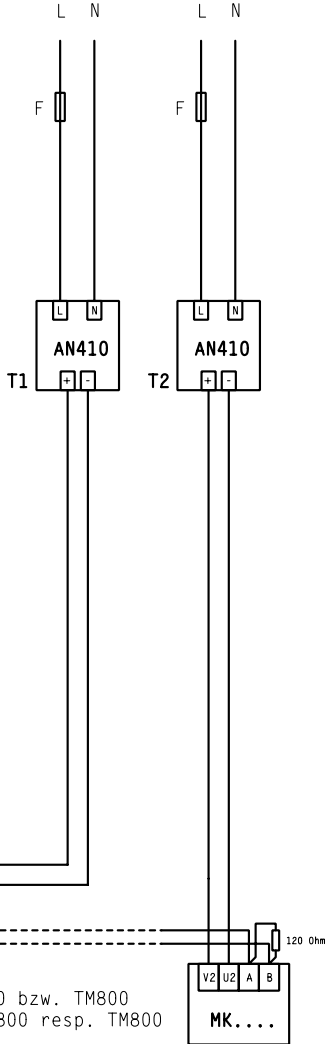




Risk of ineffective voltage monitoring.

The ATICS® must be supplied with power directly from the connected line (not from another phase) as shown. If this is not observed, the voltage monitoring does not function.

Unabhängige Versorgungsleitungen/
Independent supply lines
AC 230 V 50 Hz



MK2430 / MK800 bzw. TM800
MK2430 / MK800 resp. TM800

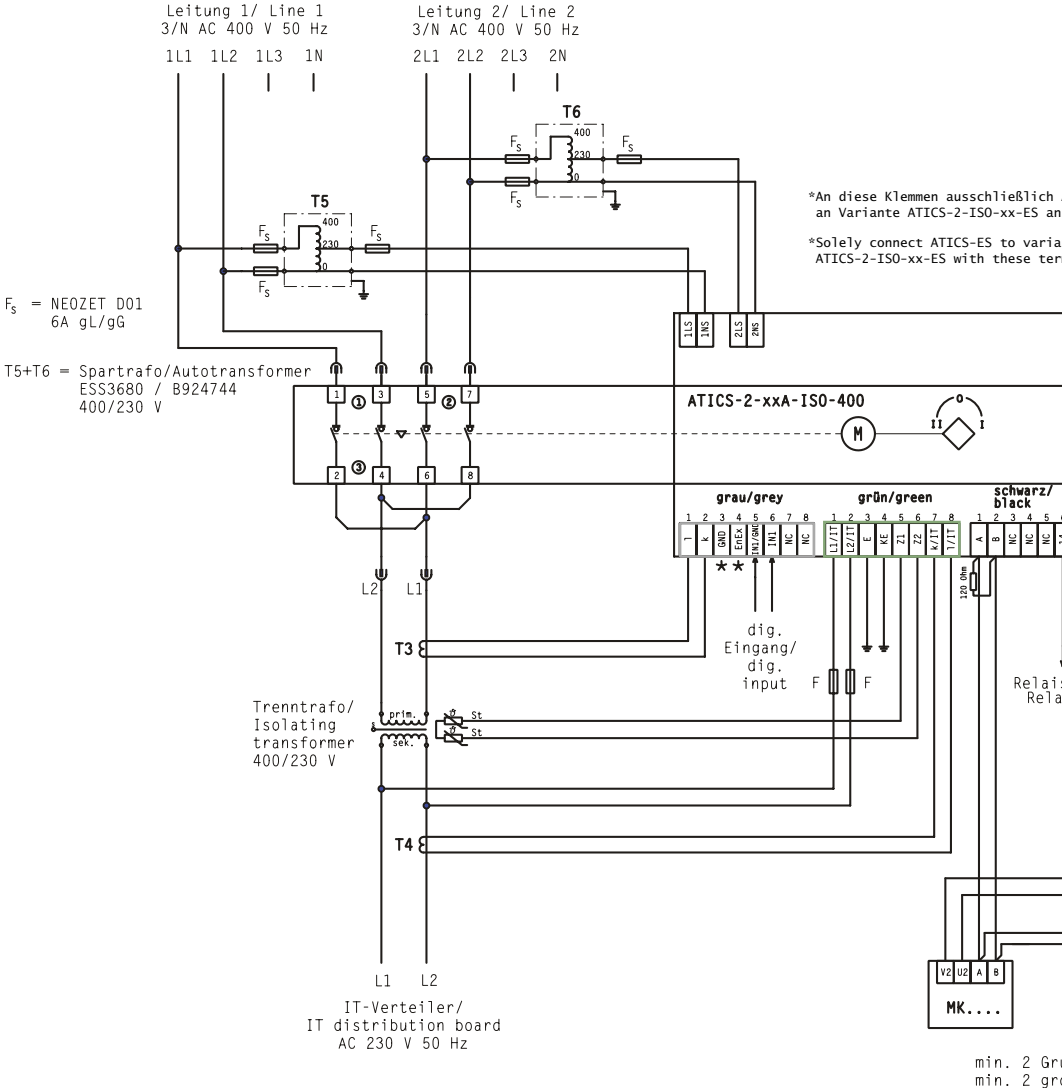
4.2.7 Connection example: ATICS® for 400-volt systems without N conductor

i Only use the T5+T6 autotransformers mentioned in the connection example.



WARNING! Risk of destruction if connected incorrectly.

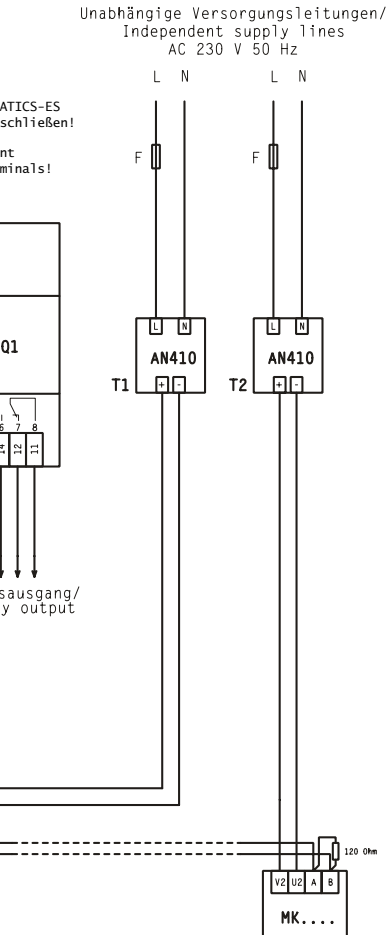
The terminals marked with "*" are intended for Bender-internal purposes only. If this is ignored, the ATICS® automatic transfer switching and monitoring device may be damaged.





Risk of ineffective voltage monitoring.

The ATICS® must be supplied with power directly from the connected line (not from another phase) as shown. If this is not observed, the voltage monitoring does not function.



uppen MK2430 / MK800 bzw. TM800
oups of MK2430 / MK800 resp. TM800

4.2.8 Connection example: ATICS® with ATICS-ES energy storage device

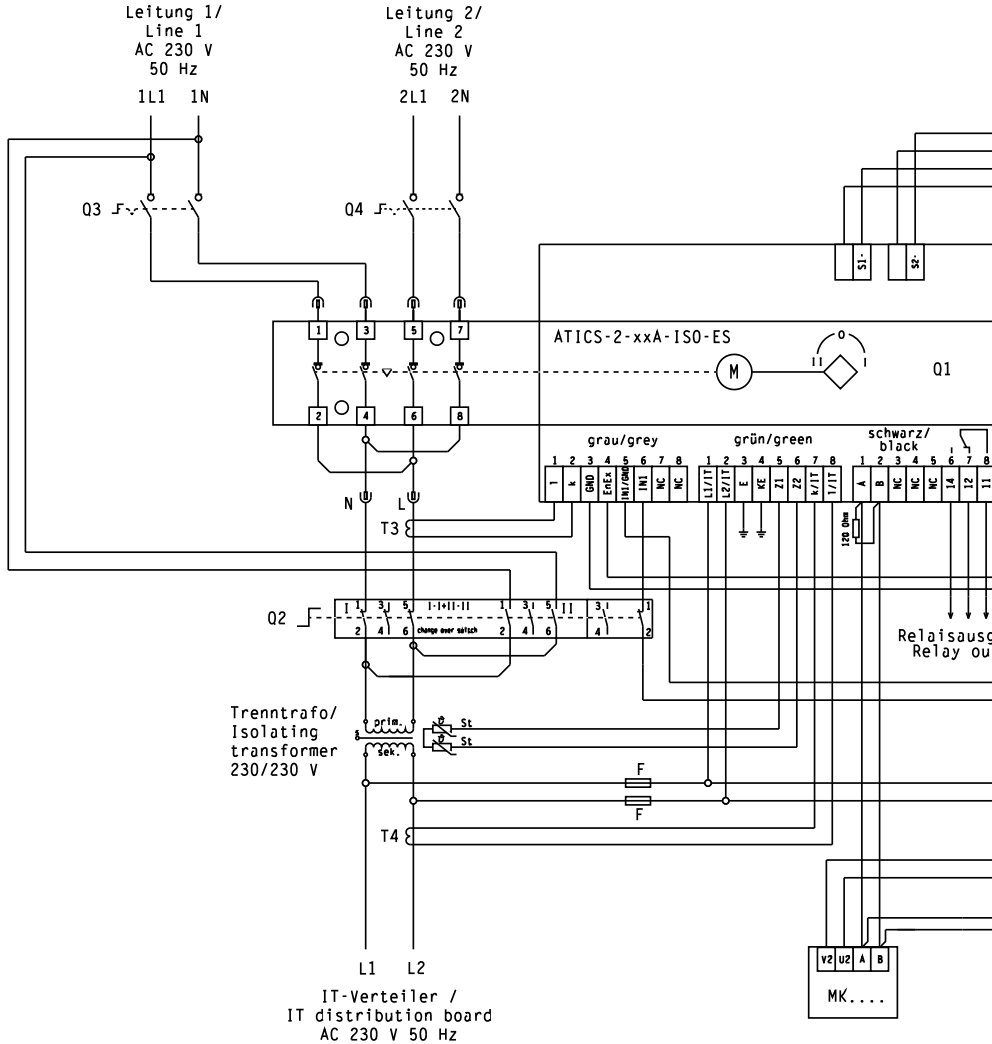


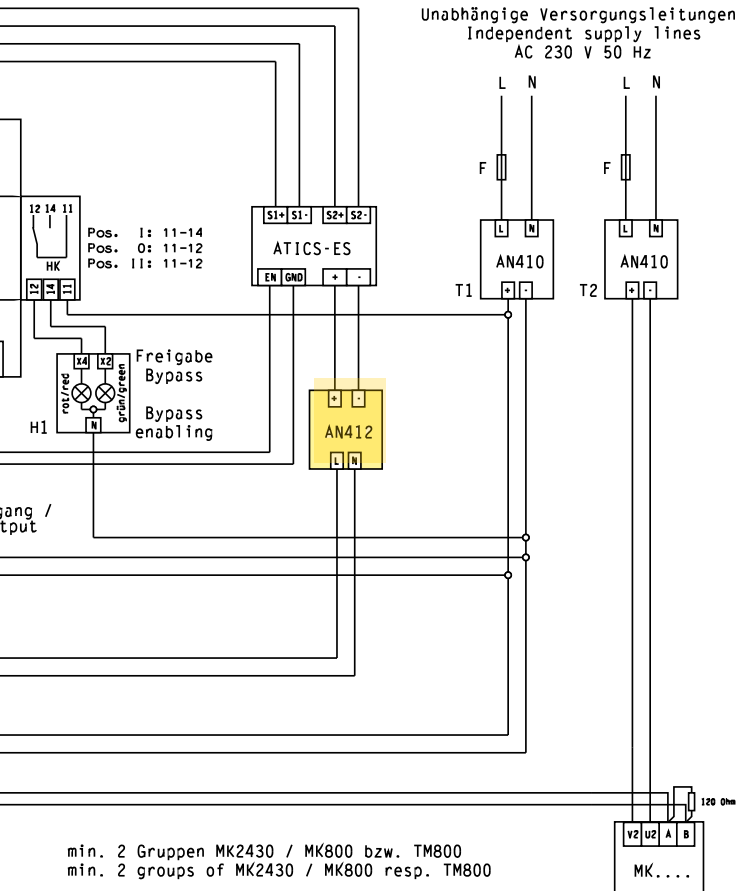
CAUTION! Risk of destruction if connected incorrectly.

The terminals marked with "*" are intended for Bender-internal purposes only. If this is ignored, the ATICS® automatic transfer switching and monitoring device may be damaged.

Power supply for the ATICS-ES energy storage device

The AN412 power supply unit with order number B924150 must be used as power supply unit for the ATICS-ES energy storage device (highlighted in yellow!)





4.2.9 Instructions for connection

4.2.9.1 Transformers for the IT system

The power for group 2 medical locations is supplied via an isolating transformer. Observe the requirements of DIN VDE 0100-710 (VDE 0100 Part 710) for transformers for medical IT systems.

4.2.9.2 Temperature sensors

Bender IT system transformers are equipped with the temperature sensors required according to their insulation class. These temperature sensors (maximum of 6 sensors connected in series) are connected to terminals Z1 and Z2.

4.2.9.3 BMS bus

Ex works, terminals A and B are available for connecting BMS-enabled devices. Alarm indicator and test combinations, alarm indicator and operator panels or other bus-enabled Bender devices can be connected. The bus line must be terminated at both ends with resistors (120 Ω , 0.25 W). Please note the information in the "BMS bus" manual.

4.2.9.4 MK... alarm indicator and test combination, TM... alarm indicator and operator panels, CP9xx Touch Control Panel

MK2430, MK800, CP9xx and TM800 are used. They have the following tasks:

- Display alarms from the ATICS® transfer switching device
- Mutual monitoring for failure
- Test of the ATICS® functions: start insulation monitoring, load current measurement and temperature monitoring and display the results.

4.2.9.5 SCADA systems (Supervisory Control and Data Acquisition)

If messages from the ATICS® transfer switching and monitoring device are to be forwarded to a SCADA system, the following options are available:

- Protocol converters (gateways, e.g. COM465...)
- Common alarm via the ATICS® relay output
- Alarms via interconnected signal converters SMO480-12 or SMO482-12. TM800, SMO480-12 and SMO482-12 convert serial signals from Bender devices into potential-free relay contact alarms.

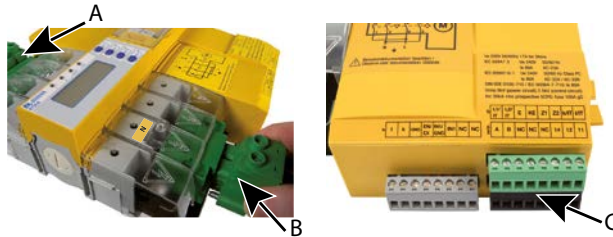
4.2.9.6 EDS151 insulation fault locator (optional)

The EDS151 insulation fault locator is used in conjunction with the ATICS® transfer switching and monitoring device to locate insulation faults in unearthed power supplies (IT systems). With the six integrated measuring current transformers, it records the locating current signals generated by the ATICS® and evaluates them accordingly. Several EDS151 insulation fault locators may be used simultaneously.

4.2.9.7 Bypass switch (optional)

The ATICS-BP-... bypass switch makes it possible to test and change the ATICS® transfer switching and monitoring device without interrupting the power supply to the line downstream of the transfer switching device. To make settings, refer to chapter „Operation with bypass switch“ on p. 90.

4.2.10 Fastening, inserting and securing connections



Connect the terminals according to the wiring diagram to the plug connectors (A, B) and the three connector plugs (C).

- Connect lines 1, 2 and 3 to the plug connectors (A,B). Observe the stripping length of 20 mm and do not use ferrules. Use a Torx® screwdriver T20 or a slotted screwdriver of 6.5 x 1.2 mm. Tightening torque: 2.5 Nm ($\leq 25 \text{ mm}^2$) or 4.5 Nm ($\geq 25 \text{ mm}^2$). Ensure that the lines are short-circuit and earth-fault proof!
 - Use a slotted screwdriver of 2.5 x 0.4 mm to connect the three connector plugs (C). Stripping length: 7 mm. Tightening torque: 0.22...0.25 Nm.
1. Insert bottom green plug connector (B) and secure with mounting screws. After that, insert top green plug connector (A) and secure with mounting screws.
 2. Insert the three connector plugs (C).

i ATICS...400 only: Plug the connector into the top (opposite side of C).

i Only "-ES" version of ATICS®: Connect the ATICS-ES energy storage device using the cable supplied.

4.3 Other functions

4.3.1 Sealing the transparent cover



The transparent cover can only be sealed when it is closed (automatic mode).

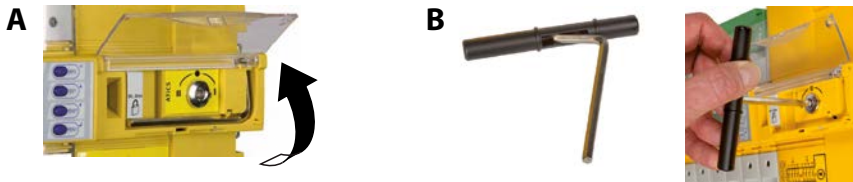
4.3.2 Manual mode



Risk of injury from rotating Allen key.

When the transparent cover is closed, the ATICS® is in automatic mode. The ATICS® detects this by the button being pressed under the transparent cover. When the transparent cover is opened, the button is no longer pressed and the ATICS® switches to manual mode. When the transparent cover is open, make sure that this button is not pressed accidentally. Check and make sure that the message "Manual mode" appears on the display. Only then can the Allen key be used to set the changeover switch to manual mode.

Enabling manual mode



Variant A: Open the transparent cover. Set the digital input. "M/A" function must be set (see chapter „Settings menu 6: Dig. input“ on p. 74).

Variant B: Place the handle on the Allen key, use the Allen key to switch over.

4.3.3 Lock transfer switching and monitoring device with a padlock



1. Pull out locking device.
2. Insert padlock and close it.

It is only possible to lock the switch in manual mode (transparent cover open). The locking device can only be locked in switch position "0". Padlock shackle diameter: 4 mm...8 mm (3/16"...5/16"). The switch position cannot be changed until the lock has been removed and the locking device has been pushed in.

5 Commissioning, settings and testing

5.1 Design and Installation



Risk of missing or incorrect displays on MK..., TM..., FTC... or CP9xx!

MK... alarm indicator and test combinations, TM... alarm indicator and operator panels or BMS-Ethernet gateways COM460..., which, together with an ATICS®, are connected to a BMS bus must be provided with the latest operating software (e.g. MK800/TM800/MK2430 V 4.03 or higher). Older MK..., TM... or FTC... cannot interpret the alarms of the ATICS® because the text modules required for the ATICS® are not integrated yet. These devices must either be updated or replaced. The TMK-SET configuration software must also be the latest version.



Risk that the ATICS® does not switch!

The ATICS® requires enough current (2 pulses of 17 A for 30 ms) for a changeover. If there are several ATICS® in one system, it is possible that the current is insufficient, especially when feeding from a battery power supply. Set the delay time $t(\text{start})$ (P. 67) on the devices in such a way that after voltage recovery the devices switch to the preferred supply one by one.

Provide at least two places for MK... alarm indicator and test combinations or TM... alarm indicator and operator panels or CP9xx. These panels display messages from the ATICS® automatic transfer switching and monitoring device and monitor each other for failure. This is an essential part of the safety concept (functional safety, SIL2). Application examples of MK... or TM... in hospitals:

- Medical locations
- Continuously manned area (e.g. nurse service area)
- Technical area

Provide a fail-safe power supply for the MK... or TM... or CP9xx.

The TM... and MK... for the medical and technical area must be supplied with power from different lines and sources. Example:

The MK... or TM... in medical locations is supplied from line 3 of the automatic transfer switching device. The MK... in technical areas is supplied from a fail-safe battery-supported line.

5.1.1 Setting parameters of indicator devices



Configure MK..., TM..., COM465, CP9xx in a meaningful way

In addition to the alarm, also configure a brief message of what to do or who to notify. Examples:

- IT system overload. Switch off unnecessary loads.
- IT system insulation fault. Call Building Services Tel. -123.

Indicator devices must display at least the following faults detected by the ATICS®:

- Failure line 1, failure line 2
- Device error, device failure ATICS®
- Insulation fault, overload, overtemperature
- Device error with complete text or error code

This is achieved by entering the ATICS® device address in the alarm address table. If necessary, individual messages can also be programmed for channels 1, 2, 5, 7...11. No individual text may be programmed for channel 6!

The failure of the other MK... or TM... or CP9xx must be reported.

MKs and TMs in technical areas are usually supposed to notify test and service reminders. For this purpose, for example, the setting "Display ATICS® warnings" must be enabled in the "TMK-SET" software in expert mode at "Parameters/Device Setup" tab "Parameter 2". In medical locations, test and service reminders should not normally be notified. For this purpose, this setting must be disabled here (factory setting).

Optionally, the EDS channels, if available, are to be displayed with circuit and/or room name.

5.1.2 ATICS® messages on the BMS bus (channel use)

| BMS channel | Entry in the menu 1. Alarm/meas.values | Description | Operating message | Alarm message | Error |
|-------------|---|---|-------------------|---------------------------------------|---|
| 1 | 1. Line 1: 228V | Line 1 | Voltage | Voltage* | -- |
| 2 | 2. Line 2: 183V | Line 2 | Voltage | Voltage* | -- |
| 3 | 3. Position:1 | Switch position | 0, 1, 2 | -- | -- |
| 4 | 4. t(2->1):-- or Switch-back lock | Return transfer delay time is enabled, counting backwards or Switch-back lock | Seconds | -- | -- |
| 5 | 5. Automatic mode | Manual mode/ Bypass/Automatic mode | -- | Alarm text** | -- |
| 6 | 6. Status | e.g. device error | -- | | Error code (see chapter „Messages with error code or service code“ on p. 85) |
| 7 | 7. I(3):35A | Load current TN system | Current | Current | Connection fault current transformer |
| 8 | 8. Dig. input | Dig. input | --** | Alarm text** | -- |
| 9 | 9. Insulation: 155kOhm | Insulation | Insulation value | Insulation fault, Insulation value | Connection fault mains/earth |
| 10 | 10. Load: 55% | IT system load | Load current | Overload, load current | Connection fault current transformer |

| BMS channel | Entry in the menu 1. Alarm/meas.values | Description | Operating message | Alarm message | Error |
|-------------|---|-------------------------|-------------------|---------------|-------|
| 11 | 11. Temperature | Transformer temperature | -- | Temperature | -- |
| 12 | 12. Fault location: -- | EDS control | -- | (EDS start) | -- |

* Message dependent on the parameter assignment in the „Settings menu 1: Changeover“ on p. 67 -> "System"

** Message dependent on the input parameter assignment (see „Messages for alarm on the digital input“ on p. 47)

The following different channel assignment applies to the Test settings in the "Interface/Profile" menu:

| BMS channel | Entry in the menu 1. Alarm/meas.values | Description | Operating message | Alarm message | Error |
|-------------|---|------------------------------------|-------------------|---------------|-------|
| 4 | 4. t(1->2) | Changeover period of the last test | Changeover period | --- | --- |
| 7 | 7. TEST:dd.mm.yy | Next TEST due on (date) | Date | when due | --- |
| 8 | 8. Service:dd.mm.yy | Next service due on (date) | Date | when due | --- |

Messages for alarm on the digital input

The following operating and alarm messages may appear depending on the settings in chapter „Settings menu 6: Dig. input“ on p. 74

| Menu settings | Function of digital input | Alarm on BMS bus | BMS channel |
|---------------|---|--|-------------|
| off | Digital input disabled | No alarm | - |
| M/A | Enable manual mode | Alarm "Manual mode" | 5 |
| Bypass | Bypass enabled | Alarm "Manual mode" | 5 |
| no2->1 | Enable switch-back lock | Operating message "Switch-back lock" | 4 |
| 1<->2 | Change preferred line | No alarm | |
| TEST | TEST- carry out changeover | No alarm | |
| ALARM | Convert message on the digital input into alarm on the BMS bus. | Alarm "Digital input" | 8 |
| OPL | Convert message on the digital input into alarm on the BMS bus. | Alarm, "Insulation fault, operating theatre light" | 8 |

5.1.3 Tests, decommissioning

- Abide by the relevant local or national regulations for periodic verification on electrical installations.
- If you notice changes on the ATICS®, you must immediately start checking the transfer switching device.

Observe the alarms on the transfer switching device. The ATICS® reports in good time when testing or servicing is necessary or if safe operation of the device according to IEC 61508 is no longer guaranteed (e.g. due to component fatigue) and action must be taken.

5.2 Setting and testing according to the checklist

The settings made at the factory take into account a total changeover period $t \leq 0.5$ s and switching back to the preferred supply within 10 seconds after voltage recovery.

The response delay $t(\text{on})$, the dead time $t(0)$, the delay on release $t(\text{off})$ and the return transfer delay time $t(2 \rightarrow 1)$ of the ATICS® are configurable and must be adjusted to the requirements of the specific application case and the requirements of DIN VDE 0100-710 (VDE 0100 Part 710) for automatic transfer switching devices. If the current monitoring (short-circuit detection) is disabled in the menu "Settings" > "Current", an additional short-circuit current calculation and configuration of the response time $t(\text{on})$ is required.

- The total off-time (from the point at which the fault occurs until the arc in the overcurrent protective device is cleared) must be less than the minimum delay for the changeover of the automatic transfer switching device.
Setting: Response delay $t(\text{on})$
- If several transfer switching devices are connected in series in a power supply system, it is recommended that they be time-graded.
Setting: Response delay $t(\text{on})$, return transfer delay time $t(2 \rightarrow 1)$ and delay on release $t(\text{off})$.
- As part of the response delay (to be custom-set), you must, at the very least, take into account the periods of time when the circuit experiences short interruptions, and the response times of the short-circuit protection equipment upstream or downstream. Regardless of this, a switchover pause corresponding to the installation location should be taken into account, in order to avoid switching overvoltages.
Setting: Response delay $t(\text{on})$, dead time $t(0)$ and return transfer delay time $t(2 \rightarrow 1)$.

If extreme inrush current peaks (e.g. during generator start-up) are to be avoided in a system with several transfer switching devices with downstream transformers, the ATICS® version "-ES" with external ATICS-ES energy storage device (option, see chapter „Ordering information“ on p. 102) should be used. For this purpose, the parameter "Load disconn." in the menu "Settings menu 1: Changeover" must be set to "on" so that ATICS® switches to position "0" if both lines fail.

The delay time $t(\text{start})$ in the menu Setting/Changeover must be set differently for the individual devices so that the devices switch on in a staggered manner when the voltage returns.

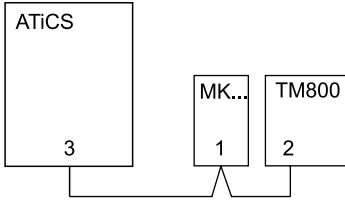
The factory settings and system-specific settings of the ATICS® transfer switching and monitoring device are documented in the checklist. Please carry out all the work outlined in the list and log each test step.

Keep the checklist with this manual in the vicinity of the device.

5.3 Addressing examples

i Use terminating resistors correctly
 Communication via the BMS bus is only guaranteed when there is a terminating resistor at the beginning and at the end of the BMS bus. Other terminating resistors cause malfunction and must not be used. Please note the information in the "BMS bus" manual.

An automatic transfer switching device with an MK... and a TM...

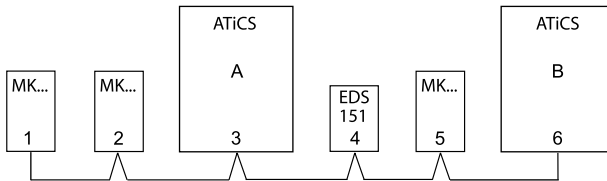


| Device | Parameter | Address settings for an automatic transfer switching device |
|-----------------|---------------|---|
| ATICS® | Bus address | 3 |
| MK... | Address | 1 |
| | Test address | 3 |
| | Alarm address | 3, 2* |
| TM800/ CP9xx | Address | 2 |
| | Test address | 3 |
| | Alarm address | 3, 1* |

* These alarm addresses are used for mutual monitoring of the MK... or TM... for device failure.

Two automatic transfer switching devices

- One with an insulation fault locator
- With one alarm indicator and test combination in each case
- And central monitoring



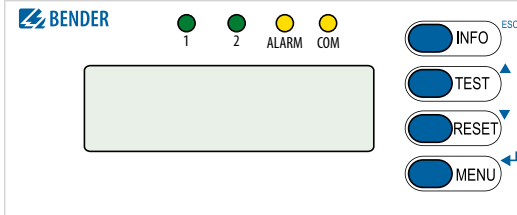
| Device | Parameter | Address settings |
|-------------------------------------|---------------|-------------------|
| ATICS® for area A | Bus address | 3 |
| First MK... (Central monitoring) | Address | 1 |
| | Test address | 3, 6 |
| | Alarm address | 2*, 3, 4**, 5*, 6 |
| Second MK... for area A | Address | 2 |
| | Test address | 3 |
| | Alarm address | 1*, 3, 4** |
| EDS151 | Bus address | 4 |
| ATICS® for area B | Bus address | 6 |
| MK... for area B | Address | 5 |
| | Test address | 6 |
| | Alarm address | 1*, 6 |

* These alarm addresses are used for mutual monitoring of the alarm indicator and test combinations.

** Program individual alarms for each EDS channel.

6 Operation

6.1 Operating and display elements

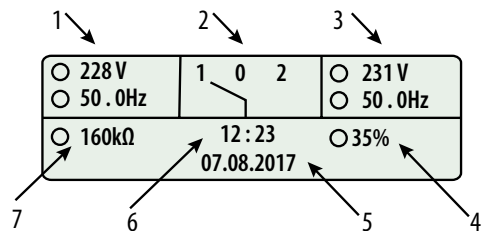


| LED/Button | Description |
|-----------------|--|
| LED "1" | lights up: Line 1 is ready |
| LED "2" | lights up: Line 2 is ready |
| LED "ALARM" | lights up: Alarm present |
| LED "COM" | flashes: Communication via BMS bus |
| "INFO" "ESC" | Query standard information Exit menu function without changing parameters |
| "TEST" ▲ | Call up test menu, change parameters, scroll |
| "RESET" ▼ | Reset alarm and error messages, disable switch-back lock, change parameters, scroll |
| "MENU" ↵ | Toggle between standard display, alarm display and MENU, confirm parameter changes |

6.2 Quick reference guide

6.2.1 Display under normal operating conditions

| Pos. | Description |
|------|--|
| 1 | Line 1: Measured values of mains voltage and frequency |
| 2 | Switch position of the automatic transfer switching device |
| 3 | Line 2: Measured values of mains voltage and frequency |
| 4 | Display of the load in the IT system in %. The maximum load current is adjustable. |
| 5 | Alarms or alternative displays ¹ |
| 6 | Date |
| 7 | Measured value of insulation resistance |



¹ Date, switch-back lock, manual mode, bypass mode, countdown timer for return transfer time

6.2.2 Display during fault condition

There is an alarm message.



- The yellow "Alarm" LED lights up.
- A detailed message appears on the LC display.

Example: Line 2 has no voltage.


Press "" button to display the current alarm:


- Line 1: ALARM
 - xx = serial number of the displayed alarm
 - yy = number of pending messages
- Line 2: Alarm status and alarm text
- Line 3: Measured value
- Line 4: Address and channel of the indicator device

| | | |
|--|-------|---|
| <input type="radio"/> 228 V | 1 0 2 | <input checked="" type="radio"/> 0.00 V |
| <input type="radio"/> 50.0Hz | | <input type="radio"/> 50.0Hz |
| <input type="radio"/> 160kΩ | 12:23 | <input type="radio"/> 35% |
| <input checked="" type="radio"/> Unterspannung / Undervoltage | | |

Use the arrow buttons ", " to select previous or next message.

If no button is pressed for a few seconds, the standard display reappears.

Press "" button again to return to the main menu.

 *The alarm text displayed in case of failure of one line depends on the setting in the "System" menu in the „Settings menu 1: Changeover“ on p. 67.*

If individual alarm messages are programmed on a TM... alarm indicator and operator panel or a CP9xx or an MK... alarm indicator and test combination, the display of this device may differ from the display of the ATICS®.

6.2.3 Test function

A test is used to check the device function. There are several ways to call up the test menu:

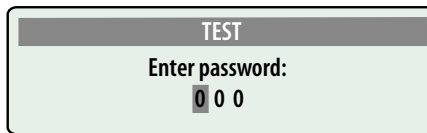
- Select standard display and then press the "TEST" button on the front panel of the device for at least one second
- Call up "TEST" mode on the Control menu

A test on the changeover function can also be triggered via a digital input (function similar to "Manual changeover"). Test menu:

| |
|--|
| <p>Exit</p> <ol style="list-style-type: none"> 1. IT system 2. Autom. changeover 3. Manual changeover |
|--|

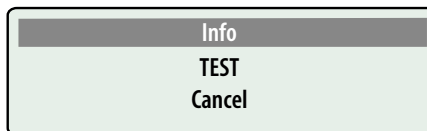
| Menu item | Function | Page |
|-----------------------|--|-----------------------|
| 1. IT system | Test of the integrated insulation monitoring device (insulation resistance, load in %, overtemperature) | P. 54 |
| 2. Autom. changeover | Test of the changeover function. Switches back automatically after time t(test). | P. 54 |
| 3. Manual changeover | Test of the changeover function. Switches back after pressing the "RE-SET" button. | P. 55 |
| 4. Last changeover | Save last changeover as test | P. 55 |
| 5. Generator | Start generator without switching over. Terminate test by pressing the "RESET" button. | P. 56 |
| 6. Test communication | Communication test via the BMS bus. To do this, simulate an alarm and send an alarm message via the BMS bus. | P. 57 |

i Test menus 2...4 are protected by a password (see chapter „Settings menu 11: Password“ on p. 79). Password protection is only effective if the password has been enabled. When an attempt is made to open one of these menus, the password entry screen appears automatically:



i During an "Autom. changeover" test or "Manual changeover" test, changeover does not take place until a delay time has elapsed which is indicated by the progress bar. For technical reasons, the menu items "Control> Test > Manual changeover", "Control > Test >Generator" and "Control > Test > Communication" cannot be accessed via gateway (COM465..., CP700, ...).

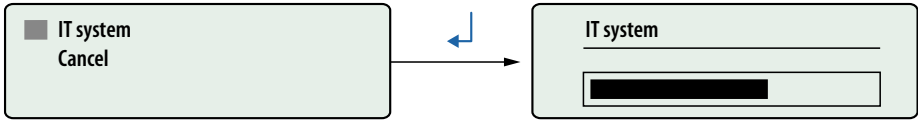
i If manual mode is selected for changeover (transparent cover open or digital input set to "manual changeover"), no changeover can take place at the test menu "Autom. changeover" or "Manual changeover". ATICS® then displays the following message:



i To run a test, the transfer switching and monitoring device must be in automatic mode.

i During an "Autom. changeover" or "Manual changeover" test, the changeover period t(1->2) is displayed. This is the time required for switching over from the preferred line to the redundant line. This time may differ from the return transfer time! See chapter „Time diagram: Changeover between preferred and redundant line“ on p. 19.

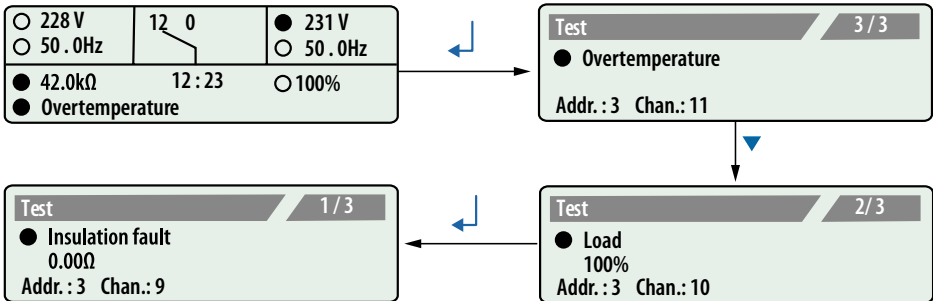
6.2.3.1 Test menu 1: IT system



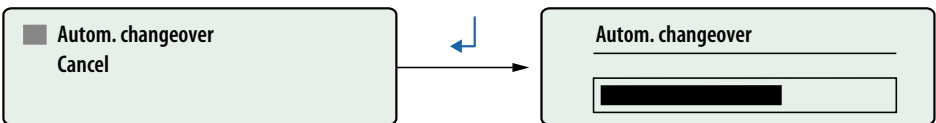
IT system Tests the integrated insulation monitoring device (insulation resistance, load in %, overtemperature). The progress of the test is shown on the display.

Cancel Return to test menu

Press the "ESC" button to leave the test function and then "Enter" to display the simulated measured values. These are available alarm messages for a few seconds after the test. The messages from this test are also stored in the history memory.

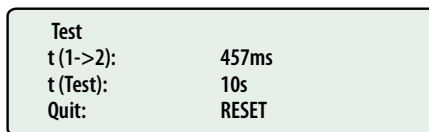


6.2.3.2 Test menu 2: Autom. changeover



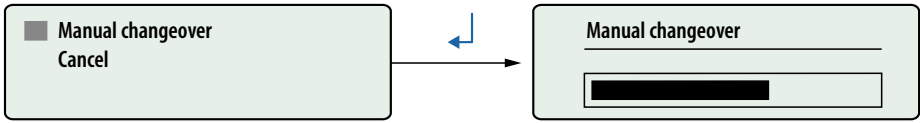
Autom. changeover Test of the changeover function. The device switches to the redundant line. The changeover period $t(1 \rightarrow 2)$ is displayed. After the set time $t(\text{test})$ has elapsed, the device switches back to the preferred line.

Cancel Return to test menu



The date of the test is saved in the test logger to send a reminder for the next test once the test interval has elapsed. The messages from this test are also stored in the history memory.

6.2.3.3 Test menu 3: Manual changeover



Manual changeover Test of the changeover function. The device switches to the redundant line and remains in this switch position. The changeover period $t(1 \rightarrow 2)$ is displayed. The device does not switch back to the preferred line until the "RESET" button has been pressed.

Cancel Return to test menu

Test

t (1->2): 346ms

t (Test): --

Quit: RESET

The date of the test is saved in the test logger to send a reminder for the next test once the test interval has elapsed. The messages from this test are also stored in the history memory.

- ⚠ Risk that the test is accidentally not completed.**
 If the test menu 3: "Manual changeover" is left after switching over to the redundant line, then the ATICS® remains in this switch position and in "TEST" mode.
- Wait until "Quit: RESET" appears on the display.
 - Press the "RESET" button.
 - Check whether the ATICS® has switched to the preferred line.

i *Manual mode aborts manual test.*
 When the transparent cover is opened after switching over to the redundant line, the ATICS® switches to manual mode. The test will be aborted. After closing the transparent cover, the ATICS® switches back to the preferred line. No entry will be made in the test logger.

6.2.3.4 Test menu 4: Last changeover

If the ATICS® has switched over due to a failure or a planned shutdown of the preferred line, the last switching operation can be saved as a test.

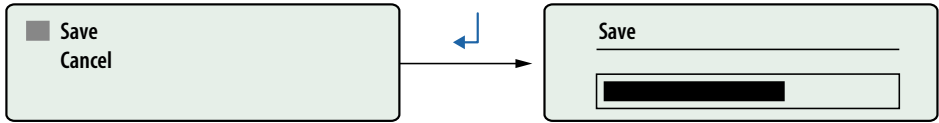
Last changeover

1. Date: 20.09.18

2. Test: 02.03.19

Save

- 1. Date Date of the last changeover
- 2. Test Date on which the next test is due
- Save Date of last changeover is saved as test date



1. Save Saves the date of last changeover as test date, as long as that date is later than the previous entry.
2. Cancel Return to test menu "Last switch"

After saving, the date on which the next test is due is increased by the test interval (in this case, 6 months).

Last changeover

1. Date: 20.09.18

2. Test: 21.03.19

Save

The date of the test is saved in the test logger to send a reminder for the next test once the test interval has elapsed. A changeover period is not saved. The messages from this test are also stored in the history memory.

6.2.3.5 Checking the ATICS-ES energy storage device (if available)



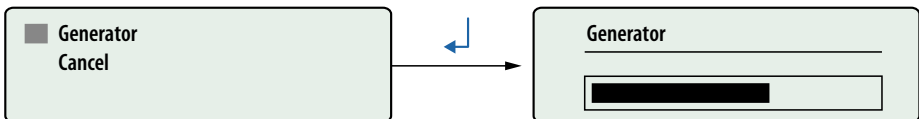
CHECK with isolator after bypass tap upstream of ATICS® feed!

Before each test, observe the LEDs on the ATICS-ES and wait until the energy storage device is fully charged. 3 tests required:

- a) Line 1 off, then line 2 off --> ATICS® must switch to position 0
- b) Line 2 off, then line 1 off --> ATICS® must switch to position 0
- c) Automatic test with both lines available

6.2.3.6 Test menu 5: Generator

Executing this function makes sense only when a generator is connected to the redundant line and the corresponding settings have been carried out (see chapter „7.3.4.1 Settings menu 1: Changeover“ on page 67). To avoid voltage interruptions, in the test menu "Generator", the ATICS® does not switch to the redundant line. In order to test the generator and the changeover switch, select "Autom. changeover" or "Manual changeover".



- Generator** Generator start relay is switched. The generator starts. However, there is no changeover to the redundant line. The test is not terminated and the generator switched off again until the "RESET" button has been pressed.
- Cancel** Return to test menu

| | |
|-----------|-----------------------------|
| Test | |
| t (1->2): | <input type="radio"/> 110ms |
| t (Test): | <input type="radio"/> -- |
| Quit | RESET |

The display shows the test duration.



Risk that the generator test is accidentally not completed.

If the test menu 5: "Generator" is left after the generator has started, then ATICS® remains in this switch position and in "TEST" mode. This means that the generator is not switched off.

- Wait until "Quit: RESET" appears on the display.
- Press the "RESET" button.
- Check whether the generator is switched off.

6.2.3.7 Test menu 6: Test communication

Test communication via the BMS bus. In order to do this, a fault message is simulated. This alarm message is sent to evaluator devices (e.g. alarm indicator and operator panels, MK800, SMO...). Check that these devices are responding to the alarm message as requested.

Select a channel:

1. Use the "▲" arrow button to go to the channel settings. Press the "↵" button.
2. Use the arrow buttons to select the channel for which the alarm message is to be simulated. Press the "↵" button to confirm your selection.

The alarm status will change from (no alarm) to (alarm). If the alarm status is not displayed, the settings made for ATICS® will not permit simulation of this alarm.

Example of an alarm simulation: "Channel 5: MANUAL MODE" is selected.

| |
|--|
| <input type="radio"/> Channel disabled |
| Exit |
| Channel: -- |



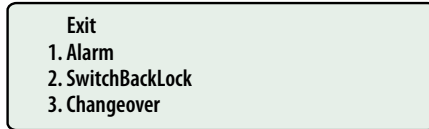
| |
|--|
| <input checked="" type="radio"/> Manual mode: -- |
| Exit |
| Channel: 5 MODE |

i The ATICS® stays in this menu until it is exited by pressing the "ESC" button. During this time, all the alarms on the BMS bus have the word "TEST". Only the alarm messages listed in the following table can be simulated: "ATICS® messages on the BMS bus (channel use)".

6.2.4 Reset function

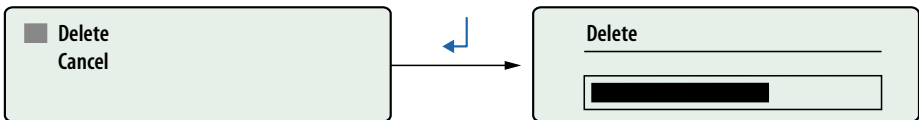
A RESET is used to reset the alarm and fault messages for the device as well as to disable the switch-back lock of the changeover function. There are several ways to call up the reset menu:

- Select standard display and then press the "RESET" button on the front panel of the device for at least one second.
- Select the "RESET" function from the Control menu. Reset menu:



| Menu item | Function | Page |
|--------------------|--|-----------------------|
| 1. Alarm | Reset alarm and fault messages on the device. | P. 58 |
| 2. SwitchBack-Lock | Disable the switch-back lock of the changeover function. The device switches back to the redundant line. | P. 59 |
| 3. Changeover | Change alarm value for the: <ul style="list-style-type: none"> - Maximum number of changeover operations performed - Maximum number of operating hours - Maximum number of changeover operations performed which were carried out with overcurrent or short-circuit current | P. 59 |
| 4. Service alarm | Reset the service alarm | P. 60 |

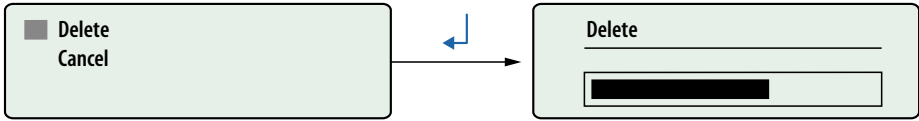
6.2.4.1 Reset menu 1: Alarm



- Delete** Reset alarm and fault messages on the device. The progress of the test is shown on the display. The reset is required if one or more alarm-triggering parameters are not constantly monitored so that the end of the alarm condition was not detected.
- Cancel** Return to reset menu

For all pending alarms, the date and time of the reset are entered in the line "End" in the history memory. The "ALARM" LED goes out. If the fault persists, a new entry is written to the history memory. The "ALARM" LED remains lit.

6.2.4.2 Reset menu 2: SwitchBackLock



Delete Disable the switch-back lock of the changeover function. The progress of the test is shown on the display. The device switches back to the redundant line.

Cancel Return to reset menu

- i** *There are different possibilities to disable the switch-back lock via gateway (COM4xx, CP700 etc.):*
- *Via menu: Select "RESET > Switch-back lock". Requirement: Parameter setting must be possible (menu "Settings > Interface > Settings > On").*
 - *Via Modbus control commands: Using the command "Changeover to line 1 or line 2". Testing must be enabled (menu "Settings > Interface > Test > On").*

6.2.4.3 Reset menu 3: Changeover



CAUTION! *With increasing service life, the probability of component failure increases for every technical product.*

For operation according to IEC 61508-2, additional limit values are monitored (number of switching cycles, operating time, number of switching cycles in the event of a short circuit). If the set limit values are exceeded, the device displays a prewarning or an alarm.

The alarm can be "deleted" by increasing the limit values.

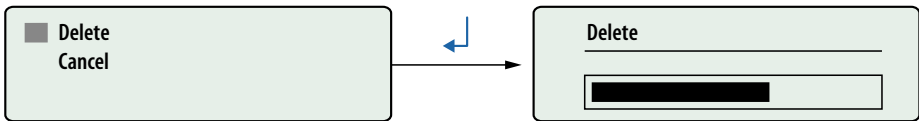
To ensure continued operation in accordance with the IEC 61508-2 standard, the device must be replaced.

- i** *Regardless of the IEC 61508-2 standard, the safe function of the device is of course still guaranteed due to the cyclical self-monitoring functions.*

Operation in accordance with DIN VDE 0100-710, DIN VDE 0100-718 or IEC 60364-7-710 is still possible if the prescribed measures are implemented (see chapter „Periodic verification and service“ on p. 89).

| Menu | Description |
|--|---|
| Exit | Exit "Changeover" reset menu; go up one menu level |
| 1. <input type="radio"/> Changeover: xxx | Number of changeovers performed |
| 2. Alarm: <input type="radio"/> 8000 | Alarm value for maximum number of changeovers performed* |
| Delete | Increase alarm value by 500 changeovers |
| 4. <input type="radio"/> Operat. time: xxh | Operating hours counter (h=hours, d=days, mo=months) |
| 5. Alarm: <input type="radio"/> 20mo | Alarm value for maximum number of operating hours (prewarning after 108 months)* |
| Delete | The limit value for the permissible number of operating hours is increased by 13 months. The value is automatically increased by 13 months if the alarm has already been cleared once before and a successful test of the changeover process is carried out. |
| 7: <input type="radio"/> Changeover I>: 0 | Number of changeovers performed which were carried out with overcurrent of short-circuit current (see chapter „Menu 2: Changeover“ on p. 64) |
| 8. Alarm: <input type="radio"/> 1 | Alarm value for maximum permitted number of changeovers performed which were carried out with overcurrent or short-circuit current* |
| Delete | Increase alarm value for changeover in case of overcurrent or short-circuit current by 1 changeover |

* for functional safety according to IEC 61508-2:2010



Delete Set new alarm value. Clear alarm.

Cancel Return to reset menu

6.2.4.4 Reset menu 4: Service alarm

- Resetting the service prewarning suppresses the service prewarning until the next service appointment.
- Resetting the service alarm sets the date for the next service appointment to "current date + service interval".

7 Menu mode: Operation and setting

7.1 Switching on and calling up the main menu

When the device is connected to the power supply, the following information appears on the display for approx. 3 seconds:



i If the device has been without power for several days, time and date must be readjusted.



If there are no messages pending, the standard display will appear after the start.

| | | |
|-------------------------------------|---------------------|-------------------------------|
| <input type="radio"/> 228 V | 1 0 2 | <input type="radio"/> 231 V |
| <input type="radio"/> 50.0 Hz | | <input type="radio"/> 50.0 Hz |
| <input type="radio"/> 160k Ω | 12:23 07.08.2017 | <input type="radio"/> 35% |

Press the "MENU" button to open the main menu.

| |
|-------------------------|
| Exit |
| 1. Alarm / mess. values |
| 2. Changeover |
| 3. History / Logger |

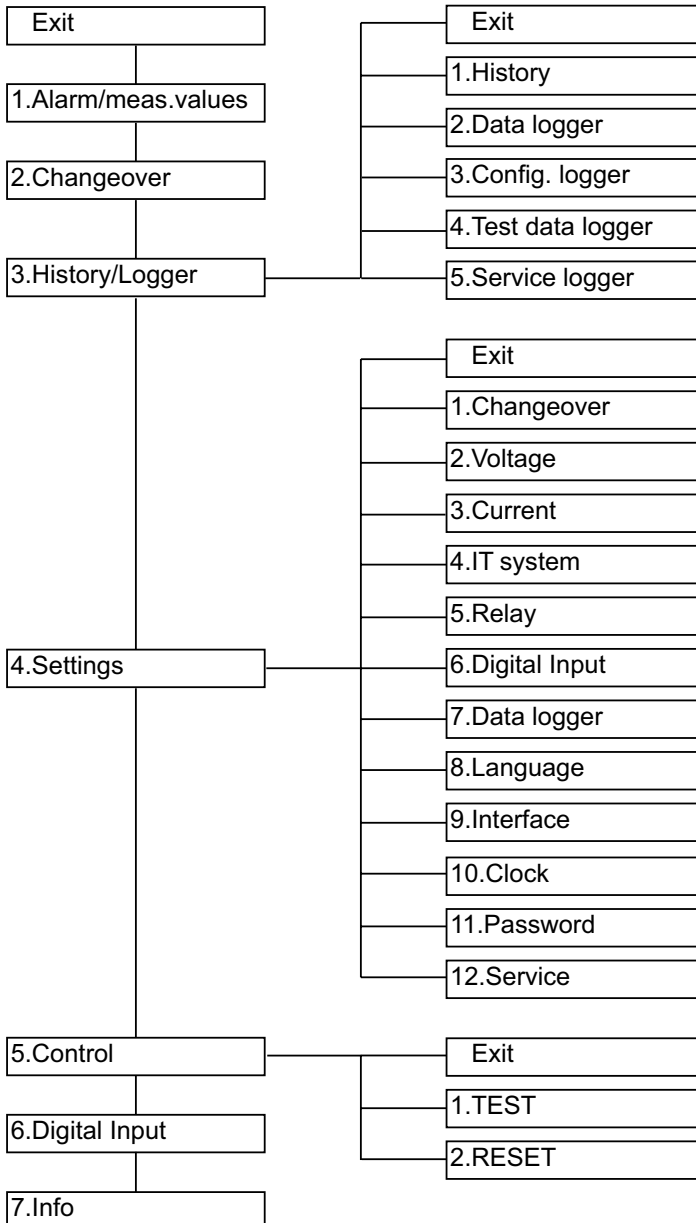
The following buttons can be used in the main menu:

-  Select menu items
-  Confirm the selected menu item (Enter)
- ESC Exit function or go up one menu level

The menu mode is exited automatically if no buttons are pressed in one of the menus for more than five minutes (exception: "Test communication" in the "TEST" menu).

7.2 Menu overview diagram

The following diagram will help you to navigate through the menus:



7.3 Function of the main menu

| Menu item | Function | Page |
|----------------------|---|-----------------------|
| Exit | Exit menu mode | |
| 1. Alarm/meas.values | Display saved status messages, alarm messages and measured values | P. 63 |
| 2. Changeover | Display information on the changeover function (number, test) | P. 64 |
| 3. History/Loggers | Display history memory, data logger, configuration logger, test logger and service logger | P. 65 |
| 4. Settings | Various settings for this device | P. 66 |
| 5. Control | Run TEST and RESET of this device | P. 81 |
| 6. Dig. input | Display voltage level of the digital input | P. 81 |
| 7. Info | Display information on device type and firmware versions | P. 81 |

7.3.1 Menu 1: Alarm/meas.values

Display current status messages, alarm messages and measured values. The device shows the alarm status for each menu item: = no alarm, = alarm.

| Menu | Description |
|--|--|
| Exit | Exit "Alarm/meas. values" menu; go up one menu level |
| 1. <input type="radio"/> Line 1: 228V | Line 1: Measured value mains voltage |
| 2. <input checked="" type="radio"/> Line 2: 183V | Line 2: Measured value mains voltage |
| 3. <input type="radio"/> Position: 1 | Switch position of the automatic transfer switching device |
| 4. <input type="radio"/> t(2->1):-- or 4. <input type="radio"/> Switch-back lock | Return transfer delay time is enabled, seconds counting backwards or Switch-back lock enabled |
| 5. <input type="radio"/> Automatic mode | <input type="radio"/> Automatic mode or <input checked="" type="radio"/> manual mode |
| 6. <input checked="" type="radio"/> Status | Device error (e.g.: no BMS bus master present) |
| 7. <input type="radio"/> I(3):35A | Load current downstream of the transfer switching and monitoring device I(3) or "CT connection" fault |
| 8. <input type="radio"/> Dig. input:-- | Alarm digital input 1 (see chapter „Settings menu 6: Dig. input“ on p. 74) |
| 9. <input type="radio"/> Insulation:-- 155kOhm | Measured value of insulation resistance |
| 10. <input type="radio"/> Load: 55% | Display of the load in the IT system in %. The maximum load current is adjustable. If a "CT connection" or "CT short-circuit" fault occurs, it will be displayed here. |
| 11. <input checked="" type="radio"/> Temperature | Overtemperature of the IT system transformer |
| 12. <input type="radio"/> Faultlocat.:--- | EDS, Start |

| Menu | Description |
|---|--|
| 13. <input type="radio"/> Line 1: 50.0Hz | Line 1: Measured value frequency |
| 14. <input type="radio"/> Line 2: 50.0Hz | Line 2: Measured value frequency |
| 15. <input type="radio"/> t(1->2): 356ms | Changeover period t(1->2) of the last test |
| 16. <input type="radio"/> TEST: 02.07.19 | Next TEST by (date) |
| 17. <input type="radio"/> Service: 11.07.19 | Next service by (date) |

The following different channel assignment applies to the "Test" setting in the "Interface/Profile" menu:

| Menu | Description |
|--|---|
| 4. <input type="radio"/> t(1->2): 356ms | Changeover period t(1->2) of the last test |
| 7. <input type="radio"/> TEST: 02.07.19 | Next TEST by (date) |
| 8. <input type="radio"/> Service: 11.07.19 | Next service by (date) |
| 15. <input type="radio"/> t(2->1): -- | Return transfer delay time is enabled, seconds counting backwards or switch-back lock enabled |
| 16. <input type="radio"/> I(3):5A | Load current TN system |
| 17. <input type="radio"/> Dig.input: -- | Alarm dig input/channel disabled |

i All messages (except measured value frequency) are also present on the BMS bus (see chapter „Messages with error code or service code“ on p. 85).

7.3.2 Menu 2: Changeover

Display information on the changeover function (number, test). The device shows the alarm status for each menu item: = no alarm, = alarm.

| Menu | Description |
|--|---|
| Exit | Exit "Changeover" menu; go up one menu level |
| 1. <input type="radio"/> Changeover: xxx | Number of changeovers performed |
| 2. <input type="radio"/> Operat. time: xxh | Operating hours counter (h=hours, d=days, mo=months) |
| 3. <input type="radio"/> Changeover I>: xx | Number of changeovers performed which were carried out with overcurrent of short-circuit current. These changeovers reduce the service life of the ATICS® transfer switching device. Currents in excess of 130 A (if an STW3 is used) are considered to be overcurrents or short-circuit currents. |

| Menu | Description |
|--|--|
| 4. <input type="radio"/> TEST: dd.mm.yy | Date for next test (changeover) |
| 5. <input type="radio"/> Service: dd.mm.yy | Date for next service |
| 6. <input type="radio"/> TEST: dd.mm.yy | Date of the last test (TEST) or last changeover (LAST SWITCH). |



7.3.3 Menu 3: History/Loggers

The device saves the history of alarm messages, measured values, settings, tests and service measures in different memories (logger).

See the technical specifications for information about the maximum number of events which can be saved from P. 95. Once the maximum number of events which can be saved is reached, the latest event overwrites the oldest entry (entry 1).

| Menu item | Function |
|-------------------|--|
| Exit | Exit "History/Loggers" menu; go up one menu level |
| 1. History | The "History" menu provides information about alarm messages and tests performed. It also indicates whether an alarm is still pending or when it was acknowledged by pressing the "mute" button on a CP9xx, a TM... alarm indicator and operator panel or an MK... alarm indicator and test combination. |
| 2. Data logger | Displays the history of measured values: supply line 1, supply line 2, switch position of the transfer switching device, load current in the TN system downstream of the transfer switching and monitoring device I(3), insulation resistance and load on the IT system in %. |
| 3. Config. logger | Shows the history of all parameter changes, their origin, modified settings and the date of the change (can only be displayed on the device): Local Change has been made in the "Settings" menu on the device. External Change has been made via an external device (e.g. BMS-Ethernet gateway COM465...). Auto Automatic change, in response to a change of another parameter. For an example, see chapter „Settings menu 5: Relay“ on p. 72. |
| 4. Test logger | Displays the history of the tests carried out: date, time and changeover period. See chapter „Time diagram: Changeover between preferred and redundant line“ on p. 19. |
| 5. Service logger | Displays the history of the service measures carried out: Date, time and service codes. Meaning of the displayed service code: see chapter „Messages with error code or service code“ on p. 85. |


7.3.3.1 Operating examples: History

1. Use the arrow buttons to select the required entry. The most recent entry appears first on the display. Older messages can be selected using the arrow buttons.
2. Press the " " button to call up the message text of the selected entry. The path the message took to reach the device is displayed (in this case: insulation , BMS bus address 3, channel 9). Refer to the tables „Fault and alarm messages“ on p. 83 for more information on possible displays.
3. Press the " " button again to return to the entry selection. Repeat these operating steps for all messages. Then press "ESC" to exit the menu. The message "TEST" appears in the last line of the history memory alarm text display: Note that the current history memory entry was created as the result of a test initiated on this device.

| History | | 500 / 500 |
|---------|----------|-----------|
| Start: | 04.12.08 | 16:00:01 |
| Acc: | 04.12.08 | 16:00:33 |
| End: | 04.12.08 | 16:03:17 |

| History | | 500 / 500 |
|-----------------------|----------|-----------|
| ● Insulation fault | | |
| min. 42 kΩ/max. 42 kΩ | | |
| Addr.: 3 | Chan.: 9 | TEST |

7.3.3.2 Operating example: Config.logger

1. Use the arrow buttons to select the required entry. In this case: The settings for the digital input are changed here.
2. Press " " to call up the additional text for the selected entry. The function of the digital input has been changed from "off" to "0". The last line contains an identification code for the type of modification (in this case: [4/1]). Channel 1 means that the first digital input has been changed. Please contact the Bender service and provide the identification number if the modification led to an undesirable behaviour of the device.

| Config.Logger | | 10 / 17 |
|---------------------|--|---------|
| Modific. (auto) | | |
| Digital Input | | |
| 04.10.11 / 16:03:17 | | |

| Config.Logger | | 10 / 17 |
|----------------|--|---------|
| Function | | |
| off -> 0 | | |
| Chan.: 1 (4/1) | | |

7.3.4 Menu 4: Settings

The settings menus are protected by a password (see chapter „Settings menu 11: Password“ on p. 79). Password protection is only effective if the password has been enabled. When opening one of those settings menus, the password entry screen appears automatically:

| Settings |
|-----------------|
| Enter password: |
| 0 0 0 |

After entering a valid password, all settings menus (except the "Service" menu) are freely accessible until the menu mode is exited.


The following menu items are available for configuring the device:

| Menu item | Function | Page |
|-----------------|--|-----------------------|
| Exit | Exit settings menu "Settings"; go up one menu level | |
| 1. Changeover | Adjust settings for changeover switch | P. 67 |
| 2. Voltage | Adjust settings for voltage monitoring | P. 69 |
| 3. Current | Adjust settings for current monitoring (short-circuit detection) | P. 70 |
| 4. IT system | Adjust settings for IT system monitoring (monitoring of the insulation resistance as well as the load and temperature of the isolating transformer) | P. 71 |
| 5. Relay | Set mode of operation and function of alarm relay | P. 72 |
| 6. Dig. input | Set operating behaviour of the digital input | P. 74 |
| 7. Data loggers | Adjust settings for data loggers | P. 75 |
| 8. Languages | Select the operating language for the device (English, German, French, Polish) | P. 77 |
| 9. Interface | Set the BMS bus address of this device, allow settings to be changed via the interface, allow performing a test via the interface. | P. 77 |
| 10. Clock | Set the date and time on the real-time clock on this device. The time setting is synchronised via the BMS bus. The device with address 1 (e.g. MK2430, MK800, TM...alarm indicator and operator panel or CP9xx) synchronises all other devices every hour. | P. 78 |
| 11. Password | The device has two separate passwords for the "Settings" menu and the "TEST" menu. Adjustable in each case: change password, enable/disable password | P. 79 |
| 12. Service | Only intended for settings by authorised Bender service personnel. Call up information about the device status and make settings for specific operating conditions. | P. 81 |

7.3.4.1 Settings menu 1: Changeover

The times set in this menu determine the timing of a changeover. Observe also the time diagrams in the chapter „The automatic transfer switching device“ on p. 16.

| Menu item | Function |
|-------------|---|
| Exit | Exit settings menu "Changeover"; go up one menu level |
| 1. t(start) | Delayed switch-on after complete power failure: Setting range: 0 s...100 s Resolution of settings: 50 ms / 100 ms / 1 s / 5 s |
| 2. t(0) | Time delay in switch position "0" (dead time): Setting range: 140 ms...100 s Resolution of settings: 10 ms / 50 ms / 100 ms / 1 s / 5 s |

| Menu item | Function |
|-------------------|--|
| 3. t(2->1) | Return transfer delay time to the preferred line: Setting range: 0 s...180 min Resolution of settings: 50 ms / 100 ms / 1 s / 5 s / 1 min |
| 4. t(test) | Test time for "Autom. changeover": Setting range: 2 s...180 min Resolution of settings: 1 s / 5 s / 1 min |
| 5. System | <p>U1-U2 Voltage line 1 - Voltage line 2 Line G Line 1 - Generator L1-L2 Line 1 - Line 2 AV-SV Normal power supply source - Safety power supply source SV-AV Safety power supply source - Normal power supply source SV-UPS Safety power supply source - Special safety power supply source UPS-SV Special safety power supply source - Safety power supply source SV-BSV Safety power supply source - Battery-supported safety power supply BSV-SV Battery-supported safety power supply - Safety power supply</p> <p>The setting also influences the creation of the alarm text which is displayed in case of voltage failure on a line:</p> <p>Setting alarm text</p> <p>U1-U2 Undervoltage, overvoltage, voltage value Line G, L1-L2 Failure line 1, failure line 2 AV-SV, SV-AV Fail.norm.supply, Fail.safet.supply SV-UPS, UPS-SV Fail.safet.supply, Failure UPS SV-BSV, BSV-SV Fail.safet.supply, Failure BSV</p> <p><i>Explanation of abbreviations:</i> AV = Normal power supply source SV = Safety power supply source UPS = Special safety power supply source BSV = Battery-supported safety power supply</p> |
| 6. SwitchBackLock | <p>on Switch-back lock enabled off Switch-back lock disabled</p> <p>See chapter „Time diagram: Changeover between preferred and redundant line“ on p. 19.</p> |
| 7. Preferred line | <p>1 Line 1 2 Line 2</p> <p>In generator mode, line 1 is always the preferred line.</p> <p> Note: A parameter change can result in an immediate changeover.</p> |
| 8. Test interval | Interval for testing the changeover function: Setting range: off, 1...24 months Resolution of setting: 1 month |

| Menu item | Function |
|--------------------|--|
| 9. Reminder | Prewarning time for test interval (set value smaller than test interval): Setting range: off, 1...60 days Resolution of setting: 1 day |
| 10. Serviceinterv. | Service interval: Setting range: off, 6...48 months Resolution of setting: 6 months |
| 11. Reminder | Warning time for service interval (d=day): Setting range: off, 1...60 days Resolution of setting: 1 day |
| 12. t (GenStart) | Time delay for changeover to generator (measured from "Voltage line 2 = OK"): Setting range: 0 s...100 s (only active when System=Line G) Resolution of settings: 1 s / 5 s |
| 13. t(GenMax) | Maximum generator start time. Monitoring whether the generator starts (time until "Voltage line 2 = OK"). Setting range: 0 s...100 s (only active when System=Line G) Resolution of setting: 1 s / 5 s |
| 14. t(Gen.off) | Time delay for turning off the generator after switching back to the preferred line: Setting range: 2 s...180 min (only active when System=Line G) Resolution of setting: 1 s / 5 s / 1 min |
| 15. Load disconn.* | on: Operation with ATICS-ES; device switches to position 0 if both lines fail. off: Device remains in the last switch position if both lines fail. |

* only for "-ES" version of ATICS®

7.3.4.2 Settings menu 2: Voltage

In this menu you can make settings for voltage monitoring on line 1 and line 2 individually or together.

Example: Line 1 is set to "Undervolt: 184 V". If the voltage on line 1 falls below 184 V, the device displays an alarm message. If the voltage on line 2 is within the set range, a changeover to line 2 takes place. The ATICS® returns to line 1 if the voltage on line 1 exceeds the pre-set value (in this case 184 V) plus the set hysteresis.

Selecting a line:

1. Use the "▲" arrow button to go to the line setting. Press the "↵" button.
2. Use the arrow buttons to select one line (voltage 1, 2) or both lines (voltage 1...2). Press the "↵" button to confirm your selection.

Setting voltage for one line:

| | |
|------------------------|-------------|
| Voltage: | 2 |
| Exit | |
| 1. Undervolt.: | 184V |
| 2. Overvoltage. | 250V |

Setting voltage for both lines:

| | |
|------------------------|-------------|
| Voltage: | 1..2 |
| Exit | |
| 1. Undervolt.: | 184V |
| 2. Overvoltage: | 250V |

Adjusting the settings:

| Menu | Description |
|---------------|---|
| Exit | Exit settings menu "Voltage"; go up one menu level |
| 1. Undervolt. | Undervoltage; setting range: 160...207 V (278 V...360 V)* |
| 2. Overvolt. | Overvoltage; setting range: 240...275 V (417 V...478 V)* |
| 3. t(on) | Response delay**: Setting range: 50 ms...100 s Resolution of settings: 50 ms / 100 ms / 1 s / 5 s / 10 s |
| 4. t(off) | Delay on release**: Setting range: 200 ms...100 s Resolution of settings: 50 ms / 100 ms / 1 s / 5 s / 10 s |
| 5. Hysteresis | Setting range: 2...10 % Resolution of setting: 1 % |

* Values for ATICS...400 versions

** Observe also the time diagrams

7.3.4.3 Settings menu 3: Current

In this menu, you can adjust settings for current monitoring (short-circuit detection) downstream of the transfer switching and monitoring device (TN system). The current is detected via a measuring current transformer (T3 in the connection example P. 33).

| Menu | Description |
|-------------------|--|
| Exit | Exit settings menu "Current"; go up one menu level |
| 1. Mode | on Current monitoring enabled off No current monitoring |
| 2. transformer | STW3 Bender measuring current transformer STW3 STW4 Bender measuring current transformer STW4 |
| 3. CT monitoring. | on CT connection monitoring enabled off CT connection monitoring disabled Note: External interference from loads can cause false tripping. In this case, the function has to be disabled. The functional safety of the transfer switching device is in no way impaired by this. |

7.3.4.4 Settings menu 4: IT system

In this menu, you can adjust settings for IT system monitoring.

| Menu | Description |
|------------------------|--|
| Exit | Exit settings menu "IT system"; go up one menu level |
| 1. Insulation | Setting range: 50...250 k Ω Resolution of setting: starting at 5 k Ω |
| 2. Current transformer | Measuring current transformer T4 in the connection example P. 33 STW2 Measuring current transformer STW3 Measuring current transformer SWL Split-core type measuring current transformer |
| 3. CT monitoring. | on CT connection monitoring enabled off CT connection monitoring disabled Note: External interference from loads can cause false tripping. In this case, the function has to be disabled. The functional safety of the transfer switching device is in no way impaired by this. |
| 4. Load | Setting range: 5...50 A (STW2), 5...100 A (STW3, SWL) Resolution of setting: 1 A, IT system Setting values: Transformer 3150 VA 4000 VA 5000 VA 6300 VA 8000 VA 10 000 VA Setting 14 A 18 A 22 A 28 A 35 A 45 A |
| 5. Hysteresis | Setting range: 5...30 % Resolution of setting: 1 % The setting only affects the value of the load current. |
| 6. t(on) | Response delay load: Setting range: 0 s...100 s Resolution of setting: 1 s |

| Menu | Description | |
|-------------------|--|--|
| 7. t(off) | Delay on release load: Setting range: 0 s...100 s Resolution of setting: 1 s | |
| 8. Temperature | on off | Temperature monitoring enabled Temperature monitoring disabled |
| 9. Fault location | off auto | Insulation fault location disabled Insulation fault location enabled Note: This function is only available if a suitable master is connected via the BMS bus (e.g. MK2430, TM800, CP9xx, COM465...). |
| 10. IT system | 230 115 | Nominal voltage of the IT system being monitored: 230 V Nominal voltage of the IT system being monitored: 115 V |

7.3.4.5 Settings menu 5: Relay

In this menu, you can adjust settings for the mode of operation and function of the relay output (alarm relay) of the ATICS-2-ISO. The function can be set for the relay as follows: Alarm message, "Active", Generator Start.

If "Alarm" is set and then "Line 1: on" is selected, the relay switches if line 1 fails. If "Active" is set and then "Line 1: on" is selected, the relay switches if line 1 operating. The setting "on" can be selected for several menus simultaneously. The relay switches when at least one of the conditions is met.

If a new alarm appears while another is already pending, the relay is deenergised briefly (approx. 1s) and is energised again. This "new value behaviour" ensures that new alarms are reported when alarm messages are forwarded to SCADA systems.

If "GenSt" is set, the operating mode for the alarm relay will always be set to "N/C-T" on. The other settings on the "Relay" menu are disabled. The alarm message "Failure line 2" is suppressed.

i If the setting "Line G" is selected in the "Changeover -> System" settings menu, the alarm relay is permanently set to:

- 1. Function: GenSt
- 2. Relay mode: N/C-T
- Menu items 4...12 inactive

Adjusting the settings:

| Menu | Description |
|-------------------|---|
| Exit | Exit settings menu "Relay"; go up one menu level |
| 1. Function | <p>ALARM Relay switches if at least one of the following menus 3...12 is set to "on" and the corresponding alarm message appears.</p> <p>Active Relay switches if at least one of the following menus 3...10 is set to "on" and the corresponding alarm message does not appear (operating message). If several of these menus are set to "on", none of them must have an alarm in order to be able to activate the relay.</p> <p>Application example: Function = "Active" Line 1 = "on", all other menus (line 2, device error, etc.) are set to "off". -> Relay is activated when line 1 is ready for operation.</p> <p>GenSt Relay is used as a generator start relay</p> |
| 2. Relay mode | <p>N/O operation. Relay only switches in the event of an alarm.</p> <p>N/C operation. Relay only switches in the event of an alarm.</p> <p>N/O-T operation. Relay switches in the event of an alarm or a test.</p> <p>N/C-T operation. Relay switches in the event of an alarm or a test.</p> |
| 3. Line 1 | <p>on Line 1</p> <p>off</p> |
| 4. Line 2 | <p>on Line 2</p> <p>off</p> |
| 5. Manual mode | <p>on Relay switches in manual mode (transparent cover open or digital input "Manual mode" selected).</p> <p>off</p> |
| 6. Device error | <p>on Internal device error 1.x, 3.x (except 3.50), 6.x, 7.x, 8.x, 9.x or BMS bus has no master, short-circuit distribution board, failure distribution board.</p> <p>off</p> |
| 7. Test interval | <p>on Relay switches when a test is due (interval elapsed).</p> <p>off</p> |
| 8. Serviceinterv. | <p>on Relay switches when service is due (interval elapsed).</p> <p>off</p> |
| 9. Dig. input | <p>on Alarm digital input. To ensure that the relay responds to the digital input, the functions "ALARM" or "R-OPL" must be additionally set in the "Settings -> Digital Input" menu.</p> <p>off</p> |
| 10. Insulation | <p>on Relay switches in the event of an insulation fault</p> <p>off</p> |
| 11. Load | <p>on Relay switches in the event of overload in the IT system</p> <p>off</p> |

| Menu | Description | |
|-----------------|-------------|---|
| 12. Temperature | on | Relay switches in the event of overtemperature in the IT system transformer |
| | off | |
| 13. Undervolt. | on | Relay switches in the event of undervoltage at the ATICS® output (line 3) |
| | off | |

i *The reminders for the test (7. Test interval) or the service (8. Serviceinterv) are always triggered at 12:00 pm. If these messages appear at night, the time is set incorrectly on the device.*

7.3.4.6 Settings menu 6: Dig. input

In this menu, you can adjust settings for the mode of operation and function of the digital input. The digital input is electrically isolated. It is designed for an input of AC/DC 24 V. ATICS-2-ISO has a digital input and a relay output with a changeover contact.


For the input, selection is possible when the input is set to: "24V" (high) or "0V" (low). In the "24V" setting, the selected function (e.g. alarm message) is carried out when there are 24 volts there. In the "0V" setting, the selected function is carried out when there are 0 volts there. It is for this reason that you should always set unused digital inputs to "off".

i *By selecting the function of the digital input, the recommended response value is automatically adjusted:*

- Test, M/A, 1, 0, 2 (switch positions) 24V (cannot be changed)
- no2->1, 1<->2, bypass, alarm and OPL 0 V (can be changed)

The "Bypass" setting can only be changed temporarily for test purposes. After restarting the ATICS® this setting returns to "0V"!

Adjusting the settings:

| Menu | Description |
|----------------|--|
| Exit | Exit settings menu "Voltage"; go up one menu level |
| 1. Functions |  Note: A parameter change can result in an immediate changeover. off Digital input disabled M/A Manual/Automatic. Manual mode means that automatic changeover can no longer take place. Bypass Alarm "Bypass operation" but TEST changeover possible no2->1 Switch-back lock. After switching to line 2, the changeover switch remains in this switch position. It remains there even when line 1 returns. Switching back to line 1 only takes place when the digital input is no longer set, line 2 fails or the "RESET" button has been pressed. The display shows the operating message "Switch-back lock". 1<->2 Changes the preferred line TEST A test changeover is carried out. In generator mode, the generator start relay is also switched. The test is completed when the output is reset. ALARM Generates a "Digital input alarm". An alarm relay of an external ISOMETER® can be connected here. The alarm message appears on the display and is passed on via the BMS bus. The alarm relay switches when adjusted accordingly. The alarm message has no effect on the changeover function. OPL Generates an alarm "Insulation fault, operating theatre light". Other functions as for the setting "ALARM". |
| 2. Resp. value | 0V At 0 V input is set. The selected function is carried out. 24V At 24 V input is set. The selected function is carried out. |
| 3. t(on) | Response delay: Setting range: 100 ms... 100 s Resolution of settings: starting at 50 ms |
| 4. t(off) | Delay on release: Setting range: 100 ms... 100 s Resolution of settings: starting at 50 ms |

7.3.4.7 Settings menu 7: Data loggers

You can adjust the settings for six data loggers of the device in this menu. These data loggers (see chapter „Menu 3: History/Loggers“ on p. 65) display the history of measured values:

- 1 Voltage line 1
- 2 Voltage line 2
- 3 Switch position of the transfer switching device
- 4 Load current I(3) in the TN system downstream of the transfer switching device
- 5 Insulation resistance
- 6 Load on the IT system in %



Risk of premature wear of the memory module.

The service life of the 500 memory locations of the EEPROM memory is limited to approx. 100 000 memory accesses. If one change to a measured value is saved every second, the end of the service life of the EEPROM is reached after one year. If changes are saved every minute, the service life is increased to approx. 57 years. Select the settings in the "Datalogger -> "Modific." settings menu in a way that frequent saving over longer periods of time can be avoided.

To protect the memory module, a minimum threshold of 10 A is incorporated in the data logger for the load current downstream the transfer switching and monitoring device I(3) and a minimum threshold of 20 % is incorporated in the data logger for the IT system. Values below this limit threshold are only stored once. A new measured value will be stored in the memory only when this limit threshold is exceeded.

Selecting a data logger:

1. Use the "▲" arrow button to go to the data logger settings. Press the "←" button.
2. Use the arrow buttons to select one data logger (1, 2, ...) or all data loggers (1...6). Press the "←" button to confirm your selection.

Set one data logger:

| No: 5 Insulation | |
|------------------|---------|
| Exit | |
| 1. Modific.: | 10.00 % |
| 2. Overwrite: | yes |

Set all data loggers:

| No.: 1...6 | |
|--------------|---------|
| Exit | |
| 1. Modific.: | 10.00 % |
| 2. Overwrite | yes |

Adjust settings and delete data loggers:

| Menu | Description | | | | |
|--------------|--|--------|---|--------|---|
| Exit | Exit settings menu "Datalogger"; go up one menu level | | | | |
| 1. Modific. | Once the measured value has been changed by the set % value, a new measured value is stored in the data logger. Setting range: 0 ... 100 % Resolution of setting: 1 % | | | | |
| 2. Overwrite | <table border="0"> <tr> <td>yes</td> <td>Once the maximum number of measured values which can be saved has been reached, the current measured value overwrites the oldest entry.</td> </tr> <tr> <td>no</td> <td>Once the maximum number of measured values which can be saved has been reached, no further measured values are saved.</td> </tr> </table> | yes | Once the maximum number of measured values which can be saved has been reached, the current measured value overwrites the oldest entry. | no | Once the maximum number of measured values which can be saved has been reached, no further measured values are saved. |
| yes | Once the maximum number of measured values which can be saved has been reached, the current measured value overwrites the oldest entry. | | | | |
| no | Once the maximum number of measured values which can be saved has been reached, no further measured values are saved. | | | | |
| 3. Delete | <table border="0"> <tr> <td>Delete</td> <td>Clear data logger</td> </tr> <tr> <td>Cancel</td> <td>Do not clear data logger.</td> </tr> </table> | Delete | Clear data logger | Cancel | Do not clear data logger. |
| Delete | Clear data logger | | | | |
| Cancel | Do not clear data logger. | | | | |




7.3.4.8 Settings menu 8: Language

Select the language for the menus and the messages to be displayed (alarm and operating messages) of the device.

| Menu | Description |
|-------------|---|
| Exit | Exit settings menu "Language"; go up one menu level |
| 1. English | Select language. Changes take effect immediately. |
| 2. Deutsch | |
| 3. Français | |
| 4. Polski | |

7.3.4.9 Settings menu 9: Interface

Set the device address for the connection to the internal BMS bus. Change the device address concerned when several devices are connected to one BMS bus. One device (e.g. MK800) must have address 1 (master). All other devices are addressed in consecutive order: 2,3,4,... There should be no gaps between the addresses. This is the only way to ensure the function of the system.

| Menu | Description |
|-----------------------|---|
| Exit | Exit settings menu "Interface"; go up one menu level |
| 1. Address | Setting range: 2...90 |
| 2. Settings | on Allow settings to be changed via interface (e.g. a COM465... Ethernet gateway) off Do not allow settings to be changed via interface |
| 3. TEST | on Allow a test to be carried out via interface (e.g. a COM465... Ethernet gateway) off Do not allow a test to be carried out via interface |
| 4. Failure monitoring | on Reports when no (more) communication with the BMS master is detected. off It is not monitored whether a BMS master is present. This setting is required when ATICS® is used as a "Stand-alone" device without BMS master.  DANGER! <i>When this setting is selected, the conditions for functional safety (SIL2) are no longer met.</i>  WARNING! <i>No EDS functionality is possible if this settings has been selected.</i>  CAUTION! <i>In the event of a power failure of more than eight hours, the time and date will be reset to the factory settings. If the "Clock" setting is not corrected, all functions depending on this setting (history memory, logger, test interval, service interval...) will lead to unusable results.</i> |
| 5. Profile | Stand. Standard setting for channel assignment for alarms/measured values and BMS channels TEST Alternative setting (see P. 46 and P. 63) |

7.3.4.10 Settings menu 10: Clock

Time and date are required for displays in the "History/Loggers" menu. The time setting is synchronised via the BMS bus. The device with address 1 (MK800, MK2430, CP9xx or TM...) synchronises all other devices every hour.

The time setting for the ATICS® is required for the rare case of use without a BMS bus. In this case, ATICS® displays the fault message "No master". The date format, date and time can be set. These settings remain stored for approx. eight hours following a supply interruption. The date and time will then be reset to the factory settings (01.01.2010, 00:00:00).


| Menu | Description |
|-----------|---|
| Exit | Exit settings menu "Clock"; go up one menu level |
| 1. Format | d.m.y German format (day.month.year) m-d-y American format |
| 2. Date | Setting the date (e.g. dd.mm.yyyy) |
| 3. Time | Setting the time (hours and minutes) |

7.3.4.11 Settings menu 11: Password

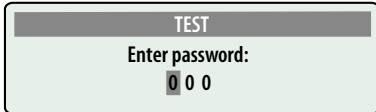
The device has two separate passwords for the "Settings" menu and the "TEST" menu.

| Menu | Description |
|-------------|--|
| Exit | Exit settings menu "Password"; go up one menu level |
| 1. Settings | Change the password for the "Settings" menu, switch the password "on/off". Factory setting: Password: 000 Status: off |
| 2. TEST | Change the password for the "TEST" menu, enable/disable password. Factory setting: Password: 000 Status: off |

Changing the password menu "Settings"

| Menu | Description |
|-------------|---|
| Exit | Exit settings menu "Password - > Settings"; go up one menu level |
| 1. Password | Change the password for the "Settings" menu. Setting range: 000 ... 999 Resolution of setting: 1 |
| 2. Status | <p>Enable/Disable the password protection for the "Settings" menu</p> <p>on Password protection is enabled. When an attempt is made to open one of the settings menus, the password entry screen appears automatically:</p> <div data-bbox="479 475 804 571" data-label="Image">  </div> <p>After entering a valid password, all settings menus (except the "Service" menu) are freely accessible until the menu mode is exited.</p> <p>off Password protection is disabled.</p> |

Changing the password menu "TEST"

| Menu | Description |
|-------------|---|
| Exit | Exit settings menu "Password - > TEST"; go up one menu level |
| 1. Password | Change the password for the "TEST" menu. Setting range: 000 ... 999 Resolution of setting: 1 |
| 2. Status | <p>Enable or disable the password protection for the "TEST" menu</p> <p>on Password protection of test menus 2...4 is enabled. When an attempt is made to open one of these menus, the password entry screen appears automatically:</p> <div data-bbox="472 1106 848 1217" data-label="Image">  </div> <p>off Password protection is disabled.</p> |
| | |

7.3.4.12 Settings menu 12: Service

The service menu is intended for settings by authorised Bender service personnel. It is only accessible to the Bender service. In the service menu, information about the device status can be called up and settings for specific operating conditions can be made.

7.3.5 Menu 5: Control

This menu offers various options for controlling individual devices or the entire system:

| Menu item | Function | Page |
|-----------|---|-----------------------|
| Exit | Exit "Control" menu; go up one menu level | |
| 1. TEST | Call up test, see chapter "Test function" | P. 52 |
| 2. RESET | Call up reset, see chapter "Reset function" | P. 58 |

7.3.6 Menu 6: Dig. input

This menu indicates the voltage level of the digital input.

Exit Exit "Dig. Input" menu; go up one menu level.

○ - - The digital input is disabled.

○ 0V Example: The response condition is not met. The input has not been set. The set function is not carried out.*

● 24.0V Example: The response condition is met and the response delay has elapsed. The input has been set. The set function is carried out.*

* Whether the input is set to 0 V or 24 V depends on the set response value (see chapter P. 74).

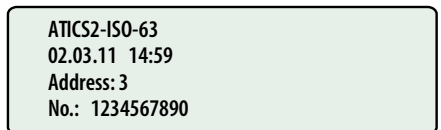


7.3.7 Menu 7: Info

This menu displays information about the device and the software. Press the arrow button "▼" several times to display all the information. Please have this information ready in case you have any queries by telephone.

You can also reach the "INFO" menu by choosing standard display and then pressing the "INFO" button on the front panel of the device.

Line 1: Device type
 Line 2: Date, time
 Line 3: Address set on the BMS bus
 Line 4: Serial number of the device
 Line 5...8: Software versions of the four controllers of the device
 ... Bender address, website
 ... Exit. Exit standard information.



8 Troubleshooting

8.1 Fault and alarm messages

In the event of an alarm, the messages of the ATICS® transfer switching and monitoring device will enable you to narrow down the possible causes. Some messages may point to several causes. The following possible faults are indicated by messages on the ATICS® display:

- Plain text messages
- Fault messages with error code

8.1.1 Plain text messages

| Fault/message | Description | Action |
|--|---|--|
| Failure line xx (xx stands for: 1, 2, AV, SV, UPS, BSV), undervoltage or overvoltage | Voltage is no longer available on line 1 or line 2 Channel 1 = Line 1, Channel 2 = Line 2 | <ul style="list-style-type: none"> • Measure voltage on line xx. • Check cause. • Eliminate fault in the system. • Check the setting for voltage and hysteresis. |
| Failure line 2 when set to System > Line G | Generator delivers no voltage within the set time t(GenMax) Voltage | |
| Insulation fault | IT system has insulation fault | <ul style="list-style-type: none"> • Search for insulation fault. • Eliminate fault in the system. |
| Overload | Current consumption too high . Sporadic indication of load current, changing without any apparent reason. The fault can also be caused by an (impermissible) connection between k or l and PE. | <ul style="list-style-type: none"> • Check settings for transformer load current. • Switch off any loads that are not urgently needed. • Separate connection between k or l and PE. |
| Overtemperature | Temperature in the IT system transformer is too high | <ul style="list-style-type: none"> • Switch off any loads that are not urgently needed. |
| CT connection | Short circuit or interruption of connecting wire has been detected: measuring current transformer STW2 (T4), isolating transformer load, channel 10 | <ul style="list-style-type: none"> • Check connecting wire of measuring current transformer. |
| System connection | Connection to the IT system interrupted or voltage in the system being monitored below 150 V | <ul style="list-style-type: none"> • Check connection of ports L1/IT, L2/IT to the IT system. • Check voltage in the IT system |
| Earth connection | Connection to PE interrupted Impermissible connection Z1 or Z2 to PE | <ul style="list-style-type: none"> • Check that connections E and KE are each connected to PE with two separate lines. • Ensure that Z1 and Z2 are not connected to PE. |

| Fault/message | Description | Action |
|----------------------------------|--|--|
| Device error + error code | For details about actions to be taken, refer to table section "Error code/service code". The message is on channel 6 of the BMS bus. | |
| Short circuit distribution board | Short circuit detected | Eliminate short circuit |
| Failure distribution board | No voltage on line 3, contact of the change-over switch defective. The fault can also be caused by an (impermissible) connection between GND, k or l and PE. | <ul style="list-style-type: none"> • Replace ATICS®. • Separate connection between GND, k or l and PE. |
| Overcurrent I(3) | Overcurrent detected by measuring current transformer STW3 | <ul style="list-style-type: none"> • Eliminate cause of overcurrent. • Eliminate any damage. |
| CT connection | Short circuit or interruption of connecting wire has been detected. Measuring current transformer STW3, channel 7 | <ul style="list-style-type: none"> • Check connecting wire of measuring current transformer. |
| No master | There is no device with master function or back-up master (device with address "1") available on the RS-485 interface | <ul style="list-style-type: none"> • Check BMS bus connection. • Check whether the master has failed or whether its address has changed. If the device is operated without a BMS bus, the "Failure monitoring" (see chapter „Settings menu 9: Interface“ on p. 77) must be disabled. |
| Service by __ (date) | Reminder for next service | <ul style="list-style-type: none"> • Schedule appointment with the Bender service. |
| Functional test by __ (date) | Reminder for next test | <ul style="list-style-type: none"> • Schedule appointment for next test. • Perform test. |
| Manual mode | Message "Manual mode" although manual mode has not been enabled | <ul style="list-style-type: none"> • Check the connections of the digital input |
| Error during changeover process | Occurs when the test set-ups do not supply sufficient current for switching the coils of the ATICS®. | <ul style="list-style-type: none"> • Only use test set-ups that provide the necessary peak current of 17 A. |

8.1.2 Messages with error code or service code

| Error code/service code | Description | Action |
|-------------------------|---|---|
| 1.xx, 4.xx, 9.xx | Fault message from the internal memory monitoring. | <ul style="list-style-type: none"> • Contact the Bender service. |
| 3.10 | Prewarning The max. number of operating hours will be reached in one year | <ul style="list-style-type: none"> • For functional safety SIL 2 requirements according to IEC 61508-2, the replacement must be planned. Alarm can be acknowledged (see chapter „Reset menu 3: Changeover“ on p. 59) |
| 3.11 | Maximum number of operating hours exceeded for functional safety according to IEC 61508-2:2010. | <ul style="list-style-type: none"> • For functional safety SIL 2 requirements according to IEC 61508-2, the replacement must be carried out. Alarm can be acknowledged • (see chapter „Reset menu 3: Changeover“ on p. 59) |
| 3.12 | Maximum number of changeovers exceeded. | <ul style="list-style-type: none"> • Plan device replacement. Alarm can be acknowledged (see chapter „Reset menu 3: Changeover“ on p. 59) |
| 3.13 | Changeover due to overcurrent or short circuit detected. These changeovers reduce the life of the device. Currents exceeding 130 A are considered to be overcurrents or short-circuit currents. | <ul style="list-style-type: none"> • Have qualified personnel assess the short-circuit load. Contact the Bender service. Alarm can be acknowledged (see chapter „Reset menu 3: Changeover“ on p. 59) |
| 3.50 | Service alarm has been reset. Only displayed in the service logger menu. | <ul style="list-style-type: none"> • No action required. |
| 4.61...4.66 | Switch state error: Deviation between the target position of the switching logic and the reported position. This error occurs when the required input voltage is detected to have failed during the changeover. | <ul style="list-style-type: none"> • Reset, perform test changeover. If no error is displayed: OK • Check supply voltage or current limitation (17 A are required for switching) • If error continues to exist: Replace device immediately |
| 6.xx, 7.xx, 8.1x | Device error. The internal self monitoring of the device has detected a fault which could impair the safe operation of the device. | <ul style="list-style-type: none"> • Replace device immediately. |

| Error code/service code | Description | Action |
|-------------------------|---|--|
| 8.21 ... 8.30 | ISOMETER® or transformer monitoring error. | <ul style="list-style-type: none"> • Reset, then execute test of the IT system • Check that the current firmware is installed. • When no fault is displayed: OK. Otherwise replace the device. • Check that the bridge on the output side is properly installed. |
| 8.22 | Temperature sensor is defective or has earth potential. | <p>Diagnostic:</p> <ul style="list-style-type: none"> • Disconnect the temperature sensor (Z1/Z2). • When the fault is no longer displayed: Replace the temperature sensor or correct its cable routing. |
| 8.51 ... 8.52 | Fault internal power supply unit. | <ul style="list-style-type: none"> • RESET -> execute alarm, then test the changeover function. • If fault persists: device replacement. • Only use test set-ups that provide the necessary peak current of 17 A. |
| 8.61 ... 8.66 | <p>Fault during changeover process. Occurs when the voltage on the new line fails during the changeover. Also occurs when the test set-ups do not supply sufficient current for switching the coils of the ATICS®.</p> <p>Can also be caused by missing or improperly installed bridge on the output side.</p> <p>The fault can also be caused by an (impermissible) connection between GND, k or l and PE.</p> | <ul style="list-style-type: none"> • Check connection of the bridge on the output side, if necessary, re-tighten screws. • RESET -> execute alarm, then test the changeover function. • If fault persists: device replacement. • Only use test set-ups that provide the necessary peak current of 17 A. • In the settings menu 1: Select changeover $t(0) \geq 160$ ms. • Delete this connection |
| 8.69* | <p>Error switching device / energy storage device</p> <p>The variant with energy storage device does not start in position 0</p> | <ul style="list-style-type: none"> • Check energy storage device and energy storage device connection • Perform changeover test. If no error is displayed: OK • If error continues to exist: Replace device |

*only for "ES" version of ATICS®

If there is an error, proceed as follows:

1. If required, enable manual mode.
2. Note down what happened before the error: Operating steps, error messages of the device, environmental conditions, etc.
3. Have the article and serial number of the device at hand.
4. Contact the Bender service and state the type of error and the three-digit error code.

8.2 Frequently asked questions

A series of clicks is always heard at around noon. What does that mean?

ATICS® carries out a coil trigger test once a day. The time is calculated as follows: 12:00:00 o'clock + (own BMS bus address * 10 s).

If set to "Generator" for the redundant line in the settings menu 1 "Changeover", the coil test for line 2 is only performed if line 2 is live.

When executing the function "TEST -> Generator", the coil test for line 2 is carried out directly after starting the generator.

Are the connections of the insulation monitoring device subject to regular testing?

Connection faults are recognised during the self test. Self tests are carried out:

- After switching the ATICS® power supply on
- After each changeover process
- When the "TEST IT system" function is executed
- Every hour
- Every minute, when any kind of ISOMETER® fault is detected

A thin vertical line runs across the display. Is the display defective?

No. The "Refresh function" of the display is being active refreshing the contents indicated.

Why is it necessary to use two separate measuring current transformers?

The measuring current transformer STW3 (T3) is designed for short-circuit detection downstream of the transfer switching device.

The measuring current transformer T4 monitors the isolating transformer load of the IT system. If the load becomes too high, it will be indicated by the ATICS®. Excessive temperature (and the corresponding message "Overtemperature") can be avoided when the devices that are not urgently needed are switched off by the operating personnel.

Can a transformer be used for both tasks simultaneously (short-circuit and load current monitoring)?

No. For each of the tasks the ATICS® features different evaluating circuits.

Why does the ATICS® not display the set time?

The time of the ATICS® is set by the BMS bus master. The time for the ATICS® only is required in the rare case when no BMS bus is used. In this case, ATICS® displays the fault message "No master".

How do I eliminate the message "No master"?

ATICS® is designed for applications where functional safety is of top priority. Therefore, this message is necessary. For applications where functional safety only plays a subordinate role, master monitoring can be disabled in the menu "Settings > Interface > Failure monitoring".

ATICS® does not switch over. In the last line on the display it indicates: "t(0): xx s".

ATICS® is waiting for the time delay t(0) to elapse and displays the remaining time in seconds. Only then can the ATICS® switch over. The time delay can be due to the following reasons:

- ATICS® is just switching. The set time delay in switch position "0" (dead time) is several seconds (see „Settings menu 1: Changeover“ on p. 67)
- ATICS® has just been supplied with voltage. After the time delay has elapsed, ATICS® is ready for operation.
- Within a short period of time, ATICS® carried out more than 12 changeover operations. The time delay is required to cool the system.

Why does writing back reports/backups lead to error messages?

ATICS® – like many Bender devices – can be monitored and configured by means of a Bender gateway CP700, COM46x... etc. The gateways are operated via a web user interface that is displayed using an Internet browser.

One of the functions of these gateways is saving reports. A report is used to store the settings and measured values of a bus device. By creating a backup, data loss (e.g. by accidentally deleting settings) can be avoided. The backup can also be imported to another device of the same type. This may be necessary if a device is replaced or if several devices are to be configured for similar tasks.

ATICS® is continuously further developed and maintained. This also affects the content of the report file. If you try to save a report that was generated with an older ATICS® (version older than 1.20) in an ATICS® with a current firmware, this can lead to error messages. These error messages are displayed on the web user interface.

- Repeat the saving process of the report in ATICS® several times. This way, the majority of the parameters can still be transferred. The remaining error messages indicate the parameters that have to be changed manually.
- To conclude, check all settings saved in the ATICS®.
- Save these settings in a new report file.

9 Periodic verification and service

9.1 Periodic verification

The use of Bender products ensures protective measures against certain hazards when operating electrical systems. The corresponding legal requirements are defined in the Ordinance on Industrial Safety and Health (BetrSichV) and the supplementary Technical Rules (TRBS):

Every company is obliged to draw up a risk assessment for its work equipment (electrical systems and equipment). With the help of the risk assessment, inspection intervals for the required periodic verification are to be determined.

As a guide, TRBS1201 refers to DGUV (German Social Accident Insurance) regulations 3 and 4 as well as to the supplementary DGUV regulations:

| System/equipment | Inspection interval | Type of inspection | Inspected by |
|--|---------------------|--|------------------|
| Electrical systems General | 4 years | For safe condition. According to applicable electrotechnical rules | Qualified person |
| Electrical installations and stationary equipment in "Special installations or locations" (DIN VDE 0100 Group 700) | 1 year | | |

According to TRBS1203, the tests must be carried out by a qualified person. The person carrying out the test must have the training and professional experience required and must be able to recognise, among other things, hazards caused by the inspection activity and the work equipment to be inspected.

The following periodic verification must be performed on electrical installations in compliance with the applicable local or national regulations. If no local/national regulations apply, at least periodic verification as recommended by DIN VDE 0100-710 (VDE 0100-710) should be performed.

| Action | To be performed by | Interval |
|--|-----------------------------|--|
| Function test of the IT system monitoring by pressing the test button on the corresponding operating units. | Medical personnel | Once every working day (recommended by Bender) |
| For function test of the IT system monitoring on the monitoring device see „7.3.4.1 Settings menu 1: Changeover“ „8. Test interval“ on p. 68 | Electrically skilled person | Monthly (recommended by Bender) |

| Action | To be performed by | Interval |
|---|---|----------------------|
| Services for the periodic verification of Bender products in electrical installations: <ul style="list-style-type: none"> • Function test of the transfer switching device • For checking the effectiveness of the protective measures monitored by Bender products as well as their disconnecting and switching functions, see „7.3.4.1 Settings menu 1: Changeover“, 10. Serviceinterv.“ on p. 69 • Optimum configuration of the Bender products • Performing the tests by qualified persons • Documentation | Bender service or electrically skilled person | Every twelve months* |

* Time interval according to DIN VDE 0100-710 (VDE 0100-710):2012-10: 12 months

9.2 Maintenance

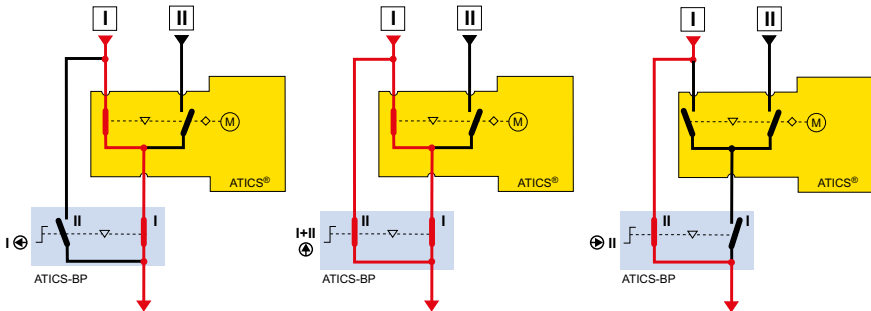
The intervals specified for periodic verification must be adhered to. We also recommend regularly checking the Allen screws on the ATICS® and the Torx® screws of the connectors on the incoming and outgoing lines of the automatic transfer switching device to make sure they are tight.

9.3 Cleaning

ATICS® may only be cleaned with a clean, dry, soft and antistatic cloth.

9.4 Operation with bypass switch

The ATICS-BP-... bypass switch enables a parallel supply of line 3. Without interrupting the voltage on line 3, ATICS® can be switched or exchanged as desired.



The green indicator indicates position 1 of the ATICS® device, which at the same time indicates that the bypass switch can be operated. In fault-free condition, line 1 is in position 1 and voltage is applied.

i Only qualified personnel may operate the bypass switch. Set the bypass switch quickly from position "I" via "I+II" to position "II" and back from "II" via "I+II" to "I". The time during which the bypass switch is set to position "II" must be reduced to the bare minimum.

**Risk of short circuit if "Enable bypass" light is ignored.**

If ATICS® is not connected to the line to which the bypass switch is connected, a short circuit may occur between line 1 and line 2. The bypass switch may only be operated when the green "Enable Bypass" light lights up.

If a voltage drop occurs on line 1 while the switch is set to "II" (=bypass), the switch must not be set to position "I+II" or "I". In this case, the ATICS® device must be switched to position "0" or "I" manually using the Allen key. Only after doing this, the bypass switch can be set to position "I" while the transparent cover (manual mode) is open. Afterwards, the transparent cover can be closed to enable the automatic mode. If the transparent cover is closed beforehand, the ATICS® device will automatically switch back to line 2.

Conditions for operation with the bypass switch

- Wiring must be carried out according to „Connection example: ATICS® with bypass switch“ on p. 34.
- The following must be set in "Settings menu 6: Dig. input":
 - 1. Function: Bypass
 - 2. Response value: 0 V
 - 3. t(on) response delay: 100 ms
 - 4. t(off) delay on release: 100 ms

**Risk of electric shock when touching the contacts on line 1, 2 or 3.**

Mains voltage at the contacts of line 1, 2 and 3. Only touch the insulated part of the connector.

9.5 Replacing the ATICS®

The plug connectors make it easy to replace the device if

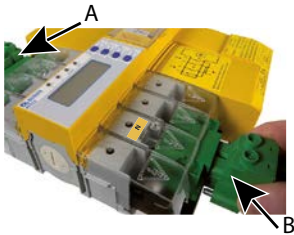
- the ATICS® has reached the end of its service life or
- an event has occurred which jeopardises safety: e.g. overvoltage, short-circuit switching, component failure.



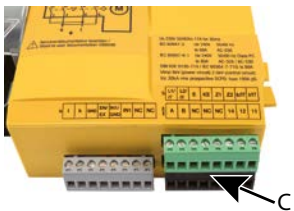
Risk of electrocution due to electric shock! Touching live parts of the system carries the risk of electric shock. Before installing and connecting the device, make sure that the installation has been de-energised. If ATICS® is bypassed by an ATICS-BP-... bypass switch, the regulations which apply to working on live parts must be observed.

9.5.1 Removing the existing ATICS®

1. Record settings on the existing ATICS®. The settings should match the entries in the checklist (see checklist, included in the scope of delivery).
2. Disconnect the device from the power supply or switch on the bypass switch. Switch existing ATICS® to manual operation, switch to position "0" and secure against unintentional switch-on (see chapter „Connecting the ATICS® safely“ on p. 31).
3. Remove connections
4. Remove the ATICS®



Undo the mounting screws on the top green plug connector and remove the connector (A). Afterwards, loosen the fastening screws of the bottom green plug connector and remove the connector (B).

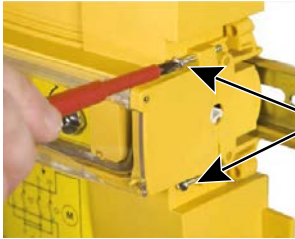


Remove the three connector plugs (C).

For ATICS...400 and -ES: Remove connector from upper part of the enclosure (opposite side of (C)).

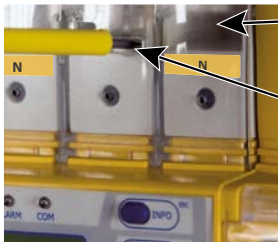


Note: extraneous voltage!

Removing the ATICS® in case of DIN rail mounting

Undo screws (D).

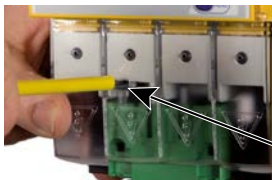
D



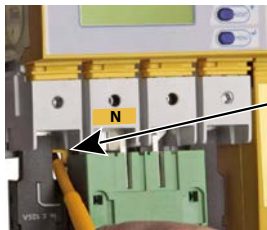
Remove lower and upper terminal covers (A) by using a screwdriver to push back the locking hook (B) located approximately in the middle of the cover in each case.

A

B

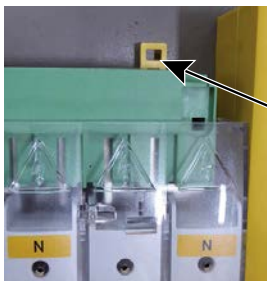


B



Use a screwdriver to pull the lower yellow slide lock (C) downwards and raise the ATICS® slightly from below.

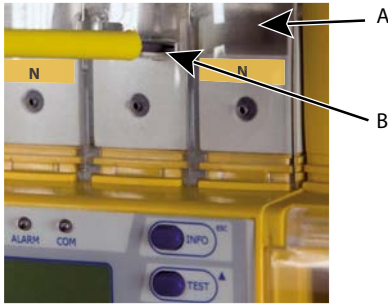
C



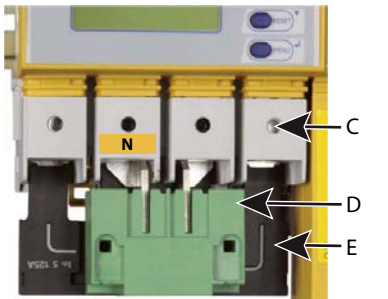
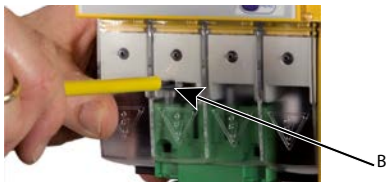
Now use the screwdriver to pull the upper yellow slide lock (D) upwards and remove the ATICS®.

D

Removing the ATICS® in case of screw mounting



Remove lower and upper terminal covers (A) by using a screwdriver to push back the locking hook (B) located approximately in the middle of the cover in each case.



Undo the Allen screws of the terminals (C).

Remove the green plug connectors (D) at top and bottom.

Remove the black bridge (E) at the bottom.

Undo the mounting screws and remove the ATICS® from the mounting plate.

9.5.2 Installing a new ATICS®



For mounting the ATICS®, see chapter „DIN rail mounting“ on p. 28 or „Screw mounting on plate“ on p. 29.



For connection of the ATICS®, see chapter „Connecting the ATICS® safely“ on p. 31

10 Technical data

10.1 Tabular data

Insulation coordination acc. to IEC 60664-1/IEC 60664-3

| | |
|---|---|
| Overvoltage category..... | III |
| Pollution degree outside, inside | 2 |
| Rated insulation voltage..... | 250 V |
| Protective separation between..... | Line 1 – Line 2; Line 1, 2, 3 – RS-485 |
| | Line 1, 2, 3 – digital inputs; Line 1, 2, 3 – relay outputs |
| Voltage test according to IEC 61010-1 (basic insulation/protective separation)..... | 2.21 kV/3.54 kV |

Supply voltage

| | |
|---|----------------|
| Supply voltage U_s | 230 V 50/60 Hz |
| Power consumption at 63 A | ≤ 16 W |
| Power consumption at 80 A | ≤ 28 W |
| Current during changeover process | 17 A/< 30 ms |

Power section/switching elements

| | |
|--|--|
| Rated operational voltage U_e | see „Ordering information“ on p. 102 |
| Frequency range f_n | 48...62 Hz |
| Crest factor..... | ≤ 1.2 |
| Number of switching cycles (mechanical)..... | ≥ 8000 |
| Short-circuit currents | see table „Short-circuit currents“ on p. 99 |
| Short-circuit current I_{cc} and fuses | see table „Utilisation categories acc. to DIN EN 60947“ on p. 99 |

Voltage monitoring/changeover

| | |
|--|---|
| Frequency range f_n | 40...70 Hz |
| Undervoltage response value (Alarm 1)..... | 160...207 V (1-V steps) |
| Overvoltage response value (Alarm 2)..... | 240...275 V (1-V steps) |
| Response delay t_{on} | 50 ms...100 s (resolution of setting starting 50 ms) |
| Delay on release t_{off} | 200 ms...100 s (resolution of setting starting 50 ms) |
| Hysteresis | 2...10 % (1-% steps) |
| Frequency measurement | 40...70 Hz (resolution 0.1 Hz) |
| Display range measured value..... | 20...300 V |
| Operating uncertainty | ± 1 % |
| Change over period..... | $t < 500$ ms...100 s |

Current monitoring (output current)

| | |
|---|--------------------------------------|
| Measuring current transformers..... | STW3, STW4 |
| Measuring range I_n (TRMS)..... | STW3: 0...> 150 A, STW4: 0...> 260 A |
| Response value for short-circuit detection ATICS-ISO (versions 63 A and 80 A) with STW3 | 130 A |
| Crest factor..... | min. 2 |
| Hysteresis for short-circuit alarm | 5 % |

Cable length:

| | |
|--|--|
| Single wire ≥ 0.75 mm ² | 0...1 m |
| Single wire, twisted ≥ 0.75 mm ² | 1...10 m |
| Shielded cable | 10...40 m |
| Cable: twisted pairs, shield connected to terminal I on one side, must not be earthed..... | recommended: J-Y(ST)Y min. n x 2 x 0.8 |

IT system monitoring

Insulation monitoring

| | |
|---|--------------------------------|
| Nominal system voltage U_n (operating range)..... | 230 V 50/60 Hz (80...275 V) |
| Measuring range..... | 10 k Ω ...1 M Ω |
| Measurement method..... | AMP (adaptive measuring pulse) |
| Response value R_{an1} (ALARM 1)..... | 50...250 k Ω |
| Relative uncertainty | $\pm 15\%$ |
| Hysteresis | $\leq 25\%$ |
| Response time t_{an} at $R_F = 0.5 \times R_{an}$ and $C_e = 1 \mu F$ | ≤ 5 s |
| Measuring voltage U_m | DC 12 V |
| Measuring current I_m (at $R_F = 0 \Omega$) | $\leq 53 \mu A$ |
| Internal resistance R_i | ≥ 240 k Ω |
| Impedance Z_i | ≥ 220 k Ω |
| Internal resistance/impedance during test | ≥ 100 k Ω |
| Permissible extraneous DC voltage U_{ig} | \leq DC 370 V |
| Permissible system leakage capacitance C_e | $\leq 5 \mu F$ |
| Automatic self test | every hour |
| Response time for loss of earth connection as well as loss of network connection..... | maximum 1 hour |

Load current monitoring (IT system transformer)

| | |
|--|---|
| Measuring current transformers..... | STW2, STW3, SWL-100 A |
| Measuring range I_l (TRMS) | 10...110 % of the response value |
| Adjustable response value (STW2, STW3, SWL-100A) | 5... (50) 100 A (1-A steps) |
| Relative uncertainty | $\pm 5\%$ |
| Crest factor | ≤ 2 |
| Response time..... | < 1 s |
| Response delay t_{on} | 0...100 s (step-by-step in 1-s steps) |
| Delay on release t_{off} | 0...100 s (step-by-step in 1-s steps) |
| Hysteresis | 5...30 % |
| Response time CT connection monitoring..... | approx. 1 h (or immediately in case of "TEST Isometer") |

Cable length:

| | |
|--|--|
| Single wire ≥ 0.75 mm ² | 0...1 m |
| Single wire, twisted ≥ 0.75 mm ² | 1...10 m |
| Shielded cable ≥ 0.5 mm ² | 10...40 m |
| Cable: twisted pairs, shield connected to terminal I on one side, must not be earthed..... | recommended: J-Y(St)Y min. n x 2 x 0.8 |

Temperature monitoring (IT system transformer)

| | |
|--|------------------|
| Response value..... | 4 k Ω |
| Relative uncertainty | $\pm 10\%$ |
| Release value..... | 1.6 k Ω |
| Response time (overtemperature or open-circuit temperature sensor) | ≤ 2 s |
| PTC resistors acc. to DIN 44081 | max. 6 in series |

Insulation fault location

| | |
|--------------------------|----------|
| Locating current IT..... | < 1 mA |
| Test cycle/pause..... | 2/4 s |

Displays and data memory

| | |
|--------------------------------|----------------------------|
| Display: graphic display | languages DE, EN, FR, PL |
| Alarm LEDs | Line 1, Line 2, Alarm, Com |
| History memory | 500 data records |
| Data logger | 500 data records/channel |
| Config. logger | 300 data records |
| Test logger | 100 data records |
| Service logger | 100 data records |

input

| | |
|------------------------------|--|
| Digital inputs | 1 |
| Galvanic separation | yes |
| Control | via potential-free contacts |
| Operating mode | active at 0 V (low) or 24 V (high), adjustable |
| Voltage range high/low | AC/DC 10...30 V / AC/DC 0...0.5 V |
| Adjustable function | switch-back lock, manual/automatic mode, bypass mode, functional test, changeover to preferred line, alarm input for operating theatre lights, alarm input for other devices |

Output

| | |
|---|---------------------------------------|
| Switching element | 1 potential-free changeover contact |
| Operating mode adjustable | N/O or N/C operation |
| Adjustable function | see "Settings menu 5: Relay" on p. 71 |
| Electrical endurance under rated operating conditions | number of cycles 10.000 |

Contact data according to IEC 61810

| | |
|--|-------------------|
| Rated operational current AC (resistive load, $\cos \varphi=1$) | 5 A/AC 250 V |
| Rated operational current DC | 5 A/DC 30 V |
| Overvoltage category | III |
| Minimum contact rating | 10 mA at DC > 5 V |

BMS interface

| | |
|--|---|
| Interface/protocol | RS-485/BMS |
| Baud rate | 9.6 kBit/s |
| Cable length | ≤ 1200 m |
| Cable: shielded, one end of shield connected to PE | CAT6/CAT7 min. AWG23* |
| * alternatively: | twisted pair, one end of shield connected to PE J-Y(St)Y min. 2x0.8 |
| Terminating resistor | 120 Ω (0.25 W) |
| Device address, BMS bus | 2...90 |

Environment/EMC

EMCEN 61326 (see CE declaration)

Classification of climatic conditions acc. to IEC 60721:

Stationary use (IEC 60721-3-3) 3K24 (except condensation and formation of ice)
 Transport (IEC 60721-3-2) 2K11
 Long-term storage (IEC 60721-3-1) 1K22
 Operating temperature -25...+55 °C

Classification of mechanical conditions acc. to IEC 60721:

Stationary use (IEC 60721-3-3) 3M11
 Transport (IEC 60721-3-2) 2M4
 Long-term storage (IEC 60721-3-1) 1M12

Terminals

Power section

Connection directly to ATICS®, for plug connections..... screw-type terminals
 rigid (flexible)/conductor sizes 10...70 mm² (6...50 mm²)/8 (10)...0 AWG
 Stripping length..... 15 mm
 Tightening torque (hexagon socket 4 mm) 5 Nm
 Connection type..... pluggable screw-type terminals
 Conductor cross section, rigid min./max..... 1.5 mm²/35 mm²
 Conductor cross section, flexible min./max. 1.5 mm²/25 mm²
 Conductor cross section AWG/min./max..... 20/2
 Stripping length (do not use ferrules) 20 mm
 Tightening torque (Torx® screwdriver T20 or slotted screwdriver 6.5 x 1.2 mm)..... 2.5 Nm (≤ 25 mm²)
 4.5 Nm (> 25 mm²)
 Torque setting for manual operation (hexagon socket 5 mm)..... approx. 6 Nm

Electronics

Connection..... pluggable screw-type terminals
 rigid/flexible/conductor sizes 0.14...1.5 mm²/28...16 AWG
 Stripping length.....7 mm
 Tightening torque (slotted screws, screwdriver 2.5 x 0.4 mm)..... 0.22...0.25 Nm

Other

Operating mode continuous operation
 Mounting display-oriented
 For use at altitudes..... up to 2000 m AMSL
 Protection class Class I
 Protection class LCD under foil (DIN EN 60529)..... IP40
 Enclosure material polycarbonate
 Flammability class..... UL94V-0
 Mounting..... DIN rail acc. to IEC 60715
 Screw mounting 4 x M5
 Dimensions incl. terminals (W x H x D)..... 234 x 270 x 73
 Weight approx. 3400 g

Short-circuit currents

| | ATICS-2-63A-ISO... | ATICS-2-80A-ISO... |
|---|--------------------|--------------------|
| Thermal current I_{th} (40 °C) | 63 A | 80 A |
| Current rated as conditional short circuit with gG fuses according to DIN | | |
| Conditional short-circuit current I_{cc} (kA eff.) | 30 | 30 |
| Associated fuse rating (A gG) | 80 | 100 |
| Current rated as conditional short circuit with circuit breaker that ensures tripping in less than 0.3 s | | |
| Current rated as short-time withstand I_{cw} 0.3 s (kA eff.) | 7 | 7 |
| Short-circuit operation (single switch) | | |
| Current rated as short-time withstand I_{cw} 1 s (kA eff.) | 4 | 4 |
| Rated peak withstand current I_{cm} (kA peak) | 17 | 17 |

Utilisation categories acc. to DIN EN 60947

| Type | Ie AC-23A | Ie AC-23B | Ie AC-32A | Ie AC-32B | Ie AC-33B |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|
| ATICS-2-63A-ISO ATICS-2-63A-ISO-ES | 63 A | 63 A | 63 A | 63 A | 63 A |
| ATICS-2-80A-ISO ATICS-2-80A-ISO-ES | 80 A | 80 A | 80 A | 80 A | 80 A |

10.2 TÜV test report according to VDE 0100 Part 710

Technischer Bericht Elektrische Sicherheit Sichtprüfung

TÜV SÜD Industrie Service GmbH – Westendstr. 199 - 80959 München

Service-Auftrags-Nr.: 15346147
Kundenauftrags-Nr.: 2247997

Fa. Bender GmbH & Co. KG
Londorfer Str. 65

D – 35305 Grünberg

Hersteller
ATICS Umschalt- u. Überwachungsgerät
Fa. Bender GmbH & Co. KG
Londorfer Str. 65
D - 35305 Grünberg

Hersteller
Modulträger
Fa. bendersystembau GmbH
Robert-Bosch-Straße 10
D – 35305 Grünberg



Industrie Service

Mehr Sicherheit.
Mehr Wert.

Das Original dieses Berichts gilt auch, wenn ein Wasserzeichen sichtbar ist oder wenn er mit einem gültigen Stempel der TÜV SÜD Industrie Service GmbH gekennzeichnet ist.

| | | |
|-------------------------------|---|--|
| Gegenstand: | ATICS Umschalt- und Überwachungsgerät Typ ATICS-2-63A-ISO inkl. Modulträger UMA710-2-63-ISO-BP / UFA710-2-63-ISO-BP | |
| Sachverständiger: | Raimund Gebhart | |
| Zeitraum: | 14.11.2013 bis 10.12.2013 | |
| Grundlage der Prüfung: | Auftrag 4620785 Pos. 020 vom 24.10.2013 | Datum: 19.12.2013 |
| Art der Untersuchung: | Ergänzungsprüfung auf Übereinstimmung des ATICS – Umschalt- und Überwachungsgeräts inkl. Modulträger mit den Mindestanforderungen der neuen DIN VDE 0100 Teil 710/10-2012, Abschnitt 710.536.101 | Unsere Zeichen: IS-EG1-MUCgeb |
| Zusammenfassung: | Die Umschalteinrichtung für medizinisch genutzte Räume vom Typ ATICS (genau Bezeichnung siehe oben) erfüllt die Anforderungen an selbsttätige Umschalteinrichtungen für medizinisch genutzte Bereiche der Gruppe 2 gemäß DIN VDE 0100 Teil 710/10-2012, Abschnitt 710.536.101 | Dokument: Bender_ATICS- ISO_13114_Funktionsbewertun g-Teil 710-2012_SUS-Rev01.doc |
| | Hinweis: Bedingt durch die konzeptuell nahezu baugleiche Ausführung des Modulträgers UMA710-2-80-ISO-BP / UFA710-2-80-ISO-BP mit dem Modulträger UMA710-2- 63-ISO-BP sehen wir keine Bedenken, das obige Ergeb- nis auch auf diese Variante zu übertragen. (weitere wichtige Hinweise siehe Bericht) | Das Dokument besteht aus 4 Seiten. Seite 1 von 4 |
| | | Die auszugsweise Wiedergabe des Dokumentes und die Verwertung zu Werbezwecken bedürfen der schriftlichen Genehmigung der TÜV SÜD Industrie Service GmbH. |
| | | Die Prüfungsergebnisse beziehen sich ausschließlich auf die untersuchten Prüfgegenstände. |

München, 19.12.2013

Thomas Wurl
Niedertassung München
Abteilung Elektrotechnik

Raimund Gebhart
Der Sachverständige



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TÜV®

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Deutschland

10.3 TÜV certificate regarding functional safety

TÜV SÜD
 ZERTIFIKAT ◆ CERTIFICATE ◆ 認証證書 ◆ CERTIFIKAT ◆ CERTIFICADO ◆ CERTIFICAT

A4 / 07.17



ZERTIFIKAT

Nr. Z10 077738 0002 Rev. 01

Zertifikatsinhaber: **Bender GmbH & Co. KG**
 Londorfer Straße 65
 35305 Grünberg
 DEUTSCHLAND

Fertigungsstätte(n): 077730

Prüfzeichen:



Produkt: **Sicherheitsbauelemente**
Umschalteinrichtung

Modell(e): ATICS

Parameter: Temperatur: -25°C...+55°C
 Betriebsspannung: 250VAC 50 / 60Hz
 Strom während Umschaltvorgang: 17A / <30ms

Der Bericht BG83832T und die Benutzerdokumentation in den aktuell gültigen Versionen sind zwingende Bestandteile dieses Zertifikats.

Geprüft nach: EN 61508-1:2010 (SIL2)
 EN 61508-2:2010 (SIL2)
 EN 61508-3:2010 (SIL2)

Das Produkt wurde auf freiwilliger Basis auf die Einhaltung der grundlegenden Anforderungen geprüft und kann mit dem oben abgebildeten Prüfzeichen gekennzeichnet werden. Eine Veränderung der Darstellung des Prüfzeichens ist nicht erlaubt. Die Übertragung eines Zertifikates durch den Zertifikatsinhaber an Dritte ist unzulässig. Umseitige Hinweise sind zu beachten.

Prüfbericht Nr.: BG83659T

Gültig bis: 2025-03-15

Datum, 2020-03-16

(Guido Neumann)

Seite 1 von 1
 TÜV SÜD Product Service GmbH • Zertifizierstelle • Ridlerstraße 65 • 80339 München • Deutschland

TUV®

10.4 Standards and certifications

The transfer switching and monitoring device conforms to the following standards:

- DIN VDE 0100-710 (VDE 0100 Part 710):2002-11*
- DIN VDE 0100-710 (VDE 0100 Part 710):2012-10*
- DIN VDE 0100-710 (VDE 0100-710) supplement 1:2014-06
- DIN VDE 0100-718 (VDE 0100-718):2014-06
- ÖVE/ÖNORM E 8007:2007-12-01
- IEC 60364-7-710:2002-11*
- IEC 60364-7-710:2021-05
- DIN EN 61508-1 (VDE 0803-1):2011-02*
- IEC 61508-1 (2010-04) Ed. 2.0*
- DIN EN 61508-2 (VDE 0803-2):2011-02*
- IEC 61508-2 (2010-04) Ed. 2.0*
- DIN EN 61508-3 (VDE 0803-3):2011-02*
- IEC 61508-3 (2010-04) Ed. 2.0*
- DIN EN 60947-6-1 (VDE 0660-114):2014-09
- IEC 60947-6-1 (2013-12) Ed. 2.1
- DIN EN 61557-8 (VDE 0413-8):2015-12

Standard-compliant isolating transformer monitoring according to:

- DIN EN 61558-1 (VDE 0570-1):2006-07
- DIN EN 61558-1/Amendment 1 (VDE 0570-1/Amendment 1):2008-11
- DIN EN 61558-1/Amendment 2 (VDE 0570-1/Amendment 2):2008-12
- DIN EN 61558-1/A1 (VDE 0570-1/A1):2009-11

The standards marked with * were part of the test conducted by TÜV Süd.

10.5 Ordering information

| Type | Rated operational voltage U_e | Rated operational current I_e | Art. No. | Manual No. |
|---------------------|---------------------------------|---------------------------------|-----------|------------|
| ATICS-2-63A-ISO | AC 240 V | AC 63 A | B92057202 | D00046 |
| ATICS-2-63A-ISO-ES* | AC 240 V | AC 63 A | B92057206 | D00046 |
| ATICS-2-63A-ISO-400 | AC 415 V | AC 63 A | B92057204 | D00046 |
| ATICS-2-80A-ISO | AC 240 V | AC 80 A | B92057203 | D00046 |
| ATICS-2-80A-ISO-ES* | AC 240 V | AC 80 A | B92057207 | D00046 |
| ATICS-2-80A-ISO-400 | AC 415 V | AC 80 A | B92057205 | D00046 |

* with connection option for ATICS-ES energy storage device.

| Type | Description | Art. No. | Manual No. |
|--------------------|--|-----------|------------|
| STW2 | Measuring current transformer (load current monitoring IT system), I_e : AC 50 A | B942709 | |
| STW3 | Measuring current transformer (short-circuit monitoring) for ATICS® < 100 A; I_e : AC 100 A | B98021000 | |
| SWL-100A | Measuring current transformer (load current monitoring IT system), I_e : AC 100 A | B98021002 | |
| ATICS-BP-2-63A-SET | Bypass switch set (I_e : AC 63 A) comprising: <ul style="list-style-type: none"> • Bypass switch 63 A single, 2-pole, sequence of operation: I-I+II-II, with auxiliary contact, bridge, terminal cover • Auxiliary contact for ATICS® • LEDs green/red for DIN rail mounting | B92057252 | D00162 |
| ATICS-BP-2-80A-SET | Bypass switch set (I_e : AC 80 A) comprising: <ul style="list-style-type: none"> • Bypass switch 80 A single, 2-pole, sequence of operation: I-I+II-II, with auxiliary contact, bridge, terminal cover • Auxiliary contact for ATICS® • LEDs green/red for DIN rail mounting | B92057253 | D00162 |
| EDS151 | Insulation fault locator | B91080101 | D00107 |
| ESS3680 | Transformer 3.68 kVA, AC 400 V / 230 V For "ATICS® for 400 volt systems without N conductor", only the transformers recommended by Bender (T5, T6) may be used! | B924744 | |
| ATICS-ES | Energy storage device for ATICS-2-63A-ISO-ES and ATICS-2-80A-ISO-ES | B72057255 | D00009 |
| AN412 | Power supply unit DC 12 V for ATICS-ES energy storage device | B924150 | |

Description ATICS-2-...-ISO:

2-pole transfer switching and monitoring device with integrated insulation, load and temperature monitoring of the IT system, 1 dig. input, 1 relay output, short-circuit detection in TN systems, with sealable contact covers on the input and output sides, bridges on the output side and pluggable screw-type terminals for all connections. Measuring current transformers STW2 and STW3.

10.6 Additional documents

- ATICS® quick-start guide "ATICS-2-ISO...DEEN" (D00046)
- ATICS® Checklist

In addition, the following instructions apply:

- ATICS-BP-SET (bypass switch set for ATICS®)
- STW2, STW3, STW4 measuring current transformers
- BMS bus Bender measuring device interface
- COM465... BMS-Ethernet gateway for the connection of the Bender measuring device interface to TCP/IP networks

- EDS150 insulation fault locator
- EDS151 insulation fault locator
- MK2430 alarm indicator and test combination
- MK800 alarm indicator and test combination
- TMK-SET configuration software for MK2430, MK800 and TM800
- CP9xx - Control Panel

10.7 Document revision history

| Date | Document version | Valid from software version | State/Changes |
|---------|------------------|--|---|
| 04/2021 | 04 | D333 V1.3x, D334 V1.3x, D335 V1.0x, D308 V1.2x | NEW: complete revision |
| 11/2021 | 05 | see above | Added: Chapter 10 „Technical Data“: Change over period Changed: Chapter 10.1: Supply voltage Chapter 10.1: Nominal system voltage Chapter 10.5: Description of Ordering details“ |

Bender GmbH & Co. KG

Bender GmbH & Co. KG