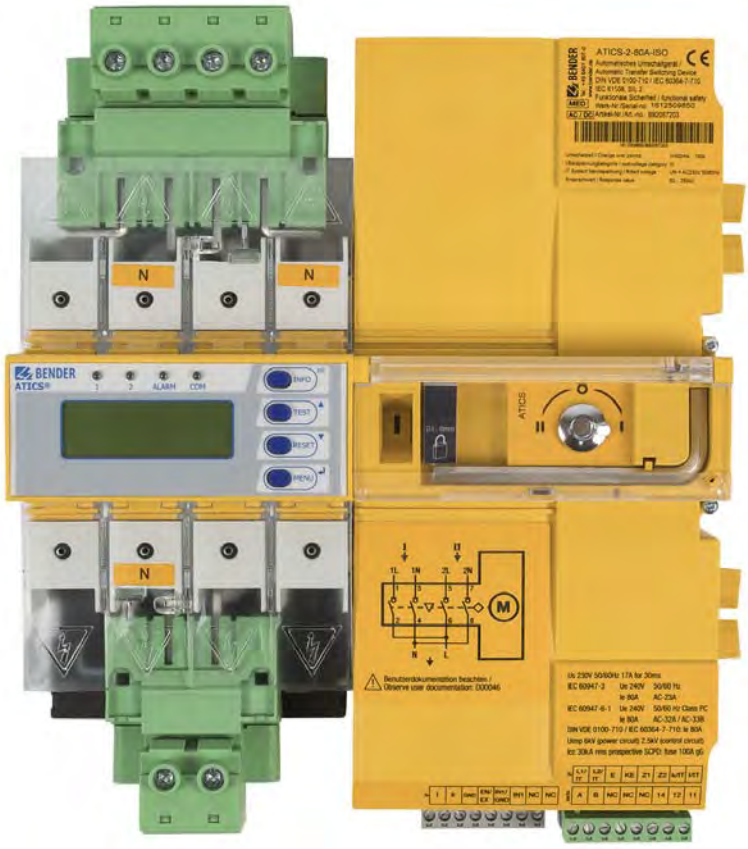
EN Manual

BENDER
The Power in Electrical Safety©

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

MED



Automatic transfer switching devices with monitoring functions for unearthed safety power supplies

Software version: D333 V1.2x/D334 V1.2x D335 V1.0x/D308 V1.2x

ATICS-2-ISO_D00046_03_M_XXEN/08.2017



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1. Important information

1.1 How to use this manual

This manual describes how to operate the ATICS® automatic transfer switching device.
Before using the devices, please read this operating manual, the supplement entitled "Important safety instructions for Bender products" and the instruction leaflets supplied with the individual system components.



*This manual is intended for **qualified personnel** working in electrical engineering and electronics, and in particular for those designing, installing and operating electrical equipment in the medical and non-medical sector.*

In this manual, the two redundant supply lines of the power supply are labelled as follows:

- "Preferred supply" or "Preferred line" and
- "Second supply" or "Redundant line".

Devices with displays use the terms "Line 1" and "Line 2" in the text they indicate.

Always keep this manual within easy reach for future reference.

To make it easier for you to understand and revisit certain sections in this manual, we have used symbols to identify important instructions and information. The meaning of these symbols is explained below:



*This signal word indicates that there is a **high** risk of danger, that **will** result in **death** or **serious injury** if not avoided.*



*This signal word indicates a **medium** risk of danger that **can** lead to **death** or **serious injury**, if not avoided.*



*This signal word indicates a **low-level risk** that **can** result in minor or **moderate injury** or **damage to property** if not avoided.*



This symbol denotes information intended to assist the user in making optimum use of the product.

This manual has been compiled with great care. It might nevertheless contain errors and mistakes. Bender cannot accept any liability for injury to persons or damage to property resulting from errors or mistakes in this manual.

ATICS® is a registered trademark of Bender GmbH & Co. KG.

1.2 Technical support: service and support

For commissioning and troubleshooting Bender offers you:

1.2.1 First level support

Technical support by phone or e-mail for all
Bender products

- Questions concerning specific customer applications
- Commissioning
- Troubleshooting

Telephone:	+49 6401 807-760*
Fax:	+49 6401 807-759
In Germany only:	0700BenderHelp (Tel. and Fax)
E-mail:	support@bender-service.de

1.2.2 Repair service

Repair, calibration, update and replacement service for Bender products

- Repairing, calibrating, testing and analysing Bender products
- Hardware and software update for Bender devices
- Delivery of replacement devices in the event of faulty or incorrectly delivered Bender devices
- Extended guarantee for Bender devices, which includes an in-house repair service or replacement devices at no extra cost

Telephone:	+49 6401 807-780** (technical issues) +49 6401 807-784**, -785** (sales)
Fax:	+49 6401 807-789
E-mail:	repair@bender-service.de

Please send the devices for **repair** to the following address:

Bender GmbH, Repair-Service,
Londorfer Straße 65,
35305 Grünberg

1.2.3 Field service

On-site service for all Bender products

- Commissioning, parameter setting, maintenance, troubleshooting for Bender products
- Analysis of the electrical installation in the building (power quality test, EMC test, thermography)
- Training courses for customers

Telephone:	+49 6401 807-752**, -762 **(technical issues) +49 6401 807-753** (sales)
Fax:	+49 6401 807-759
E-mail:	fieldservice@bender-service.de
Internet:	www.bender.de

*Available from 7.00 a.m. to 8.00 p.m. 365 days a year (CET/UTC+1)
**Mo-Thu 7.00 a.m. - 8.00 p.m., Fr 7.00 a.m. - 13.00 p.m.

1.3 Training courses

Bender is happy to provide training regarding the use of test equipment. The dates of training courses and workshops can be found on the Internet at www.bender-de.com -> Know-how -> Seminars.

1.4 Delivery conditions

Bender sale and delivery conditions apply.
For software products the "Softwareklausel zur Überlassung von Standard-Software als Teil von Lieferungen, Ergänzung und Änderung der Allgemeinen Lieferbedingungen für Erzeugnisse und Leistungen der Elektroindustrie" (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) set out by the ZVEI (Zentralverband Elektrotechnik- und Elektronikindustrie e. V.) (German Electrical and Electronic Manufacturer's Association) also applies.
Sale and delivery conditions can be obtained from Bender in printed or electronic format.

1.5 Inspection, transport and storage

Inspect the dispatch and equipment packaging for damage, and compare the contents of the package with the delivery documents. In the event of damage in transit, please contact Bender immediately.
The devices must only be stored in areas where they are protected from dust, damp, and spray and dripping water, and in which the specified storage temperatures can be ensured.

1.6 Warranty and liability

Warranty and liability claims in the event of injury to persons or damage to property are excluded if they can be attributed to one or more of the following causes:

- 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 and the use of replacement parts or accessories not approved by the manufacturer.
- Catastrophes caused by external influences and force majeure.
- Mounting and installation with device combinations not recommended by the manufacturer.

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

1.7 Disposal

Abide by the national regulations and laws governing the disposal of this device. Ask your supplier if you are not sure how to dispose of the old equipment.
The directive on waste electrical and electronic equipment (WEEE directive) and the directive on the restriction of certain hazardous substances in electrical and electronic equipment (RoHS directive) apply in the European Community. In Germany, these policies are implemented through the "Electrical and Electronic Equipment Act" (ElektroG). According to this, the following applies:

- Electrical and electronic equipment are not part of household waste.
- Batteries and accumulators are not part of household waste and must be disposed of in accordance with the regulations.
- Old electrical and electronic equipment from users other than private households which was introduced to the market after 13 August 2005 must be taken back by the manufacturer and disposed of properly.

For more information on the disposal of Bender devices, refer to our website at www.bender-de.com -> Service & support.

2. Safety instructions

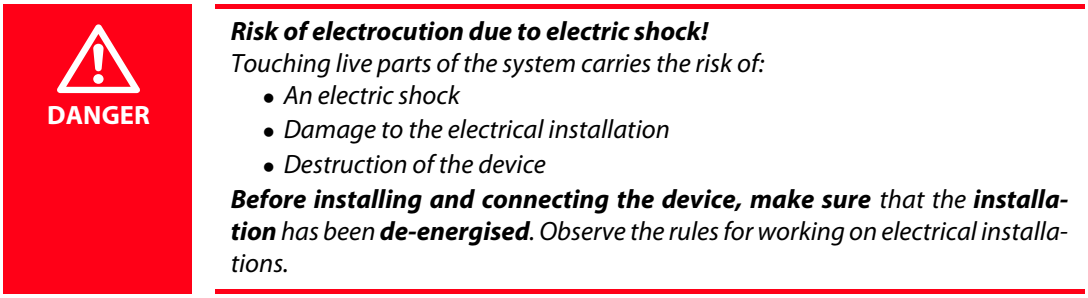
2.1 General safety instructions

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

2.2 Work activities on electrical installations



*Only **qualified personnel** are permitted to carry out the work necessary to install, commission and run a device or system.*



Risk of electrocution due to electric shock!
Touching live parts of the system carries the risk of:

- *An electric shock*
- *Damage to the electrical installation*
- *Destruction of the device*

***Before installing and connecting the device, make sure** that the **installation** has been **de-energised**. Observe the rules for working on electrical installations.*

If the device is used outside the Federal Republic of Germany, the applicable local standards and regulations must be complied with. The European standard EN 50110 can be used as a guide.

2.3 Intended use

Changeover devices are used everywhere there is dependence on high availability from the power supply. The ATICS® transfer switching device is intended for the application described in the chapter "System description". When the preferred supply fails, 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, computer centres
- Fire extinguisher and sprinkler systems

Several versions of ATICS® are available. They differ for example by changing over from two- or four-pole systems or by the load current (see chapter "ATICS® tasks" on page 17). 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.

2.4 Device-specific safety instructions

WARNING

Failure to adjust settings may result in malfunction
The settings must be changed in order to adapt the ATICS® transfer switching device to the existing equipment. When doing so, follow the instructions in chapter "5. Commissioning, settings and testing", page 41 et seq.

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.
In particular note the information on the pages: 14, 15, 16, 22, 57 and 85.

2.5 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.

3. System description

3.1 Properties

3.1.1 Product description

The ATICS® 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 bypass switches enable ATICS® to be tested during ongoing operation. In case of need for service, it is possible to repair or replace the device without interrupting 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, optionally locked with 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 integrated graphic display and external indication at MK2430/MK800/TM800 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

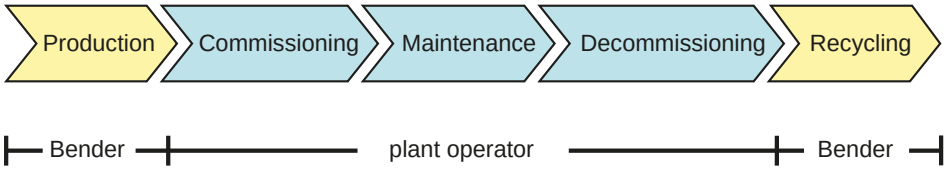
3.2 Functional safety

Functional safety according to IEC 61508 guarantees safety from risks arising from malfunction when used properly. 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:



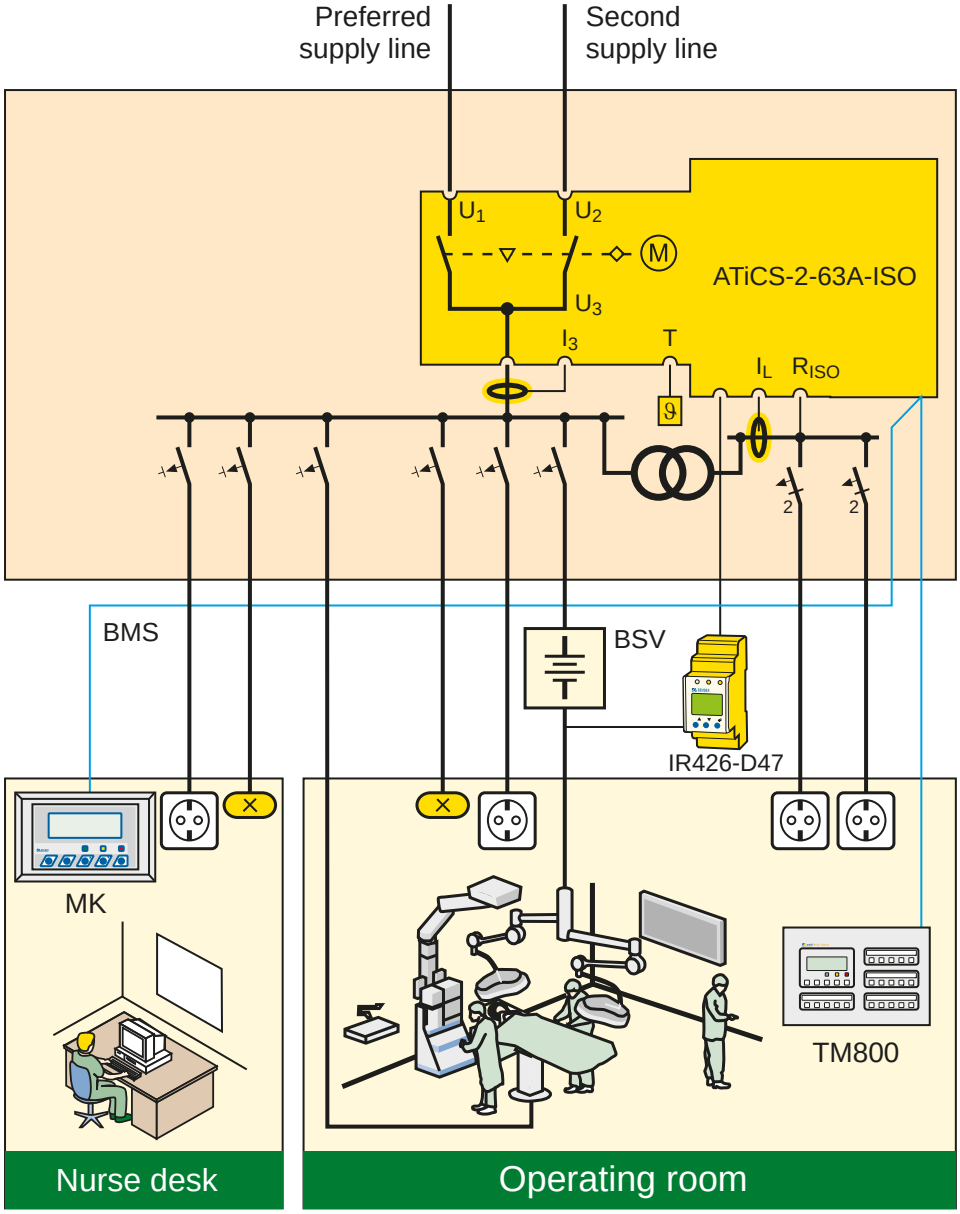
For detailed information refer to

- chapter "5. Commissioning, settings and testing" on page 41
- chapter "9. Periodic verification and service" on page 87

3.3 Application examples

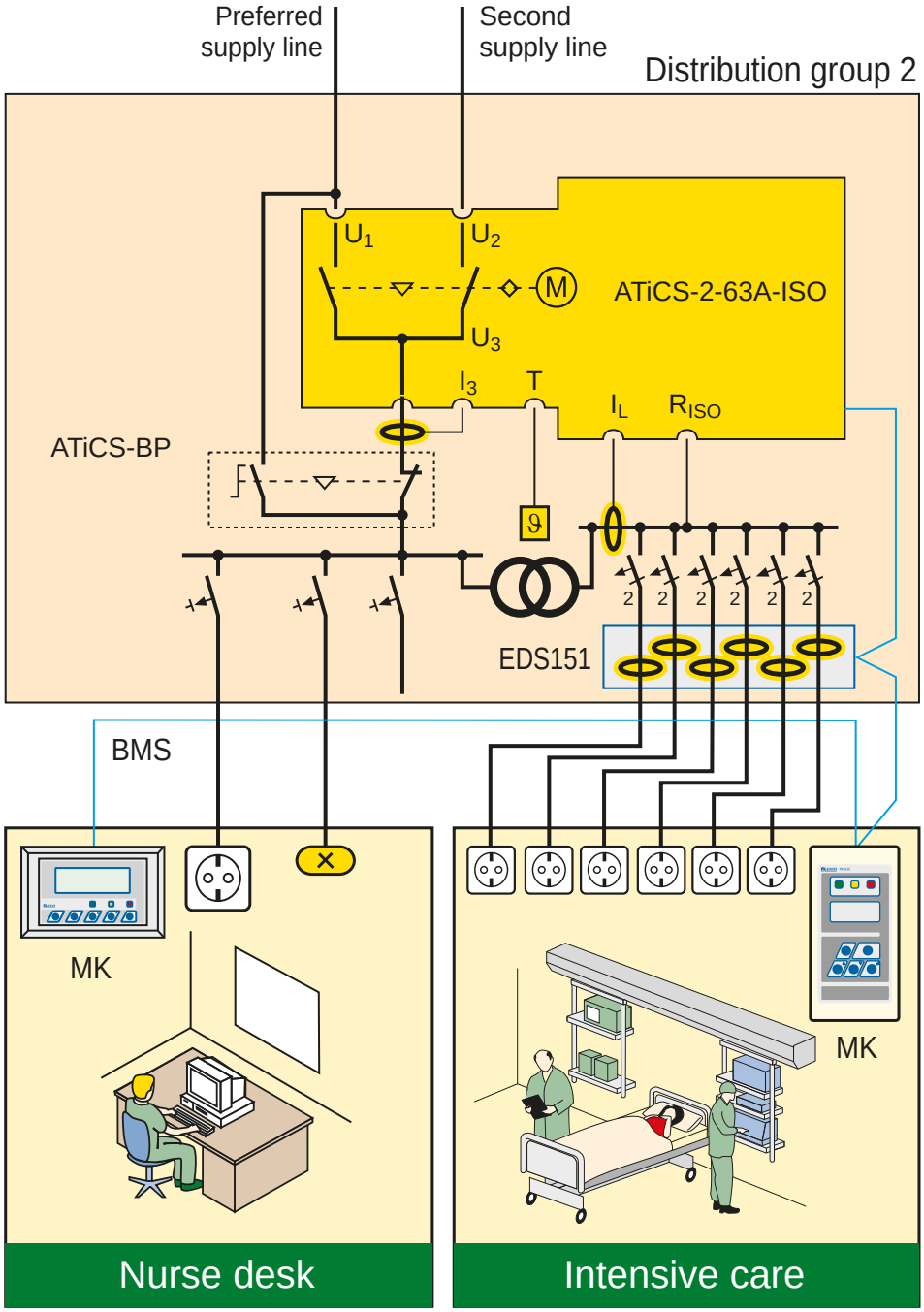
3.3.1 Application example operating theatre

- 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 the operating theatre light IT system (optional)
- MK2430/MK800/TM800: Alarm at at least two points with independent power supplies for functional safety



3.3.2 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 localisation (recommended)
- ATICS-BP: Bypass switch for uninterrupted test/maintenance (recommended)
- MK2430/MK800/TM800: Alarm at at least two points with independent power supplies for functional safety



3.4 ATICS® tasks

The ATICS® transfer switching device has the following capabilities:

- Two-pole changeover of the power supply
- Voltage monitoring for the preferred supply (Line 1)
- Voltage monitoring for the second supply (Line 2)
- Voltage monitoring at the 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 to remote MK... alarm indicator and test combinations, and to TM… 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, ATICS® ensures that the power supply is changed over safely.

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

1	Line 1 switched on
0	Both lines switched off
2	Line 2 switched on

Either line 1 or line 2 can be set as the preferred line (setting described in "Settings menu 1: Changeover" on page 66 or "Settings menu 6: Digital input" on page 72).

1. In normal operating condition (fault-free operation) the preferred supply is connected. ATICS® will switch 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 reconfigured to the other line

2. ATICS® will switch from the redundant line back to the preferred line if
   - the voltage on the preferred line is restored
     - the return transfer delay time t(2->1) has expired and no switching back interlocking function is enabled
     - immediately after pressing the "RESET" button or when the redundant line fails (even when the switching back interlocking function is enabled)
   - the setting "Preferred Line" is reconfigured to the other line
   - the digital input is configured to "TEST" and this input is reset
   - a test of the transfer switching device is active and the test period has elapsed

WARNING

Failure to adjust delay times may result in malfunctions
The response delay t(on), the return transfer delay time t(2->1), the delay on release t(off) and the dead time t(0) of 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 Part 710) for automatic changeover devices (see chapter "Commissioning, settings and testing").

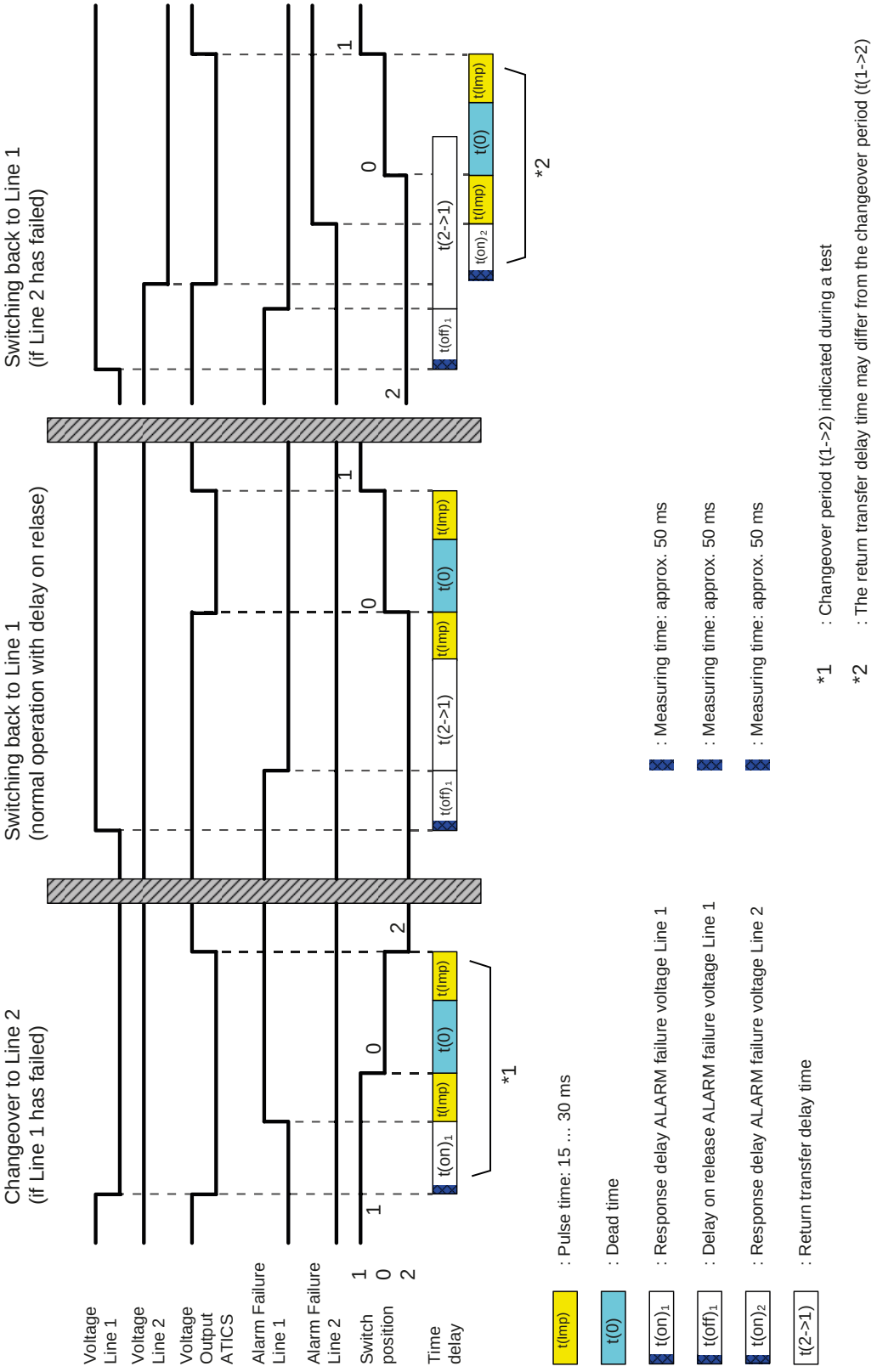
The factory settings guarantee a changeover period of t ≤ 0.5 seconds and switching back within 10 seconds when voltage is restored on the preferred supply. Therefore, ATICS® can be used in IT systems with a requirement for a changeover period t ≤ 0.5 s (IT systems with operating theatre lights, endoscopic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

When there is a short circuit downstream of the transfer switching device, the transfer switching device must not continually change back and forth between the two lines. This can occur when the short-circuit current is small and the transfer switching device switches faster than the short-circuit breaker trips. ATICS® monitors the load current downstream of the 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, ATICS® does not switch over immediately but only once the circuit breaker has tripped.

If 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 the preferred and the redundant line

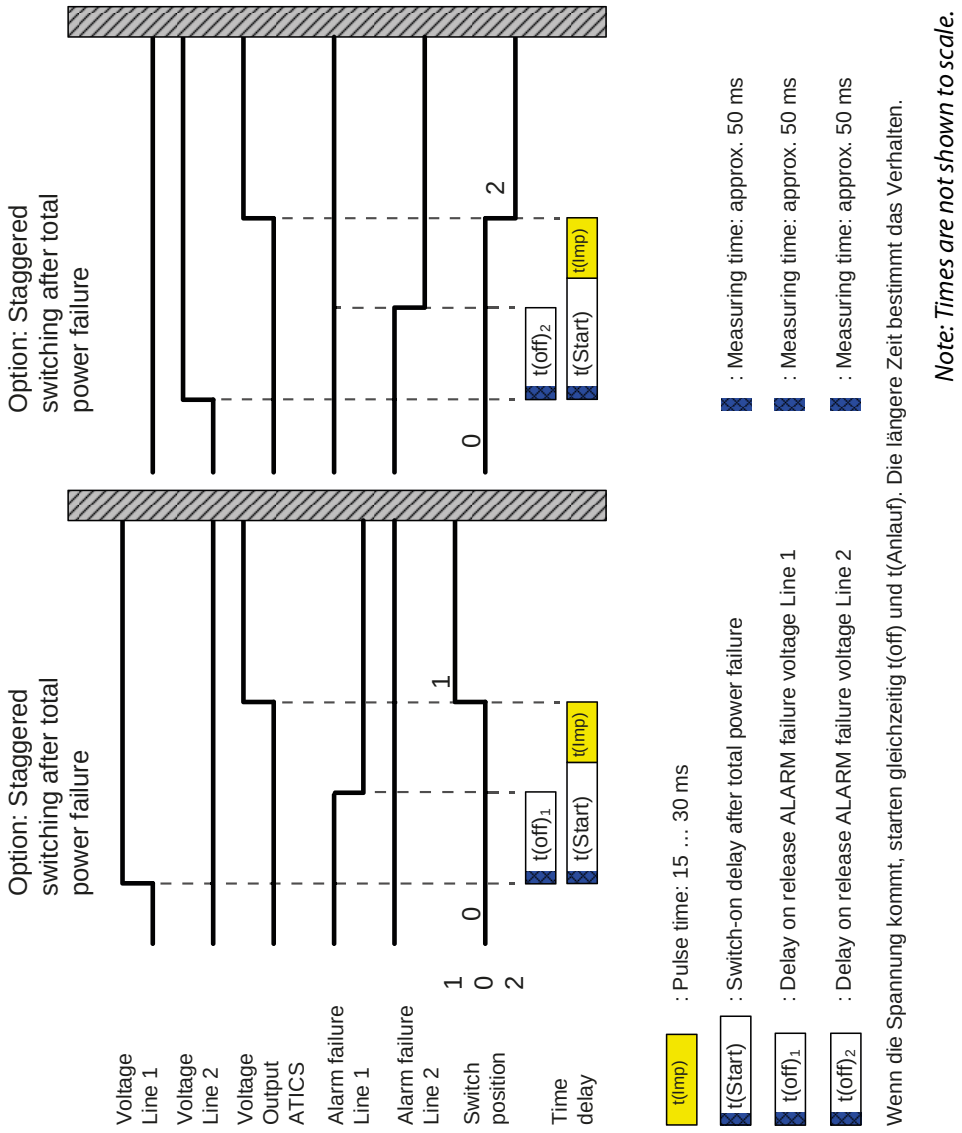
Example: Line 1 is set as the preferred line.



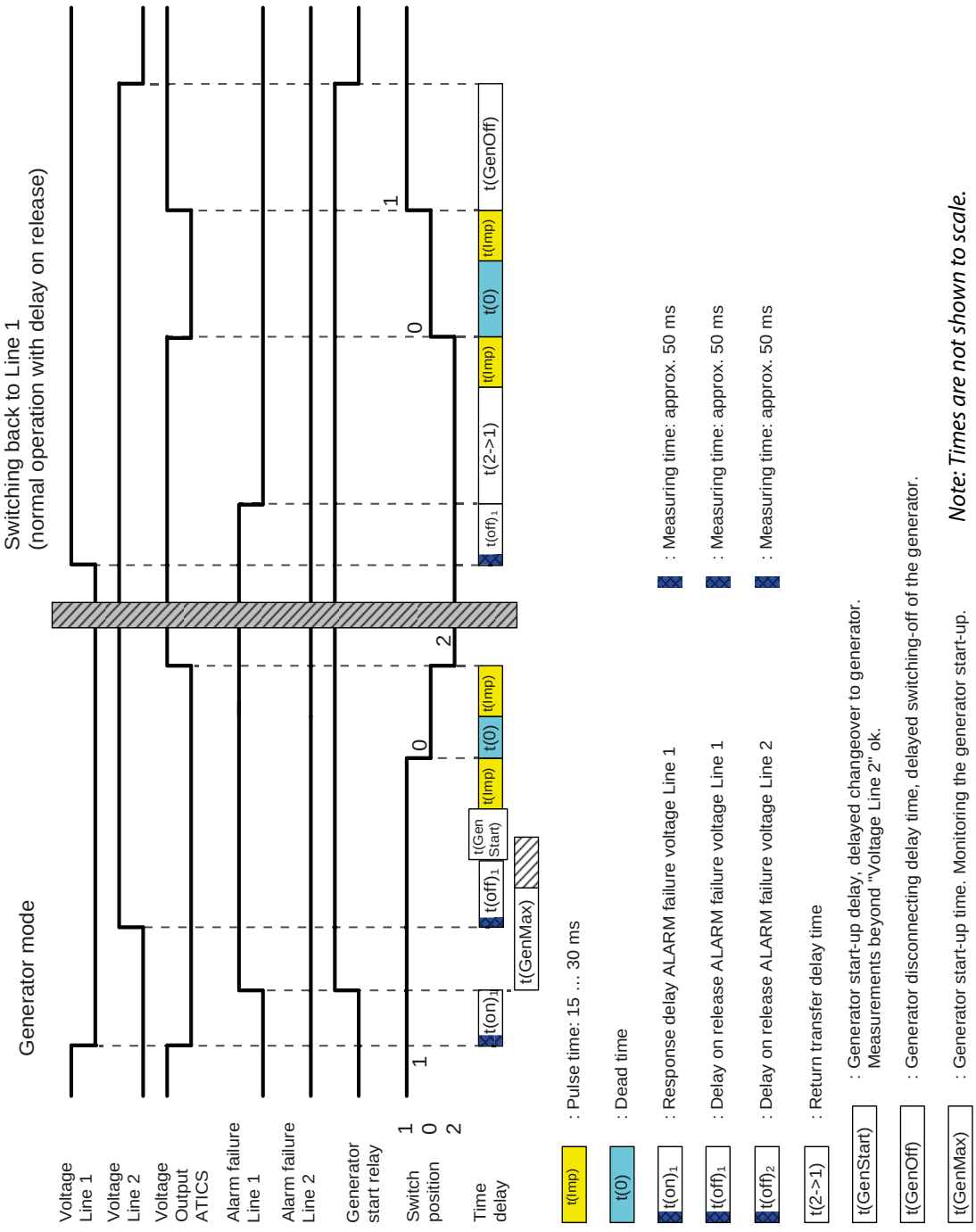
3.5.1.2 Time diagram: Staggered switching after complete power failure

After a complete power failure (i.e. no voltage on either of the power supplies) it is often necessary to switch to the supply at staggered intervals. This prevents all loads being switched on simultaneously. Switch ATICS® to position "0" using an Allen key. When power is restored, ATICS® switches on the supply again with the set delay time t(start).

Example: Line 1 is set as the preferred line.



3.5.1.3 Time diagram: Changeover to generator mode



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 capacitance increases.

Load current measurement
The load current in 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 1 mA. This feature can be switched on or off (see chapter "7.3.4.4 Settings menu 4: IT system").

CAUTION

The locating current flowing between the IT system and earth can cause controller faults in sensitive parts of the system, such as the 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 switch position of the switch as well as coils 1 and 2 of the switch once a day at 12:00 p.m.

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 (necessary for functional safety).

WARNING

For systems with generator: total power failure possible
If the preferred line fails, ATICS® will start the generator connected to the redundant line. If the generator does not start, the line downstream of the transfer switching device will be dead.
When the generator is switched off, ATICS® cannot check the redundant line. Therefore, regularly test the generator and the transfer switching device to make sure they are working properly (see checklist in the appendix to this manual).

3.5.4 Power supply

The coils of the switching device 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.

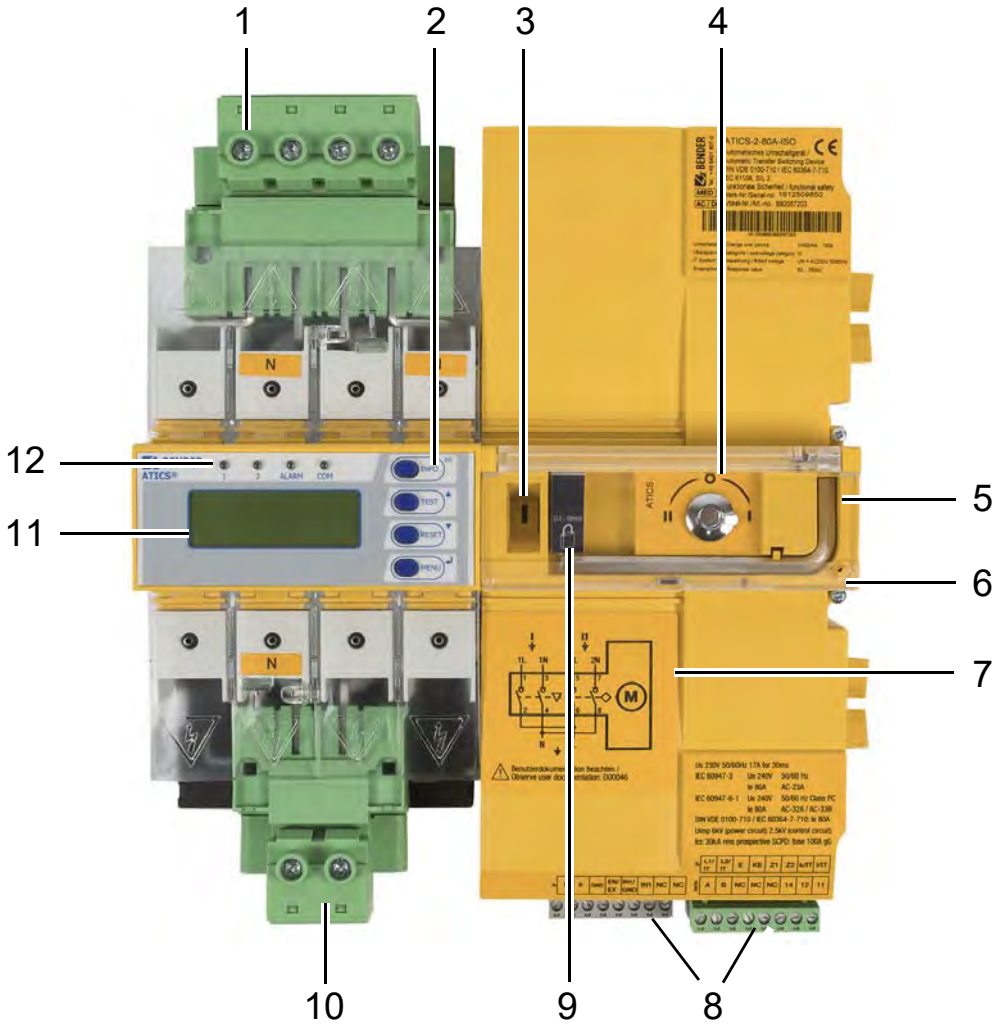
The power supply of the electronic system is of redundant supply from lines 1 and 2. This ensures constant supply to the electronic system even when one line fails.

If both lines fail, the changeover switch remains in the last switch position. Switch ATICS® to position "0" using an Allen key. When power is restored, ATICS® switches on the supply again with the set delay time t(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.

3.5.5 Manual mode

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

3.6 The 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	Manual mode of the transfer switching device, indicates the switch position
5	Allen key for manual mode
6	Transparent cover for changeover switch (manual mode), sealable
7	Wiring diagram for lines 1, 2 and 3
8	Three coded connector plugs
9	Locking device for switch position 0
10	Green plug connector for line 3
11	LCD
12	Operating and alarm LEDs

4. Installation and connection

DANGER

Risk of electrocution due to electric shock!
Touching live parts of the system carries the risk of electric shock. 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.

In manual mode, ATICS® can be held in switch position "0" and locked with a padlock.

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

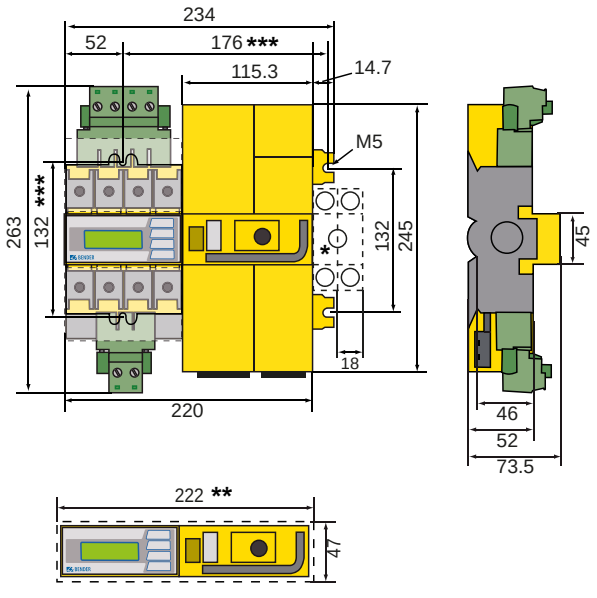
4.1 Mounting

CAUTION

Risk of destruction by plastering
Liquid plaster may run into the device and the device may jam.
Do not seal the device with plaster.

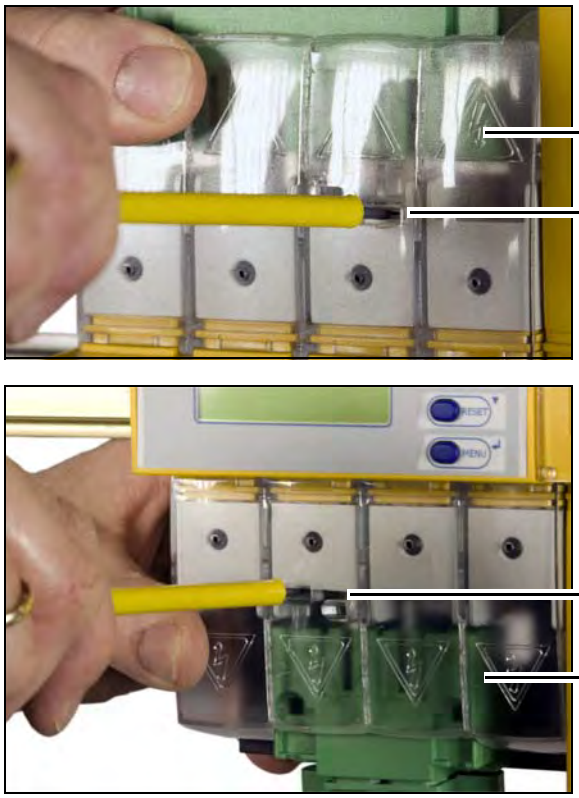
ATICS® is suitable for DIN rail mounting or screw mounting on plate. To guarantee the protection against accidental contact, it is to be installed behind a plastic cover.

4.1.1 Dimension diagram



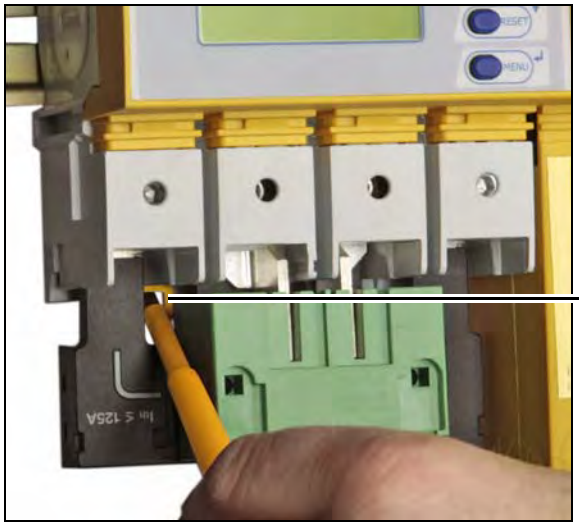
* *Only when using the bypass switch ATICS-BP-…: additional space required for auxiliary contact*
** *Adjust the cutout to the terminal cover*
*** *Dimensions for screw mounting on mounting plate*

4.1.2 Removing the terminal covers

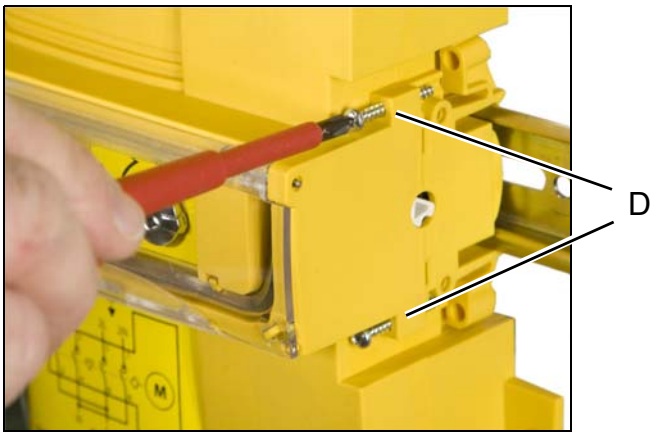


1. Push back the locking hook (B) in the middle of the top and bottom terminal cover (A) using a screwdriver.
2. Remove the terminal cover.

4.1.3 Mounting on DIN rail



1. Place ATICS® on the top edge of the rail.
2. Use a screwdriver to pull down the lower yellow slide lock (C) and snap ATICS® into place with slight pressure. Check that the slide locks are properly snapped into position by pulling slightly the lower part of the enclosure.
3. Secure all terminals including the unused terminals with Allen screws.
   Tightening torque: 5 Nm.
4. Fasten the terminal covers.



5. Always tighten the mounting screws (D) (PZ1, 8,8 lb-in, 1 Nm).

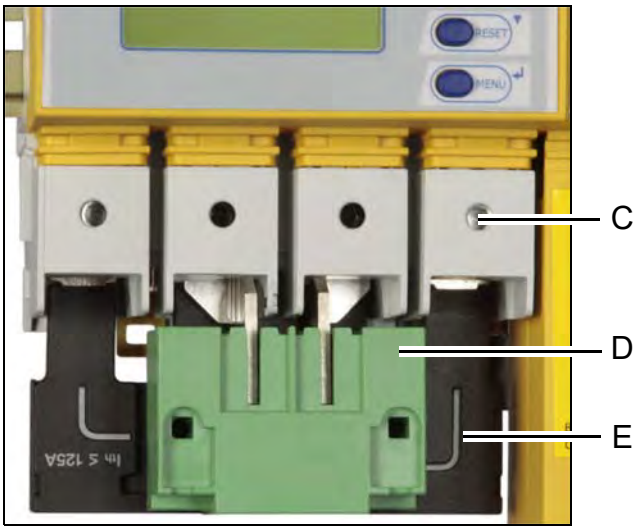
CAUTION

If the screws are not tightened, the vibration occurring during the switching process may damage ATICS®.

4.1.4 Screw mounting on plate

WARNING

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.
It is the responsibility of the mounting staff to select the appropriate mounting plate and mounting screws and to keep the prescribed torque setting.



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 ATICS® to the mounting plate with M5 mounting screws, torque setting 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. Use Allen screws to tighten all terminals (C) including the unused terminals. Tightening torque: 5 Nm.
8. Fasten the terminal covers.

4.2 Connection

4.2.1 Short-circuit protection

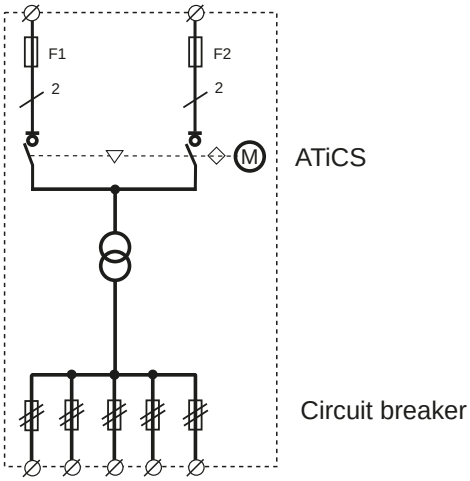
When choosing the short-circuit protective devices in the supply cables and output cables of the transfer switching devices, follow the requirements of DIN VDE 0100-710 (VDE 0100 Part 710).

- 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 laid so that they are 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 rooms: 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 a 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 selectivity for the overcurrent devices connected downstream in the IT systems.

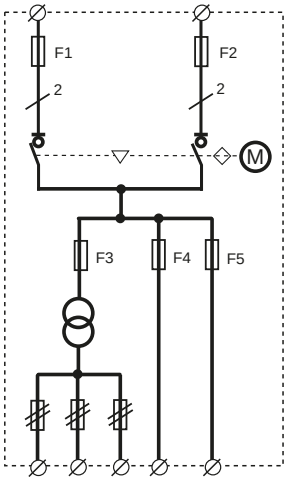
When choosing back-up fuses, keep to both the maximum permissible values laid down by the guidelines which apply to the site of use and national and international standards to make sure that the contacts do not weld. The considerations presented below are based on the standard DIN VDE 0100-710 (VDE 0100 Part 710).

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

Selecting a short-circuit protective device for several loads



This circuit branches into several load groups. This means that each fuse of each load group is moved downstream of the 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 calculated using the method above for ATICS®. 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 ATICS® safely

DANGER

Risk of fatal injury from electric shock

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

Open the transparent cover of the device for manual mode selection and wait until the display shows "Manual mode".



Turn the Allen key to switch position "0". Leave the transparent cover open and lock the transfer switching device with a padlock to prevent it from starting accidentally.



DANGER

Risk of fatal injury from 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.
Note the assignment of the "ATICS® terminals" on page 31. 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.

CAUTION

Prevent incorrect insulation measurement

Only one insulation monitoring device may exist in an IT system to prevent erroneous measurements. ATICS® includes an insulation monitoring device.
-> Do not connect additional insulation monitoring devices.

WARNING

Risk of destruction when insulation and voltage test are carried out

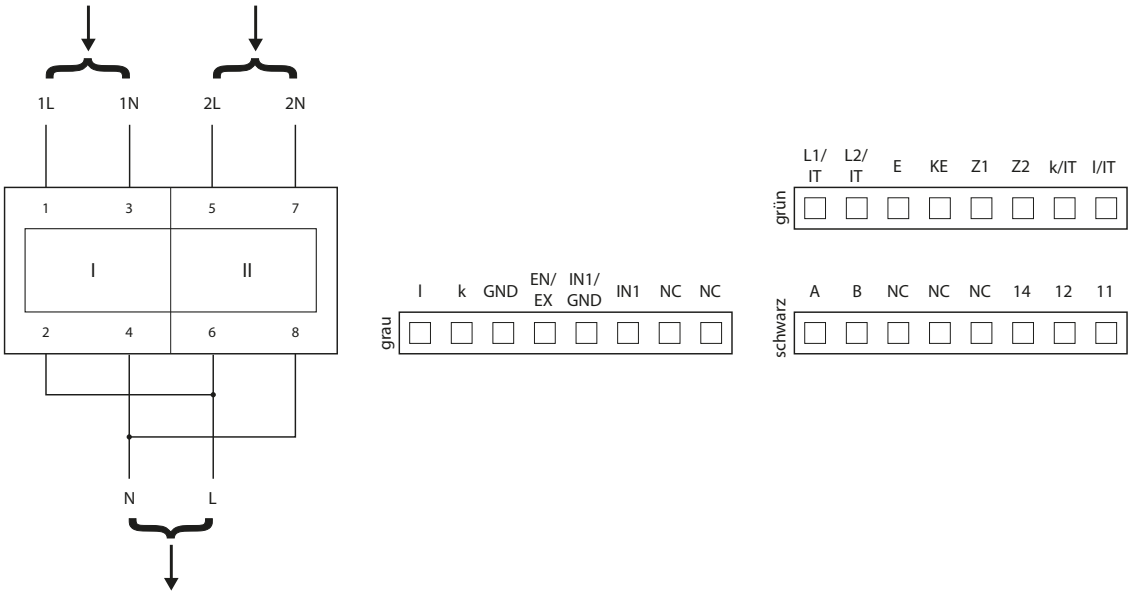
-> Disconnect the device from the mains for the duration of the test.

WARNING

Risk of destruction if connected incorrectly

*-> The terminals labelled GND **must not** be connected to PE.*

ATICS® terminals



Legend

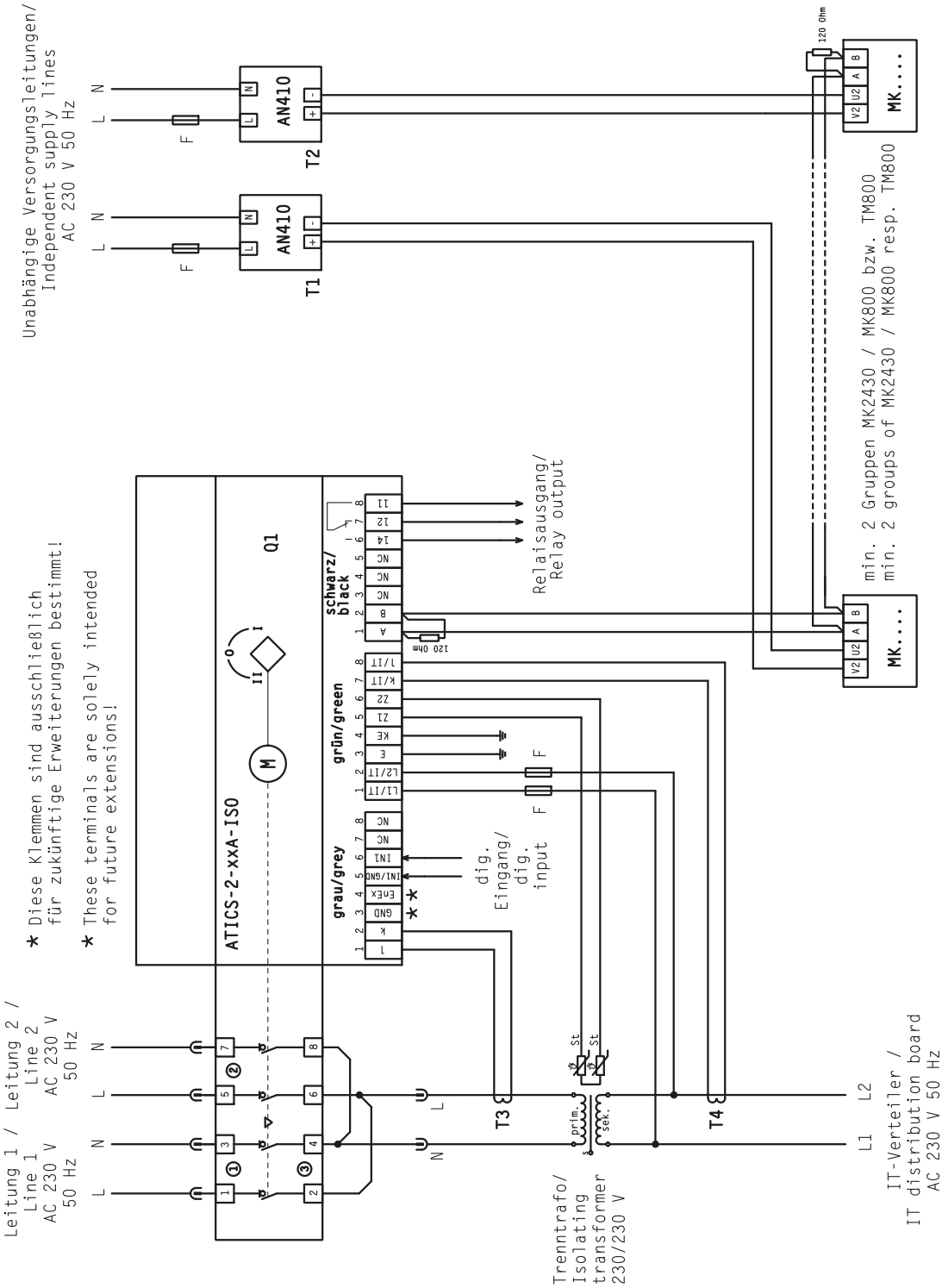
1L, 1N	Connection line 1 (input line)
2L, 2N	Connection line 2 (input line)
L, N	Connection line 3 (output line)
l, k	Connection measuring current transformer T3 (STW3) for monitoring the load current downstream the transfer switching device (short-circuit monitoring)
GND, En/Ex	Connection must not be used. Intended for Bender-internal purposes only (12 V).
IN1/GND, IN1	Digital input, configurable (see "Settings menu 6: Digital input" on page 72)
NC	Not used
L1/IT, L2/IT	Connection to the IT system. Monitoring the insulation resistance. When there is an insulation fault: Locating current fed in for insulation fault location. Bipolar protection via 6 A back-up fuse.
E, KE	Connection of E and KE to two separate PE lines
Z1, Z2	Temperature monitoring for the IT system transformer
k/IT, l/IT	Connection 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 Connection example: ATICS® basic configuration

CAUTION

Risk of destruction if connected incorrectly

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

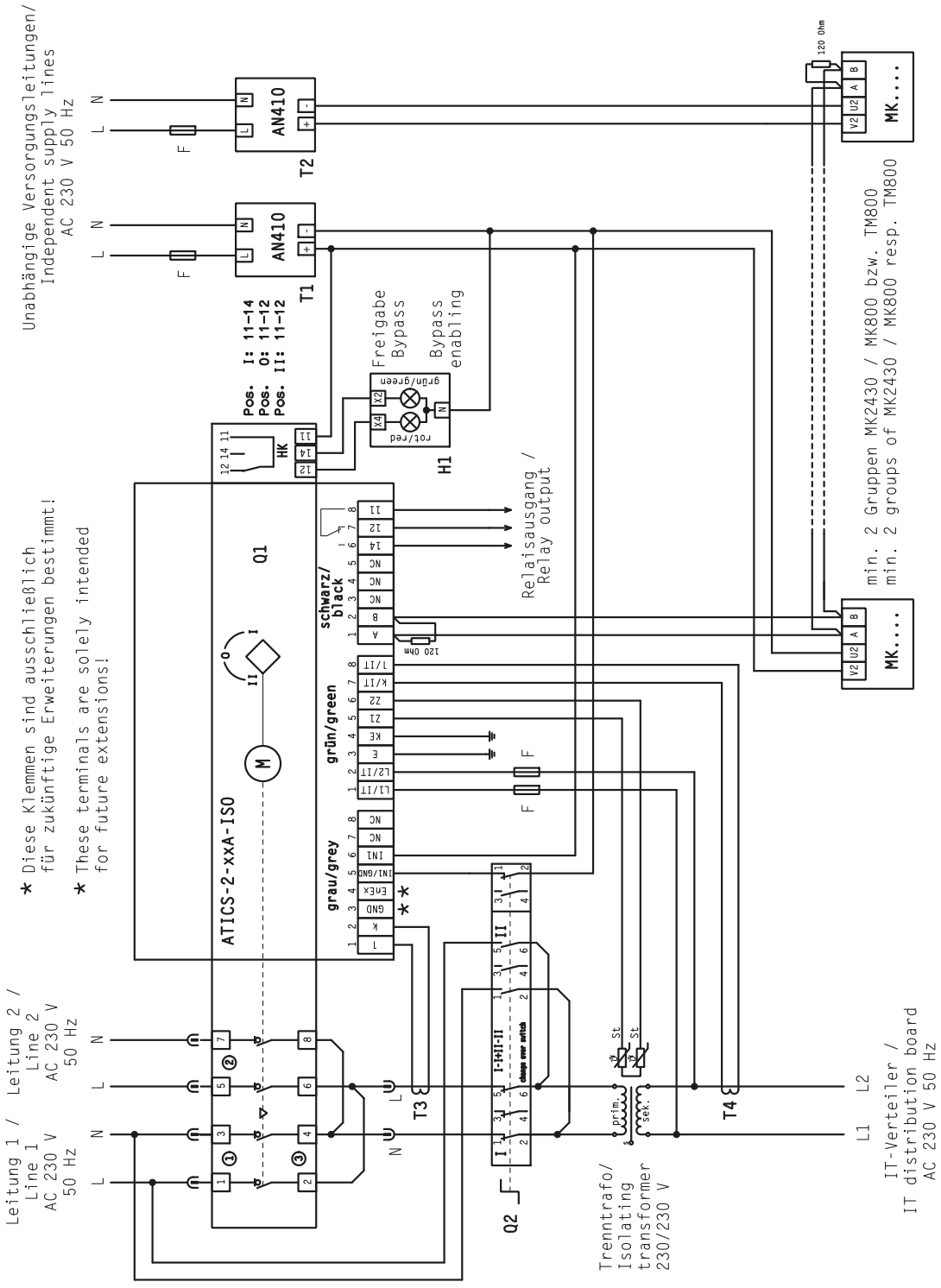


4.2.4 Connection example: ATICS® with bypass switch

CAUTION

Risk of destruction if connected incorrectly

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

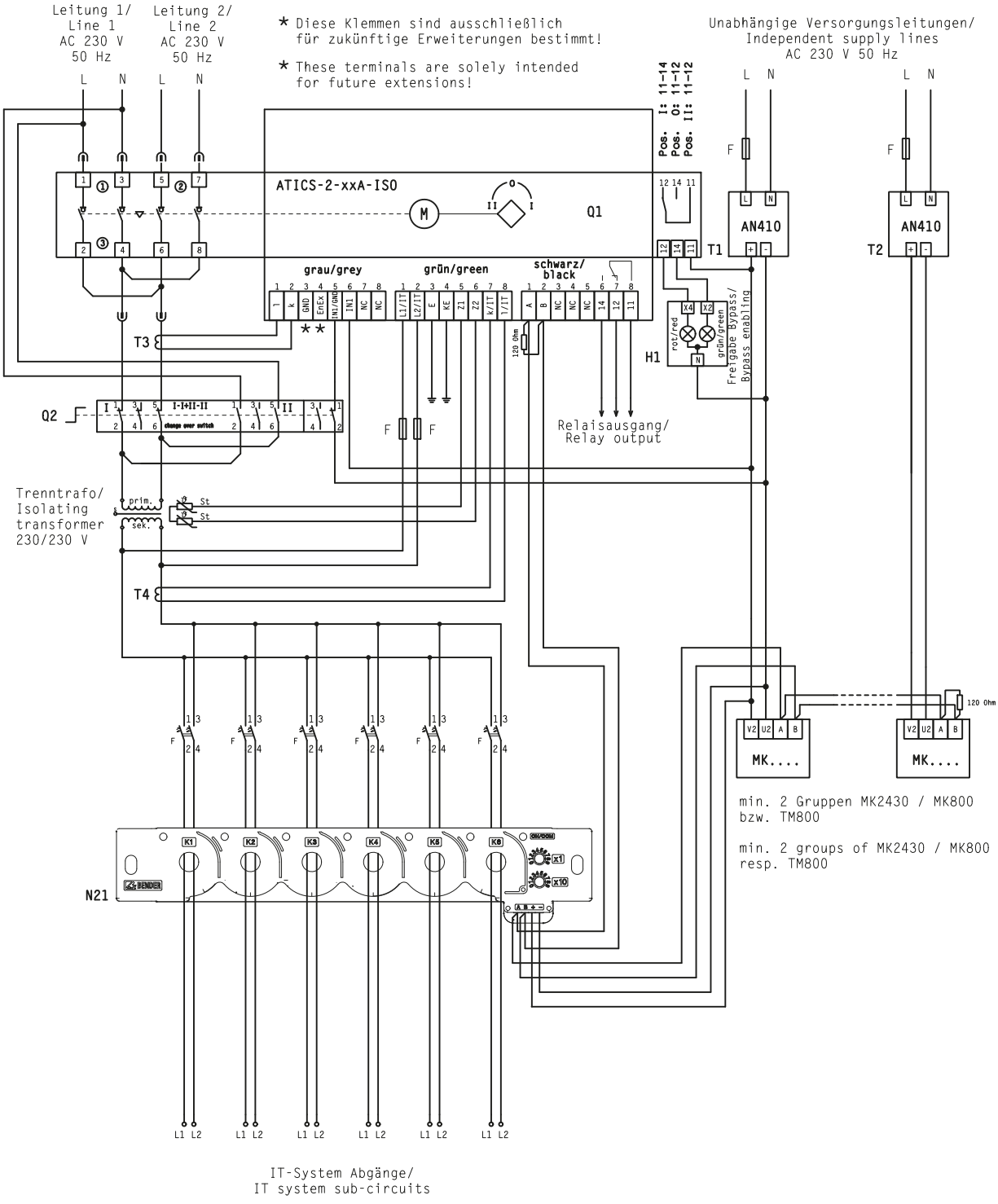


4.2.5 Connection example: ATICS® with bypass switch and EDS151

CAUTION

Risk of destruction if connected incorrectly

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



4.2.6 Connection example: ATICS® for 400-volt systems

CAUTION

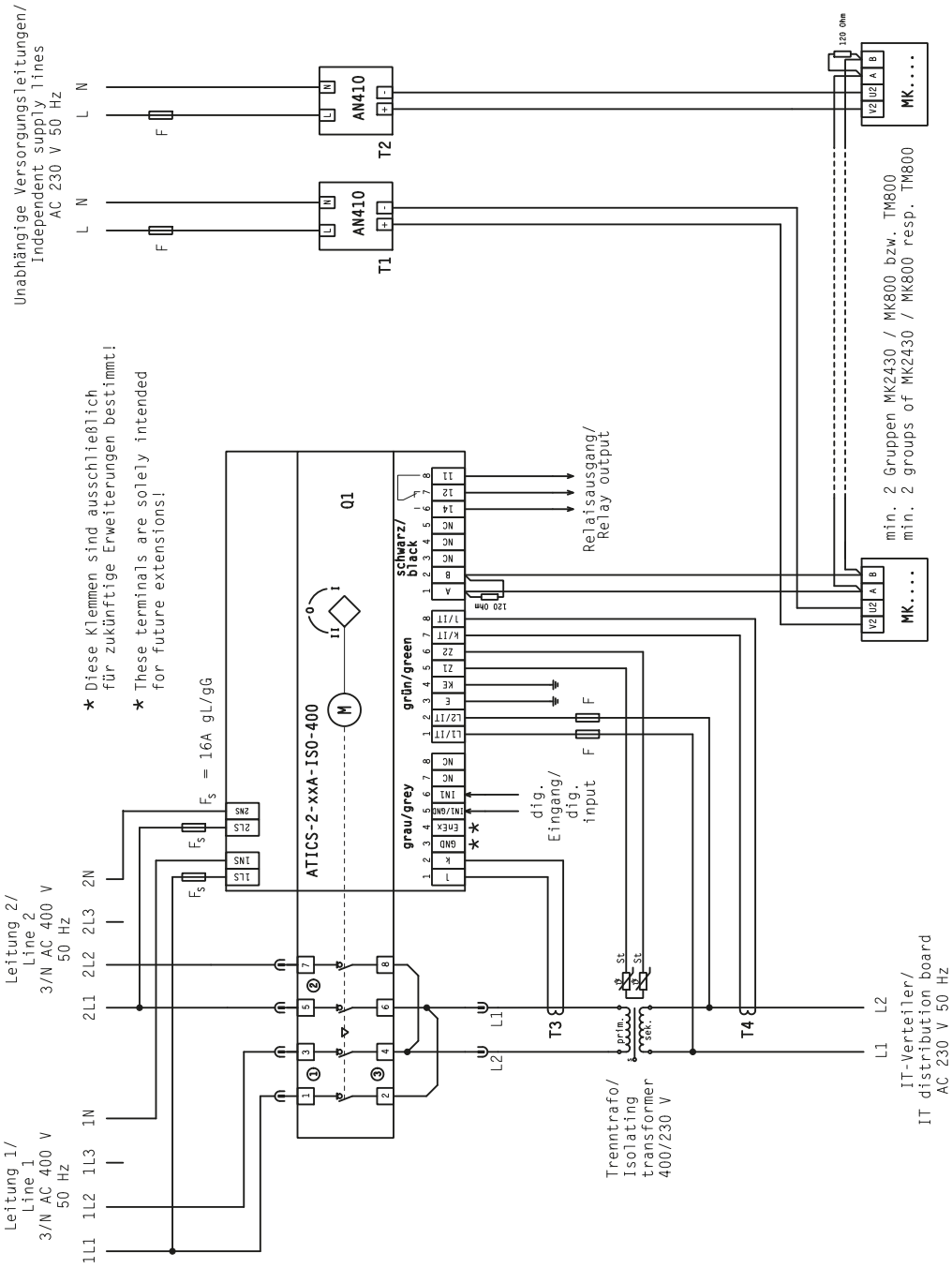
Risk of destruction if connected incorrectly

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

CAUTION

Risk of ineffective voltage monitoring

ATICS® must be supplied directly from the connected line as represented below (not from a different phase). If this is not observed, the voltage monitoring does not function.



4.2.7 Instructions for connection

4.2.7.1 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.

4.2.7.2 Temperature sensors

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

4.2.7.3 BMS bus

Ex works, the 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.

4.2.7.4 MK… alarm indicator and test combination and TM… alarm indicator and operator panels

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

- Showing alarms from the ATICS® transfer switching device
- Mutual monitoring for failure
- Testing ATICS® functions: starting insulation monitoring, load current measurement and temperature monitoring and display the results

4.2.7.5 SCADA systems (Supervisory Control and Data Acquisition)

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

- 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.

4.2.7.6 Insulation fault locator EDS151 (optional)

The EDS151 insulation fault locator is used in conjunction with the ATICS® transfer switching 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 ATICS® and evaluates them accordingly.
Several EDS151 insulation fault locators may be used simultaneously.

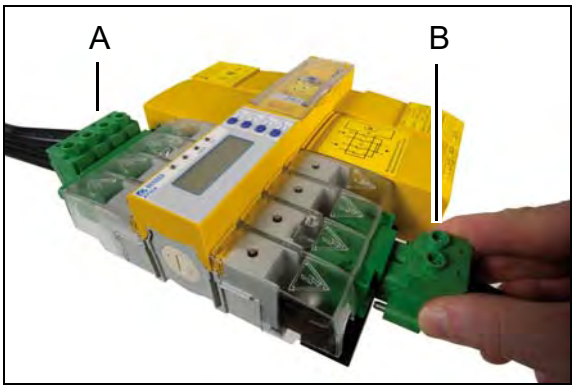
4.2.7.7 Bypass switch (optional)

The ATICS-BP-… bypass switch makes it possible to test and replace ATICS® without interrupting the power supply to the line downstream of the transfer switching device. Adjusting the settings: see "Operation with bypass switch" on page 88.

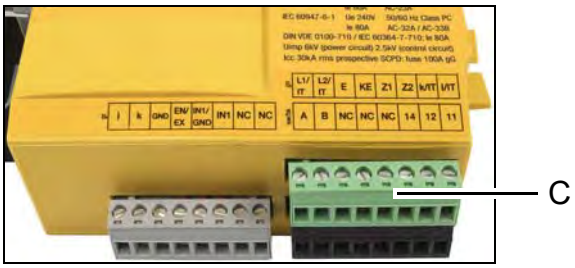
4.2.8 Fastening, inserting and securing connections

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

- Connect the lines 1, 2 and 3 to the plug connectors (A, B). Consider a 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 (≤ 25 mm²) or 4.5 Nm (≥ 25 mm²).
- Connect the three connector plugs (C) with a slotted screwdriver of 2.5 x 0.4 mm. Stripping length: 7 mm. Tightening torque: 0.22…0.25 Nm.



Insert bottom green plug connector (B) and secure with mounting screws. After that, insert top green plug connector (A) and secure with mounting screws.



Insert the three connector plugs (C).

ATICS…400 only: Plug connector into upper part of the enclosure (opposite side of (C)).

4.3 Other functions

4.3.1 Sealing the transparent cover of the transfer switching device



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

4.3.2 Manual mode

CAUTION

Risk of injury from rotating Allen key

When the transparent cover is closed, ATICS® is in automatic mode. ATICS® detects this by means of the button being pressed under the transparent cover. When the transparent cover is opened, the button is no longer pressed and 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.



Manual mode can be enabled in the following ways:

- Open the transparent cover
- Set the digital input. "M/A" function must be set (see "Settings menu 6: Digital input" on page 72).





Manual mode:

- Put the handle on the Allen key
- Use the Allen key to change over
- The switching device can be held in switch position "0" and locked with a padlock.

4.3.3 Locking the transfer switching device with a padlock

It is only possible to lock the selector 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″)

Locking the transfer switching device:



1. Pull out locking device
2. Thread in padlock and close it

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

CAUTION

Risk of erroneous measurements
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 one insulation monitoring device should be connected on each interconnected IT system!

CAUTION

Risk of missing or false messages on the display on MK..., TM... or FTC...
MK… alarm indicator and test combinations, TM... alarm indicator and operator panels or BMS Ethernet gateways COM465…, which, together with ATICS®, are connected to a BMS bus must be loaded 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 ATICS® because the text modules required for ATICS® are not integrated yet. These devices must either be updated or replaced.
The TMK-SET configuration software must also be the latest version.

CAUTION

Risk that ATICS® does not switch
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-powered power supply.
Set the delay time t(start) on the devices in such a way that after voltage recovery the devices switch to the preferred supply one by one.

- Observe the relevant standards and regulations for installation and connection as well as the operating manual of the respective device.
- Provide at least two places for MK… alarm indicator and test combinations or TM… alarm indicator and operator panels. These panels display messages from the ATICS® automatic transfer switching 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. nurses' station)
  - Technical area
- Provide a fail-safe power supply for the MK… or the TM…
- The TM... and MK... for the medical and technical area must be supplied with power from different lines and sources.
  Example:
  The MK… or the TM… in medical locations is supplied from line 3 of the transfer switching device. The MK… in technical areas is supplied from a fail-safe line backed up by battery.

5.1.1 Configure MK… or TM…

Configure MK… or TM… 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.

MK… or TM… must display at least the following faults detected by ATICS®:

- Failure line 1, failure line 2
- Device error, device failure ATICS®
- Failure of the other MK… or TM…
- Insulation fault, overload, overtemperature
- Optional: EDS channels with circuit and/or room name
- Device error with complete text or error code

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

BMS channel	Entry in the menu 1.Alarm/meas. values	Description	Operational status 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 switching back interlocking function	Return transfer delay time is enabled, counting backwards or switching back interlocking function	Seconds	---	---
5	5. Auto mode	Manual/Automatic mode	---	Manual mode	---
6	6. Status	e.g. device error	---		Error code (see chapter "8.1.2 ")
7	7. I(3):35A	Load current TN system	Current	Current	Connect. fault CT
8	8. Digital Input	Digital 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	Connect. fault CT
11	11. Temperature	Transformer temperature	---	Temperature	---
12	12. Fault locat.: --	EDS control	---	(EDS start)	---

** Message dependent on the parameter assignment in the "Settings menu 1: Changeover" -> "System" (for details see "Settings menu 1: Changeover" on page 66)*
*** Message dependent on the input parameter assignment (for details see "Messages for alarm on the digital input" on page 43)*

Messages for alarm on the digital input
The following operational status and alarm messages may appear depending on the settings in the "Settings menu 6: Digital input":

Menu setting	Function of digital input	Alarm on BMS bus	BMS channel
off	Digital input switched off	No alarm	-
M/A	Enabling manual mode	Alarm "Manual mode"	5
Bypass	Bypass enabled	Alarm "Manual mode"	5
no2->1	Enable switching back interlocking function	Operational status 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
R-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 verifications on electrical installations.
- If you notice changes on ATICS®, you must immediately start checking the transfer switching device.

Heed the alarms on the transfer switching device. 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 failure) 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 ≤ 0.5 s and switching back to the preferred supply within 10 seconds on voltage recovery.

The response delay t(on), the dead time t(0), the delay on release t(off) and the return transfer delay time t(2->1) of 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 changeover devices. If the current monitoring (short-circuit detection) is deactivated in the menu "Settings" > "Current", an additional short-circuit current calculation and configuration of the response time t(on) is required.

- The total turn-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(on)
- If several automatic transfer switching devices are connected in series in a power supply system, it is recommended that they are time-graded.
  Setting: Response delay t(on), return transfer delay time t(2->1) and delay on release t(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(on), dead time t(0) and return transfer delay time t(2->1).

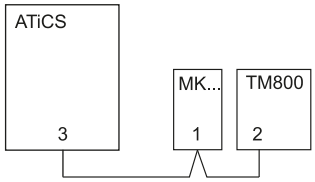
The factory settings and system-specific settings of the ATICS® transfer switching device are documented on the checklist. Please carry out all the work outlined in the list and log each test step.

Keep the checklist with this manual near to the device.

5.3 Addressing examples

Insert 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 malfunctions and must not be used. Please note the information in the "BMS bus" manual.

An automatic transfer switching device with one MK… and one TM…

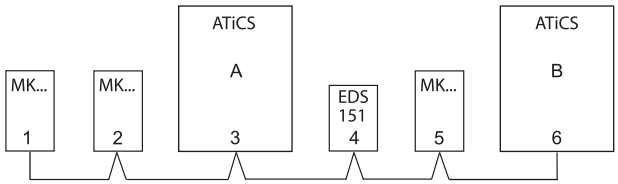


Device	Parameter	Address settings for an automatic transfer switching device
ATICS®	Bus address	3
MK…	Address	1
	Test address	3
	Alarm address	3, 2*
TM800	Address	2
	Test address	3
	Alarm address	3, 1*

* *These alarm addresses are used for MK… or TM… to monitor one another for device failure.*

Two automatic transfer switching devices

- one with an insulation fault locator
- with two alarm indicator and test combinations each
- and one central monitoring



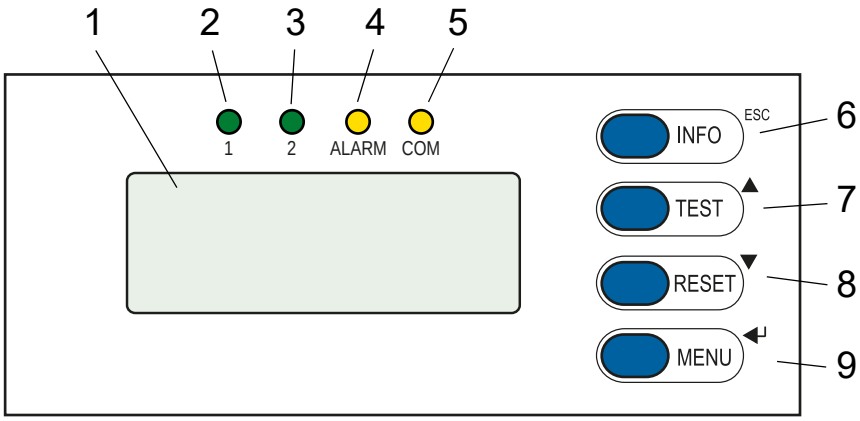
Device	Parameter	Address settings
ATICS® for area A	Bus address	3
First MK… (Central monitoring)	Address	1
	Test address	3, 6
	Alarm address	2*, 3, 4**, 5, 6
Second MK… for area A	Address	2
	Test address	3
	Alarm address	1*, 3, 4**
EDS151	Bus address	4
ATICS® for area B	Bus address	6
MK… for area B	Address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

* *These alarm addresses are used for alarm indicator and test combinations to monitor one another.*
** *Program individual alarms for each EDS channel.*

6. Operation

This chapter can also be used as a quick reference guide by technical operating personnel.

6.1 Operating and display elements



LED and LCD

1	Illuminated graphic LCD
2	LED "1" lights up when line 1 is ready
3	LED "2" lights up when line 2 is ready
4	LED "Alarm" lights up when there is an alarm message
5	LED "COM" flashes during communication via the BMS bus

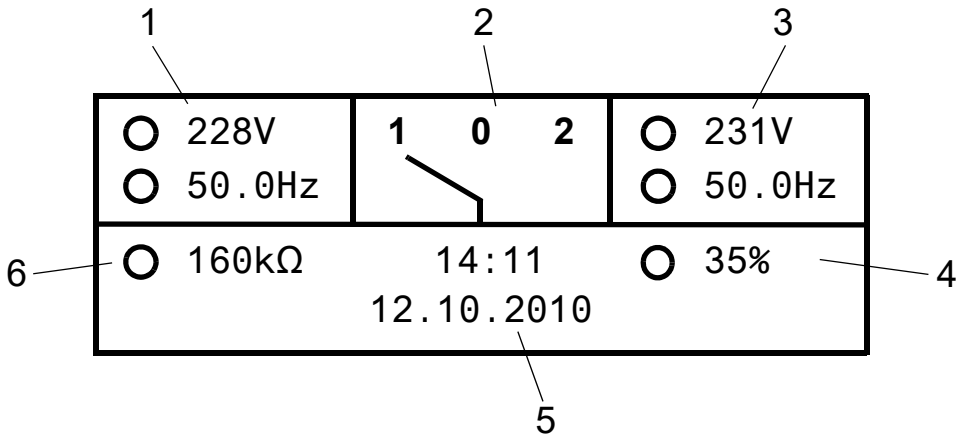
The buttons have the following functions:

6	"INFO" ESC	Calls up standard information Exits the menu function without changing parameters
7	"TEST" ▲	Calls up test menu Parameter changes, scrolling
8	"RESET" ▼	Resets alarm and fault messages, unlocks switching back interlocking function Parameter changes, scrolling
9	"MENU" ↵	Toggles between the standard display, alarm display and "MENU" Confirms parameter changes (Enter button)

6.2 Quick reference guide

6.2.1 Display under normal operating conditions

There is no alarm message. The LCD shows the standard information.
Example:



Legend

1	Line 1: Measured values of mains voltage and frequency
2	Switch position of the 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	Date and time
6	Measured value of insulation resistance

The device shows the alarm status for each measured value

○	No alarm
●	Alarm

Alternative displays in the bottom line of the display

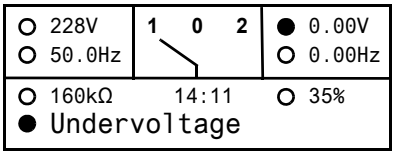
The device displays alarm messages in the bottom line of the display. Also shown there are:
- Switching back interlocking function
- Manual mode
- Countdown timer for return transfer time

6.2.2 Display during fault condition

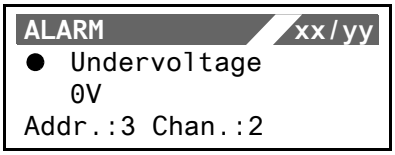
There is an alarm message.

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

Example: Line 2 has no voltage



- Press the button "↵" to display the current alarm.



  - Line 1: ALARM
    xx = Serial number of the displayed alarm
    yy = Number of pending messages
    Use the arrow buttons "▲, ▼" to select the previous or next message.
  - Line 2: Alarm status and alarm text
  - Line 3: Measured value
  - Line 4: Address and channel of the device triggering the message

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

The alarm text displayed in case of failure of one line depends on the setting "System" in the "Settings menu 1: Changeover" on page 66.

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

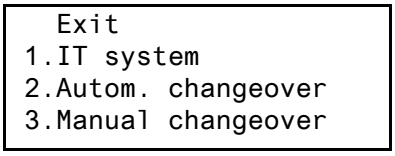
- Press "↵" again, then the main menu will appear.

6.2.3 Test function

A test is used to test the functioning of the device. There are several ways to call up a 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 in the Control menu

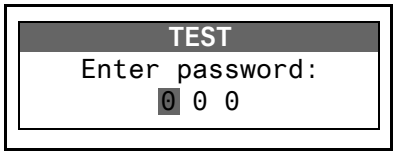
A test of the changeover function can also be triggered via a digital input (function similar to "Manual changeover"). Test menu:



Select:

Menu item	Function	Page
1. IT system	Tests the integrated insulation monitoring device (insulation resistance, load in %, overtemperature)	51
2. Autom. changeover	Test of the changeover function. Switches back automatically after time t(test).	52
3. Manual changeover	Test of the changeover function. Switches back after pressing the "RESET" button.	52
4. Last switch	Save last changeover as test	53
5. Generator	Start generator without changing over. Terminate test by pressing the "RESET" button.	54
6. Test communication	Test communication via the BMS bus. To do this, simulate an alarm and send an alarm message via the BMS bus.	54

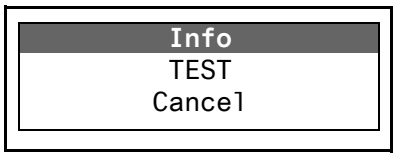
Test menus 2…4 are protected by a password (see Settings-> Password -> Test). Password protection is only effective if the password has been enabled (switched on). When an attempt is made to open one of these menus, the password entry screen appears automatically:



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 a gateway (COM465…, CP700, …).*

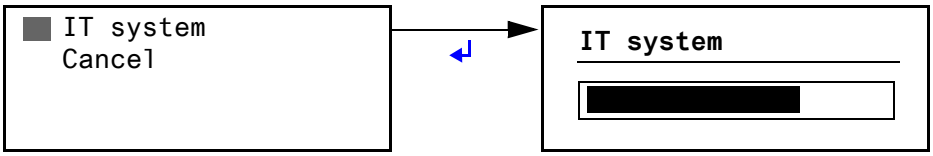
If manual mode is selected for changeover (transparent cover open or digital input set to "manual changeover") then no changeover can take place under the test menu "Autom. changeover" or "Manual changeover". ATICS® then displays the following fault alarm:



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

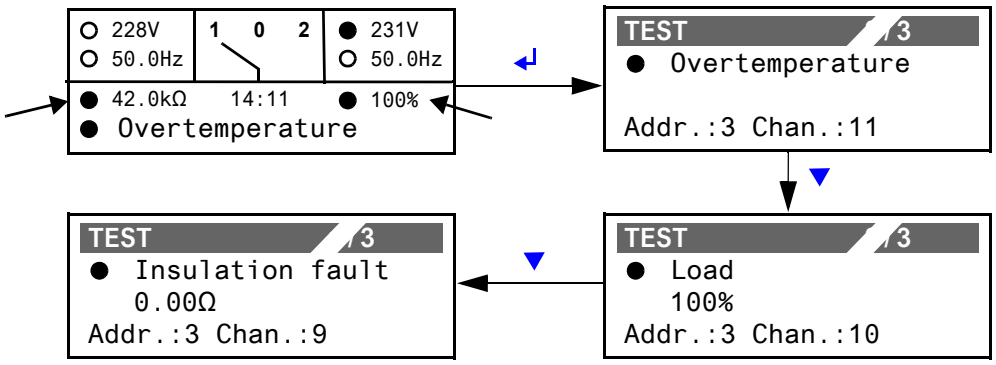
During an "Autom. changeover" or "Manual changeover" test, the changeover period t(1->2) is displayed. This is the time required for changing over from the preferred line to the redundant line. This time may differ from the return transfer time! Also refer to "Time diagram: Changeover between the preferred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

6.2.3.1 Test menu 1: IT system

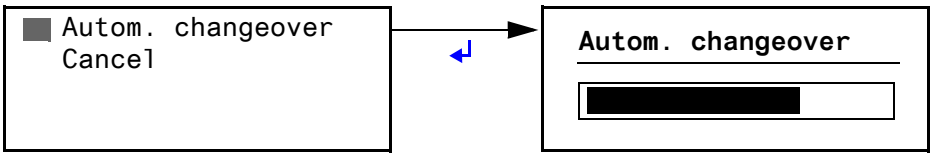


IT system	Tests the integrated insulation monitoring device (insulation resistance, load in %, overtemperature). The progress of the test is shown on the display.
Cancel	Back to test menu

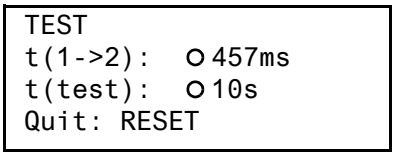
Press the "ESC" button to leave the test function and then "Enter" to display the simulated measured values. These are available alarm messages for a few seconds after the test. The messages from this test are also stored in the history memory.



6.2.3.2 Test menu 2: Autom. changeover

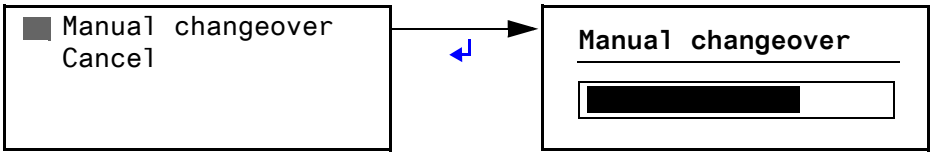


Autom. changeover	Test of the changeover function. The device changes to the redundant line. The changeover period t(1->2) is displayed. After the set time t(test) has elapsed, the device changes back to the preferred line.
Cancel	Back to test menu

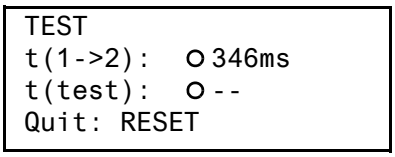


The date of the test is saved in the test data logger to remember the next test once the test interval has elapsed. The messages from this test are also stored in the history memory.

6.2.3.3 Test menu 3: Manual changeover



Manual changeover	Test of the changeover function. The device changes to the redundant line and remains in this switch position. The changeover period t(1->2) is displayed. The device does not change back to the preferred line until the "RESET" button has been pressed.
Cancel	Back to test menu



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

CAUTION

Risk that the test is accidentally not terminated

If the test menu 3: "Manual changeover" is left after changing over to the redundant line, then ATICS® remains in this switch position and in "TEST" mode.

- Wait until "Quit: RESET" appears on the display.

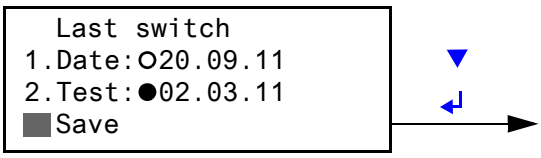
- Press the "RESET" button.

- Check whether ATICS® has changed to the preferred line.

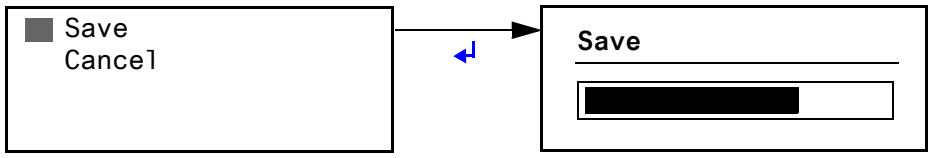
Manual mode aborts manual test
When the transparent cover is opened after changing over to the redundant line, ATICS® switches to manual mode. The test will be aborted.
After closing the transparent cover, ATICS® switches back to the preferred line.
***No** entry will be made in the test data logger.*

6.2.3.4 Test menu 4: Last switch

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

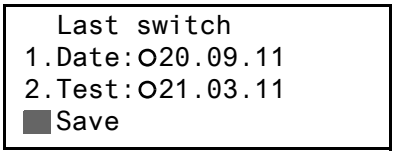


1. Date	Date of the last changeover
2. Test	Date on which the next test is due
Overwrite	Date of last changeover is saved as a test date



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

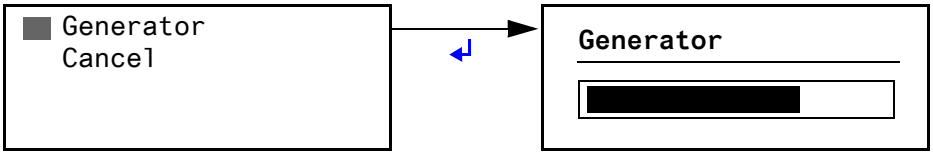
After saving, the date on which the next test is due is counted up by the test interval (in this case, 6 months).



The date of the test is saved in the test data logger to remember 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.

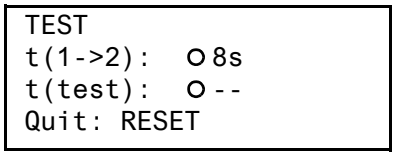
6.2.3.5 Test menu 5: Generator

Executing this function makes sense only when a generator is connected to the redundant line and the associated settings have been carried out (see "Settings menu 1: Changeover" on page 66). To avoid voltage interruptions, in the test menu "Generator", 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 turned off again until the "RESET" button has been pressed. The progress of the test is shown on the display.

Cancel — Back to test menu



The messages from this test are also stored in the history memory. The date of the test is saved to remember the next test once the test interval has elapsed.

WARNING

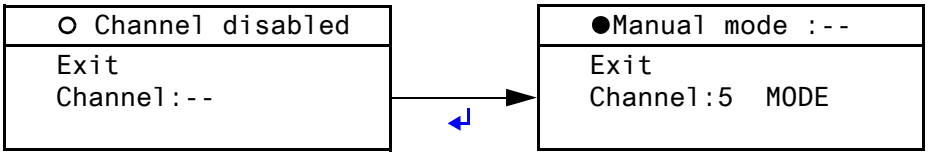
Risk that the generator test is accidentally not completed
If the test menu 5: "Generator" is left after the generator has started, then ATICS® remains in this switch position and in "TEST" mode. This means that the generator is not switched off.
- Wait until "Quit: RESET" appears on the display.
- Press the "RESET" button.
- Check whether the generator is switched off.

6.2.3.6 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 setting. 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 O (no alarm) to ● (alarm). If the alarm status ● is not displayed, then the settings made for ATICS® will not permit simulation of this alarm.

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



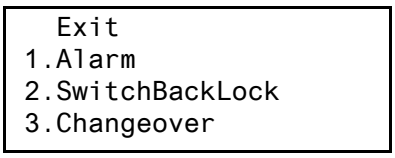
ATICS® stays in this menu until it is exited by pressing the "ESC" button. During this time, all the alarms on the BMS bus have the word "TEST".

Only the alarm messages listed in the following table can be simulated: "ATICS® messages on the BMS bus (channel use)" on page 42.

6.2.4 Reset function

A RESET is used to reset the alarm and fault messages for the device and for reactivating the switching back interlocking function of the changeover switch. There are several ways to call up a test menu:

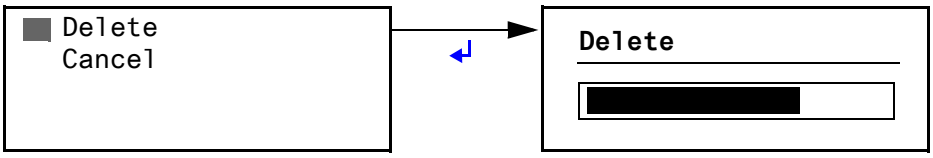
- Select standard display and then press the "RESET" button on the front panel of the device for at least one second.
- Select the "RESET" function from the Control menu. Reset menu:



Select:

Menu item	Function	Page
1. Alarm	Resets alarm and fault messages on the device.	56
2. SwitchBackLock	Reactivates the switching back interlocking function for the changeover function. The device changes back to the redundant line.	56
3. Changeover	Change alarm value for the: - 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	57

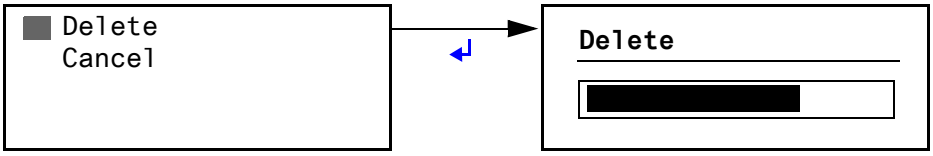
6.2.4.1 Reset menu 1: Alarm



Delete	Resets 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	Back 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 in the history memory. The "ALARM" LED is still lit.

6.2.4.2 Reset menu 2: SwitchBackLock



Delete	Cancels the switching back interlocking function for changeover. The progress of the test is shown on the display. The device changes back to the redundant line.
Cancel	Back to reset menu

There are different possibilities to deactivate the switching back interlocking function via a 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". A test must be allowed (menu "Settings > Interface > Test > On").*

6.2.4.3 Reset menu 3: Changeover

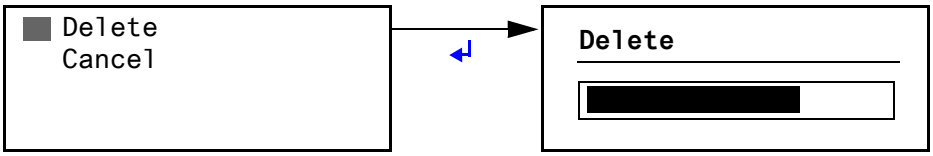
ATICS® monitors the parameters important for its service life. On reaching the set limits, the unit displays an alarm message. Replacement of the device must be initiated. During the period until it is replaced the annoying alarm can be "deleted" by increasing the limits.

WARNING

Once the stipulated service life has been exceeded, safe operation of the transfer switching device is not guaranteed!
Fatigued components can fail. Replace the device as soon as possible.

Menu	Meaning
Exit	Exit "Changeover" reset menu; go up one menu level
1. O Changeover: xxx	Number of changeovers performed
2. Alarm:O 8000	Alarm value for maximum number of changeovers performed*
Delete	Increase alarm value by 500 changeovers
4. O In operation: xxh	Operating hours counter (h=hours, d=days, mo=months)
5. Alarm: O 120mo	Alarm value for maximum number of operating hours*
Delete	Increase value by 200 days (this is only possible when the alarm value is already exceeded)
7. O Changeover I>: 0	Number of changeovers performed which were carried out with overcurrent or short-circuit current (see also "Menu 2: Changeover" on page 62)
8. Alarm:O1	Alarm value for maximum permitted number of changeovers performed which were carried out with overcurrent or short-circuit current*
Delete	Increase alarm value by 1 changeover

** for functional safety*



Delete — Set new alarm value. Cancel alarm.
Cancel — Back to reset menu

7. Menu mode: Operation and setting

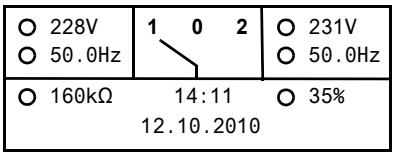
7.1 Switching on and calling up the main menu

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

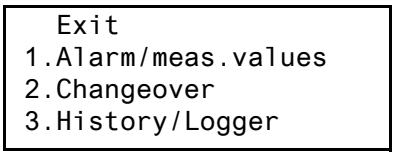


If the device has been without power for several days, the time and date must be reset.

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



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



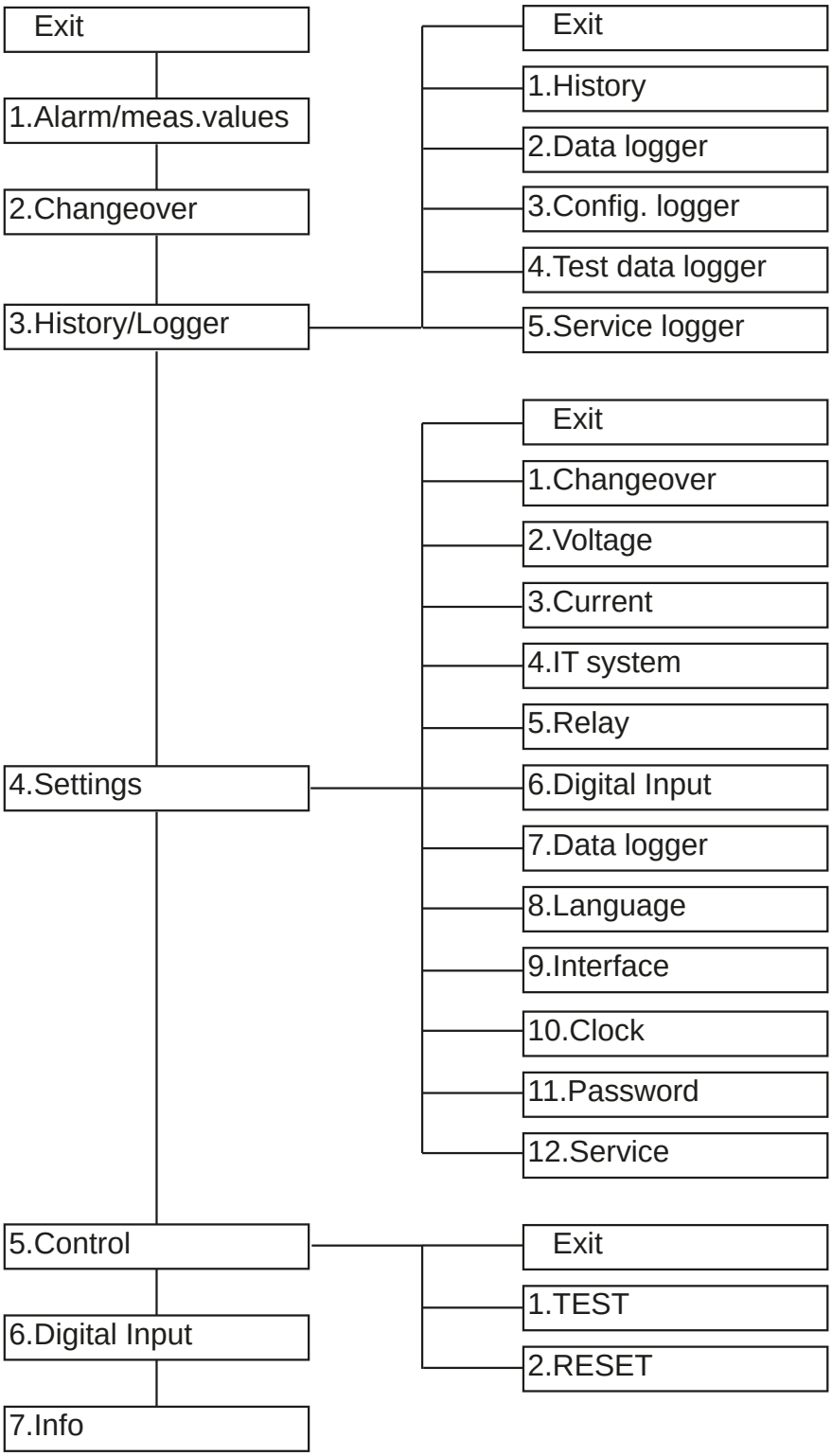
The following buttons can be used in the main menu:

▲, ▼	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 Main menu functions

Menu item	Function	Page
Exit	Exit menu mode	
1. Alarm/meas.values	Displays saved status messages, alarm messages and measured values	62
2. Changeover	Displays information on the changeover function (number, test)	62
3. History/Logger	Displays the history memory, data logger, config. logger, test data logger and service logger	63
4. Settings	Various settings for this device	65
5. Control	Run TEST and RESET for this device	79
6. Digital Input	Display voltage level of the digital input	79
7. Info	Display information on device type and firmware versions	79

7.3.1 Menu 1: Alarm/meas.values

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

Menu	Meaning
Exit	Exit "Alarm/meas. values" menu; go up one menu level
1. O Line 1: 228V	Line 1: Measured value mains voltage
2. ● Line 2: 183V	Line 2: Measured value mains voltage
3. O Position:1	Switch position of the transfer switching device
4. O t(2->1):-- or 4. O SwitchBackLock	Return transfer delay time is enabled, seconds counting backwards or Switching back interlocking function enabled
5.O Auto mode	O Automatic mode or● manual mode
6. ● Status	Device error (e.g.: no BMS bus master present)
7. O I(3):35A	Load current on the TN system or "No CT connected" fault
8. O Digital Input:--	Alarm digital input 1 (see "Settings menu 6: Digital input" on page 72)
9. O Insulation:155kOhm	Measured value of insulation resistance
10. O Load: 55%	Display of the load in the IT system in %. The maximum load current is adjustable. If a "No CT connected" or "Short circuit CT" fault occurs, it will be displayed here.
11. ● Temperature	Overtemperature
12. O Faultlocat.:---	EDS, Start
13. O Line 1: 50.0Hz	Line 1: Measured value frequency
14. O Line 2: 50.0Hz	Line 2: Measured value frequency

All messages (with the exception of Measured value frequency) are also available on the BMS bus (also refer to "Messages with error code or service code" on page 82).

7.3.2 Menu 2: Changeover

Displays information on the changeover function (number, test). The device shows the alarm status for each menu item: O = No alarm, ● = Alarm

Menu	Meaning
Exit	Exit "Changeover" menu; go up one menu level
1. O Changeover: xxx	Number of changeovers performed

Menu	Meaning
2. O In operation: xxh	Operating hours counter (h=hours, d=days, mo=months)
3. O 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.
4. O TEST: dd.mm.yy	Date for next test (changeover)
5. O Service: dd.mm.yy	Date for next service
6. O TEST: dd.mm.yy	Date of the last test (TEST) or the last changeover (LAST SWITCH).

7.3.3 Menu 3: History/Logger

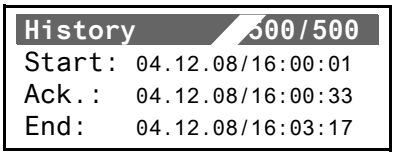
The device saves the history of alarm messages, measured values, settings, tests and servicing activities in different memories (logger).

See the technical specifications for information about the maximum number of events which can be saved. Once the maximum number of events which can be saved is reached, the latest event is written over the oldest entry (Entry 1).

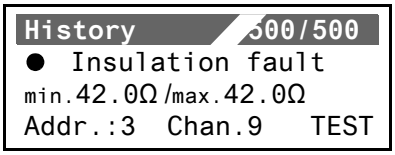
Menu item	Function
Exit	Exit "History/Logger" menu; go up one menu level
1. History	The "History" menu provides information about alarm messages and tests performed. It also indicates whether an alarm is still pending or when it was acknowledged by pressing the "mute" button on a TM... alarm indicator and operator panel or an MK… alarm indicator and test combination.
2. Data logger	Displays the history of measured values: Voltage line 1, voltage line 2, switch position of the transfer switching device, load current in the TN system downstream of the transfer switching 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): Internal 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, refer to "Settings menu 5: Relay" on page 71.
4. Test data logger	Displays the history of the tests carried out: date, time and changeover period. Also refer to "Time diagram: Changeover between the preferred and the redundant line" on page 19.
5. Service logger	Displays the history of the service activities carried out: Date, time and service codes. Meaning of the displayed service code: see table "Messages with error code or service code" on page 82.

7.3.3.1 Operating example: History

1. Use the arrow buttons to select the entry you require. 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). The table on the following page contains information about other possible displays.



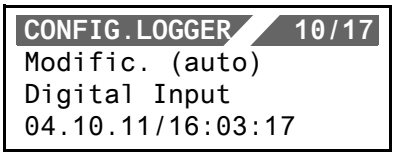
3. Press the "↵" to return to entry selection.

Repeat these operating steps for all messages you need. Then press "ESC" to exit the menu.

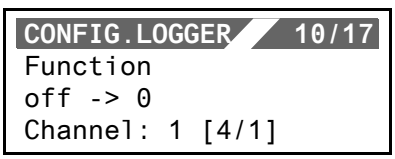
The message "TEST" appears in the last line of the history memory alarm text display: Note that the current history memory entry was created as the result of a test initiated on this device.

7.3.3.2 Operating example: Config.logger

1. Use the arrow buttons to select the entry you require. In this case: The settings for the digital input are changed here.

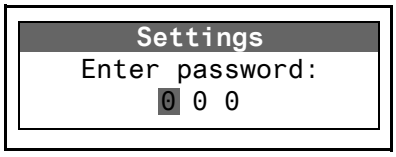


2. Press "↵" to call up the additional text for the selected entry. The function of the digital input has been changed from "off" to "0". The last line contains an identification code for the type of modification (in this case: [4/1]). Channel 1 means that the first digital input has been changed. Please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



7.3.4 Menu 4: Settings

The setup menus are protected by a password (see Settings-> Password -> Settings). Password protection is only effective if the password has been activated (enabled). When an attempt is made to open one of the setup menus, the entry screen for entering the password appears automatically:



Once a valid password has been entered, full access will be granted to all setup menus (except the "Service" menu) until menu mode is exited.

The following menu items are available for configuring the device:

Menu item ATICS-2-ISO	Function	Page
Exit	Exit "Settings" menu; go up one menu level	
1. Changeover	Adjusting settings for changeover switch	66
2. Voltage	Adjusting settings for voltage monitoring	68
3. Current	Adjusting settings for current monitoring (short-circuit detection)	69
4. IT system	Adjusting settings for IT system monitoring (monitoring of the insulation resistance and the isolating transformer's load and temperature)	70
5. Relay	Setting mode of operation and function of alarm relay	71
6. Digital Input	Setting operating behaviour of the digital input	72
7. Data logger	Adjusting settings for data logger	74
8. Language	Selection of the operating language for the device (English, German or French)	75
9. Interface	Setting the BMS bus address of this device, Allow settings to be changed via the interface, Allow a test to be carried out via the interface.	75
10. Clock	Setting 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 or TM… alarm indicator and operator panel) synchronises all other devices every hour.	76
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	77
12. Service	These settings can only be made by authorised Bender service personnel. Retrieve information about the device status, enter settings for special operating conditions and execute a firmware update.	78

7.3.4.1 Settings menu 1: Changeover

The times set in this menu determine the timing of a changeover. Also note the time charts on page 19 et seq.

The following settings for the changeover are available:

Menu	Meaning
Exit	Exit settings menu "Changeover"; go up one menu level
1. t(start)	Delayed switch-on after total 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
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	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 power supply- Safety power supply source The setting also influences the creation of the alarm text which is displayed in case of voltage failure on a line: **Setting** **alarm text** 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 *Explanation of abbreviations:* *AV = Normal power supply source* *SV = Safety power supply source* *UPS = Special safety power supply source* *BSV = Battery-supported safety power supply*

Menu	Meaning
6. SwitchBackLock	on Switching back interlocking function is switched on off Switching back interlocking function is switched off Also refer to "Time diagram: Changeover between the preferred and the redundant line" on page 19.
7. Prefer.supply	1 Line 1 2 Line 2 In generator mode, Line 1 is always the preferred line. **Note: A parameter change may cause an immediate changeover.**
8. Test interval	Interval for testing the changeover function: Setting range: off, 1…24 months Resolution of setting: 1 month
9. Reminder	Warning time for test interval: Setting range: off, 1…30 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…30 days Resolution of setting: 1 day
12. t(Gen.Start)	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(Gen.Max)	Maximum generator start time. Monitoring whether the generator starts (time to "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 changing 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

7.3.4.2 Settings menu 2: Voltage

In this menu, you can adjust settings for monitoring the voltage 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 change-over to line 2 follows. ATICS® returns to line 1 if the voltage on line 1 exceeds the preset value (in this case 184 V): plus the selected 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 a voltage for one line

```
  Voltage:      2
  Exit
1.Undervolt.:    184V
2.Overvoltage:   250V
```

Setting a voltage for both lines

```
  Voltage:      1..2
  Exit
1.Undervolt.:    184V
2.Overvoltage:   250V
```

Adjusting the settings:

Menu	Meaning
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*

** *Also note the time charts on page 19ff.*

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 device (TN system). The current is detected via a measuring current transformer (T3 in the connection example).

Menu	Meaning	
Exit	Exit settings menu "Current"; go up one menu level	
1. Mode	on off	Current monitoring is switched on Current monitoring switched off
2. CT	STW3 STW4	Bender measuring current transformer STW3 Bender measuring current transformer STW4
3. CT monitor	on off **Note:** External interference from loads can cause false tripping. In this case, the function has to be deactivated.	CT connection monitoring is switched on CT connection monitoring switched off

7.3.4.4 Settings menu 4: IT system

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

Menu	Meaning
Exit	Exit settings menu "IT system"; go up one menu level
1. Insulation	Setting range: 50…250 kΩ Resolution of setting: starting at 5 kΩ
2. CT	Measuring current transformer T4 in the connection example STW2 Measuring current transformer STW3 Measuring current transformer SWL Split-core type measuring current transformer
3. CT monitor	on CT connection monitoring is switched on off CT connection monitoring switched off **Note:** External interference from loads can cause false tripping. In this case, the function has to be deactivated.
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
7. t(off)	Delay on release load: Setting range: 0 s…100 s Resolution of setting: 1 s
8. Temperature	on Temperature monitoring is switched on off Temperature monitoring switched off
9. Fault locat.	off Insulation fault location switched off auto Insulation fault location switched on. **Note:** This function is only possible if a suitable master (e.g. MK2430, TM800, COM465…) is connected via the BMS bus.
10. IT system	230 Nominal voltage of the IT system being monitored: 230 V 115 Nominal voltage of the IT system being monitored: 115 V

7.3.4.5 Settings menu 5: Relay

In this menu, you adjust settings for the mode of operation and function of the relay output (alarm relay) of ATICS-2-ISO. The function can be set for the relay as follows: alarm message, operational status message, generator start. This setting has an influence on the following menus.

If "Alarm" is set and then "Line 1: on" is selected, the relay will switch when line 1 has failed. If "Active" is set and then "Line 1: on" is selected, the relay will switch when line 1 is in operation. The setting "on" can be selected for several menus simultaneously. The relay switches when at least one of the conditions is met.

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

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	Meaning	
Exit	Exit settings menu "Relays"; go up one menu level	
1. Function	ALARM	Relay switches if at least one of the following menus 3…12 is set to "on" and the associated alarm message appears.
	Active	Relay switches if at least one of the following menus 3…10 is set to "on" and the associated alarm message does **not** appear (operational status 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. **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.
	GenSt	Relay is used as a generator start relay
2. Relay mode	N/O	N/O operation. Relay only switches in the event of an alarm.
	N/C	N/C operation. Relay only switches in the event of an alarm.
	N/O-T	N/O operation. Relay switches in the event of an alarm or a test.
	N/C-T	N/C operation. Relay switches in the event of an alarm or a test.
3. Line 1	on off	Line 1
4. Line 2	on off	Line 2
5. Manual mode	on	Relay switches in manual mode (transparent cover open or digital input "Manual mode" selected).
	off	
6. Device error	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, test due, service due.
	off	
7. Test interval	on off	Relay switches when a test is due (interval elapsed).

Menu	Meaning	
8. Service interv	on off	Relay switches when service is due (interval elapsed).
9. Digital input	on off	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.
10. Insulation	on off	Insulation fault
11. Load	on off	Overload on the IT system
12. Temperature	on off	Overtemperature on the IT system transformer

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

7.3.4.6 Settings menu 6: Digital input

In this menu, you can adjust settings for the mode of operation and function of the digital input. The digital input is galvanically 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".

By selecting the function of the digital input, the recommended response value is automatically adjusted:
- Test, H/A,1, 0, 2 (switch positions) 24V (cannot be changed)
- no2->1, 1<->2, bypass, alarm and R-OPL 0 V (can be changed)
The "Bypass" setting can only be changed temporarily for test purposes. After restarting ATICS® this setting returns to "0 V"!

Adjusting the settings:

Menu	Meaning
Exit	Leave the "Digital Input" settings menu; go up one menu level
1. Function	**Note:** **A parameter change may cause an immediate changeover.** off — Digital input switched off M/A — Manual/Automatic. Manual mode means that automatic changeover can no longer take place. Bypass — Alarm "Manual mode", but TEST changeover possible no2->1 — Switching back interlocking function. After changing over to line 2, the changeover switch remains in this switch position. It waits there even when line 1 returns. It does not switch back to line 1 until the digital input is no longer set, line 2 fails or the "RESET" button is pressed. The display shows the operational status message "SwitchBackLock". 1<->2 — Changing the preferred line TEST — A test changeover is carried out. In generator mode, the generator start relay is also switched. The test is terminated 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. R-OPL — Generates an alarm "Insulation fault, operating theatre lights". Other functions as for the "ALARM" setting.
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: 100 ms…100 s Resolution of setting: starting at 50 ms
4. t(off)	Delay on release: 100 ms…100 s Resolution of setting: starting at 50 ms

7.3.4.7 Settings menu 7: Data logger

The settings for six data loggers of the device are adjusted in this menu. These data loggers (see "Menu 3: History/Logger" on page 63) 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 chip

The service life of the 300 memory locations of the EEPROM memory is limited to about 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 one change to the measured value is saved every minute, then the service life is increased to 57 years. Select the settings in the "Data logger -> "Modific." settings menu in a way that frequent saving over longer periods of time can be avoided.

To protect the memory module, a minimum limit threshold of 10 A for the load current is incorporated in the data logger for the TN system and a minimum limit threshold of 20 % 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 chip only when this limit threshold is exceeded.

Selecting a data logger:

1. Use the "▲" arrow button to go to the data logger setting. Press the "↵" button.
2. Use the arrow buttons to select a data logger (e.g. 1) 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
```

Adjusting settings and deleting data loggers:

Menu	Meaning
Exit	Exit settings menu "Data logger"; go up one menu level
1. Modific.	Once the measured value is changed according to the set % value, a new measured value is saved to the data logger. Setting range: 0 … 100 % Resolution of setting: 1 %

Menu	Meaning	
2. Overwrite	yes	Once the maximum number of measured values which can be saved is reached, the current measured value overwrites the oldest entry.
	no	Once the maximum number of measured values which can be saved is reached, no further measured values are saved.
3. Delete	Delete	Delete data logger
	Cancel	Do not delete data logger

7.3.4.8 Settings menu 8: Language

Selecting the language for the menus and the messages to be displayed (alarm and operational messages) on the device.

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

7.3.4.9 Settings menu 9: Interface

Setting the device address for 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 the address 1 (master). All other devices are addressed in consecutive order: 2,3,4…. There should be no gaps between the addresses. Only in this way the functionality of the system can be ensured.

Menu	Meaning	
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 the interface (e.g. an Ethernet gateway COM465…)
	off	Do not allow settings to be changed via the interface
3. TEST	on	Allow a test to be carried out via the interface (e.g., an Ethernet gateway COM465…)
	off	Do not allow a test to be carried out via the interface

Menu	Meaning
4. Failure monitoring	on Indicates when communication with the BMS master has not been detected (anymore). off The presence of a BMS master is not monitored. This setting is required when ATICS® is used as a "Stand-alone" device without BMS master. **DANGER** ***When this setting is selected, the conditions for functional safety (SIL2) are no longer met.*** **WARNING** *No EDS functionality is possible if this settings has been selected.* **CAUTION** *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.*

7.3.4.10 Settings menu 10: Clock

This menu is used to set the date and time for indication on the "History/Logger" menu. The time setting is synchronised via the BMS bus. The device with address 1 (MK800, MK2430 or TM…) synchronises all other devices every hour.
The time setting for ATICS® is required in that rare case when no BMS bus is used. In this case, ATICS® shows 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).

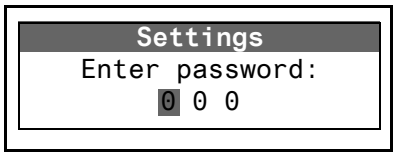
Menu	Meaning
Exit	Exit settings menu "Clock"; go up one menu level
1. Format	d.m.y German format (day.month.year) m-d-y American format
2. Date	Setting the date (e.g. dd.mm.yyyy)
3. Time	Setting the time (hours and minutes)

7.3.4.11 Settings menu 11: Password

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

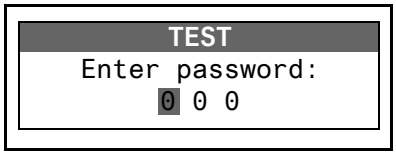
Menu	Meaning
Exit	Exit settings menu "Password"; go up one menu level
1. Settings	Change the password for the "Settings" menu, switch the password "on/off". Factory setting: Password: 000 Status: off
2. TEST	Change the password for the "TEST" menu, enable/disable password. Factory setting: Password: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

Changing the password menu "Settings"

Menu	Meaning
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	Enable the password protection for the "Settings" menu on: Password protection is enabled. When an attempt is made to open one of the setup menus, the entry screen for entering the password appears automatically:  Once a valid password has been entered, full access will be granted to all setup menus (except the "Service" menu) until menu mode is exited. off: Password protection is disabled.

Changing the password menu "TEST"

Menu	Meaning
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

Menu	Meaning
2. Status	Enable or disable the password protection for the "TEST" menu 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:  off — Password protection is disabled.

7.3.4.12 Settings menu 12: Service

Only Bender service personnel are authorised to make settings in the Service menu. It is only accessible to 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 overall system:

Menu item	Function	Page
Exit	Exit "Control" menu; go up one menu level	
1. TEST	Call up test, see chapter "6.2.3 Test function"	50
2. RESET	Call up a reset, see chapter "6.2.4 Reset function"	55

7.3.6 Menu 6: Digital input

This menu indicates the voltage level of the digital input.

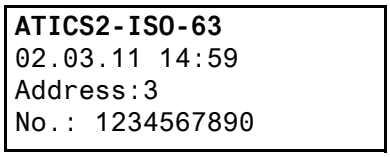


Exit "Digital Input" menu; go up one menu level.
O -- The digital input is switched off
O 0V Example: The response condition is not met. The input has not been set. The set function will not be carried out.*
● 24.0V Example: The response condition is met and the response delay has elapsed. The input has been set. The set function will be carried out.*

* Whether the input is set to 0 V or 24 V depends on the set response value (see "Settings menu 6: Digital input" on page 72).

7.3.7 Menu 7: Info

This menu displays information about the device and the software. Use the "▼" button to scroll all the information. Please have this information to hand if you need to contact us for assistance 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 ATICS® 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	- 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)	
insulation fault	IT system has insulation fault	- 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.	- Check setting for transformer load current. - Switch off any loads that are not urgently needed. - Separate connection between k or l and PE.
Overtemperature	Temperature on the IT system transformer is too high	- Switch off any loads that are not urgently needed.
No CT connected	Short circuit or interruption of connecting wire has been detected: Measuring current transformer STW2 (T4), isolating transformer load, channel 10:	- 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	- Check connection of ports L1/IT, L2/IT to the IT system. - Check voltage in the IT system
Connection earth	Connection to PE interrupted Impermissible connection Z1 or Z2 to PE	- Check that the E and KE are connected to the protective earth conductor by two separate lines. - Check 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 changeover switch defective. The fault can also be caused by an (impermissible) connection between GND, k or l and PE.	- Replace ATICS®. - Separate connection between GND, k or l and PE.
Overcurrent I(3)	Overcurrent detected by measuring current transformer STW3	- Eliminate cause of overcurrent. - Eliminate any damage.
No CT connected	Short circuit or interruption of connecting wire has been detected. Measuring current transformer STW3, channel 7	- 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	- Check BMS bus connection cable. - Check whether the master has failed or whether its address has changed. If the device is operated without BMS bus the "Failure monitoring" (see "Settings menu 9: Interface" on page 75) must be deactivated.
Service: __ (date)	Reminder for next service	- Agree date with Bender service.
Functional test: __ (date)	Reminder for next test	- Plan date for test. - Run test.
Manual mode	Message "Manual mode" although manual mode has not been activated	- Check the connections of the digital input.
Error during the changeover process	Occurs when the test set-ups do not supply sufficient current for switching the coils of ATICS®.	- 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.	- Contact Bender service.
3.11	Maximum number of operating hours exceeded.	- Plan device replacement. Alarm can be acknowledged (see "Reset menu 3: Changeover" on page 57).

Error code/ service code	Description	Action
3.12	Maximum number of changeovers exceeded.	- Plan device replacement. Alarm can be acknowledged (see "Reset menu 3: Changeover" on page 57).
3.13	Changeover due to overcurrent or short circuit detected. These changeovers reduce the life of the device. Currents which are measured in excess of 130 times the rated current are evaluated as overcurrents or short-circuit currents.	- Have personnel assess the short-circuit load. Contact Bender service. Alarm can be acknowledged (see "Reset menu 3: Changeover" on page 57).
3.5	Service has been carried out. This is not a fault message. Only displayed in the service logger menu.	- No action required.
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.	- Replace device immediately.
8.21 … 8.30	Fault ISOMETER® or monitoring of the transformer.	- 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.	Diagnostic: - 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.	- 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	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 ATICS®. Can also be caused by missing or improperly installed bridge on the output side. The fault can also be caused by an (impermissible) connection between GND, k or l and PE.	- Check connection of the bridge on the output side, if necessary, retighten 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) ≥ 160 ms. - Separate this connection

If a fault occurs, proceed as follows:

1. Activate manual mode, if necessary.
2. Make a note of what happened prior to the fault: operator inputs, device error messages, ambient conditions, etc.
3. Keep the article and serial number of the device to hand.
4. Speak to Bender Service, describe the type of fault and quote 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 configured to "Generator" for the redundant line on settings menu 1 "Changeover", then the coil test will only be run for line 2 when line 2 has a voltage.
When the "TEST -> Generator" is run, the coil test is carried out for line 2 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 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 ATICS®. Excessive temperature (and the associated message "Overtemperature") can be avoided when the devices which 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 ATICS® features different evaluating circuits.

Why doesn't ATICS® display the pre-set time?
The time of ATICS® is set by the BMS bus master.
The time for ATICS® only is required in that rare case when no BMS bus is used. In this case, ATICS® shows 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 deactivated in the menu "Settings > Interface > Failure monitoring" (see page 75).

ATICS® does not change 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 ATICS® change over. The time delay can be due to the following reasons:

- ATICS® is just switching. The adjusted time delay in switch position "0" (dead time) takes several seconds (see "Settings menu 1: Changeover" on page 66)
- ATICS® has just been supplied with voltage. After the expiry of the time delay, ATICS® will be 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® can – like many Bender devices – be monitored and configured by means of a Bender gateway CP700, COM46x… etc. The gateways are operated via a web user interface which is represented by means of an Internet browser.

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

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

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

9. Periodic verification and service

9.1 Periodic verification

The following periodic verification must be performed on electrical installations in compliance with the local or national regulations that apply.

Action	To be performed by	Interval
Functional test of IT system monitoring (insulation, load current, transformer temperature and connection monitoring) by pressing the TEST button on the alarm indicator and test combination or on the alarm indicator and operator panel.	Medical personnel	Once every working day (recommended by Bender)
Functional test of the transfer switching device*: Functional test of the automatic transfer switching device	Bender service or electrically skilled person	Every twelve months/ every six months**
Functional test of the IT system monitoring (insulation, load current, transformer temperature and connection monitoring) on the monitoring device.	Bender service or electrically skilled person	Every twelve months/ every six months**
Test the set values and the changeover periods	Bender service or electrically skilled person	Every 12 months
Test of the automatic transfer switching device, the IT system monitoring, and the connection to the SCADA system (Supervisory Control and Data Acquisition) (if applicable) and the interaction between the components in the system. The test encompasses the following: - Inspection: Labels, display elements, mechanical components, wiring, torque settings, parameter settings, connection third-party equipment, evaluation of fault memory - Measurement: Internal/external supply voltages/potentials, bus voltage, bus protocol, bus scan - Testing: Device function, device communication - Documentation: Test results, recommendations for eliminating defects	Bender Service	Every two years (recommended by Bender)

* *This test must only be performed by an electrically skilled person who has been appointed to do so in agreement with the medical locations concerned.*

** *Time interval according to DIN VDE 0100-710 (VDE 0100 Part 710):2012-10: 12 months.*
Time interval according to DIN VDE 0100-710 (VDE 0100 Part 710):2002-11: 6 months.
Thereby the minimum requirements are satisfied.
Bender recommends a monthly test to ensure that the operating personnel is familiar with the testing procedure in the event of a fault.

With all the tests, follow the instructions for carrying out functional tests on the checklist in the appendix of this manual. If no local/national directives apply, you should at least perform periodic verification as recommended by DIN VDE 0100-710 (VDE 0100 Part 710).

9.2 Maintenance

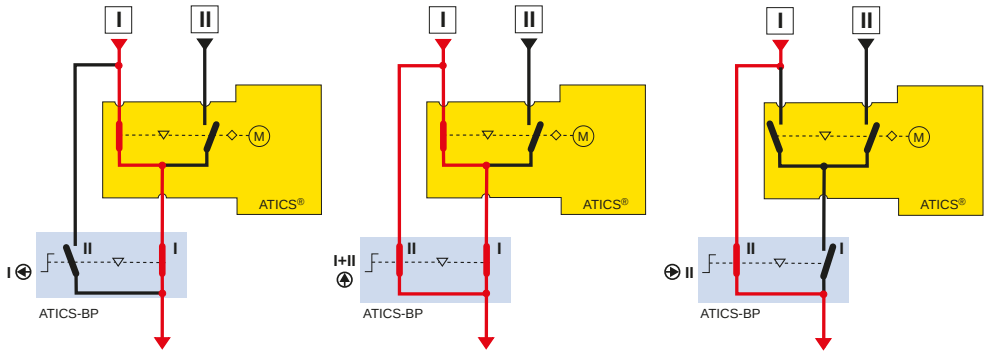
The ATICS® system does not contain any parts that must be maintained. Despite this, the intervals specified for periodic verification should be adhered to. We also recommend regularly checking the Allen screws at the ATICS® and the Torx® screws of the connectors on the incoming and outgoing lines of 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

ATICS-BP-… bypass switch makes possible parallel supply from Line 3. ATICS® can be connected in any way or replaced without interrupting the power on Line 3.



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.

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.

WARNING

Risk of short-circuit of the "Enable Bypass" light is ignored.
If ATICS® is not on the line to which the bypass switch is connected, it is possible for a short-circuit to 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 has to be manually switched to position "0" or "I" by means of the Allen key. Only after doing this, the bypass switch can be set to position "I" while the clear cover (manual mode) is open. Afterwards, the clear cover can be closed to activate the automatic mode. If the clear cover is closed before, the ATICS® device switches automatically to line 2.

Conditions for operation with the bypass switch

- Wiring must be carried out according to "Connection example: ATICS® with bypass switch" on page 33.
- The following settings are to be set in the "Settings menu 6: Digital input" menu:
  - 1. Mode: Bypass
  - 2. Resp. value: 0 V
  - 3. t(on) response delay: 100 ms
  - 4. t(off) delay on release: 100 ms

WARNING

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.
Plug must not be touched unless the part is isolated.

9.5 Replace ATICS®

The plug connectors make it easy to replace the device if

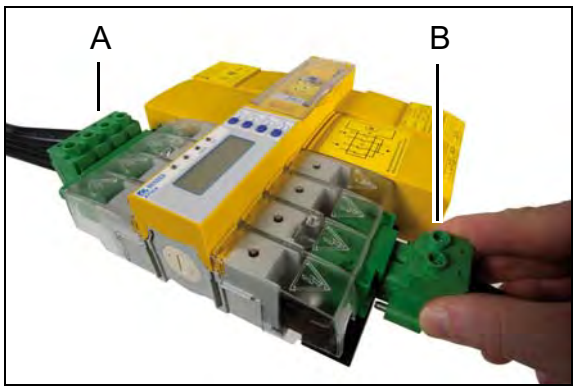
- ATICS® has reached the end of its useful life or
- an event has occurred which jeopardises safety: e.g. overvoltage, switching if there is a short-circuit or component failure.

DANGER

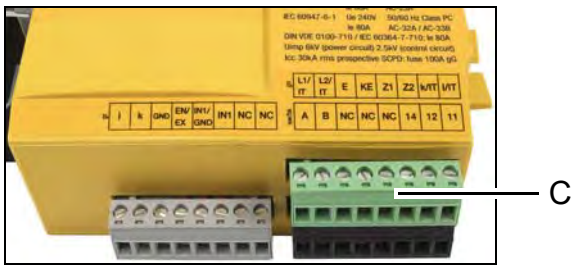
Risk of fatal injury from electric shock
Touching live parts of the system carries the risk of electric shock.
Before fitting the device and prior to working on the device connections, make sure that the power supply has been disconnected.
If ATICS® is bypassed by an ATICS-BP-… bypass switch, then the regulations which apply to working on live parts must be followed.

9.5.1 Removing the existing ATICS®

1. Record settings on the existing ATICS®.
   The settings should match the entries on the checklist (see checklist in the appendix of this manual or, if necessary, update checklist).
2. Make device dead or switch on bypass switch. Switch existing ATICS® to manual mode and switch to switch position "0" (see "Connecting ATICS® safely" on page 30).
3. Remove connections



Undo the mounting screws on the upper green plug connector and remove the connector (A). When this has been done, undo the mounting screws of the lower green plug connector and remove the connector (B).

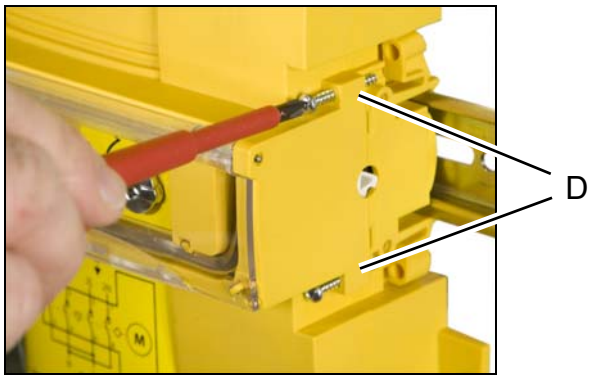


Remove the three connector plugs (C).

ATICS…400 only: Plug connector into upper part of the enclosure (opposite side of (C)).

4. Remove ATICS®

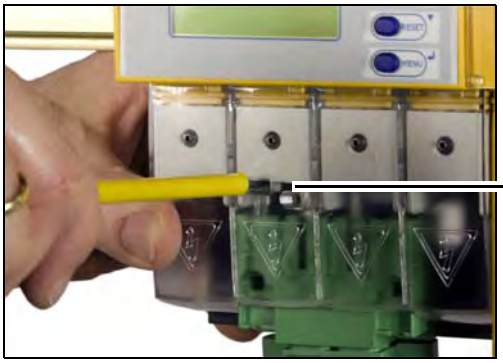
Removing ATICS® from rail mounting

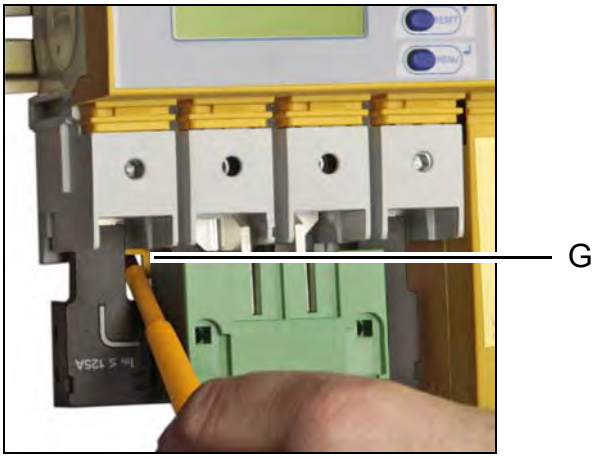


Undo screws (D).



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





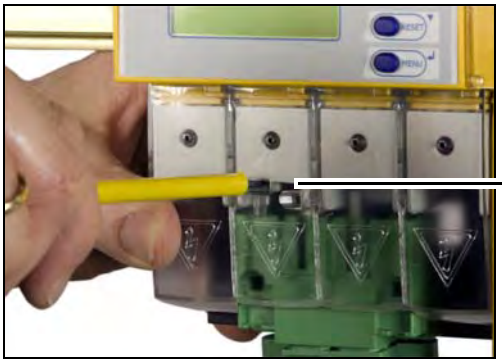
Use a screwdriver to pull the lower yellow slide lock (G) downwards and raise the ATICS® slightly from below.

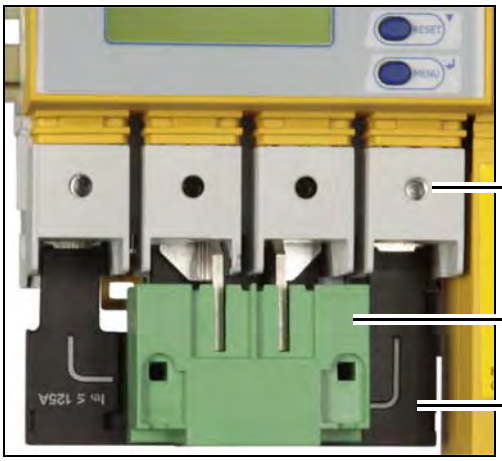
Now use the screwdriver to pull the upper yellow slide lock upwards and remove ATICS®.

Remove ATICS® from screw mounting



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





Undo the Allen screws of the terminals (F).

Remove the green connectors (G) top and bottom.

Remove the black bridge (H) bottom.

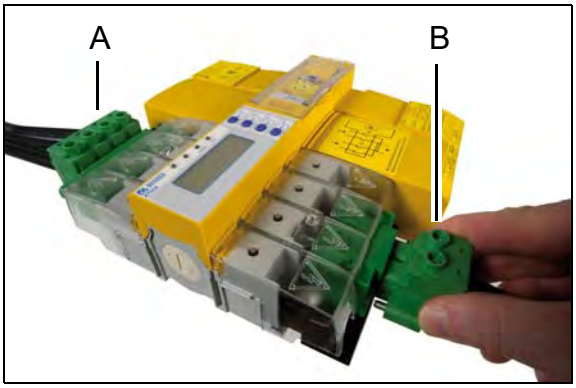
Undo mounting screws and remove ATICS® from the mounting plate.

9.5.2 Installing a new ATICS®

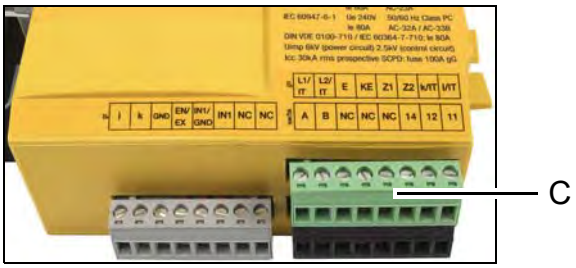
1. Install ATICS®:

- "Mounting on DIN rail" see page 26
- "Screw mounting on plate" see page 27

2. Connect ATICS®



Insert bottom green plug connector (B) and secure with mounting screws. After that, insert top green plug connector (A) and secure with mounting screws.



Insert the three connector plugs (C).

ATICS…400 only: Plug connector into upper part of the enclosure (opposite side of (C)).

3. Switch on voltage.
4. Adjust ATICS® according to the checklist and check for operation (see checklist in the appendix of this manual).
5. Disable bypass switch.

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

Rated operational voltage U_e ..... AC 50 . . . 60 Hz, 230 V
Supply voltage U_S ..... see ordering information
Power consumption at 63 A ..... ≤ 16 W
Power consumption at 80 A ..... ≤ 28 W
Current during the changeover process ..... 17 A/< 30 ms

Power section/switching elements

Nominal system voltage U_n ..... refer to ordering details
Frequency range f_n ..... 48 . . . 62 Hz
Crest factor ..... ≤ 1.2
Number of switching cycles (mechanical) ..... ≥ 8000
Short-circuit currents ..... refer to table "Short-circuit currents"
Short-circuit current I_{cc} and fuses ..... refer to table "Utilisation category acc. to DIN EN 60947"

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 %

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 mm² ..... 0 . . . 1 m
Single wire, twisted ≥ 0.75 mm² ..... 1 . . . 10 m
Shielded cable ..... 10 . . . 40 m
Cable: twisted pairs, shield to terminal 1 at one end, must not be earthed .... recommended: J-Y(St)Y min. n x 2 x 0.8

IT system monitoring

Insulation monitoring

Nominal system voltage (operating range) ..... 80 . . . 275 V
Measuring range ..... 10 kΩ . . . 1 MΩ
Measurement method ..... AMP (adaptive measuring pulse)
Response value R_{an1} (ALARM 1) ..... 50 . . . 250 kΩ
Relative uncertainty ..... ±15 %
Hysteresis ..... ≤ 25 %
Response time t_{an} at $R_F = 0.5 \times R_{an}$ and $C_e = 1$ µF ..... ≤ 5 s
Measuring voltage U_m ..... DC 12 V
Measuring current I_m (at $R_F = 0$ Ω) ..... ≤ 53 µA
Internal resistance R_i ..... ≥ 240 kΩ
Impedance Z_i ..... ≥ 220 kΩ
Internal resistance/impedance during test ..... ≥ 100 kΩ
Permissible extraneous DC voltage U_{fg} ..... ≤ DC 370 V
Permissible system leakage capacitance C_e ..... ≤ 5 µF
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 ..... ±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 mm² ..... 0 . . . 1 m
Single wire, twisted ≥ 0.75 mm² ..... 1 . . . 10 m
Shielded cable ≥ 0.5 mm² ..... 10 . . . 40 m
Cable: twisted pairs, shield to terminal 1 at one end, must not be earthed .... recommended: J-Y(St)Y min. n x 2 x 0.8

Temperature monitoring (IT system transformer)

Response value ..... 4 kΩ
Relative uncertainty ..... ±10 %
Release value ..... 1.6 kΩ
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
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 data logger ..... 100 data records
Service logger ..... 100 data records

Input

Digital inputs 1
Galvanic separation ..... yes
Control ..... via potential-free contacts
Mode of operation ..... 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 ..... switching back interlocking function, manual/automatic mode, bypass mode, functional test, changeover to the preferred line, alarm input for operating theatre lights, alarm input for other devices

Output

Switching element ..... 1 potential-free changeover contact
Mode of operation adjustable ..... N/O or N/C operation
Adjustable function ..... see "Settings menu 5: Relay" on page 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 φ=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 (twisted pairs, shielded, shield connected to PE on one side) ..... recommended: J-Y(St)Y min. n x 2 x 0.8
Terminating resistor ..... 120 Ω (0.25 W)
Device address, BMS bus ..... 2 . . . 90

Environment/EMC

EMC ..... EN 61326 (see CE declaration)
Classification of climatic conditions according to IEC 60721:
Stationary use (IEC 60721-3-3) ..... 3K5 (except condensation and formation of ice)
Transport (IEC 60721-3-2) 2K3
Long-term storage (IEC 60721-3-1) 1K4
Operating temperature ..... -25 . . . +55 °C
Classification of mechanical conditions acc. to IEC 60721:
Stationary use (IEC 60721-3-3) 3M4
Transport (IEC 60721-3-2) 2M2
Long-term storage (IEC 60721-3-1) 1M3

Terminals

Power section

Connection directly on 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 terminals
Conductor cross section, rigid min./max. ..... 1.5/35 mm²
Conductor cross section, flexible min./max. ..... 1.5 mm²/25 mm²
Conductor cross section AWG/min./max. 20/2
Stripping length (without 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 (Allen 5 mm) ..... approx. 6 Nm

Electronics

Connection ..... screw 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
DIN rail mounting 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} at 40 °C	63 A	80 A
Current rated as conditional short-circuit with fuse gG DIN Conditional short-circuit current I_{cc} (kA eff.) Associated fuse rating (A)	 30 80	 30 100
Current rated as conditional short-circuit with circuit breaker that ensures tripping in less than 0.3s Current rated as short-time withstand I_{cw} 0,3 s (kA rms)	 7	 7
Short-circuit operation (switch only) Current rated as short-time withstand I_{cw} 1 s (kA rms) Rated peak withstand current I_{cm} (kA peak)	 4 17	 4 17

Utilisation category 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	63 A	63 A	63 A	63 A	63 A
ATICS-2-80A-ISO	80 A	80 A	80 A	80 A	80 A

10.2 TÜV test report according to VDE0100 Part 710

Technischer Bericht
Elektrische Sicherheit
Sichtprüfung

Industrie Service

Mehr Sicherheit. Mehr Wert.

TÜV SÜD Industrie Service GmbH – Westendstr. 199 - 80686 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

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
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
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 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 Ergebnis auch auf diese Variante zu übertragen. **(weitere wichtige Hinweise siehe Bericht)**

Datum: 19.12.2013

Unsere Zeichen:
IS-EG1-MUC/geb

Dokument:
Bender_ATICS-ISO_131114_Funktionsbewertung-Teil 710-2012_SUE-Rev01.doc

Das Dokument besteht aus 4 Seiten.
Seite 1 von 4

Die auszugsweise Wiedergabe des Dokumentes und die Verwendung zu Werbezwecken bedürfen der schriftlichen Genehmigung der TÜV SÜD Industrie Service GmbH.

Die Prüfergebnisse beziehen sich ausschließlich auf die untersuchten Prüfgegenstände.

München, 19.12.2013

Thomas Wurl
Niederlassung München
Abteilung Elektrotechnik

Raimund Gebhart
Der Sachverständige

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

Sitz: München
Amtsgericht München HRB 96 869
USt-IdNr. DE129484218
Informationen gemäß § 2 Abs. 1 DL-InfoV unter www.tuev-sued.de/impressum

Aufsichtsrat:
Karsten Xander (Vorsitzender)
Geschäftsführer:
Ferdinand Neuwieser (Sprecher),
Dr. Ulrich Klotz, Thomas Kainz

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Deutschland

10.3 TÜV certificate regarding functional safety



ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD Product Service

ZERTIFIKAT

Nr. Z10 15 12 77738 002

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

Fertigungsstätte(n): 77730

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 (bis SIL2)
EN 61508-2:2010 (bis SIL2)
EN 61508-3:2010 (bis 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: 2020-12-20

Datum, 2015-12-21 (Peter Weiss)

Seite 1 von 1

TÜV SÜD Product Service GmbH · Zertifizierstelle · Ridlerstraße 65 · 80339 München · Germany

TÜV®

A1 / 04.11

10.4 Standards and certifications

The transfer switching 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 Part 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*

- 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 details

Type	Description	Rated operational current I_e	Art. No.
ATICS-2-63A-ISO	Two-pole transfer switching device (U_n: AC 230 V, U_S: AC 230 V) with integrated IT system insulation, load and temperature monitoring, 1 dig. input, 1 relay output, short-circuit detection in the TN system, with sealable contact covers on the output and input side, bridges on the output side and screw terminals for all connections. Measuring current transformers STW2 and STW3.	AC 63 A	B92057202
ATICS-2-63A-ISO-400	Two-pole transfer switching device (U_n: AC 400 V, U_S: AC 230 V) with integrated IT system insulation, load and temperature monitoring, 1 dig. input, 1 relay output, short-circuit detection in the TN system, with sealable contact covers on the output and input side, bridges on the output side and screw terminals for all connections. Measuring current transformers STW2 and STW3.	AC 63 A	B92057204
ATICS-2-80A-ISO	Two-pole transfer switching device (U_n: AC 230 V, U_S: AC 230 V) with integrated IT system insulation, load and temperature monitoring, 1 dig. input, 1 relay output, short-circuit detection in the TN system, with sealable contact covers on the output and input side, bridges on the output side and screw terminals for all connections. Measuring current transformers STW2 and STW3.	AC 80 A	B92057203
ATICS-2-80A-ISO-400	Two-pole transfer switching device (U_n: AC 400 V, U_S: AC 230 V) with integrated IT system insulation, load and temperature monitoring, 1 dig. input, 1 relay output, short-circuit detection in the TN system, with sealable contact covers on the output and input side, bridges on the output side and screw terminals for all connections. Measuring current transformers STW2 and STW3.	AC 80 A	B92057205
STW2	Measuring current transformer (load current monitoring IT system)	AC 50 A	B942709
STW3	Measuring current transformer (short-circuit monitoring) for ATICS® < 100 A	AC 100 A	B98021000
SWL-100A	Measuring current transformer (load current monitoring IT system)	AC 100 A	B98021002
ATICS-BP-2-63A-SET	Bypass switch set comprising: - Bypass switch 63 A single, two-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	AC 63 A	B92057252

Type	Description	Rated operational current I_e	Art. No.
ATICS-BP-2-80A-SET	Bypass switch set comprising: - Bypass switch 80 A single, two-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	AC 80 A	B92057253
EDS151	Insulation fault locator		B9108 0101

10.6 Additional documents

- ATICS® quick-start guide "Installation and connection"
- ATICS® quick-start guide "Commissioning and operation"
- ATICS® Checklist

In addition, the following instructions apply:

- ATICS-BP-3-SET Bypass switch set for ATICS®
- STW2, STW3, STW4 Measuring current transformers
- BMS bus Bender measuring device interface
- 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

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