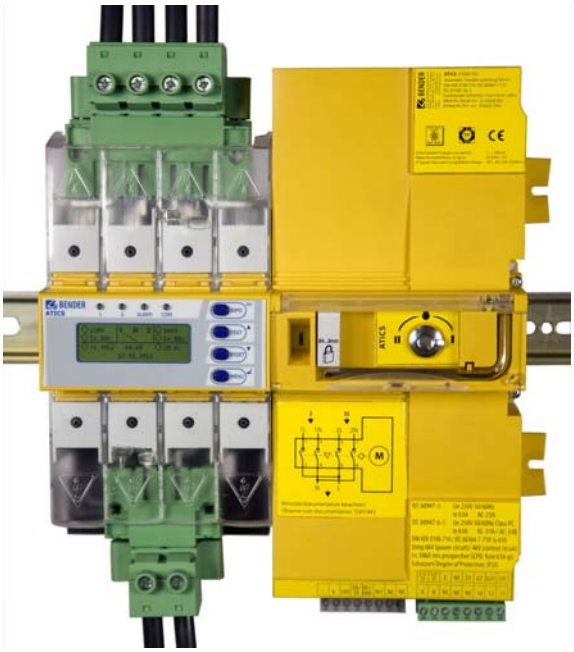
EN Manual

BENDER
The Power in Electrical Safety©

UMA710-2-...-ISO-...
UFA710-2-...



Two-pole changeover and monitoring modules with insulation monitoring and insulation fault location system for medical locations

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

UMA710-UFA710-ISO_D00191_01_M_XXEN/07.2017

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Photos: Bender archives

Table of Contents

1. Important information

1.1 How to use this manual

This manual describes how to operate changeover and monitoring modules of type UMA710-2-…-ISO-… and UFA710-2-…-ISO-…
Before using the equipment, 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 display, such as alarm indicator and test combinations MK2430-… use the terms "Line 1" and "Line 2" by default 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 807-259
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. Current dates of training courses and workshops can be found on the Internet at:
www.bender.de > 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 homepage 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.*

DANGER

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 safety rules for working on electrical equipment.*

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 changeover and monitoring module is intended for the application described in chapter "System description". When the preferred supply fails, the ATICS® automatically switches to the second supply. The areas of application are group 2 medical locations according to DIN VDE 0100-710 and IEC 60364-7-710.

Several versions of the changeover and monitoring module are available (refer to "Ordering details" on page 51). The differences between the versions are for example the load current level, a bypass switch or an insulation fault location system (refer to chapter "Tasks of the UMA710-2-…-ISO-…, UFA710-2-…-ISO-…" on page 15). Please heed the limits of the range of application indicated in the technical data.

In order to meet the requirements of applicable standards, the equipment must be adjusted to local equipment and operating conditions by means of customised parameter settings.

Intended use includes following all the instructions in the operating manual and complying with the test intervals. Any other use than that described in this manual is regarded as improper.

2.4 Device-specific safety instructions

WARNING

Failure to adjust the settings may result in malfunction
Device-specific settings are required in order to adapt the module to the existing equipment. When doing so, follow the instructions in the chapter "Commissioning, settings and testing" on page 31.

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.
Please pay special attention to the information regarding functional safety in the "ATICS-2-ISO" manual.

2.5 General safety instructions

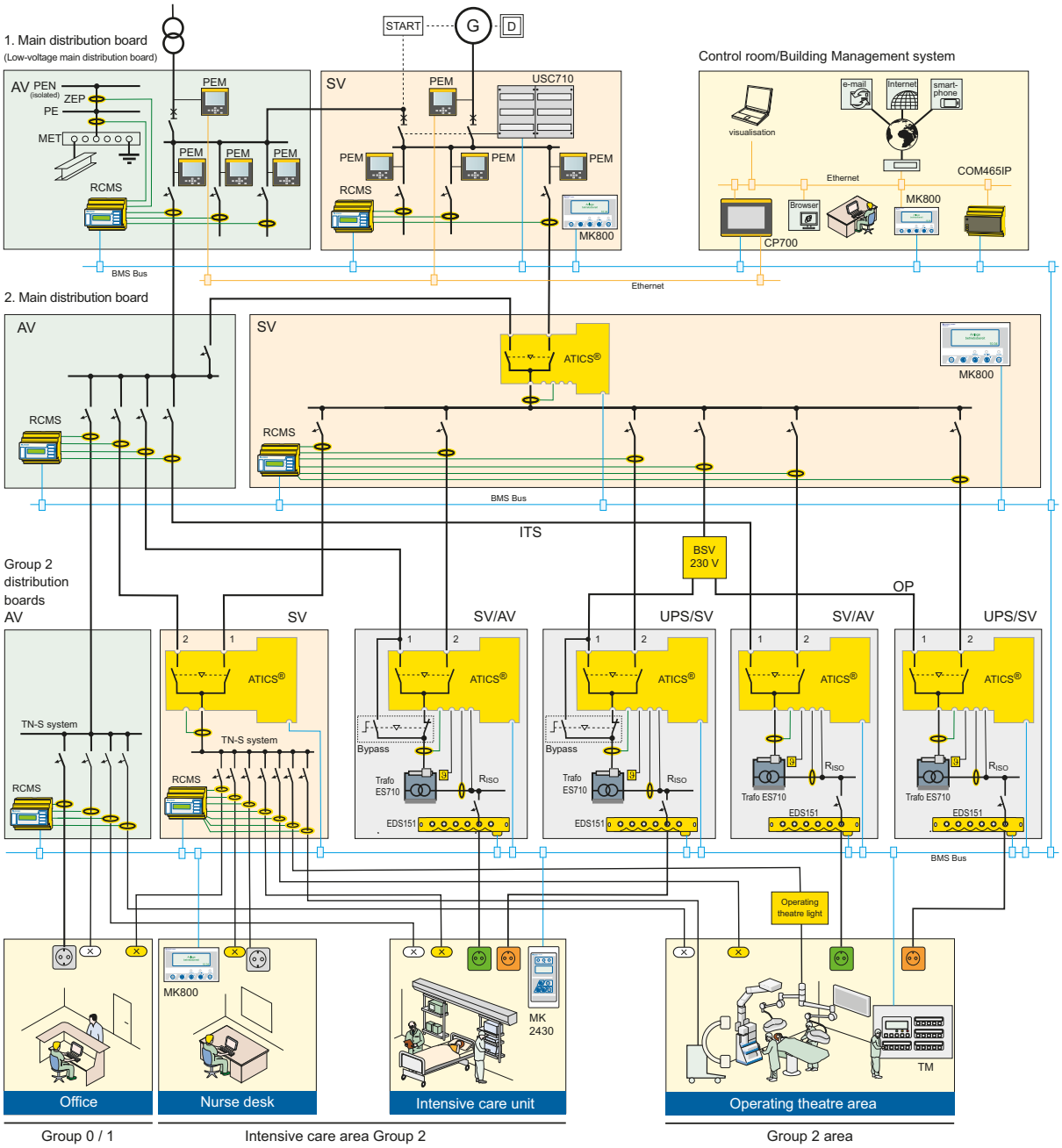
Bender devices are designed and built in accordance with the state of the art and accepted rules in respect of technical safety. However, the use of such devices may introduce risks to the life and limb of the user or third parties and/or result in damage to Bender devices or other property.

- 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 devices contained in the module must 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.

3. System description

3.1 MEDICS®

The changeover and monitoring module UMA710-2-…-ISO-… or UFA710-2-…-ISO-… is part of the MEDICS® system. MEDICS® does not refer to a single product, but rather an intelligent system for safe power supply in medical locations. Example:



This is a rough overview that requires detailed planning in any application case.

Legend of the example

HES	Main earthing terminal
SV	Safety power supply
AV	Normal power supply
PA	Equipotential bonding
ZPA	Central equipotential bonding
ZEP	Central earthing point
BSV	Battery-supported safety power supply

MEDICS® includes:

- AC and 3(N)AC changeover and monitoring modules.
  MEDICS® system modules are, for example: UMA…, UMC…, USC…, UFA…, UFC… as well as EDS… insulation fault location systems for IT systems or RCMS… for TN-S systems
- Display and operating units such as alarm indicator and operator panels or alarm indicator and test combinations.
- Communication between these components via the BMS bus (two-wire connection).
- The connection of third-party systems by means of protocol converters (gateways) via digital inputs and relay outputs.

The real strength of MEDICS® is to be found in communication between all involved components and the resulting information provided to the user. The functionality of the equipment is continuously monitored; Operating states, irregularities, faults and equipment failures are displayed. This means high operational reliability for the user.

3.2 Application examples

3.2.1 Application example operating theatre

- UMA710 module: 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

3.2.2 Example intensive care unit

UFA710 module: Changeover between the preferred and redundant line while monitoring the medical IT system with transformer load and temperature monitoring including a bypass switch
EDS151: Insulation fault locator for fast insulation fault localisation
ATICS-BP: Bypass switch for uninterrupted testing/maintenance (recommended)
MK2430/MK800/TM800: Alarm at at least two points with independent power supplies for functional safety.

3.3 Features of the UMA710-2-…-ISO-…, UFA710-2-…-ISO-…

The changeover and monitoring module has the following features:

- Continuous monitoring of the internal electronic and the circuitry with automatic alarm
- Preventive safety due to an automatic reminder of mandatory testing procedures
- Maximum reliability when switching
  - Patented switching system with mechanical and electrical interlocking
  - Short-circuit-proof contacts with the mechanic of a circuit breaker
  - Insensitive to voltage fluctuation and vibration due to stable switch position and permanent contact pressure
- Continuous load current monitoring for standard-compliant behaviour in the event of a short circuit downstream of the changeover module according to DIN VDE 0100-710
- Easy to use and with a good overview due to a clear menu structure and user interface
- The right information at the right time with clear alarm texts on a backlit graphic display as well as via the BMS bus
- Manually switchable. ATICS® can be locked in switching position "0" for maintenance to prevent a restart.
- Complete event log (switching operations, tests, parameter changes)
- Functional test or repair without operational interruptions by means of an optional bypass switch
- Compact structure of electronic and switching elements in an enclosure or on an equipment rack
- Changeover and IT system monitoring in one device
- UFA710-2-…-ISO-… only: Insulation fault location system for 6…24 outgoing circuits
- Easy wiring due to integrated structure
- The module is ready to connect, tested and mounted on an equipment rack for fast and easy installation in a distribution cabinet. The ATICS® automatic transfer switching device is pluggable.
- Communication with alarm indicator and test combinations, and TM… alarm indicator and operator panels via BMS bus
- Optional bypass switch
- Functional safety according to IEC 61508 for use in special safety environment according to SIL2

WARNING

The changeover and monitoring module is a configured unit and is only certified and tested in this assembly. Do not make any changes to the components, their password-protected settings or the wiring without consulting Bender first.
In any case, you should make the settings that are required for adaptation to the application case in question and local conditions.

3.3.1 Tasks of the UMA710-2-…-ISO-…, UFA710-2-…-ISO-…

The changeover and monitoring module has the following tasks:

- Two-pole changeover of the power supply
- Voltage monitoring on the preferred supply
- Voltage monitoring on the redundant supply

- Voltage monitoring at the automatic transfer switching device output (line 3)
- Monitoring of the changeover switch for correct switch position
- Monitoring of the load current to delay the changeover until the protective device has disconnected the short circuit.
- Internal functional testing, including checking the switching times
- Monitoring of the insulation resistance in the IT system
- Connection monitoring to the IT system (power supply and PE connection)
- Monitoring of the IT system transformer load current (connection monitoring)
- Monitoring of the IT system transformer temperature
- UFA710-2-…-ISO-… only: Detection of the faulty outgoing circuit by means of the insulation fault location system
- Communication with remote MK... alarm indicator and test combinations, and with TM… and other alarm indicator and operator panels via BMS bus
- Conformity with changeover period according to DIN VDE 0100-710
- Conformity with changeover period according to DIN VDE 0100-710 with a changeover period of less than 15 s or even less than 0.5 s

3.4 UMA710-2-…-ISO-… functionality

3.4.1 The ATICS® automatic transfer switching device

If the preferred supply fails, the 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:

I - Line 1 is switched on
0 - Both lines are switched off
II - Line 2 is switched on

Either line 1 or line 2 can be set as the preferred line.

- In the normal condition (fault-free operation) the preferred supply is connected.
  The ATICS® will switch to the redundant line if:
  - the preferred line fails
  - the "TEST" button is pressed and the test function is executed via the menu
  - a digital input is configured to "TEST" and this input is enabled
  - the setting "Preferred line" is reconfigured to the other line
- The ATICS® switches 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
    + after pressing the "RESET" button and the switching back interlocking function has been deleted via the menu
    + if 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 transfer switching device test is enabled and the test time has expired

WARNING

Failure to adjust delay times and activate short-circuit monitoring may result in malfunction.
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 the ATICS® are adjustable and must be adjusted to the requirements of the specific case, the short-circuit calculation and the requirements of DIN VDE 0100-710, section "Automatic changeover devices" (see chapter "Commissioning, settings and testing" on page 31).

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, the 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 automatic transfer switching device, the automatic 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 automatic transfer switching device switches faster than the short-circuit breaker trips. The ATICS® monitors the load current downstream of the automatic transfer switching device in order to detect a possible short circuit.
If the preferred line fails and a short-circuit current is detected at the same time, the ATICS® does not switch over immediately but only once the circuit breaker has tripped. If the ATICS® detects a supply failure or a fault, an alarm will appear 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.

Typical time diagrams of the ATICS® automatic transfer switching device can be found in the following chapters of the "ATICS-2-ISO" manual.

Chapter 3.5.1.1
Time diagram: Changeover between the preferred and redundant line
Example: Line 1 is set as the preferred line.

Chapter 3.5.1.3
Time diagram: Changeover to generator mode
With switching back to line 1, with inactive delay

3.4.2 IT system monitoring

Insulation monitoring
The insulation monitoring device measures the insulation resistance in AC IT systems, which may also contain DC voltage components. Adaptation to the system leakage capacitances occurs automatically.

Load current measurement
The load current is measured using an STW2 measuring current transformer.

Temperature measurement
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 (common alarm) will be triggered. The "ALARM" LED lights up, the alarm relay trips (if set). This alarm is forwarded to other Bender devices (such as an alarm indicator and test combination) via the BMS bus.

3.4.3 Automatic insulation fault location 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.

If the ATICS® detects an insulation fault in the IT system, it will signal the alarm via the "ALARM" LED and the display. The locating current injector integrated in the ATICS® generates a defined locating current to locate the insulation fault. This feature can be switched on or off (Setting menu 4: IT system). The locating current is limited to a max. of 1 mA.
The insulation fault locator EDS151 starts measuring via all six measuring current transformer channels. If the locating current detected in a channel exceeds the response value, the corresponding LED "1…6" will light up on the EDS151. In addition, the fault message is forwarded to other Bender devices.
In the period between the evaluation of the individual measuring current transformer channels, the ATICS® monitors the insulation resistance of the IT system. If the insulation resistance improves and the alarm is cleared, the insulation fault location will be stopped.

3.4.4 Monitoring the device functions and functional safety (SIL2)
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. The ATICS® automatic transfer switching device also continuously monitors:

- The switch position of the switch and coils 1 and 2 of the switch
- 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 (TN-S system, IT system)
  - Temperature sensor connection (IT system transformer)
  - Power supply and PE connection (ISOMETER®)

When functional safety (SIL2) is required, the alarm indicator and test combinations (MK…) and the alarm indicator and operator panels must be supplied by isolated fail-safe sources. Furthermore, they have to monitor each other for device failure via the BMS bus.

WARNING

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

3.4.5 Power supply

The coils of the changeover switch are each supplied from the line that 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 will remain in the last switch position.

3.4.6 Manual mode

In manual mode, changeover can be achieved using an Allen key. For easier use, the Allen key can be inserted in the provided handle. The changeover switch can only be locked with a padlock in the switch position "0".

3.4.7 Bypass mode (optional)

By means of the optional bypass switch the ATICS® automatic transfer switching device can be bypassed. The bypass switch makes it possible to test the ATICS® automatic transfer switching device without interrupting the power supply to the line downstream of the automatic transfer switching device.

Only qualified personnel may operate the bypass switch.
Please refer to the chapter "Using the bypass circuitry (optional)" on page 35.

4. System components

In the chapter "Appendix", you can find manuals and data sheets of the system components:

Designation	Identification	Function
ATICS-2-xx-ISO	Q1	Changeover and monitoring device with a nominal current of 63 A or 80 A, including insulation monitoring
Power supply unit	T1	Power supply units for the supply of the alarm indicator and test combinations
STW2	T4	Measuring current transformer for measuring the load current of the secondary side of the IT system transformer
STW3	T3	Measuring current transformer for measuring the load current and preventing a changeover during the short circuit.
ES710…	ES710…	IT system isolating transformer between 3150 VA and 8000 VA, acc. to DIN VDE 0100-710
Fuse	F1, F2	Fuses for connecting the ISOMETER® to the IT system
MK2430-xx	MK2430-xx	Alarm indicator and test combination
EDS151 (optional)	N21	Insulation fault locator, mounted behind/ between the branch circuit breakers
Bypass switch (optional)	Q2	To bypass the load contacts of the changeover and monitoring device, with auxiliary contacts
Indicator	H1	Indicator, red + green to indicate the bypass mode

The ATICS® automatic transfer switching devices are designed to be mounted on equipment racks with DIN rails but can also be mounted on mounting plates.

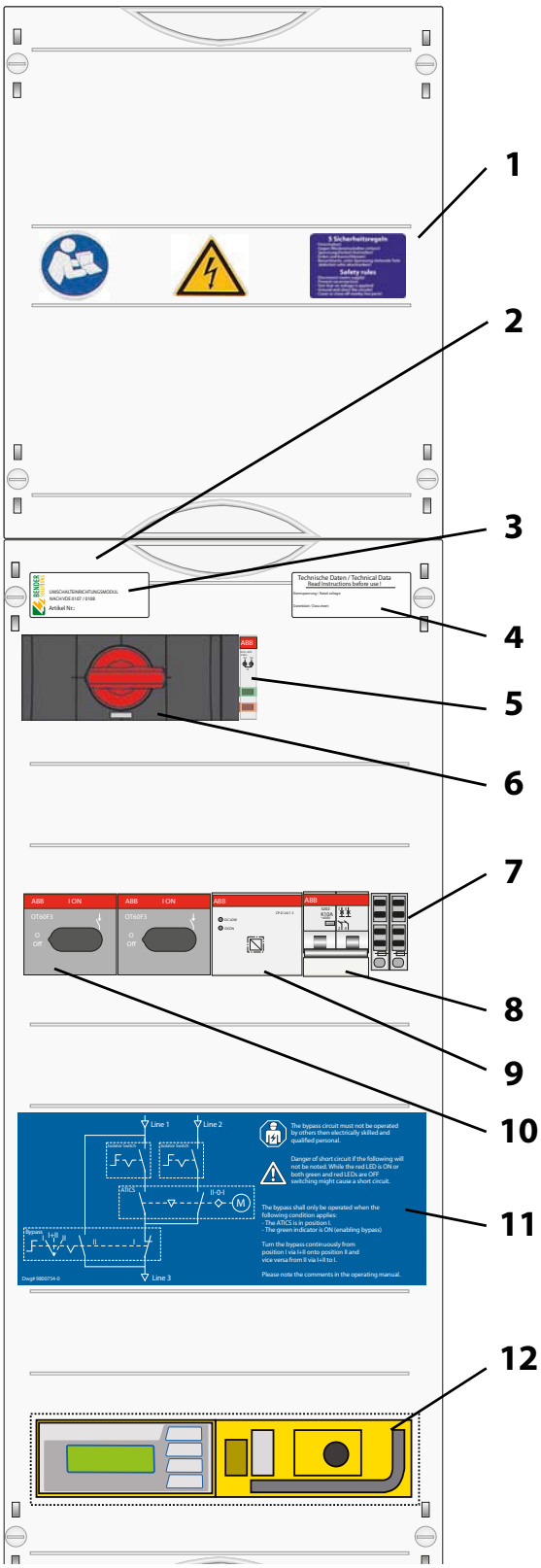
Multiple DIN rails are mounted on equipment racks of at least one vertical section of 250mm in width. Other mounting arrangements with multiple vertical sections are also possible.

Depending on the number of sections the DIN rails may also differ. E.g. a wall mounted enclosure with 6 DIN rails in one vertical section or a switchgear cabinet with 10 or 12 DIN rails per vertical and multiple sections in a free standing cabinet.

The following equipment racks will show some typical arrangements only. The optional bypass switch is also shown in these examples.

4.1 Front view of UMA710-2-xx-ISO-BP

Example: Front view of UMA710-2-xx-ISO-BP on an equipment rack by the company Striebel & John.



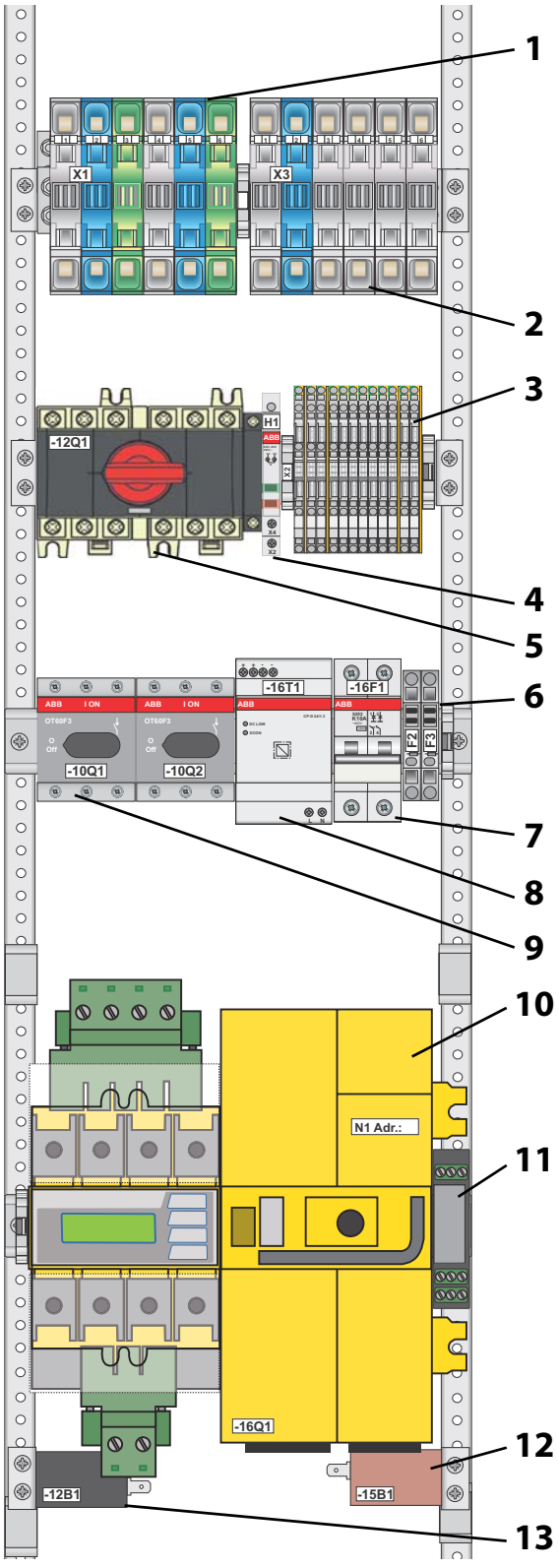
Key

1. Cover of the terminal compartment with safety instructions
2. Cover with internal components of the equipment rack
3. Nameplate
4. Technical data
5. H1 indicator, for bypass enabling circuitry
6. Q2 switch, for bypass enabling circuitry with auxiliary contact for alarm message "manual mode"
7. Fuses F2, F3:
   Connection ISOMETER®. Refer also to chapter "7.3 Fuses"
8. Branch circuit breaker F1, two-pole. Fuse for power supply unit and, if necessary, TM…
9. Power supply unit
10. Switch disconnector
11. Labels with important instructions regarding operation of the bypass circuitry
12. ATICS® automatic transfer switching device

The illustration shows a typical equipment rack arrangement by way of example. Please observe the individual, job-related or project-related documentation provided in the appendix.

4.2 Arrangement plan of UMA710-2-xx-ISO-BP

Example: Mounting frame of UMA710-2-xx-ISO-BP on an equipment rack by the company Striebel & John.

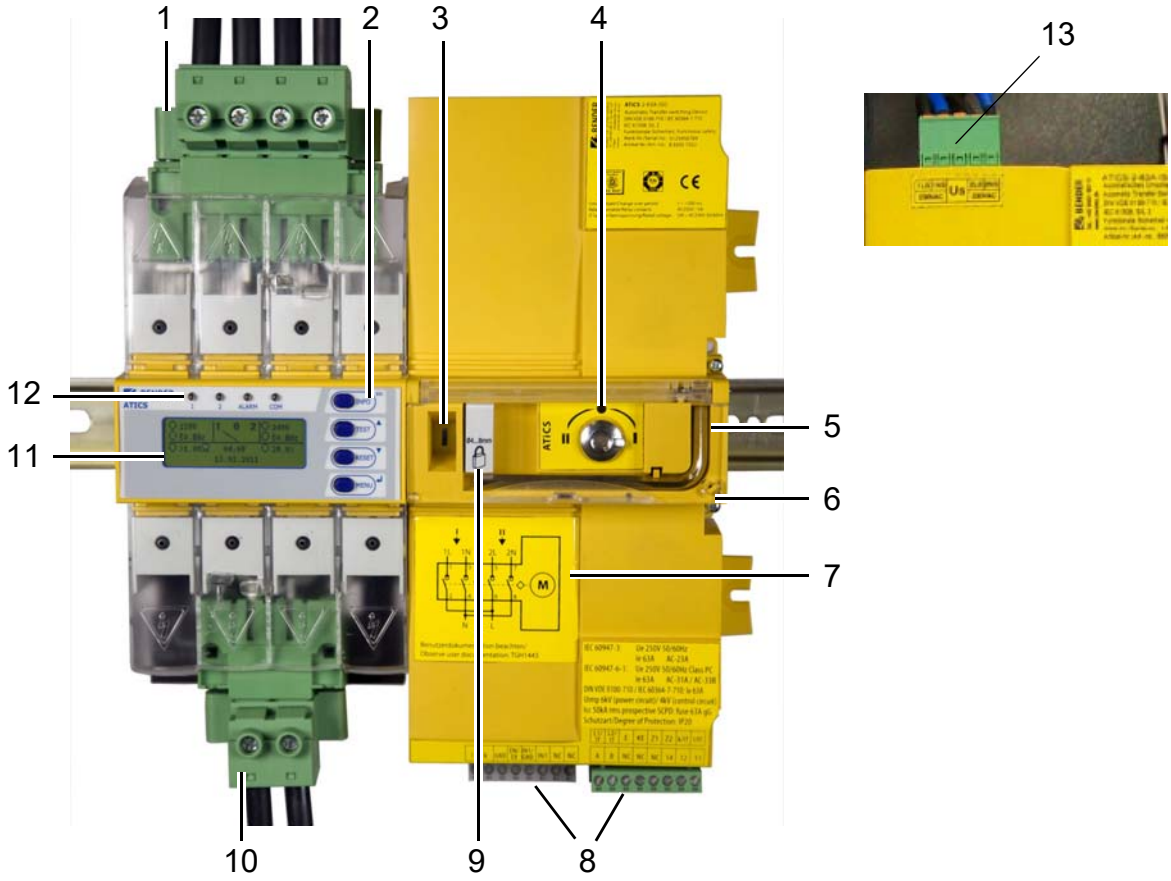


Key

1. Terminal board, infeed
2. Terminal board, IT system transformer
3. Terminal board, interfaces
4. H1 indicator, for bypass enabling circuitry
5. Q2 switch, for bypass enabling circuitry with auxiliary contact for alarm message "manual mode"
6. Fuses F2, F3:
   Connection ISOMETER®. Refer also to chapter "7.3 Fuses F2, F3"
7. Branch circuit breaker F1, two-pole. Fuse for power supply unit and, if necessary, TM…
8. Power supply unit
9. Switch disconnector
10. ATICS® automatic transfer switching device
11. ATICS-HK, auxiliary contact for ATICS, recognises the switch position of the ATICS for bypass function.
12. Current transformer STW2, for load current measurement of the IT system
13. Current transformer STW3, for load current measurement and switch preventing function in the event of a short circuit

The illustration shows a typical equipment rack arrangement by way of example. Please observe the individual, job-related or project-related documentation provided in the appendix.

4.3 ATICS-2-ISO (ATICS-2-ISO-400) automatic transfer switching device



Legend

1	Green plug connector for line 1 and line 2	8	Three coded connector plugs
2	Control buttons	9	Locking device for switch position 0
3	Inspection window: Indicates mechanical switch position of the changeover.	10	Green plug connector for line 3
4	Manual mode of the automatic transfer switching device, indicates the switch position	11	LCD
5	Allen key for manual mode	12	Operating and alarm LEDs
6	Transparent cover for changeover switch (manual mode), sealable	13	**ATICS-2-…-ISO-400 only:** Coils supply voltage AC 230 V
7	Wiring diagram for lines 1, 2 and 3		

For installation and connection of the ATICS® automatic transfer switching device, please refer to chapter 4 of the "ATICS-2-ISO" manual.

5. Connection of UMA710-2-xx-ISO-xx

5.1 Connection

DANGER

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.*

For information regarding installation and connection of the individual components such as ATICS®, please refer to the "ATICS-2-ISO" manual.

5.1.1 Short-circuit protection

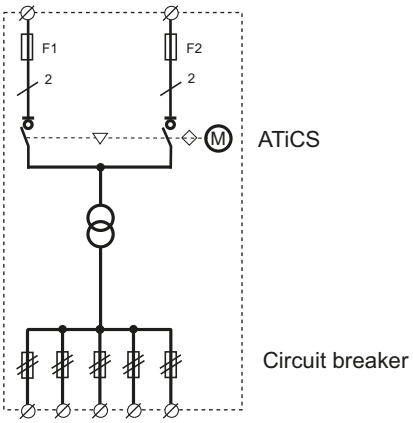
When choosing the fuses in the supply cables and output cables of the automatic transfer switching devices, follow the requirements of DIN VDE 0100-710 (VDE 0100 Part 710):

- 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 automatic 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. Recommended cable: (Halogen-free, flexible single-core rubber cable NSHX-AFö 1.8/3 kV).
- Protection of the cable system in group 2 medical locations:
  When choosing protective devices, it is essential to ensure that when the prospective short-circuit currents occur, the protective device upstream of a fault will selectively trip the protective devices which are further upstream.
- Connecting several load groups downstream of an automatic transfer switching device must not lead to all the load groups failing in the event of a fault. As a result, the choice of back-up fuses F should ensure both short-circuit protection for the transformer and 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.

5.1.2 Selecting a fuse for only one load

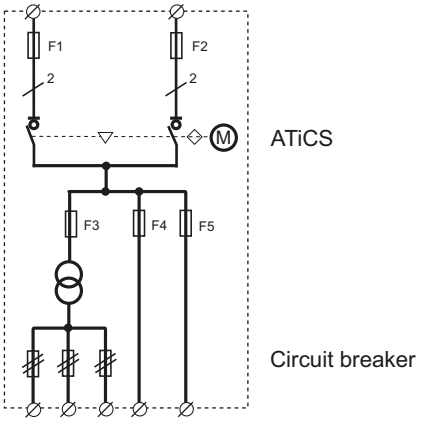
- The circuit has only one load, the "IT system transformer".
- Refer to the information provided by the transformer manufacturer for the minimum size of back-up fuses for the IT system transformer chosen.
- The rated operational current of the ATICS® must be greater than or the same as the rated operational current of the transformer.
- Refer to the technical specifications of the ATICS® for the maximum size of back-up fuses F1 or F2.



5.1.3 Selecting a fuse for several loads (not recommended)

According to DIN VDE 0100-710 (VDE 0100-710):2012-10 section 710.410.4, in the TN-S system in group 2 rooms only operating theatre tables, x-ray machines and electrical loads with a nominal voltage higher than 5 kVA are permissible. Their nominal current but also their inrush current may lead to problems. TN-S protective contact socket-outlets are not permissible! A device connected to a socket-outlet could impair the entire IT system. It is possible to use this variant for lighting.

- This circuit branches into several load groups. This means that each fuse of each load group is moved downstream of the automatic transfer switching device.
- However, the maximum possible back-up fuse is calculated in the same way as described above.
- The fuse F1 or F2 must match the 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 the 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.



5.2 Changeover module

5.2.1 Typical connection

Connect the changeover module to the terminals as follows:

Function	Terminals (explanation)
Preferred supply, line 1 *)	Phase, L (L1/L2 for UMA…-400) Neutral conductor, N PE conductor, PE
Second line, line 2 *)	Phase, L (L1/L2 for UMA…-400) Neutral conductor, N PE conductor, PE
IT system transformer *)	Primary side, L and N Secondary side, L1 and L2 Shield, PA/S = connection to PE not required (but if connected to PE, it must be routed short-circuit and earth-fault proof). Temperature monitoring.
Alarm indicator and test combination (MK2430-xx, MK800-xx)	Internal BMS bus, A, B These terminals are also used to terminate the BMS bus with a 120-ohm resistor. Shielding S = PE (The shield may only be connected to PE on one end.) Voltage supply, AC/DC 24 V
Common alarm message contact	Potential-free changeover contact (adjustable)
Alarm contact "Bypass on"	Potential-free contact, (optional, for bypass function only)
Control and alarm indicator panel (TM-800)	Voltage output AC 230 V, PE

*) The cross sections have to be chosen in compliance with DIN VDE 0100 Part 430.

DANGER

Please observe the following individual, job-related or project-related documentation provided in the appendix:
- Wiring diagrams
- Circuit diagram with resolved, all-pole representation
- Elevation illustrations
- Cable routing diagrams

5.3 Instructions for connection

5.3.1 Isolating transformer

The power for group 2 medical locations is supplied via an isolating transformer. For protection against indirect contact, one of the following measures should be used for the transformer:

- Protective insulation according to DIN VDE 0100-410 (VDE 0100 Part 410):2007-06, section 413.2 (Use of a protection class II transformer).

- Protection by non-conductive locations according to DIN VDE 0100-410 (VDE 0100 Part 410):2007-06, section 413.3
- Protection by a local, earth-free equipotential bonding according to DIN VDE 0100-410 (VDE 0100 Part 410):2007-06, section 413.4
- Protection by special installation. For this measure, note the following:
  - The class I transformer is to be installed in an insulated state and must not be connected to the PE conductor. In Bender's ES710 range of transformers, the fixing brackets are isolated from the transformer core.
  - An information plate must be attached to the transformer and its cover as follows:

    Caution!
    Accessible parts of the transformer may be live.
    Ensure that it is disconnected from the power supply before touching it.

  - The transformer must be installed behind a cover, which can only be opened using a tool or a special key. It must only be accessed by qualified personnel.
  - The shield winding which has been brought out can be connected to the PE conductor. The connecting wire must be laid so that it is short-circuit and earth-fault proof.

5.3.2 Temperature sensors

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

5.3.3 Outgoing circuits, circuit breakers (UFA710 only…)

The changeover and monitoring modules UFA710… are equipped with two-pole circuit breakers in the outgoing circuits of the IT system. The lines of the outgoing circuits can be connected to the terminal block X4. Please refer to the respective circuit diagrams with all-pole representation in the appendix.

5.3.4 Alarm indicator and test combination

Two pairs of terminals are provided ex works for connection of each changeover module to BMS-capable devices: A and B. Can be connected to alarm indicator and test combinations, remote alarm indicator and operator panels or other bus-capable Bender devices. The BS bus must be terminated at both ends with terminating resistors (120 Ω, 0.25 W). Please note the information in the "BMS bus" manual.

1. A BMS device or an existing BMS bus with several devices is connected to terminals A and B: The last device at the end of the bus has to be terminated with 120 Ω.
2. An existing BMS bus that has already been terminated on both ends is disconnected and one open branch is connected to the terminals A and B. The 120 Ω resistor, provided ex works, must be removed and the open bus
   branches must be connected to the specified terminals.

Please read the information on cable routing provided in the "BMS bus" instruction leaflet. The power supply unit T1 (DC 24 V, max. 1.3 A) can supply MK2430 alarm indicator and test combinations, EDS… insulation fault locators and the indicators of the bypass switch. Please consider the maximum permissible current consumption as well as the documentation for the relevant devices. The power supply unit T1 is not suitable for supplying power to remote alarm indicator and operator panels of the TM series. Remote alarm indicator and operator panels of the TM… series can be supplied via the 230-V output terminals.

5.3.5 SCADA systems (Supervisory Control and Data Acquisition)

If messages from the changeover and monitoring module are to be transmitted to a SCADA system, you have the following options:

- Protocol converter (Gateways)
- OPC server
- Common alarm via the relay outputs of the ATICS® automatic transfer switching device
- Alarms via interconnected signal converters SMO480-12 or SMO482-12. TM…, SMO480-12 or SMO482-12 convert serial signals from Bender devices into potential-free relay contact alarms.

For additional functions of the ATICS® automatic transfer switching device, refer to the "ATICS-2-ISO" manual.

5.3.6 Insulation fault locator EDS151 (optional)

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

5.3.7 Bypass switch (optional)

The optional bypass switch makes it possible to test the ATICS® automatic transfer switching device without interrupting the power supply to the loads downstream of the automatic transfer switching device.

Only qualified personnel may operate the bypass switch. Please read the chapter "Using the bypass circuitry (optional)" on page 35.

6. Commissioning, settings and testing

6.1 Design and parameter setting

Notes for the design

- During installation and connection, abide by the relevant standards and regulations and follow the operating manuals for the 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.

Application examples of MK… or TM… in hospitals:

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

- Provide a fail-safe power supply for the MK… or TM…
- The TM… and MK… for medical locations or technical areas must be supplied with power from different lines and sources (required for functional safety, SIL2).
- Example: The MK… or TM… in medical locations is supplied from line 3 of the automatic transfer switching device. The MK… in technical areas is supplied from a fail-safe line backed up by battery.

Notes on parameter setting
MK… or TM… must display at least the following faults detected by the 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

An overview of the channel assignment of the ATICS® messages on the BMS bus can be found in the "ATICS-2-ISO" manual.

6.2 Setting and testing according to the checklist

The factory settings take into account a total changeover period t ≤ 0.5 s and switching back to the preferred supply within 10 seconds on voltage recovery. Please refer to the time diagrams in the "ATICS-2-ISO" manual.

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 the ATICS® are configurable and must be adjusted to the requirements of the specific application case and the requirements of DIN VDE 0100-710 (VDE 0100 Part 710) for automatic 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 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 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 changeover 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® automatic transfer switching device are documented in the checklist. Please carry out all the work outlined in the list and log each test step.

You can find the checklist in the appendix of this manual. Keep the checklist with this manual near to the device.

6.2.1 Avoiding common errors

CAUTION

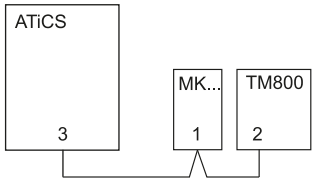
Risk of missing or false messages on the display on MK…, TM… or COM…
MK… alarm indicator and test combinations, TM… alarm indicator and operator panels or COM460IP… protocol converters which, together with an ATICS®, are connected to a BMS bus must be provided with the latest operating software (e.g. MK800/TM800 V 4.0 or higher, MK2430 V3.0 or higher).

Older MK…, TM… or FTC… are not able to interpret the alarms of the ATICS®. These devices must either be updated or replaced. The TMK-SET configuration software must also be the latest version.

6.3 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 malfunction 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… each

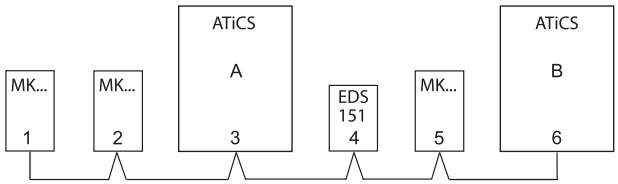


Device	Parameter	Address settings for an automatic transfer switching device
ATICS®	Bus address	3
MK…	Address	1
	Test address	3
	Alarm address	3, 2*
TM800, MK800	Address	2
	Test address	3
	Alarm address	3, 1*

* *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 in each case
- 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	6

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

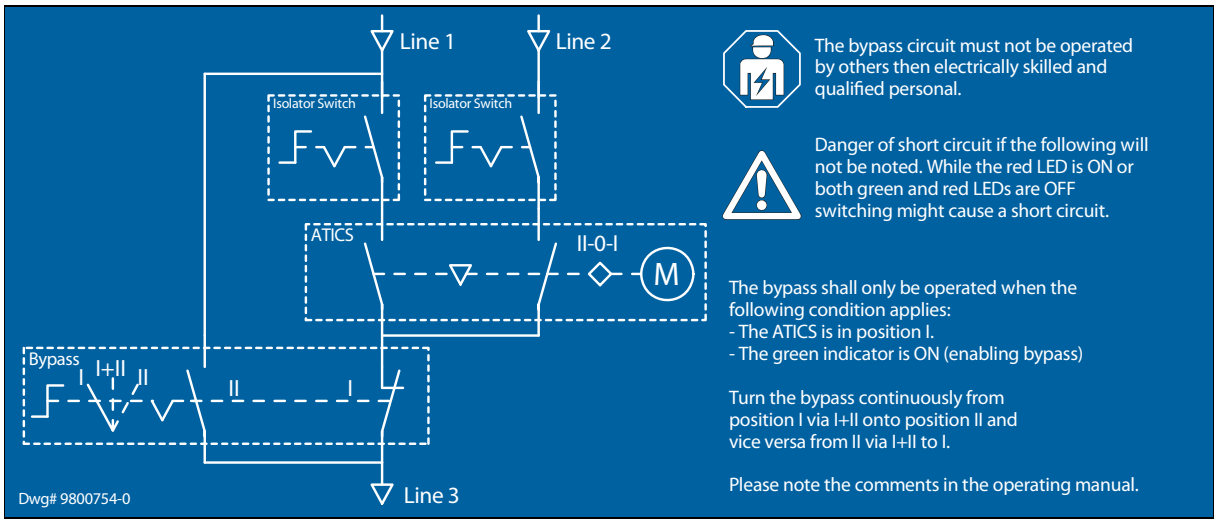
6.4 Operating the automatic transfer switching device

You can find a brief commissioning and operating instruction for qualified personnel in the appendix.
For the detailed operating manual of the ATICS® device, please refer to the "ATICS-2-ISO" manual.

6.5 Using the bypass circuitry (optional)

By using the optional bypass switch, the ATICS® automatic transfer switching device can be tested without power interruption. A green and a red indicator as well as the power supply unit are on the same DIN rail.
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.

Please consider the following instruction on the blue label before operating the bypass circuitry.



WARNING

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

The time during which the bypass is active in position "I+II" as well as "II" (=bypass) must be reduced to the bare minimum.

If a voltage drop occurs on line 1 while the switch is set to "II" (=bypass) the switch must not be set to position "I+II" or "I". In this case, the ATICS® device must be manually switched to position "0" or "I" using the Allen key wrench. 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® will automatically switch to line 2.

After each switching operation the normal operating condition has to be verified and logged in a protocol.

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.

The bypass switch may only be operated when:
- The ATICS® switch is set to position "I".
- The green indicator is lit.
If the red LED is lit or both LEDS are off, switching might cause a short circuit!

7. Troubleshooting

7.1 Error messages

If a fault occurs, the message of the ATICS® automatic transfer switching device will enable you to narrow down the possible causes. Some messages may point to several causes. The following possible faults are indicated by messages on the ATICS® display:

- Plain text messages
- Fault messages with error code

7.1.1 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 if set to System > L-Gen	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.
CT connection	Short circuit or interruption of connecting wire has been detected: measuring current transformer STW2, 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
Earth connection	Connection to PE interrupted	- Check that the E and KE are connected to the protective earth conductor by two separate lines.
Device error + error code	For details about actions to be taken, refer to table section "Messages with error code or service code" on page 38. The message is on channel 6 of the BMS bus.	

Fault/message	Description	Action
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 the 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.
CT connection	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" must be deactivated (Settings > Interface > Failure monitoring).
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 the ATICS®.	- Only use test set-ups that provide the necessary peak current of 17 A.

7.1.2 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" in the"ATICS-2-ISO" manual). In this case, the interval for the functional test of the changeover device must be reduced to 3 months.

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" in the"ATICS-2-ISO" manual).
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 150 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" in the"ATICS-2-ISO" manual).
3.5	Service was 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.	- Device has to be replaced immediately.
8.21 … 8.30	Fault ISOMETER® or transformer monitoring.	- 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 can supply the necessary peak current
8.61 … 8.66	Fault during changeover process. Occurs when also the voltage on the new line fails during the changeover. Also occurs when the test set-ups do not supply sufficient current for switching the coils of the ATICS®. 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 exists, proceed as follows:

1. If necessary, activate manual mode (see "ATICS-2-ISO" manual).
2. Make a note of what happened prior to the fault:
   operator inputs, error messages, ambient conditions, etc.
3. Keep the type, article and serial number of the ATICS® automatic switching device to hand.
4. Keep the project number, job number and drawing number (see name plate of the changeover module or the esb/Bender switchgear cabinet to hand.
5. Contact Bender service, describe the type of fault and quote the three-digit error code.

Please also read the chapter "Frequently asked questions" of the "ATICS-2-ISO" manual.

7.2 Device replacement

7.2.1 Replacing the ATICS®

Replacing the ATICS® automatic transfer switching device might be necessary if:

- the 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.

If a replacement of the ATICS® automatic transfer switching device is necessary after consulting our service or commissioning department, please read the detailed description in the chapter "Replacing the ATICS®" in the "ATICS-2-ISO" manual.

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.

7.2.2 Replacing the device when operated with a bypass switch

The bypass switch makes possible parallel supply from line 3. The ATICS® can be switched as required or replaced without interrupting the power on line 3.

WARNING

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

Conditions for operation with the bypass switch

- The wiring must be done in accordance with the provided wiring diagram.
- In menu "4. Settings" > "6. Dig. input" the following settings have to be made:
  - 1. Function: Bypass
  - 2. Response value: 0 V
  - 3. t(on) response delay: 100 ms
  - 4. t(off) delay on release: 100 ms
- Information plate for operation of the bypass circuitry

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.
Touch the insulated part of the plug connector only.

Only qualified personnel may operate the bypass switch.
Please read the chapter "Using the bypass circuitry (optional)" on page 35.

7.3 Fuses

The changeover and monitoring module is equipped with three fuses. Fuse F1 protects the power supply unit and the TM800 panel, if necessary. Fuses F2 and F3 protect the IT insulation monitoring circuit of the ATICS® automatic switching device against a short circuit.

CAUTION

If F2 or F3 trips, there may be a defect in the changeover module. These fuses should only be replaced after consulting the Bender service department.

The changeover and monitoring module is equipped with a two-pole circuit breaker F1, which protects the power supply unit and a 230-V output control voltage against a short circuit.

Technical data of fuses F2, F3

Tripping current ..... 4 A, slow acting
Breaking capacity ..... 10 kA
ELU Type 189140
Dimensions ..... 6.25 x 32 mm

As an option, the changeover and monitoring module can be equipped with an additional two-pole circuit breaker, which protects an 230-V output control voltage against a short circuit. This output will be used for supplying alarm and control panels.
An overload on the 230-V output terminals or short-circuit situation may trip this circuit breaker.

8. Periodic verification and maintenance

8.1 Periodic verification

The following periodic verifications of electrical installations have to be carried out according to the local or national standards effective at the time of installation. For your Bender products, we recommend:

Action	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
Functional test of the automatic transfer switching device*: Functional test of the automatic transfer switching device	Bender service or electrically skilled person	Once every six months
Functional test of the IT system monitoring (insulation, load current, transformer temperature and connection monitoring) on the insulation monitoring device. *	Bender service or electrically skilled person	Once every six months
Test of the setting values and the changeover periods	Bender service or electrically skilled person	Once 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 includes 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 elimination of defects	Bender service	Once every 24 months

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

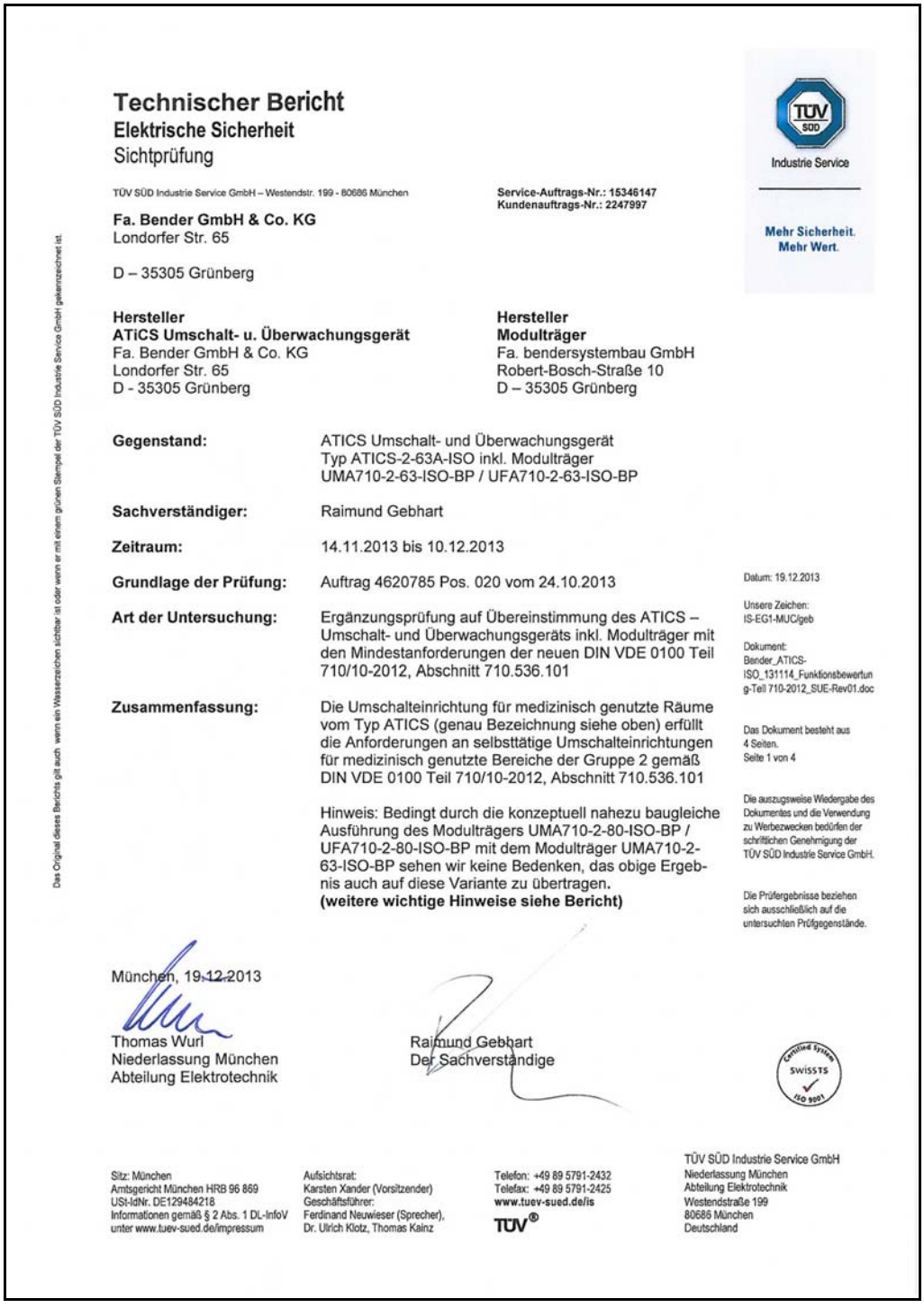
With all the tests, follow the instructions for carrying out functional tests in the checklist in the appendix of this manual. If no local/national directives apply, you should at least perform periodic verification as recommended by DIN VDE 0100-710 (VDE 0100-710).

8.2 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. Data

9.1 TÜV test report according to VDE0100 Part 710



Technischer Bericht
Elektrische Sicherheit
Sichtprüfung

TÜV SÜD Industrie Service

Mehr Sicherheit. Mehr Wert.

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.

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

Certified System SWISSTS ISO 9001

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

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The complete test report will be gladly provided upon request.

9.2 Standards

The changeover and monitoring module UMA710-2-…-ISO-… conforms to the following standards:

- DIN VDE 0100-710 (VDE 0100 Part 710):2012-10*
- DIN VDE 0100-710 (VDE 0100-710) supplement 1:2014-06
- DIN VDE 0100-718 (VDE 0100-718):2014-06
- ÖVE/ÖNORM E 8007:2007-12-01
- IEC 60364-7-710:2002-11*
- DIN EN 61439-1 (VDE 0660-600-1):2012-06
- DIN EN 61439-2 (VDE 0660-600-2):2012-06

- 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
- EN 61557-8:2015

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.

9.3 Manufacturer's certificate

As part of the scope of supply for the changeover and monitoring module, you will find a manufacturer's certificate in chapter "10.1 Manufacturer's certificate, checklist, documentation".

9.4 Tabular data

Insulation coordination acc. to IEC 60664-1 *)

Rated insulation voltage	AC 250 V
Rated impulse withstand voltage/pollution degree	4 kV/3
Nominal insulation voltage	400 V

Voltage ranges *)

Nominal system voltage U_n ..... AC 230 V
Nominal frequency f_n ..... 50 . . . 60 Hz
Supply voltage U_S ..... from the system being monitored
Frequency range of U_s ..... 50 . . . 60 Hz
Current consumption during the changeover process ..... 17A/< 30 ms

Power section/switching elements *)

Rated operational voltage U_e ..... AC 230 V
Frequency of U_e ..... 48 . . . 62 Hz
Rated operational current I_e ..... for ATICS-2-63A- . . . -xx: 63 A
..... for ATICS-2-80A- . . . -xx: 80 A
Crest factor ..... ≤ 1.2
Number of cycles at nominal load ..... < 6000

Voltage monitoring*)

Frequency range f_n ..... 40 . . . 70 Hz
Response value undervoltage adjustable ..... 160 . . . 207 V
Response value overvoltage ..... 240 . . . 275 V
Response time t_{on} ..... 50 ms . . . 100 s
Delay on release t_{off} ..... 200 ms . . . 100 s
Hysteresis ..... 2 . . . 10 %

Insulation monitoring (only for ATICS-2-xx-ISO-xx) *)

Nominal system voltage (operating range) ..... 80 . . . 275 V
Measuring range ..... 10 kΩ . . . 1 MΩ
Response value adjustable ..... 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
Permissible system leakage capacitance C_e ..... ≤ 5 µF
Measuring voltage U_m ..... DC 12 V
Measuring current I_m (at $R_F = 0$ Ω) ..... ≤ 120 µA
Max. permissible extraneous DC voltage U_{fg} ..... DC 375 V
Automatic self test ..... every hour

Insulation fault location *)

Test current I_T ..... 1 mA
Test pulse/break ..... 2 s/4 s

Monitoring of the IT system transformer load current *)

Measuring current transformers STW2, STW3, SWL-100A
Measuring range I_L (True r.m.s.) ..... 10 . . . 110 % of the response value
Response value adjustable ..... 5 . . . (50) 100 A
Hysteresis ..... 5 . . . 30 %

Temperature monitoring for the IT system transformer *)

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

ATICS digital input*)

Digital inputs, galv. separated 1
Operating principle ..... adjustable
Function ..... adjustable

ATICS alarm output *)

Switching element, galv. separated ..... 1 potential-free changeover contacts
Operating principle ..... adjustable
Function ..... adjustable

Interfaces

Interface/protocol RS-485/BMS
Baud rate ..... 9.6 kbit/s
Max. cable length (without additional bus amplifier) ..... ≤ 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 on BMS bus ..... 2 . . . 90

Connection type power section

Connection type ..... modular terminals
Cage-clamp spring terminal (at I_e < 65 A, AC3) ..... 1.5 . . . 35 mm²
Screw type terminals tightening torque ..... 0.5 . . . 0.6 Nm
Cage-clamp spring terminal (at I_e ≥ 65 A, AC3) ..... 6 . . . 35 mm²
Screw type terminals tightening torque ..... 0.5 . . . 0.6 Nm

Connection type control section

Connection type ..... modular terminals
Cage-clamp spring terminals ..... 0.8 . . . 2.5 mm²

General data

EMC immunity ..... acc. to EN 61000-6-2
EMC emission ..... acc. to EN 61000-6-4
Ambient temperature, in use ..... -25 °C . . . +55 °C
Climatic conditions for stationary use (IEC 60721-3-3) ..... 3K5 (except condensation and formation of ice)
Climatic conditions for transport (IEC 60721-3-2) ..... 2K3 (except condensation and formation of ice)
Climatic conditions for long-term storage (IEC 60721-3-1) ..... 1K4 (except condensation and formation of ice)
Operating mode ..... continuous operation
Mounting ..... vertical
Degree of protection, internal components (DIN EN 60529) IP30
Degree of protection, terminals (DIN EN 60529) IP20
Mounting into standard distribution panels ..... see table "Dimensions and weights"
Protection class ..... Class I
Power consumption ..... for ATICS-2-63A-. . .-xx: approx. 16 W
..... for ATICS-2-80A-. . .-xx: approx. 28 W
Weight approx. ..... see table "Dimensions and weights"

**) For further technical details, please refer to the "ATICS-2-ISO" manual.*

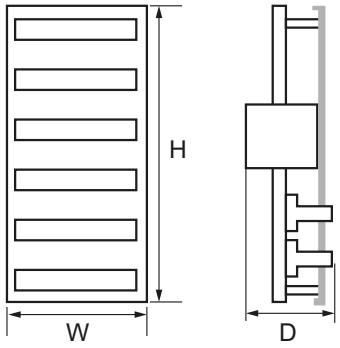
9.5 Dimensions and weights

The ATICS® automatic switching devices as well as rail-mounted devices and terminals are designed to be mounted on DIN rails but can also be mounted on mounting plates.

Multiple DIN rails are mounted on equipment racks of at least one vertical section of 250mm in width.
Other mounting arrangements with multiple vertical sections are also possible.

Depending on the number of fields, the equipment racks can also differ regarding the number of vertical rows, such as 6-row wall switchgear cabinet or a multi-fielded row switchgear cabinet with 10 or 12 rows each.

The following equipment racks will show some typical arrangements only.



9.5.1 Dimensions and weights UMA710…

Type	Sections/Rows *	Dimensions in mm			Recommended cabinet depth	Approx. weight
	Quantity	Width (W)	Height (H)	Depth (D)	mm	kg
UMA710-2-63-ISO	1/6	250	900	250 (on request 190)	350 (on request 300)	10
UMA710-2-80-ISO	1/6	250	900			10
UMA710-2-63-ISO-BP	1/6	250	900			11
UMA710-2-80-ISO-BP	1/6	250	900			11
UMA710-2-63-ISO-400	1/6	250	900			10
UMA710-2-63-ISO-BP-400	1/6	250	900			11

* One row has a height of 150 mm. One section has a width of 250 mm.

9.5.2 Dimensions and weights UMA710…

Type	Sections/Rows *	Dimensions in mm			Recommended cabinet depth	Approx. weight
	Quantity	Width (W)	Height (H)	Depth (D)	mm	kg
UFA710-2-xx-ISO-06-B16	1/8	250	1200	250 (on request 190)	350 (on request 300)	12
UFA710-2-xx-ISO-12-B16	1/9	250	1350			14
UFA710-2-xx-ISO-18-B16	1/10	250	1500			16
UFA710-2-xx-ISO-24-B16	1/11	250	1650			18
UFA710-2-xx-ISO-BP-06-B16	1/8	250	1200			13
UFA710-2-xx-ISO-BP-12-B16	1/9	250	1350			15
UFA710-2-xx-ISO-BP-18-B16	1/10	250	1500			17
UFA710-2-xx-ISO-BP-24-B16	1/11	250	1650			19

* One row has a height of 150 mm. One section has a width of 250 mm.

9.6 Ordering details

9.6.1 Ordering details UMA710…

Type	Nominal current (AC3) of the changeo-ver mod-ule	Max. per-missible current acc. to DIN VDE 0100-710	Upstrea m fuse max.	Power con-sump-tion	Article No. Bender
UMA710-2-63-ISO	63 A	63 A	80 A, gG	16 W	B22040126
UMA710-2-80-ISO	80 A	80 A	100 A, gG	28 W	B22040133
UMA710-2-63-ISO-BP	63 A	63 A	80 A, gG	19 W	B22040128
UMA710-2-80-ISO-BP	80 A	80 A	100 A, gG	31 W	B22040134
UMA710-2-63-ISO-400	63 A	63 A	80 A, gG	16 W	B22040127
UMA710-2-63-ISO-BP-400	63 A	63 A	80 A, gG	28 W	On request

9.6.2 Ordering details UFA710…

Type	Nominal current (AC3) of the changeo-ver mod-ule	Max. per-missible current acc. to DIN VDE 0100-710	Upstrea m fuse max.	Approx. power con-sump-tion	Article No. Bender
UFA710-2-63-06-B16	63 A	63 A	80 A, gG	16 W	B22040105
UFA710-2-63-12-B16	63 A	63 A	80 A, gG	17 W	B22040106
UFA710-2-63-18-B16	63 A	63 A	80 A, gG	18 W	B22040107
UFA710-2-63-24-B16	63 A	63 A	80 A, gG	19 W	B22040108
UFA710-2-63-30-B16	63 A	63 A	80 A, gG	19 W	B22040109
UFA710-2-63-BP-06-B16	63 A	63 A	80 A, gG	16 W	B22040110
UFA710-2-63-BP-12-B16	63 A	63 A	80 A, gG	17 W	B22040111
UFA710-2-63-BP-18-B16	63 A	63 A	80 A, gG	18 W	B22040112
UFA710-2-63-BP-24-B16	63 A	63 A	80 A, gG	19 W	B22040113
UFA710-2-80-06-B16	80 A	80 A	100 A, gG	28 W	B22040114
UFA710-2-80-12-B16	80 A	80 A	100 A, gG	29 W	B22040115
UFA710-2-80-18-B16	80 A	80 A	100 A, gG	30 W	B22040116

Type	Nominal current (AC3) of the changeo-ver mod-ule	Max. per-missible current acc. to DIN VDE 0100-710	Upstrea m fuse max.	Approx. power con-sump-tion	Article No. Bender
UFA710-2-80-24-B16	80 A	80 A	100 A, gG	31 W	B22040117
UFA710-2-80-30-B16	80 A	80 A	100 A, gG	31 W	B22040118
UFA710-2-80-36-B16	80 A	80 A	100 A, gG	31 W	B22040119
UFA710-2-80-BP-06-B16	80 A	80 A	100 A, gG	28 W	B22040120
UFA710-2-80-BP-12-B16	80 A	80 A	100 A, gG	29 W	B22040121
UFA710-2-80-BP-18-B16	80 A	80 A	100 A, gG	30 W	B22040122
UFA710-2-80-BP-24-B16	80 A	80 A	100 A, gG	31 W	B22040123

10. Appendix

10.1 Manufacturer's certificate, checklist, documentation

The following individually compiled documents are provided with the changeover and monitoring module:

- Test protocol/manufacturer's certificate
- Checklist for commissioning
- Wiring diagram
- Circuit diagram with resolved, all-pole representation
- If applicable, project-related:
  - Elevation illustrations
  - Cable routing diagrams

10.2 The manuals for the system components

The following manuals and data sheets of the individual components of the changeover and monitoring module are enclosed.

- Safety instructions for Bender products
- ATICS® quick-start guide "Installation and connection"
- ATICS® quick-start guide "Commissioning and operation"
- ATICS® checklist for commissioning
- BMS bus Bender measuring device interface
- STW2, STW3 measuring current transformers
- CP-D24/…A power supply unit

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BENDER
The Power in Electrical Safety©

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