TAPCON®
NEXT-GENERATION VOLTAGE REGULATORS.
WWW.REINHAUSEN.COM
TAPCON® – VOLTAGE REGULATION FOR THE CHALLENGES OF TOMORROW.
The new TAPCON® voltage regulator is based on the new ISM® technology, which offers the greatest flexibility even with regard to future requirements. In addition to simple regulation tasks, TAPCON® also supports complex special applications such as the regulation of three-winding transformers, transformer banks, phase shifters, and shunt reactors. Our modular system enables you to precisely match the regulator’s performance spectrum to your individual requirements.

During the development of the new TAPCON® we also gave consideration to the challenges of tomorrow. With its new regulation algorithms, such as the TAPCON® Dynamic Set Point Control (TDSC) function, TAPCON® now offers, for example, a solution to the challenges resulting from the decentralized input of photovoltaic facilities.

Maximum operating reliability and data security

TAPCON® keeps your data secure at all times and our role-based password concept protects against unauthorized use. Furthermore, TAPCON® supports all common communication protocols and is also able for integrations in redundant communication networks with RSTP, PRP or HSR protocol. The operator is free to select the data transmission medium thereby ensuring communication without delay even if the connection with the control system is interrupted.

Proven quality in every detail

All of our products fulfill the highest quality, dependability, and robustness requirements. Extensive part tests for every assembly group ensure the faultless quality of the new TAPCON®. All devices pass through automatic optical inspections, in-circuit tests and run-in tests. Automated final testing also checks the delivery configuration of every individual device. All of these actions combine to ensure maximum reliability for later operation.
The new TAPCON® generation offers you exactly the functional scope you need. Regardless of the chosen equipment, you profit from the most state-of-the-art hardware currently available with functions that guarantee the simplest operation with maximum flexibility.

State-of-the-art hardware

- Modular 19" construction; details customized to your individual requirements
- Components can be retrofitted
- Supports all common interfaces and protocols
- Redundant Ethernet communication with RSTP, PRP and HSR protocols (IEC 62439-3 Edition 2.0, 2012-07)
- Voltage regulator visualization/operation locally on the device or optionally at any other location, e.g. via decentralized PCs or operating panels

All-purpose application with scope for individual expansion

- Supports special applications such as three-winding transformers, parallel bank operation, phase-shifter regulation or shunt reactors
- Special regulation algorithms for problems presented by decentralized input (TAPCON® Dynamic Set Point Control (TDSC))
- Optional programming tool TPLE (TAPCON® Personal Logic Editor) enables the creation of individual application functions by the user
- Easy activation and deactivation of functions – without programming
- Comprehensive monitoring functions for OLTC and regulation

Maximum operational reliability and data security

- Maximum security via integrated user authorization and role-based user administration based on BDEW/NERC
- SSL transmission encryption of visualization and data uploads/downloads
- Bridging of short-term voltage dips without data loss
- Continuous monitoring of functional availability of all assemblies in operation
- Ensured EMC consistency for the potentially extreme requirements of high-voltage facilities
Simple commissioning and operation thanks to ISM® Intuitive Control Interface (IICI)

- Integrated, fully graphic 5.7” color display with knob operation
- Newly developed, intuitive user interface, simplified parameterization
- Guidance for initial commissioning TILA (TAPCON® Interactive Launch Assist) to avoid setting errors incl. automatic determination of parameters and plausibility test of chosen settings
- Easy updating of firmware and configuration via Ethernet or USB
- No external parameterization tools necessary thanks to web-based visualization with HTML 5 technology which, among other things, also make presentation on mobile end devices possible
- Interface for remote access included in standard scope of delivery
- Product documentation available at all times as PDF via the web visualization
Volatile electricity production is typical in modern energy supply systems – and it presents new challenges for the automation of substations. With its ISM® Technology, MR has created a pioneering and consistent basis covering all aspects of substation automation.
ISM® Technology is the consistent hardware and software basis which is now available for use in all MR automation solutions

The hardware components and the universal software architecture are characterized by user friendliness and flexibility. And, naturally, the system is designed for the special requirements of energy technology with regard to long life, dependability, and robustness.

ISM® Technology is openly and flexibly conceived and therefore facilitates the implementation of standard products as well as the realization of individual requirements of substation automation. Regardless of application, users benefit from consistent components, tools and operating interfaces – in short: the ISM® Intuitive Control Interface (ICI).

Software

- Robust operating system as the basis for all system and application functions
- Numerous transaction-supporting databases for current and historical operating data as well as status and log information
- Web-based visualization in accordance with HTML 5 standard with SVG (Scalable Vector Graphics)
- All necessary control system protocols which are available with client or server functionality

Hardware

- Modular and efficient hardware design
- Integrated, flexible functions particularly through the use of ASICs
- Specific modules for various tasks such as measurement or communication
- Support for all standard interfaces
- 19" design or housing for mounting on top hat rail in control cabinets or motor drive units
TAPCON®

ALWAYS IN THE BEST HANDS – SERVICE BY MR.

We demand the highest precision and perfection from our products. Naturally, the same applies to our service activities.

Our first-class service is based on a worldwide unique close-knit network of certified Premium Service Providers who are optimally and routinely trained in accordance with our specifications. This is the network of its kind anywhere in the world. Fast personal support in cases of disruption or for questions – whether is provided on site in your facility or via remote communication.

We are also pleased to offer additional services such as commissioning and providing general product training. We also provide technical training in our optimally equipped training centers in Regensburg, Germany or at one of our selected MR subsidiaries. If requested, we can also attend certification of your facilities or factory/site acceptance tests. With regard to facility modernization, we assist you by providing, for example, system consultation or the modification of existing facilities.

Individual customer solutions, exactly tailored to your needs

On request, our experts develop specialized ISM® solutions for your specific requirements. For energy supply, transmission, and distribution, we offer tailor-made systems for data management, control system integration, regulation and control, automization of operating equipment, and monitoring of energy-supply components. Take advantage of our decades of experience in OLTC regulation and monitoring.

Our all-round service comprises:
- Baseline study
- Consultation
- Solution formulation
- Engineering
- Development and implementation
- Commissioning
- Support
MORE BENEFIT, MORE VALUE.

Play it safe in OLTC operation. With our expert knowledge and the TAPCON® voltage regulator.

Modular design and flexible customization
- Modular system for enables customization precisely to your individual needs as well as various assembly variations
- Suitable for retrofitting previous MR models TAPCON® 240 and 260 and parallel operation with previous MR devices (TAPCON® 230/240/250/260)
- Complex tasks such as regulation of three-winding transformers, transformer banks, phase shifters or shunt reactors possible
- Optional programming tool TPLE (TAPCON® Personal Logic Editor)

Simple operation and modern graphic presentation
- Fully graphic 5.7” VGA color display and vector-based graphics – perfect scaling of pictures and text on all end devices with web browser
- Intuitive user interface, simple operating concept with operating knob
- Commissioning wizard helps avoid setting errors; some parameters are automatically determined or tested for plausibility (TAPCON® Interactive Launch Assist (TILA))
- Easy firmware and configuration updates are possible via Ethernet and/or USB connection
- Web-based visualization makes installation of additional software unnecessary
- Interface for remote access included as standard

Additional services
- Commissioning
- Conduct of and support during factory or site acceptance tests (FAT/SAT)
- Modernization of facilities – including system consultation and wiring modifications
- General product training
- Technical training in our training centers in Regensburg or at selected MR subsidiaries
- On-site training with hand’s on element on the equipment
- Support during facility certification

Maximum operational reliability
- Sample-tested individual components as well as automated functional tests of all delivery configurations
- Protection against unauthorized use through user authentication with role-based administration
- Inclusion in redundant network systems
- Encrypted communication connection with SSL
- Audited in accordance with BDEW and BSI recommendations
- Password protection for all interfaces
# TAPCON® – TECHNICAL DATA.

## Functional scope

<table>
<thead>
<tr>
<th>Operation types</th>
<th>Local, remote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulation modes</td>
<td>Manual, auto</td>
</tr>
<tr>
<td>Tap-position capture</td>
<td>Digital, analog</td>
</tr>
</tbody>
</table>

### Standard functions

- Voltage control linear and inverse
- Line compensation (R-X or Z compensation)
- Parallel operation of up to 16 transformers (methods: master/follower, auto-synchronization or circulating reactive current)

### Optional functions*

- Customer-specific topology
- Regulation of three-winding transformers
- Bank-parallel operation of single-phase transformers
- Phase-shifter applications (regulation of active power, reactive power or phase angle)
- Order-specific programming
- Measured value memory with graphic presentation

## Monitoring functions

- Bandwidth monitoring
- Switching interval monitoring (for RAISE, LOWER and complete tap-changes)
- Function monitoring
- Adjustable tap limits
- Various adjustable limit values for all analog values incl. hysteresis

## Communication (optional)

- IEC60870-5-101/103, Slave & Master
- IEC60870-5-104, Server & Client
- DNP 3, Slave & Master
- MODBUS ASCII / RTU / TCP, Server & Client
- IEC 61850 Edition 1 and 2, Server & Client, GOOSE*
- Dual-port Ethernet connection with redundancy protocols RSTP, PRP and HSR (IEC 62439-3 Edition 2.0, 2012-07)

## Security

- User administration and access protection based on BDWE or NERC

## Programming tool TPLE*

- Creation of individual control and monitoring functions

## User languages

- German, English, French, Spanish, Italian, Portuguese, Russian, Chinese, Korean

* Optional
### Technical data

<table>
<thead>
<tr>
<th>Ambient temperature</th>
<th>During operation</th>
<th>-25°C to +70°C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>During storage</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>Power supply</td>
<td>100...240 V AC 50/60 Hz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100...240 V DC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>24...60 V DC*</td>
<td></td>
</tr>
<tr>
<td>Housing design</td>
<td>19* standard 84 DU x 3 HU</td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>Approx. 483 x 133 x 160 mm (width x height x depth)</td>
<td></td>
</tr>
<tr>
<td>Control panel mounting frame*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection class</td>
<td>Front IP52</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Back IP20</td>
<td></td>
</tr>
</tbody>
</table>

* Optional

### Hardware

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMI</td>
<td>5.7&quot; fully graphic color display with 1 operating knob, 7 operating keys and 8 LEDs, 1 parameter interface (Ethernet RJ45)</td>
</tr>
<tr>
<td>Measurement</td>
<td>1-phase U/I measurement</td>
</tr>
<tr>
<td>Digital inputs and outputs</td>
<td>Digital inputs</td>
</tr>
<tr>
<td></td>
<td>Relay outputs</td>
</tr>
<tr>
<td>Analog inputs and outputs</td>
<td>Analog inputs</td>
</tr>
<tr>
<td></td>
<td>Analog outputs</td>
</tr>
<tr>
<td>Interfaces (device back)</td>
<td>Ethernet</td>
</tr>
<tr>
<td></td>
<td>1 x RJ45 for remote parameterization</td>
</tr>
<tr>
<td></td>
<td>1 x RJ45 for HMI connection</td>
</tr>
<tr>
<td></td>
<td>2 x optical fiber, 1310 nm</td>
</tr>
<tr>
<td></td>
<td>2 x RJ45 or optical fiber (1310nm) incl. redundancy functions RSTP and PRP*</td>
</tr>
<tr>
<td></td>
<td>Serial</td>
</tr>
<tr>
<td></td>
<td>Fiber optic (connection: FST or FSMA, wavelength 660 or 850 nm*)</td>
</tr>
<tr>
<td></td>
<td>2 x CAN (for parallel operation and connection of decentralized I/O modules)</td>
</tr>
<tr>
<td></td>
<td>1 x USB 2.0</td>
</tr>
</tbody>
</table>

* Optional

### Regulations/norms

<table>
<thead>
<tr>
<th>Norms taken into consideration during design</th>
<th>IEC 61010-1</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>IEC 61010-2-030</td>
</tr>
<tr>
<td></td>
<td>IEC 61000-6-2/-4</td>
</tr>
<tr>
<td></td>
<td>IEC 60255-21-1/-2/-3 Class 1</td>
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</tbody>
</table>
Please note:
The data in our publications may differ from the data of the devices delivered. We reserve the right to make changes without notice.

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