

TAPCON® 230 – user-friendly, flexible and reliable

Now
available with
IEC 61850



TAPCON® 230 – the new standard in voltage regulation

Maschinenfabrik Reinhausen (MR) has been developing and manufacturing voltage regulators for over 40 years. Thousands of these are still running smoothly around the world today, some under extreme usage conditions. Devices like the legendary MK 20 paved the way for their reputation of incredible reliability and robustness. Our TAPCON® 230 series, available in three variants (basic, pro and expert), combines this extensive know-how with maximum customer benefit. Prepare to be impressed by the rapid installation, simple operation and flexible communication possibilities.



Major improvements – maximum customer benefit

The TAPCON® 230 series includes a number of impressive product improvements and consequently tangible benefits for the customer. Our test engineers ensured that the vastly more demanding quality requirements were satisfied in the development phase: not just through stricter checks using the product and process FMEAs (Failure Mode Effects Analysis) but also through extensive type tests which far exceed the requirements of the relevant standards. As a result, TAPCON® 230 sets standards, for example in regard to interference resistance.

Every single TAPCON® 230 has to pass a series of strict tests before it leaves our factory. All devices undergo automatic optical inspections, in-circuit tests, burn-in-tests and high-voltage tests. The firmware can only be loaded once the hardware has been proven to be totally free of errors. The function tests then follow. If everything is fine, our experts sign the test report and the TAPCON® 230 can be put into robust packaging and sent to the customer. This is the first point at which it satisfies our standard of maximum quality for faultless operation.

Three models – the right device for every application



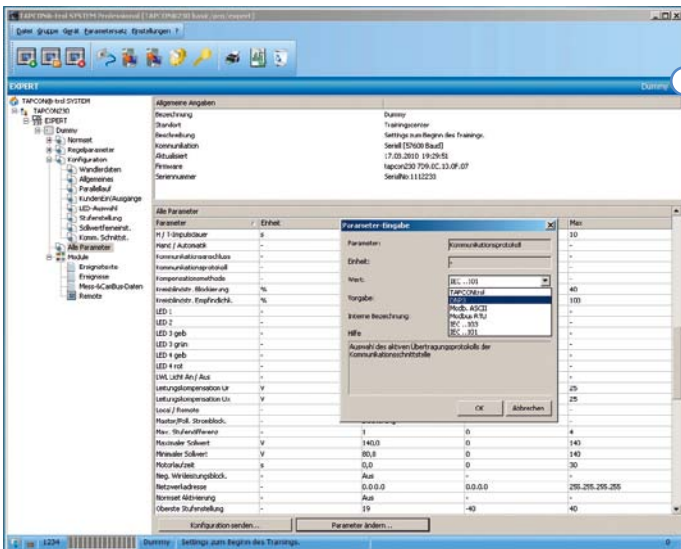
Functions			TAPCON® 230		
			basic	pro	expert
Assembly variants	Wall mounting		x	x	x
	Flush panel mounting		x	x	x
	DIN rail mounting		o	o	o
Monitoring	Limit values	I>, V>, V<	x	x	x
	General	Status, function monitoring	x	x	x
Power supply	AC or DC	88-265 V DC/AC	x	x	x
	Transformer supply	88-265 V DC/AC	x	x	x
	Additional mains adapter	70-210 V DC for supplying the digital inputs		x	x
Customized	Inputs / outputs	Digital	x	x	x
	LED selection	Red, green, amber	x	x	x
	Input	Analog		x	x
Parallel operation	Integrated	Circulating reactive current minimization, master / follower		x	x
Tap position	Recording	BCD, dual, 0(4)-20 mA, potentiometer, gray code		x	x
	Output	BCD		x	x
Interfaces	Control system protocol	IEC60870-5-101/ -103, ModBus ASCII and ModBus RTU, DNP 3.0			x
	Hardware CI card	RS232; RS485			x
		RJ45 Ethernet			o
		Fiber optic			o
	Control system protocol	IEC61850			x
	Hardware IEC61850 card	RJ45 Ethernet			x
Fiber optic - FO-LC plug (Ethernet)				x	

Standard = x Optional = o



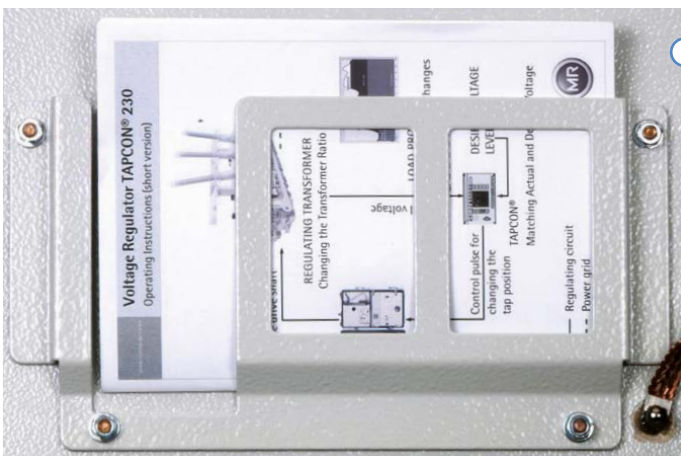
Intuitive and simple operation

- | Clear display/signaling via graphic display with logical menu structure and different-colored LEDs, some of which can be freely configured
- | User-friendly arrangement of control and function keys
- | Display available in German, English, Italian, Spanish, Portuguese, French and Russian



Convenient and time-saving parameterization via TAPCON®-trol

- | Complete parameterization using "MR-Suite" PC software
- | Parameterization possible on site via RS232 front interface
- | TAPCON® 230 expert with remote parameterization by Ethernet
- | Real-time remote control



Modular, task-based documentation for assembly, commissioning and operational management

- | Connection diagram as slide-in element in the device
- | Installation and commissioning instructions
- | Operating instructions
- | Quick reference guide in the device



Flexible choice of control system communication

- | Protocols and interfaces to SCADA can be selected on the device
- | For IEC60870-5-101/ -103, ModBus ASCII & ModBus RTU, DNP 3.0:
 - RS232 or RS485
 - CAN-Bus
 - RJ45 Ethernet
 - FO optional
- | For IEC61850:
 - FO (Ethernet)
 - RJ45 Ethernet



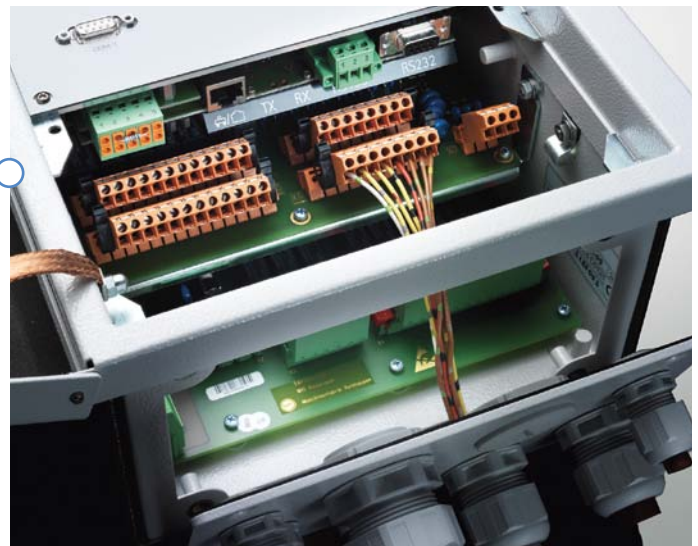
Reliable device technology with numerous assembly options

- | Steel sheet metal housing, powder-coated
- | IP54 level of protection
- | Housing can be locked
- | Door can be unhinged
- | Various assembly options:
 - Flush panel mounting, wall mounting, DIN rail mounting
- | Entire base plate can be taken off/disassembled



Large cable connection compartment for simple wiring and measurement

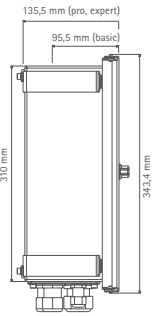
- | Modern "Easy Cable" screw/plug technique
- | Plenty of space for cable connections
- | Cable screw connections of various sizes for strain relief and sealing the connection cables



TAPCON® 230 – other special features

- Recording of steps via analog value or BCD code
- Automatic calibration function of step recording for resistor contact series
- All-in-one mains adapter, 88 – 265 V AC/DC
- Additional auxiliary voltage supply for TAPCON® 230 pro and expert

TAPCON® 230: Setting ranges	
	Range
Desired values 1 ... 3	49 ... 140 V
Bandwidth	0.5 ... 9.0%
Delay time T1	0 ... 600 s
Delay time T2	1 ... 10 s
Length of switching pulse	0 ... 10 s
Line drop compensation	V_R : -25 ... +25 V V_X : -25 ... +25 V
Undervoltage blocking Overvoltage blocking with rapid return control (can be switched off)	60 %...100 % of desired value 100 %...140 % of desired value
Undercurrent blocking Overcurrent blocking	0 ... 210 % 50 ... 210 %
Voltage transformer Current transformer	0 ... 9.999 kV / 57 ... 113 V 0 ... 9.999 A / 1 or 5 A

Protective housing TAPCON® 230		basic	pro	expert
	Housing (W x H)	198 x 310 mm		
	Depth	95.5 mm	135.5 mm	
	Door (W x H)	242 x 343 mm		
	Weight	6.0 kg	6.8 kg	7.0 kg

Control station communication (TAPCON® 230 expert only)					
	RS232	RS485	Fiber optic (serial)	RJ45 (Ethernet, TCP only)	Fiber optic (Ethernet)
TAPCON®-trol	x	x	o	x	
DNP3 (level 2)	x	x	o	x	
MODBUS ASCII	x	x	o		
MODBUS RTU	x	x	o	x*	
IEC60870-5-101	x	x	o		
IEC60870-5-103	x	x	o		
IEC61850				x	x

* does not correspond to Modbus TCP, but Modbus RTU via TCP

Standard = x Optional = o

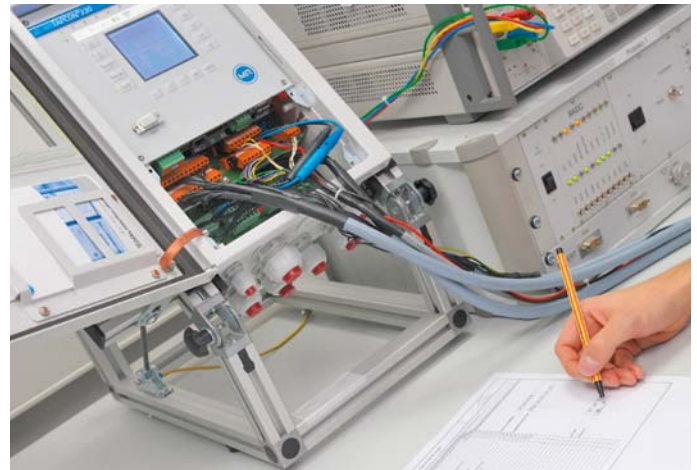
The world market's leading company – the perfect partner for those who expect only the best

Maschinenfabrik Reinhausen GmbH (MR) is the largest company of the REINHAUSEN Group, both in sales and number of employees. Founded in 1901, MR is today considered the world's leading premium provider of on-load tap-changers for regulating power transformers.

All our products satisfy the highest standards in terms of quality, reliability and stability. Our voltage regulators and monitoring systems provide reliable service worldwide, in some cases under extreme conditions of use. This is the result of the unique expertise derived from over 40 years' experience in this specialist field.

Our experts are familiar with the requirements of both end customers and transformer manufacturers. This knowledge drives our innovations and is also used to provide challenging special solutions. In addition, it enables us to continually set new standards, which are then used by the entire industry sector. We use our research and development center in Regensburg, unique worldwide, for this purpose. Every product that leaves our company has been tested against the applicable standards and beyond. That's how we ensure that our customers get exactly what they expect from us – failure-free regulation of their transformers, even under extreme conditions and over a period of several years.

Our responsibility doesn't end when the product is delivered. We offer reliable customer support throughout the lifetime of the product, which may be several decades. During this time we provide an ongoing maintenance service and stock all the necessary spare parts. That's because our systems are built to last. Guaranteed.



The densest service network worldwide – no matter where you are, we are close by

Maximum precision and perfection are demanded of our products – and that of course applies for our service as well. To ensure this, we depend on a unique, closely-knit, worldwide network made up of certified premium service providers. These premium service providers are thoroughly trained in accordance with our regulations and also attend instruction courses at regular intervals.

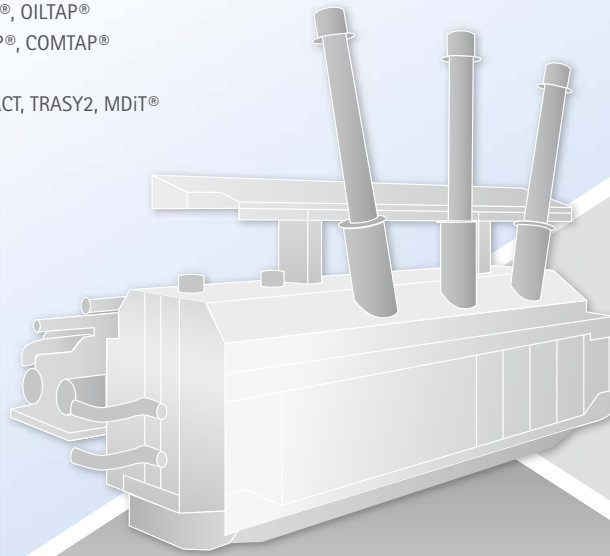
Your one-stop provider – everything in MR quality



MR is your reliable partner for all power transformer issues and system provider for all products in the areas of Power Transmission, Power Distribution, Automation & Control, Asset Management Solutions, Power Composites and Power Quality.

Power Transmission, Power Distribution

On-load tap-changers VACUTAP®, OILTAP®
 Off-circuit tap-changers DEETAP®, COMTAP®
 Drives TAPMOTION®
 Temperature monitoring COMPACT, TRASY2, MDiT®
 Intelligent fan control MTeC®
 Buchholz relay MSafe®
 Flow indicators MFloC®
 Oil level indicators MTO, MMK
 Pressure relief devices MPreC®
 Dehydrating breathers MTrAB®
 Sensors, accessories
 Smart Grid Solutions



Automation & Control

Voltage regulator TAPCON®
 Monitoring systems TAPGUARD®

Asset Management Solutions

On-load tap-changer service and support
 Training
 Spare parts
 Retrofit solutions for all products

Power Composites

Composite hollow isolators ReCoTec®
 Glass fiber reinforced plastic (GFRP) tubes ROTAFIL®

Power Quality

Compensation systems for all voltage levels
 Components, network studies

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