

# VACUTAP® AVT – regulating transformers in it's best way



## VACUTAP® AVT – our experience – your advantage



As the world leader in on-load tap-changer technology we are pioneers in the field of oil-free tap-changers for dry-type transformers. To meet the requirements of our customers, especially those in China, we have incorporated our many years of experience into the development of the new on-load tap-changer type AVT.

### Convincing technology

With a combination of 2 vacuum-interrupters and a load-free change-over switch for each phase to be switched, the design of the AVT ensures reliable operation of the regulating transformer in all applications. Other than the locally customary 10 kV, the AVT is designed for  $U_m = 11.5$  kV.

The heart of the new on-load tap-changer consists of vacuum-interrupters developed exclusively for MR by Siemens and designed specially for the requirements of tap-changer applications.

Components performing mechanical functions are manufactured from corrosion-resistant materials. The stable base structure is fully zinc-coated. When designing the mechanical driving system, our top priorities were reliability, quiet running and a long lifespan.

### Quality in every detail

The tap selector is driven directly by a step-by-step gear comparable to the well-known MR geneva gear. This ensures defined positioning and locking-in of the on-load tap-changer in every operating situation. Apart from its long lifespan, the linear energy accumulator with its wear-resistant movable roll-pawls provides monitoring of the locking-in process by means of sensors.

The basis for the precise functioning of the diverter switch is the control of the vacuum-interrupters by means of links.

A new concept for controlling the motor drive unit also increases the reliability of the AVT on the electrical side. The motor drive unit and all the control devices are located on one side in the tapchange housing and can be accessed by a door.

## Voltage regulator TAPCON® 230-AVT

A digital voltage regulator of the latest generation – the TAPCON® 230-AVT – is used as external control unit. This regulator was developed especially for the application areas of the VACUTAP® AVT. In addition to the control function, the TAPCON® 230-AVT offers protection against overload and overvoltage. As a speciality, the AVR is equipped with a serial RS 485 interface for connection to a control system. The housing with large observation window is made of robust steel plating and is protected against splashed water (protection rating IP44). The TAPCON® 230-AVT can be used reliably within a temperature range from  $-10^{\circ}$  to  $+60^{\circ}$  Celsius and at altitudes up to 3000 m above sea level.



<b>VACUTAP® AVT® – Technische Daten</b>	
<b>On-load tap-changer</b>	
Number of phases	3
Rated step voltage	500 V
Short-circuit withstand capability	4000 A r.m.s. 2 s dynamic (peak value) 7.5 kA
Max. rated current per phase	170 A
Rated frequency	50 – 60 Hz
No. of operating positions	9
<b>Insulation to ground and phase to phase</b>	
Highest voltage for equipment Um 11.5 kV	11.5 kV
Rated impulse withstand voltage 75 kV	75 kV
Rated power-frequency withstand voltage 35 kV	35 kV
<b>Internal insulation</b>	
Rated impulse withstand voltage over 1 step	10 kV
Rated power-frequency withstand voltage over 1 step	3 kV
Rated impulse withstand voltage over the adjustment range	45 kV
Rated power-frequency withstand voltage	15 kV
Housing dimensions	(w x h x d) – 1750 x 1612 x 460 mm
Weight	350 kg
On-load tap-changer design according to	IEC 60214–1
<b>Driving unit (integrated into the tap-changer housing)</b>	
Power	0.25 kW
Voltage	3 ACN 220 / 380 V
Rated current	1.55 / 0.9 A
Frequency	50 Hz
Ambient temperature -20°C – +65°C	-20°C – +65°C

Setting ranges	
Desired voltage level	195 – 255 V
Bandwidth	$\pm 0.5 \dots \pm 9 \%$
Delay time T1	1 ... 180 s
Delay time T2	1 ... 10 s
Switching pulse duration	1.5 s
LDC	Ur = 0 ... $\pm 25$ V Ur = 0 ... $\pm 25$ V
Z compensation selection	Voltage rise 0 ... 15 % of desired voltage Limitation 0 ... 15 % of desired voltage level
Undervoltage blocking	70 ... 99 % of desired voltage level
Overvoltage detection	101 ... 130 % of desired voltage level
Overcurrent blocking 50 ... 210%	50 ... 210 %
Voltage measurement	220 V AC
Current transformer	45 kV

Operation elements, display	
Function keys	Manual / Automativ Raise / Lower Meu keys
Display	4-line, 16-digit LC display 1 LED lamp (green) for signalling status 1 LED lamp (red) each for signalling U<, U>, I> 1 LED lamp (green) for signalling, "parallel operation active" status 1 LED lamp (green) for signalling "NORMset active" status
Power supply	22 V (-15 % / + 20 %) 40 - 60 Hz, can be chosen either from the measuring voltage or separately. Power consumption approx. 5.5 VA (at 115 V, idle state)
Protective housing	Steel-plate housing with inspection window for flush or projected panel mounting 216 x 326 x 137 mm (W x H x D) Degree of protection provided by enclosure: IP 44 according to IEC 60529, Weight approx. 5.4 kgs

## 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 meet highest standards when it comes to quality, reliability and endurance strength. Proof of our extraordinary market position – more than 50% of the world's electrical current flows through MR on-load tap-changers. Behind all this is our edge in expertise, gained from more than 80 years of 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 does not stop at delivery. We will remain your absolutely reliable partner over the entire lifetime of the product. And that can be 50 years or more. Even after this time, our customers will receive the necessary service, maintenance and spare parts. Because what we make lasts a long time. That's a sure thing.



### 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.

#### MR service means:

- | 24-month warranty on all services
- | Service engineers on site within 24 hours
- | Access to original MR spare parts over decades
- | Experience gained from thousands of service calls
- | Preparation of individual service strategies
- | Training courses for your service personnel at our training centers

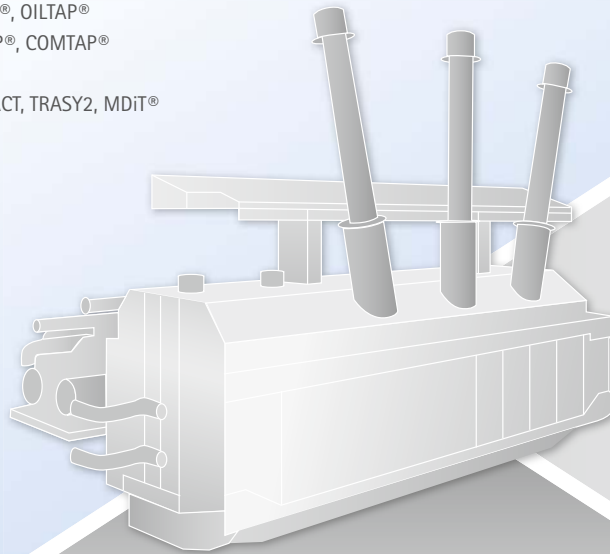
## Your one-stop provider – everything in MR quality



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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