VACUTAP® VM®

UNIQUELY VERSATILE – UNIQUELY FIT FOR THE FUTURE.

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VACUTAP® VM® – THE ALL-ROUNDER FOR GRID OPERATION AND INDUSTRY.

The challenge: maximum reliability with minimum maintenance costs.
Our solution: the VACUTAP® VM® on-load tap-changer.
For all operators who don't want to compromise.

The age of transformers around the world is constantly increasing. 50 years of operation and more are not uncommon these days. Of course, tap changers also have to function smoothly for these long periods. Our VACUTAP® VM® on-load tap-changer rises to this challenge. Our engineers have managed to combine the legendary reliability of the OILTAP® M supplied in more than 80,000 units with the benefits of vacuum switching technology.

Cut maintenance costs – and stay on the safe side

The new development is the culmination of our expertise in proven oil technology and decades of experience in the field with vacuum switching technology. The result is a design using tried and tested components coupled with new high-performance materials. Our development work focused on robustness – especially in situations of increased loads such as transformer overload operation. We asked our engineers to delivery maximum reliability and minimum maintenance requirements. Their impressive solution is 300,000 tap-change operations without any maintenance. The expected service life of the diverter switch insert is 1.2 million tap-change operations.

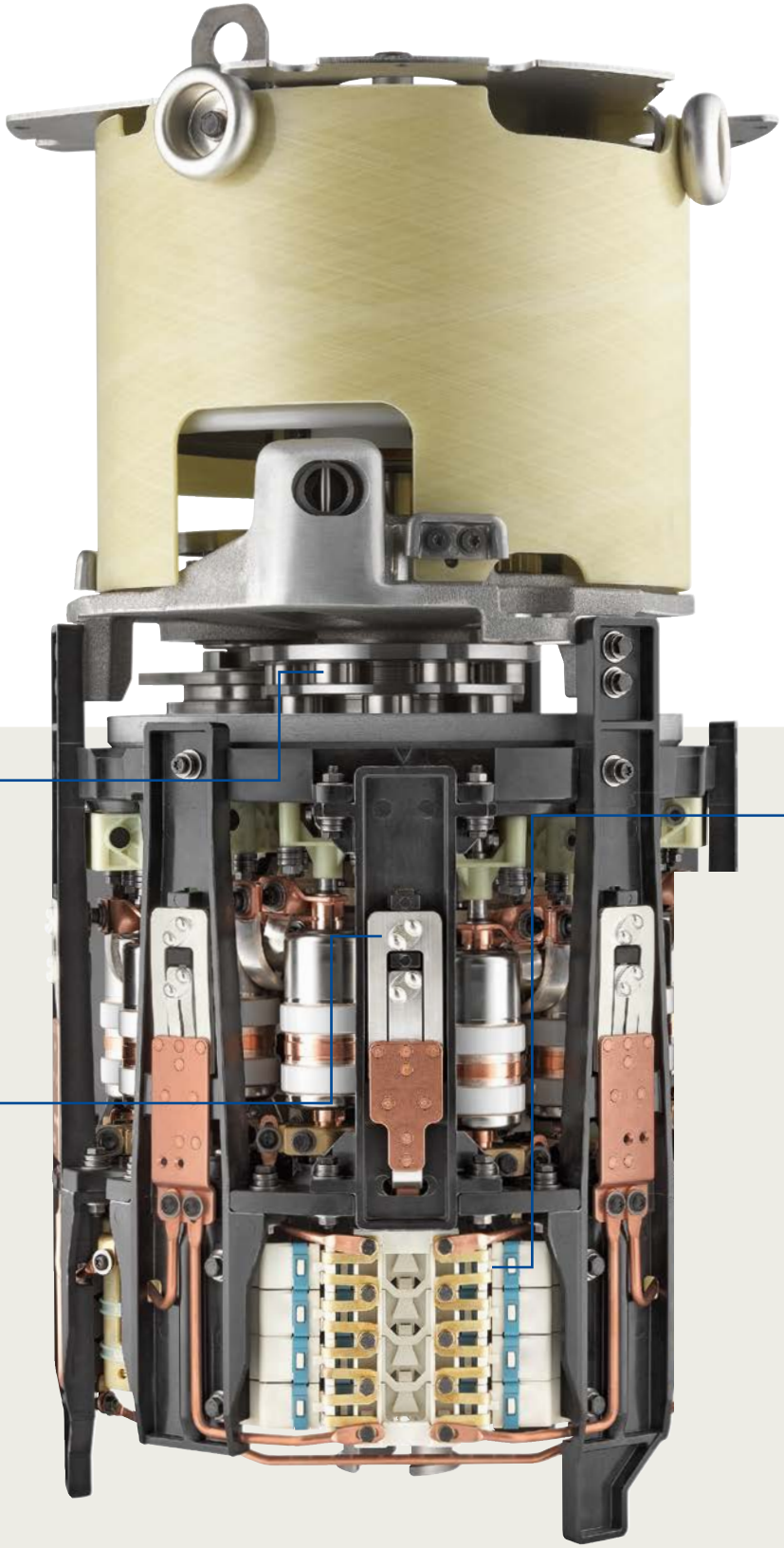
The VACUTAP® VM® is a genuine all-rounder. It is mainly used in 30-200 MVA transformers and the 110-230 kV voltage levels typical in the transmission grid. But the VACUTAP® VM® is equally at home in challenging electric arc-furnace, HVDC, electrolysis, rectifier and phase-shifter applications. And best of all: operators currently using oil technology can easily upgrade to our tried and tested vacuum technology with the VACUTAP® VM®.

Plug & play – the easy way to switch from oil to vacuum

The shift to vacuum technology has never been easier: the VACUTAP® VM® is retrofittable and 100% connection compatible with the OILTAP® M.
In principle, this also applies to tap changers with manufactured under other licenses.

VACUTAP® VM® – UNIQUE AND 4 TIMES BETTER.

Decades of experience in vacuum technology.
The result: an on-load tap-changer that combines maximum operational safety with maximum ease of service.



Retrofittable VACUTAP® VM® diverter switch insert

- 100% connection compatible with OILTAP® M and MS
- Licensed tap changers can also be upgraded

VACUTAP® Arc Control System® [1)]

- Perfectly matched interaction between our interrupters, developed especially for the on-load tap-changer (Advanced Interrupter Technology), and the new, patented actuation kinematics (Dual Energy Accumulator)
- Ensures reliable, optimum arc extinguishing
- Prevents damage to the tap changer and transformer

Interrupter Exchange Module

- For applications with a very high number of tap-change operations, e. g. HVDC or electric arc furnaces
- Complete carrier unit with preassembled vacuum interrupters
- Simplifies replacement after 600,000 tap-change operations
- Shortens production downtimes for maintenance
- Ensures optimum functionality and safety

[1)] For all VM® models except VMS®

Quality down to the last detail – tested for longer, lasts longer

Endurance counts. This is why the VACUTAP® VM® has been put through longer and tougher tests than any MR tap changer before it. Far more than 200 tap changers were tested in advance to ensure the statistical certainty needed to guarantee a zero-defect launch. Our test engineers purposefully surpassed the values laid down in the IEC guidelines several times over. From a mechanical standpoint, the VACUTAP® VM® had to meet requirements 3 times higher. This meant not 500,000 but 1.5 million switching operations! Or for the rated switching performance tests: 600,000 rather than 50,000 switching operations. This was all done with one common goal in mind: being able to offer our customers the best possible assurance of faultless functioning.

Our vacuum interrupters are produced exclusively for MR and optimized for use in tap changers. No other manufacturer has so many vacuum cells in use around the world.

VACUTAP® Step Protection System®

- Special components protect the diverter switch against tap short circuits in the event of overvoltage in the grid (e.g. lightning strike or switching operations etc.)
- Less scatter in response values
- Optimum insulation coordination inside the diverter switch
- Prevents destruction of the insulation in the diverter switch

Other benefits for network applications:

- Minimum maintenance requirement with maximum lifetime: A maintenance interval of 300,000 switching operations means that the on-load tap-changer does not have to be maintained throughout the transformer's entire usage period
- Factory built for selected alternative insulating fluids[1)]
- ATEX certification (for use in explosive environments)[1)]
- Also suitable for use in earthquake zones

[1)] For all VM® models except VMS®

A simple approach to transformer design – perfectly prepared with TAPMODELLER

We are the only supplier of on-load tap-changers to provide transformer manufacturers with another free service: TAPMODELLER. This service provides 3D models of our tap changers and de-energized tap-changers, allowing manufacturers to include the CAD geometry in the transformer's 3D model at the design stage. This enables more precise planning while saving time and money. Exact knowledge of the CAD geometry also permits optimized transformer dimensions because voltage spacing can be estimated at the design stage. TAPMODELLER provides to-scale 3D models of the DEETAP® DU product families and the VACUTAP® VR®, VM®, VV® and VT®; OILTAP® V, M, MS and R tap changers. Depending on the order, a 3D model of the entire drive train can, of course, also be provided.

Benefits: Cost calculation, time saved in development, less rework.

VACUTAP® VM® TECHNICAL DATA.

On-load tap-changers

Description		VM® III 300Y	VM® III 350Y	VM® III 500Y	VM® III 650Y	VM® II 302	VM® II 352	VM® II 502	VM® II 652	VM® I 301	VM® I 351	VM® I 501	VM® I 651	VM® I 802	VM® I 1002	VM® I 1203	VM® I 1503	VMS® III 400Y	VMS® III 650Y
Number of phases and application		3	3	3	3	2	2	2	2	1	1	1	1	1	1	1	1	3	3
Max. rated through-current I_r (in A)		300	350	500	650	300	350	500	650	300	350	500	650	800	1000	1200	1500	400	650
Rated short-time current (in kA)		4	4.2	5	6.5	4	4.2	5	6.5	4	4.2	5	6.5	8	10	12	15	4	6.5
Rated duration of short circuits (in s)		3																	
Rated peak withstand current (in kA)		10	10.5	12.5	16.25	10	10.5	12.5	16.25	10	10.5	12.5	16.25	20	25	30	37.5	10	16.25
Max. rated step voltage U_{ir} (in V)		3300																1300	
Step capacity P_{StN} (in kVA)		990	1155	1625	1625	990	1155	1625	1625	990	1155	1625	1625	2600	2600	3500	3500	520	845
Rated frequency (in Hz)		50...60																	
Operating positions[3]	without change-over selector	max. 18																max. 14[1]	
																		max. 18[2]	
	with change-over selector	max. 35																max. 27[1]	
		with multiple coarse change-over selector: max 107																max. 35[2]	
Motor-drive unit		ETOS® ED, ETOS® TD																	

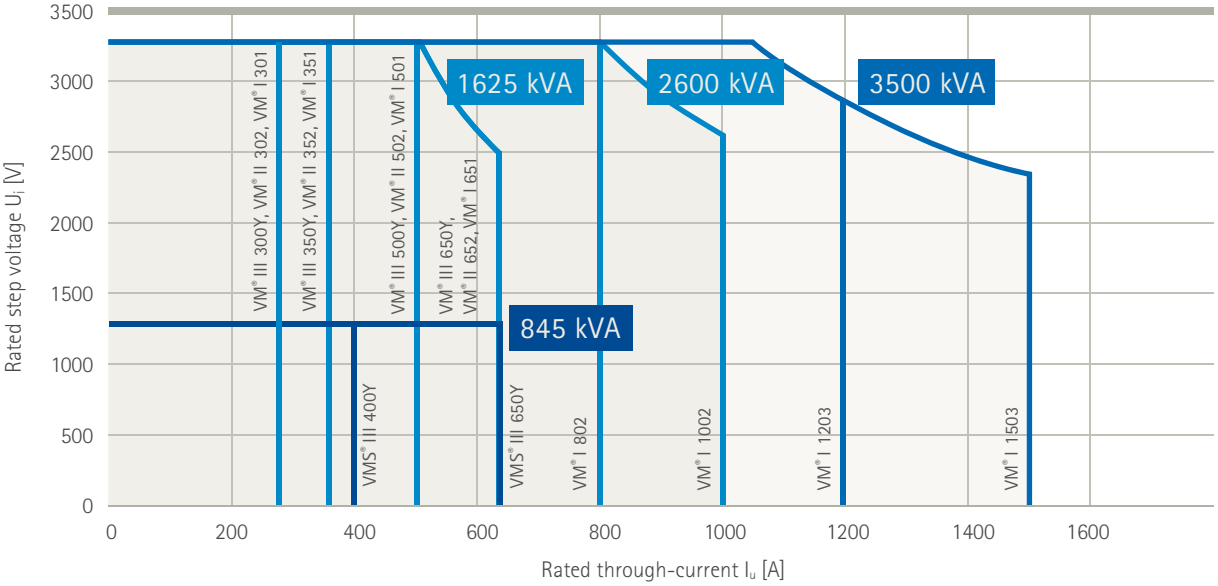
[1] with MS selector, [2] with M selector
[3] 300 Ampere variants with a maximum of 27 operating positions available

Rated insulation level[4]

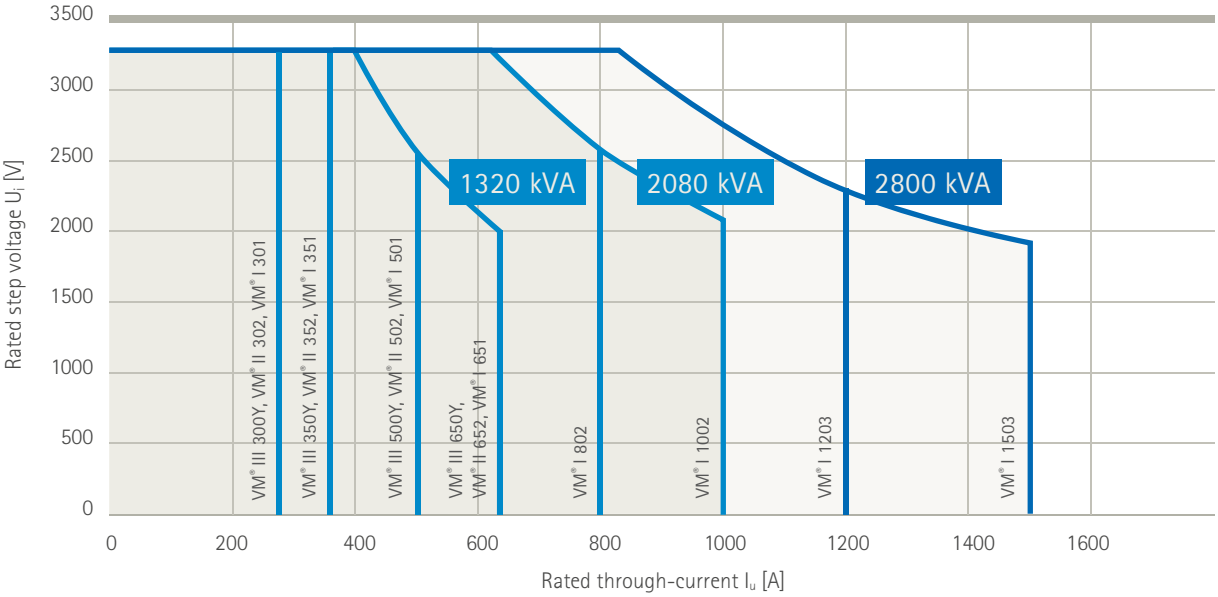
Maximum voltage for equipment U_m (in kV)	72.5	123	170	245	300
Rated lightning impulse withstand voltage (in kV, 1.2|50 µs)	350	550	750	1050	1050
Rated short-duration power frequency withstand voltage (in kV, 50 Hz, 1 min.)	140	230	325	460	460

[4] Star-point on-load tap-changer and 300 A variant available up to max. U_m 245 kV.
VACUTAP® VMS® available up to max. 170 kV.

Step capacity diagram VM® grid



Step capacity diagram VM® electric arc furnace



OUR VACUUM TECHNOLOGY – TESTED IN OUR TEST CENTER; THE ONLY ONE OF ITS KIND IN THE WORLD.

MORE POWER, MORE VALUE.

For reliable, economical operation.

Maintenance free and long lasting

- Maintenance interval of 300,000 tap-change operations with no time limit
- Lifetime of the diverter switch insert: 1.2 million tap-change operations
- Maximum lifetime, yet minimum maintenance requirements

Maximum operational reliability

- The VACUTAP® Arc Control System®[1)] extinguishes the arc with absolute reliability
- The VACUTAP® Step Protection System® effectively protects the diverter switch against overvoltage in the grid
- Also suitable for use in earthquake zones
- ATEX certification (for use in explosive environments)[1)]

Low life-cycle costs

- Reduction in maintenance-linked production downtimes thanks to Interrupter Exchange Modules
- The VACUTAP® VM® diverter switch insert is retrofittable, which means longer maintenance intervals and maximum cost effectiveness

Designed with future requirements in mind

Factory built for selected alternative insulating fluids[1)]

Simple installation in the transformer

It's never been easier to switch to our tried and tested vacuum technology: The VACUTAP® VM® is retrofittable and 100% connection compatible with the OILTAP® M. All you have to do is dismantle the old diverter switch and fit the new VM® model.

[1)] For all VM® models except VMS®

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THE POWER BEHIND POWER.