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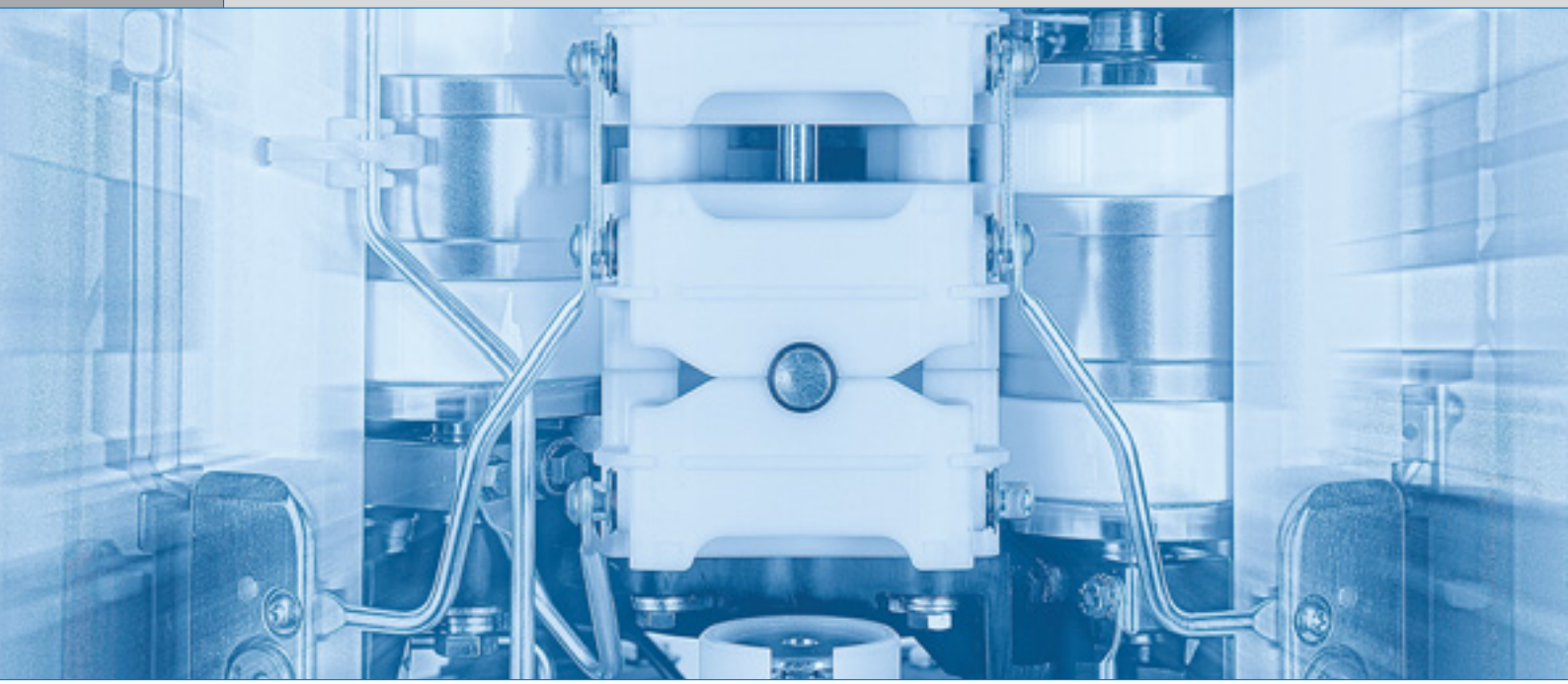
VACUTAP® VR

On-Load Tap-Changer
for Regulating Transformers



VACUTAP® VRC, VRE

Types and variants of VACUTAP® VRC, VRE / OILTAP® M, RM

U_m 72.5...245 kV	VRC		VRE		U_m 72.5...245 kV
	U_{im}: 3300 V		U_{im}: 4000 V		
	VACUTAP®	OILTAP®	VACUTAP®	OILTAP®	
	3-phase		3-phase		
	VRC III 400Y	M III 350Y			
	VRC III 550Y	M III 500Y			
	VRC III 700Y	M III 600Y	VRE III 700Y	RM III 600Y	
U_m 72.5...300 kV	2-phase				U_m 72.5...300 kV
	VRC II 402	M II 352			
	VRC II 552	M II 502			
	VRC II 702	M II 602			
	1-phase		1-phase		
	VRC I 401	M I 351			
	VRC I 551	M I 501			
	VRC I 701	M I 601	VRE I 701	RM I 601	
	VRC I 1001	M I 802	VRE I 1001	RM I 1201	
				M I 1203	
	VRC I 1301	M I 1203	VRE I 1301	RM I 1201	

Number of pairs of tap selector planes (tap selector planes in total):
3(6) 2 (4) 1 (2)

Types and variants of VACUTAP® VRD, VRF, VRG / OILTAP® R

U_m 72.5...245 kV	VRD		VRF/VRG*		U_m 72.5...245 kV
	U_{im}: 3300 V		U_{im}: 4000 V		
	VACUTAP®	OILTAP®	VACUTAP®	OILTAP®	
	3-phase		3-phase		
	VRD III 1000Y	R III 1200Y	VRF III 1000Y	R III 1200Y	
	VRD III 1300Y	R III 1200Y	VRF III 1000Y	R III 1200Y	
U_m 72.5...300 kV			2-phase		U_m 72.5...362 kV
			VRF II 1302	R II 1202	
	1-phase		1-phase		
			VRF I 1001	R I 1201	
	VRD I 1301	M I 1203	VRF I 1301	R I 1201	
		R I 1201			
			VRF I 2602 2)	R I 2402 2)	

Number of pairs of tap selector planes (tap selector planes in total):
3(6) 2 (4) 1 (2)

* VRG: identical variants as VRF, but with selector size "E"
2) Forced current splitting by two parallel winding branches required

VACUTAP® VRD, VRF

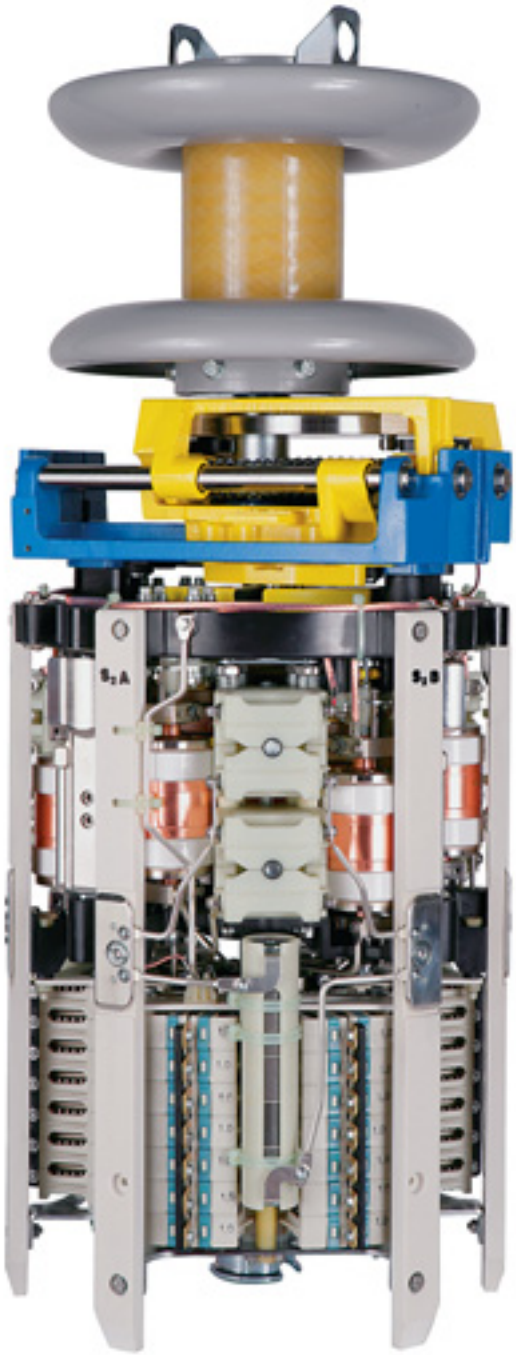
On-load tap-changer	VRC III 400Y	VRC III 550Y	VRC III 700Y	VRC II 402	VRC II 552	VRC II 702	VRC I 401	VRC I 551	VRC I 701	VRC I 1001	VRC I 1301	VRE III 700Y	VRE I 701	VRE I 1001	VRE I 1301	VRD III 1000Y	VRD III 1300Y	VRD I 1301	VRF III 1000Y VRG III 1000Y	VRF III 1300Y VRG III 1300Y	VRF II 1302 VRG II 1302	VRF I 1001 VRG I 1001	VRF I 1301 VRG I 1301	VRF I 2602 2) VRG I 2602 2)
Number of phases and application	3 1)	3 1)	3 1)	2	2	2	1	1	1	1	1	3 1)	1	1	1	3 1)	3 1)	1	3 1)	3 1)	2	1	1	1
Max. rated through-current I_{um} (in A)	400	550	700	400	550	700	400	550	700	1000	1300	700	700	1000	1300	1000	1300	1300	1000	1300	1300	1000	1300	2600
Rated short-time withstand current (in kA)	6	8	10	6	8	10	6	8	10	12	15	10	10	12	15	12	15	15	12	15	15	12	15	26
Rated short-circuit duration (in s)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Rated peak withstand current (in kA)	15	20	25	15	20	25	15	20	25	30	37.5	25	25	30	37.5	30	37.5	37.5	30	37.5	37.5	30	37.5	65
Max. rated step voltage U_{im} (in V) 3)	3300	3300	3300	3300	3300	3300	3300	3300	3300	3300	3300	4000	4000	4000	4000	3300	3300	3300	4000	4000	4000	4000	4000	4000
Step capacity P_{StN} (in kVA)	1320	1500	1500	1320	1500	1500	1320	1500	1500	1500	1500	2800	2800	3000	3000	1500	1500	1500	3000	3000	3000	3000	3000	6000
Rated frequency (in Hz)	50...60															50...60								
Operating positions	Without change-over selector: max. 18, with change-over selector: max. 35															Without change-over selector: max. 18, with change-over selector: max. 35								

1) Neutral point 2) Forced current splitting by two parallel winding branches required 3) The maximum rated step voltage may be exceeded by 10% due to overexcitation of the transformer if the step capacity is limited to its rated value.

VACUTAP® VR – Now With Even More Possible Applications

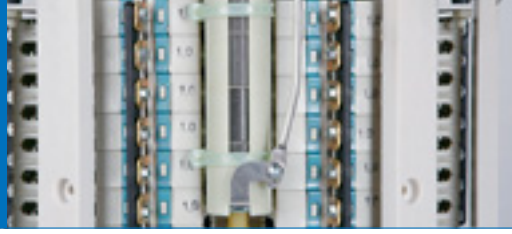
The VACUTAP® VRC/VRE 700 vacuum on-load tap-changer became available for delivery in September 2004. Since then they have made a name for themselves around the world. Starting in the third quarter of 2006, we will be expanding the high end of the performance spectrum with the new VACUTAP® VRD/VRF/VRG 1300.

The result will convince you: significantly reduced operating costs combined with maximum quality and highest environmental and safety standards.

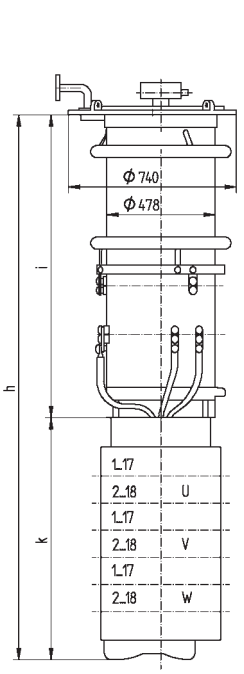


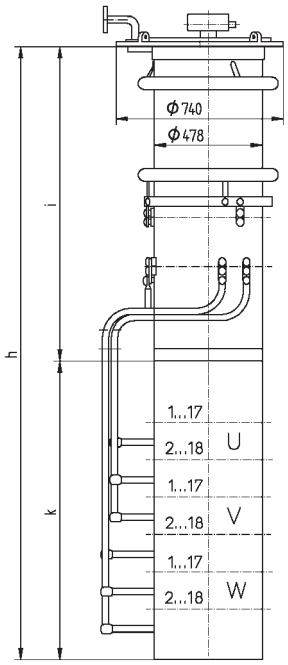
Advantages VACUTAP®:

- Experience with the state-of-the-art vacuum switching technology since the 80ies, i.e. 8,000 VACUTAP® OLTCs are in use worldwide.
- Maintenance-free for up to 300,000 operations or even more, depending on application
  - No time based maintenance
  - Maintenance-free for almost all network applications
  - Significant reduction of life-cycle-costs
  - Increased transformer availability
- Friendly to the environment
  - No oil carbonization: no arcing in the insulating oil
  - No oil filter unit
  - Extended lifespan of the insulating oil
- Designed for selected, alternative liquids
- Extended application of VACUTAP® VR for autotransformers, for regulation at beginning of the delta winding, for HVDC transformers and for sealed transformers
- Ideal for industrial applications and for application in potentially explosive areas
- Vacuum switching technology now also available for almost all the extensive OILTAP® R/RM and M program
- Same diameter (740 mm) of the on-load tap-changer head, same diameter (478 mm) of the oil compartment as for OILTAP® R/RM and M – only minor changes in installation length



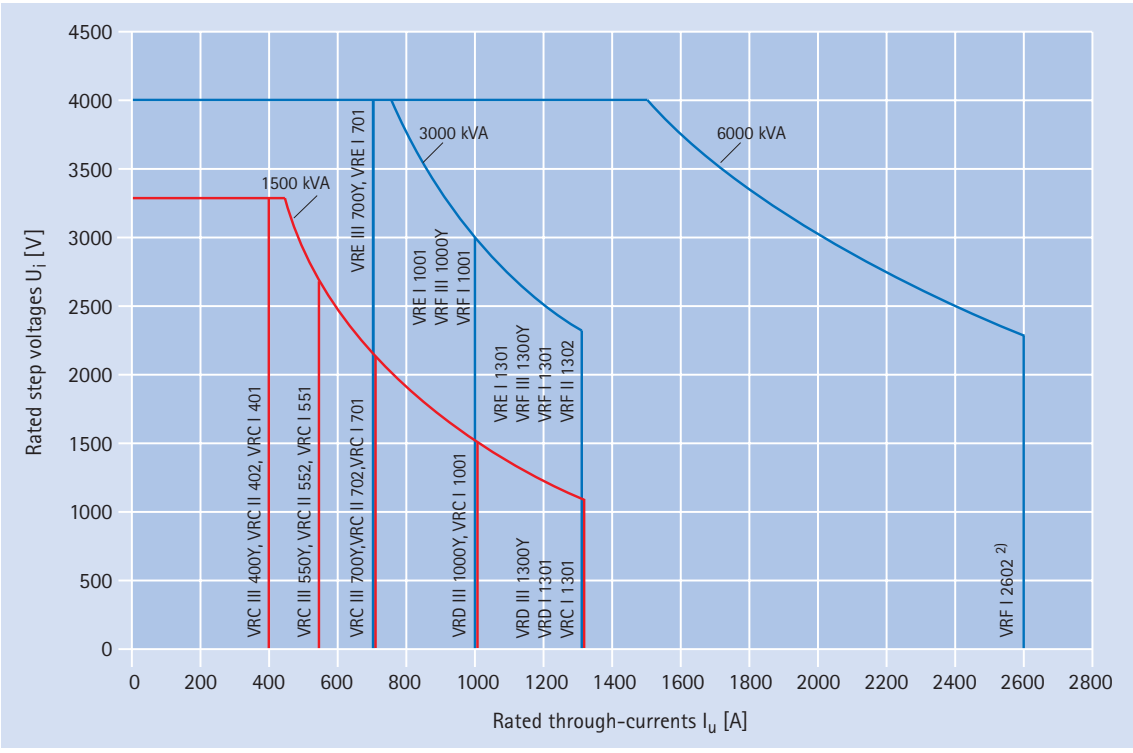
VACUTAP® VRC, VRE **VACUTAP® VRD, VRF** **Installation lengths**





Type	min. kV	h	i	max. kV	h	i
VRC III 700Y-C	72.5	2183	1111	245	2513	1441
VRC II 702-C	72.5	1943	1111	300	2403	1571
VRC I 701-C	72.5	1703	1111	300	2163	1571
VRC I 1001-C	72.5	1913	1111	300	2373	1571
VRC I 1301-C	72.5	2123	1111	300	2583	1571
VRE III 700Y-C	72.5	2313	1241	245	2643	1571
VRE I 701-C	72.5	1833	1241	300	2293	1701
VRE I 1001-C	72.5	2043	1241	300	2503	1701
VRE I 1301-C	72.5	2253	1241	300	2713	1701
VRD III 1300Y-D	72.5	2758	1162	245	3088	1492
VRD I 1301-D	72.5	1902	1162	300	2362	1622
VRF III 1300Y-D	72.5	2758	1162	245	3088	1492
VRG III 1300-E	72.5	3094	1162	245	3424	1492
VRF II 1302-D	72.5	2330	1162	362	2920	1752
VRG II 1302-E	72.5	2614	1162	362	3204	1752
VRF I 1301-D	72.5	1902	1162	362	2492	1752
VRF I 2602-D [2)]	72.5	2232	1162	362	2822	1752

Step capacities [4)]



[4)] Only applies to network service. When used for industrial transformers, please contact us.

www.reinhausen.com

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On-load tap-changer designations

Example: VRF III 1300 Y - 72.5 / C - 10 19 1G

Basic connection diagramm

Type	VACUTAP® VRC	VRC
	VACUTAP® VRE	VRE
	VACUTAP® VRD	VRD
	VACUTAP® VRF	**VRF**
	VACUTAP® VRG	VRG
No. of phases	1 phase	I
	2 phase	II
	3 phase	**III**
I_{um} (in A)	VRC I, II, III	400
	VRC I, II, III	550
	VRC I, II, III, VRE I, III	700
	VRC I, VRE I, VRD III, VRF/VRG I, III	1000
	VRC I, VRE I, VRD I, III, **VRF**/VRG I, II, **III**	**1300**
	VRF I, VRG I	2600
No. of configured sectors	1 sector	1
	2 sectors	2
	3 sectors	3
	3 sectors (Y)	**0**
Application	Application at neutral point only	**Y**
U_m (in kV)	VRC, VRE, VRD, VRF, VRG	**72.5**
	VRC, VRE, VRD, VRF, VRG	123
	VRC, VRE, VRD, VRF, VRG	170
	VRC, VRE, VRD, VRF, VRG	245
	VRC, VRE, VRD, VRF, VRG	300
	VRF, VRG	362
Tap selector size	VRC, VRE	B
	VRC, VRE, VRD, VRF	**C**
	VRC, VRE, VRD, VRF	D
	VRC, VRE	DE
	VRG	E
Contacts	10	**10**
	12	12
	14	14
	16	16
	18	18
No. of max. operating positions without change-over selector	10	10
	12	12
	14	14
	16	16
	18	18
No. of max. operating positions with change-over selector	19	**19**
	23	23
	27	27
	31	31
	35	35
Mid-positions	0 mid-positions (without change-over selector)	0
	1 mid-position	**1**
	3 mid-positions	3
Change-over selector	Reversing change-over selector	W
	Coarse change-over selector	**G**

IN206/08en – 0406/2000 – 207/08/01/0 – F0081707 · dp · Printed in Germany