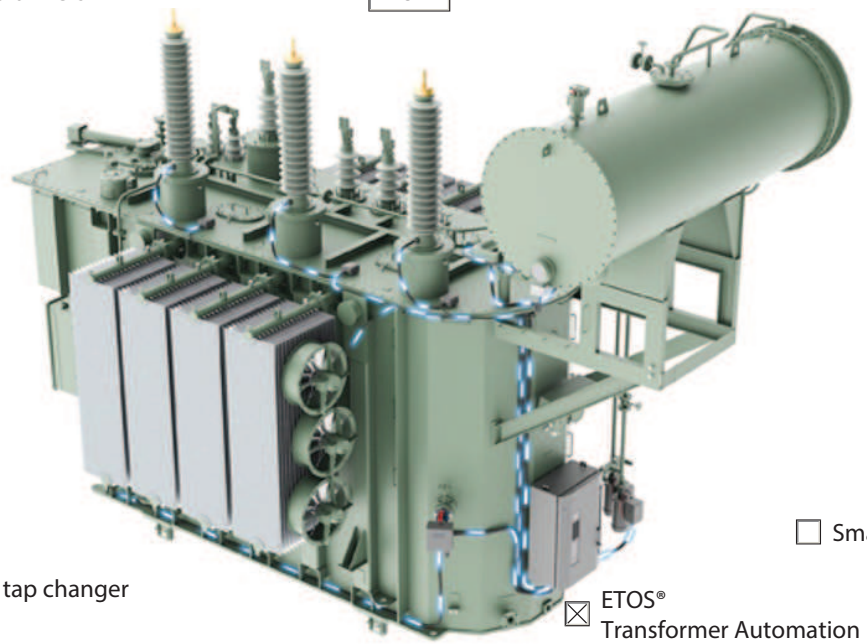
Specification - General

Project data			Language	English
Customer data				
MR customer:	Techno Venture Ltd.	Project/Project no.:	BREB (14MVA / 33kV)	
Inquiry/order no.:	TVL/Work Order/2023/241	Transformer manufacturer	Techno Venture Ltd.	
Commission no.:		Operator/country of installation:		
Previous delivery (order no.):		Previous delivery (serial no.):		
MR data (internal):				
Offer no.:	10492891	Order no.:	20552742	Serial no.: 2750282-86

Scope of order

Number of transformers: 5



☒ Tap changer





☐ De-energized tap changer

☐ Intelligent sensors



☐ Instruments



☐ Smart transformer accessories



☒ ETOS®
Transformer Automation

☐ Drives

☐ Oil filter unit

☒ TAPCON®



☐ Accessories



MASCHINENFABRIK REINHAUSEN GMBH

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Individual product configuration, see page 2

				Document number:	
				Checked	
				Processed	
Index	Amendments	Date	Name	Date	

Specification - General

Product selection

Tap changer	VACUTAP® VVS®
ETOS® Transformer Automation	ETOS® ED
Electronics	TAPCON® 230

Documentation

Operating instructions - transformer	English	Quantity	1	Supply	digital
Operating instructions - operator	English	Quantity	1		
Connection-diagram / label language	English				
Additional connection-diagram language	without				

Transformer application

Transformer application	network

Special transformer design

Special transformer design	without

General

Ambient temperature	-25°C...+50°C
Color of painted parts	RAL 7033
Corrosiveness category	C4H (ISO 12944-2)
Insulating medium (tap changer)	Mineral oil
Insulating medium (transformer)	Mineral oil

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Remarks

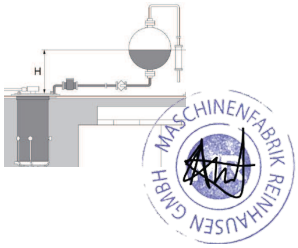
Specification - Transformer data

General

Type	separate winding transformer	Number of phases of transformer(s)	3
Frequency	50 HZ		
Overload	IEC 60076-7 / ANSI C57.91		
Short-time withstand current / Short-circuit duration	4 kA	/ 3 s	
Max. peak withstand current	kA		

Tap-changer design data

Electrical connection of tapped winding in complete system	delta, at line end	
Rated power	14	MVA
☒ Constant (FCBN) ☐ Decreasing from		
Regulated voltage	33	kV
Regulating range	+6 % / -18	%
Number of electrical steps	16	Steps
Constant voltage		kV
Tertiary voltage		kV
Maximum rated through current	172,46	A
Maximum step voltage in the phase	495	V
Transformer vector group	Dyn 1	
☐ Only for coarse / tapped winding	Leakage inductance: x =	jOhm
Induction of regulated transformer		
OLTC conservator height above cover	0-5 m (Standard)	



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Test and operating voltages

☒ In accordance with TD

The insulation distances of the on-load tap changer requsted and/or to be ordered are sufficient for the loading in the transformer

Voltage stress during transformer testing and in operation		AC 1min. [kV]	LI 1.2/50 [kV]	SI(optional) [kV]	Operation Umax [kV]
between selected and preselected tap	a0				
between fine tap selector contacts of a tap position	a1				
lengthwise along the tapped winding of a phase	a				
between tapped windings of various phases	b				
lengthwise along the coarse and tapped winding of a phase	c1				
between coarse windings of various phases	c2				
between connected and neighboring coarse tap contacts	d1				
between unconnected, neighboring coarse tap contacts	d2				
lengthwise along all coarse windings of a phase	d3				
between tap-changer and ground	f				
between tap selector contacts of different tap windings	a6				
between change-over selector contacts of different coarse windings	a7				

Specification - Transformer data

Tap-changer design data

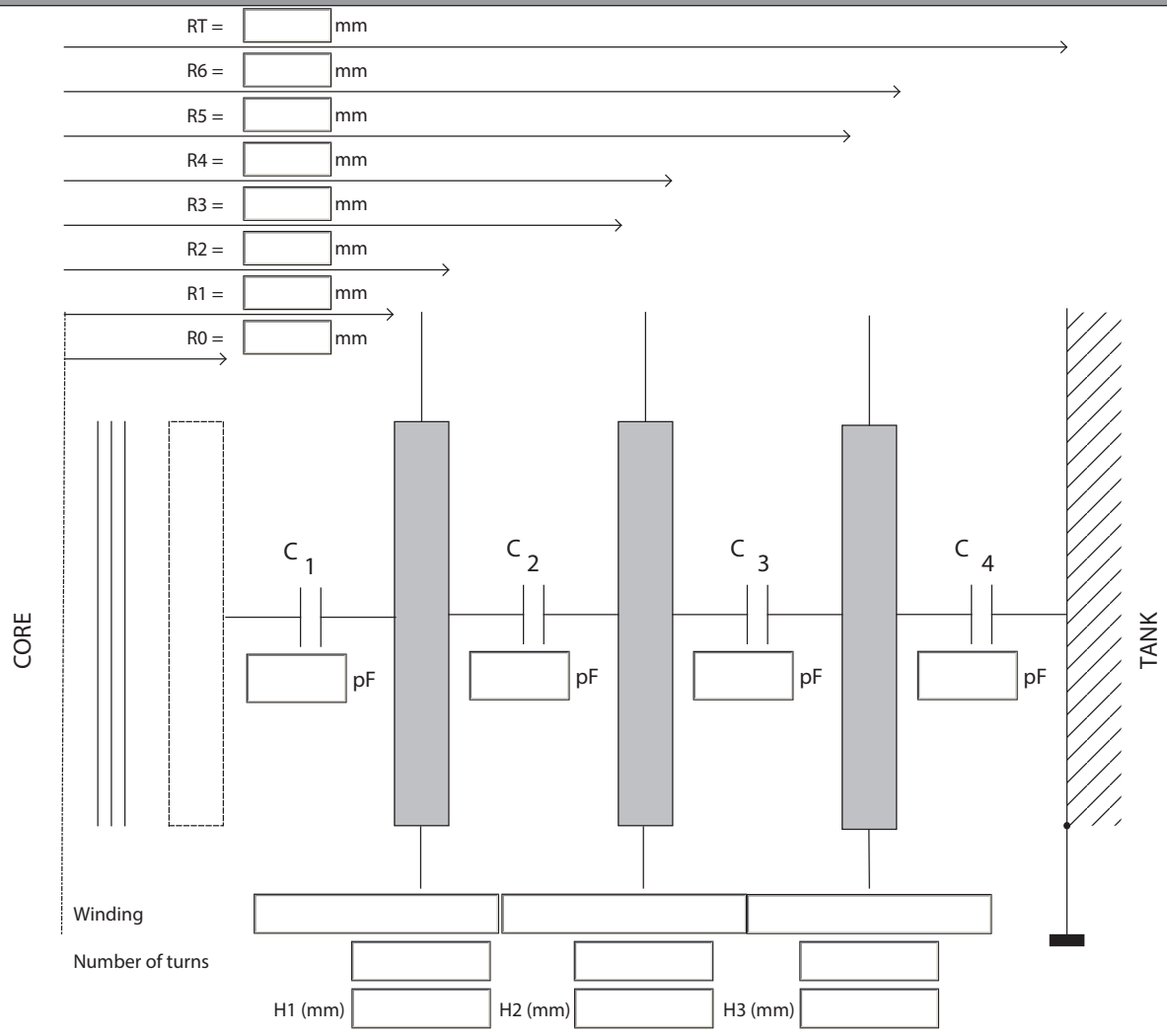
Recovery voltage	
Potential design	without

Remarks

- Customer : No TIR

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Winding arrangement



Specification - Tap-changer

Details see technical data

Number of columns		Type	Number of phases	Rated current	Y/D	Um (kV)		Basic connection diagram				
1	X	VVS	III	400	D	76	-	10	19	3	☐	G

Operating positions

Max. effect. number of turns at position	Mid-position(s)	Min. effect. number of turns at position
1	9A,9B,9C	17

Tap-changer head

Flange for bell-type tank: with ☐ Groove in tap-changer head for o-ring

Protective relay RS 2001: 1 n/o (A)

Head gasket: without

Pressure relief device: without

Pipe connection R: without bleeder L=140 H=82

Pipe connection S: with bleeder L=140 H=82

Pipe connection Q: blind flange on OLTC head

Pipe connection E2: blind flange on OLTC head

Temperature sensor: without

Tap selector

☐ Loose screening caps ☐ Contact bridges

Drive shaft

Arrangement: G4 Details see technical data

☐ L ☒ R

Horizonal drive shaft (mm)	H1	1200	H2		H3		H4	
Vertical drive shaft (mm)	V1	1600	V2		V3		V4	

Vertical drive shaft: standard design

Vertical drive shaft protection: unpainted

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Remarks

Specification - ETOS®

Documentation			Product information
VDE application guide	without		
Design of connection diagram	Modular circuit diagram		
Connection diagram standard	DIN EN 60617/IEC 60617		
Connection diagram version	paper DIN A4		
Enduser standard		Diagram no:	
Additional GUI language 1	without	Additional GUI language 2	without

Communication and protocols	
IT security	BASIC - in acc. with IEC 62443
Visualization (remote control)	with
Visualization interface	RJ45
Control-system protocol	without
SCADA interface	without
MR Sensorbus (Modbus RTU)	without
IoT connection (MQTT)	ETOS® Webserver

Additional functions	
TPLE (Transformer Personal Logic Editor)	without
Additional digital inputs	4 free digital inputs
Additional digital outputs	4 free digital outputs
Additional analog inputs	without
Additional temperature inputs	without
Additional analog outputs	without

Monitoring	
Thermal monitoring	without
Temperature sensors	without
Direct winding temperature (FO)	without
Grid measurement	without
Hot-spot calculation HV/MV/LV	without

Remarks

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Specification - ETOS®

Monitoring	Product information
Dissolved gas analysis	without
DGA sensor	without
OLTC monitoring	BASIC - Statistics, maintenance interval
Tap-position capture	Side Drive
Drive monitoring	without
Monitoring - Bushing	without
Field 1 operating voltage	kV
Type of bushing (field 1)	
Field 2 operating voltage	kV
Type of bushing (field 2)	

Range of regulation "MINUS" (%)	-18		
Range of regulation "PLUS" (%)	+6		
Capacity C1 phase L1 field 1 (pF)		Capacity C1 phase L1 field 2 (pF)	
Capacity C1 phase L2 field 1 (pF)		Capacity C1 phase L2 field 2 (pF)	
Capacity C1 phase L3 field 1 (pF)		Capacity C1 phase L3 field 2 (pF)	

Regulation	
Voltage regulation	without
Grid measurement	without

Control	
Visualisation, control units	RJ45 Comfort
Main switch	without
OLTC drive control	in accd. with IEC 60214
Intermediate gear	without
Automatic passage of position(s)	9A,9C
Star/delta monitoring	without
Local/remote switch	without
Switching delay function	without
OLTC temperature locking	without

MASCHINENFABRIK REINHAUSEN GMBH

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Remarks

Specification - ETOS®

Control	Product information
OLTC drive signalling	Motor protection & running message
Position indication (BCD, 4…20mA)	BCD-Code (ISM)
Position indication (BCD, 4…20mA)	without
Position indication (BCD, 4…20mA)	without
☒ analogue module for automatic passage of positions by-passed	
Position indication module	NO contact range 0.5A (break before make)
Position indication module	without
Position indication module	without
Position indication module	without
Position indication module	without
Position indication module	without
☐ Step resistors for automatic passage of positions by-passed	
Series resistor at PT-module	without
Position transmitter gear	without
Running time	1/1
Cooling system control	without
Cooling system monitoring	without
Oil filter unit - Control	without

Housing	
Climate zone	BASIC -25°C...+50°C
Protective housing design	single-walled
Protective housing size (L x W x D)	1200 (1213mm x 700mm x 446mm)
Protective housing type	Standard
Insulated mounting	without
Vibration damped protective housing	without
Control cabinet handle/door arresting device	Stainless steel handle with door arrest
Protective housing locking system	Blind cover, prepared for a lock
Operating devices	inside
Door hinges	left

Remarks

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Specification - ETOS®

Housing	Product information
Door swing angle	130°
Control cabinet monitoring Indoor climate	without

Wiring	
Terminal type	Wago 2002
Spare terminals	without
Wiring	H07V-K
Identification sleeves	without
Cable entry (bottom plate)	Blind plate
Cable glands (metric)	without

Supply	
Number of grounding terminals	3
Protection in accordance with standard	without
Supply voltage monitoring	without

Motor circiut					
Voltage	400 V	Network type	3AC/N	Frequency	50 Hz

Control circuit	
Supply	from main supply
Supply ISM	from control circuit

Heating circuit	
Supply	from control circuit

Plug connector for emergency heating	**without**
Coupling relay for control	without
Plug socket	without

Remarks

MASCHINENFABRIK REINHAUSEN GMBH
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Signals	Product information

delete

Signalling (ISM relay output)

delete

Additional digital inputs

delete

Additional analog channels

Remarks



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Specification - ETOS®

Sensor connection			Product information
Connection of signalling	external	Voltage signalling contacts	110V DC
Transformer Buchholz relay	without	Connection to ISM	without
OLTC Buchholz relay	without	Connection to ISM	without
Transformer pressure-relief device	without	Connection to ISM	without
OLTC pressure-relief device	without	Connection to ISM	without
OLTC protection RS2001	without	Connection to ISM	without
Transformer oil level	without	Connection to ISM	without
OLTC oil level	without	Connection to ISM	without
Transformer oil temperature	without	Connection to ISM	without
Transformer bottom oil temperature	without	Connection to ISM	without
OLTC oil temperature	without	Connection to ISM	without
OLTC selector temperature	without	Connection to ISM	without
Winding temperature	without	Connection to ISM	without
Transformer dehydrating breather	without	Connection to ISM	without
OLTC dehydrating breather	without	Connection to ISM	without
Oil analysis (DGA)	without	Connection to ISM	without
Direct winding temperature	without	Connection to ISM	without

Remarks

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Specification - TAPCON® 230

TAPCON® 230	EXPERT

Serial no. : 2750287 - 2750291
Exw Date : 08.05.2024

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Remarks
Connection diagrams and operating instructions will only be provided in German and English. Further languages are available for download under: www.reinhausen.com