Type W □ G Off-Circuit Tap Changer
Operating Instrutions

HM 0.460.6001

Shanghai Huaming Power Equipment Co.,Ltd.

Content

1. General

Drum type off-circuit tap changer (herein referred as tap changer) is applicable to the oil immersed power transformers with rated frequency 50Hz or 60Hz, highest voltage for equipment from 12kV to 252kV, maximum rated through current from 250A to 2000A, as well as special transformers such as furnace transformers, rectification transformers and traction transformers, etc. It regulates transformer voltage by changing taps with circuit de-energized,thus changing transformer ratio,and finally stabilizing the output voltage.

According to number of phase tap changer is divided into three categories: three- phase, single plus two -phase and single phase.

By leads output terminal location, it is divided into three categories: A. middle leads-out; B. two ends leads-out; C. no leads-out. (See Fig. 1, 2, 3)

There are two mounting locations inside transformer for the tap changer, one is between two adjacent windings (Type A and Type B), and another is at one side of the transformer winding (C type).

The operation methods of tap changer include manual operation on top,manual operation at side with top driving, manual operation at side with bottom driving,and motor driving at side(fig.4.5.6)

The feature of this type tap changer is to save transformer space with compact structure and easy connection.

The tap changer is applicable to standard type and bell type transformers.

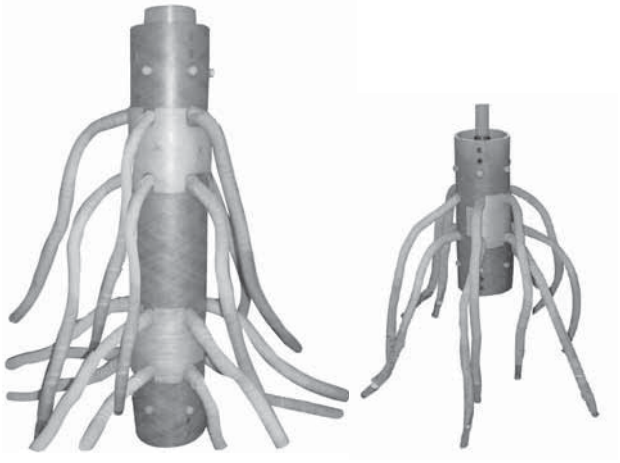


Fig.1 Type A(Lead from radial direction)

Fig. 2 Type B(Single phase: lead from axial direction)

Fig. 3 Type C (Three phase: no leads-out)

Fig. 4 Driving mechanism for manual operation on top

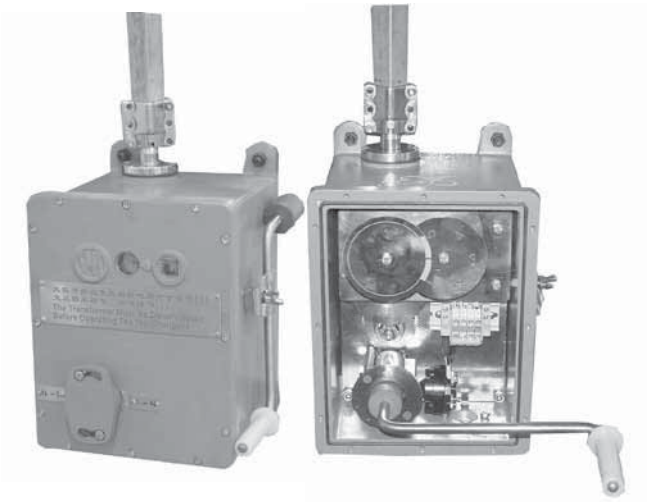


Fig. 5 Driving mechanism for manual operation at side

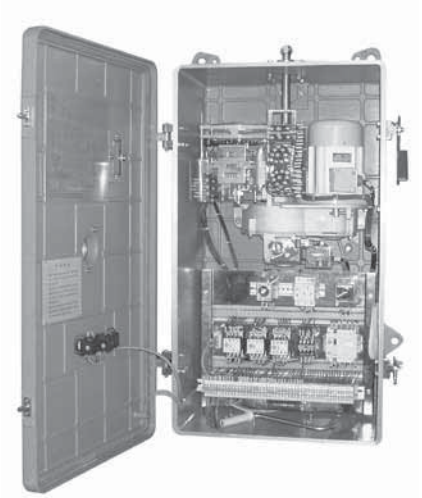


Fig. 6 Motor drive unit at side - CMA7
(Offer relevant motor drive unit upon request)

1.1 Model designation:

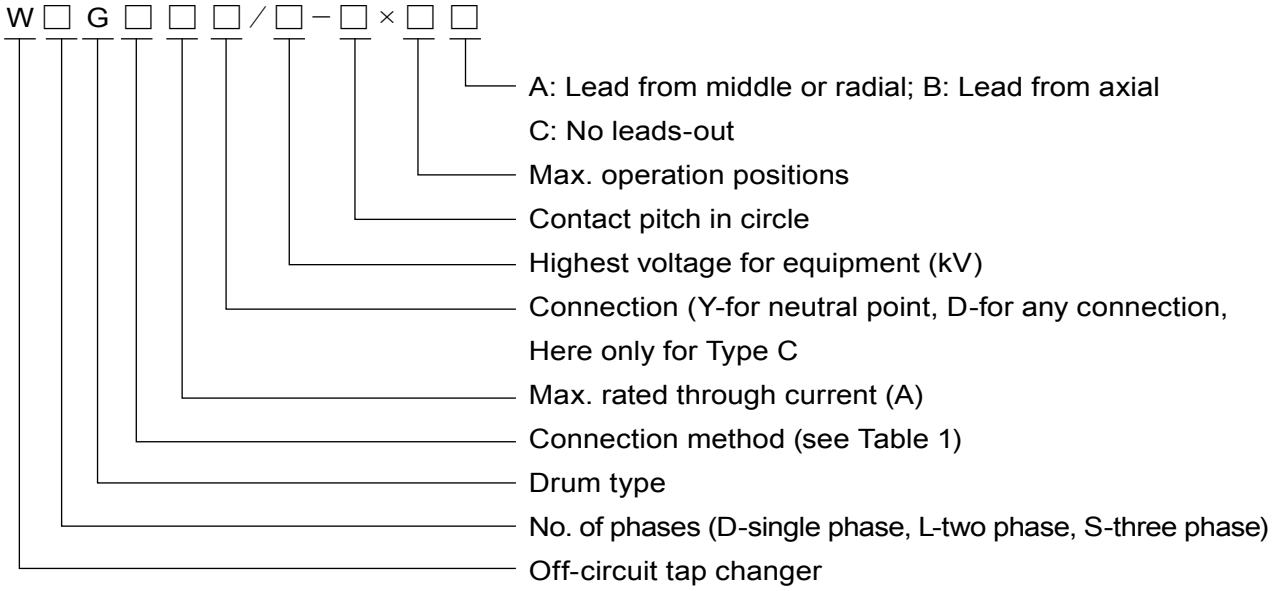


Table 1 Tap changer connection method and code

Mark	IV	V	VI	VII	VIII	II
Connection	Linear	Single-bridging	Y-D transform	Double bridging	Series-parallel transform	Reversing

1.2 Service condition

1.2.1 The storage ambient temperature of OLTC is from -25℃ to 40℃ . The storage humidity of the OLTC should be no more than 85 percent.

The service temperature of standard designed OLTC is -25℃ to 40℃

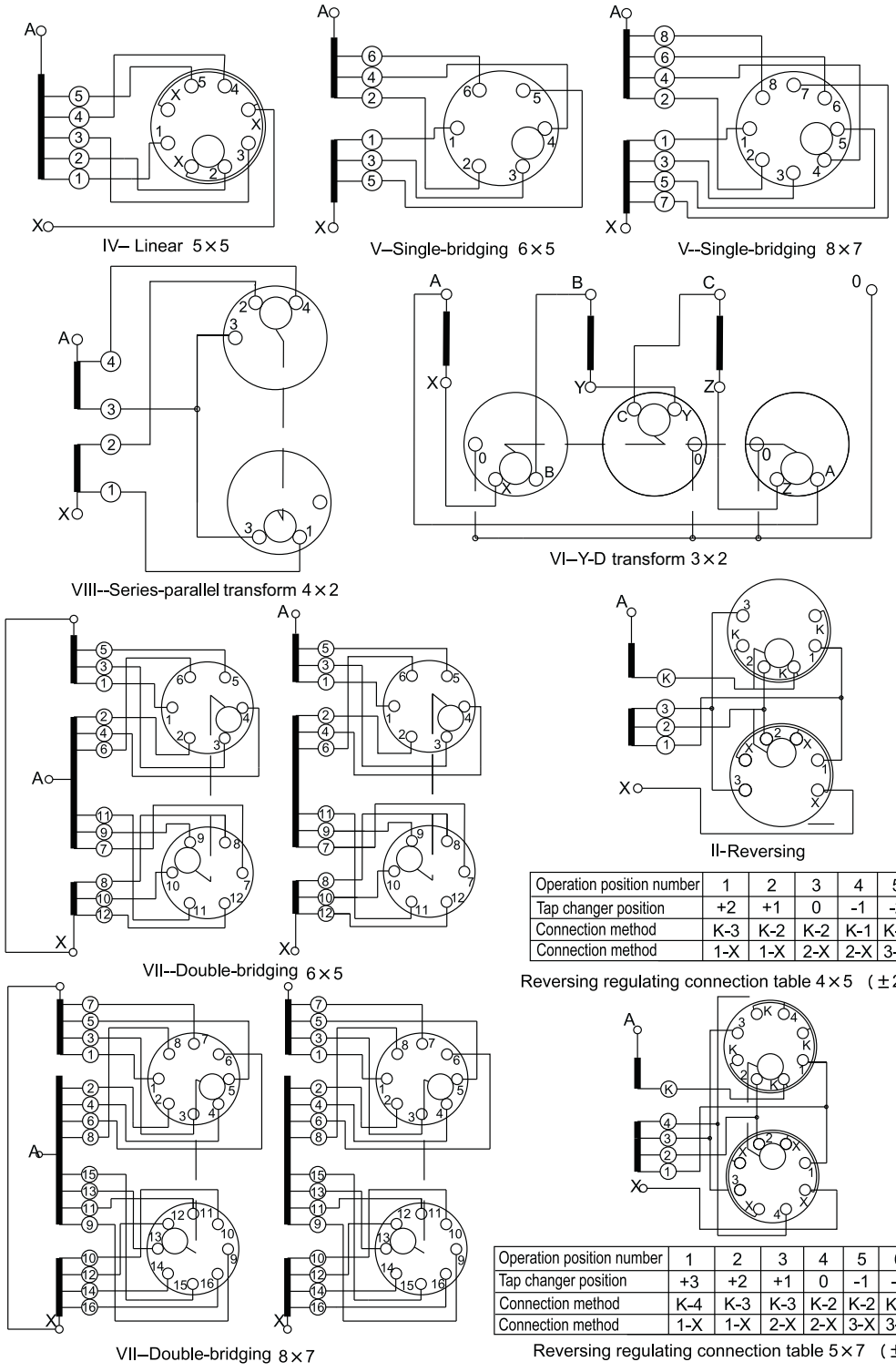
If the temperature exceeds the range of above (-25℃ to 40℃), please specify when ordering.

1.2.2 To meet the ordering requirements and comply with the operating environment, if the requested service temperature is out of the range of -25℃ to 40℃ , the material and accessories of the OLTC will be specially designed and selected.

1.2.3 Perpendicular deflection between ground and tap changer after being mounting on transformer shall be less than 2%.

1.2.4 There shall be no serious dust, explosive gas or corrosive gas at site.

1.3 Tap changer connection diagram (See Fig.7)



Operation position number	1	2	3	4	5
Tap changer position	+2	+1	0	-1	-2
Connection method	K-3	K-2	K-2	K-1	K-1
Connection method	1-X	1-X	2-X	2-X	3-X

Reversing regulating connection table 4×5 (±2)

Operation position number	1	2	3	4	5	6	7
Tap changer position	+3	+2	+1	0	-1	-2	-3
Connection method	K-4	K-3	K-3	K-2	K-2	K-1	K-1
Connection method	1-X	1-X	2-X	2-X	3-X	3-X	4-X

Reversing regulating connection table 5×7 (±3)

Remark: 1. All connections have been done inside the tap changer, only tap leads should be connected to the transformer winding (except special design)
2. The connection diagram is taken one phase as example except from Y-D transform.

Fig. 7 Tap changer connection diagram

2. Tap changer main specification and technical data (See Table 2)

Table 2 Tap changer technical data

Item	Type			WDG (single phase), WLG (2-phases), Type A									
1	Phase			1+2									
2	Max. rated through current(A)			250	300	400	500	600	800	1000	1250	1600	2000
3	Short circuit current test (kA)		Thermal (3s)	5	5.4	6	7	8	10	12	14	16	20
			Dynamic (Peak)	12.5	13.5	15	17.5	20	25	30	35	40	50
4	Connection			Linear (IV), single-bridging (V), Y-D transform (VI), Double-bridging (VII), series-parallel (VIII) ,reversing (II)									
5	Frequency (Hz)			50 or 60									
6	Maximum operation positions			5(IV) 7(V, VII) 2(VI, VIII) 7(II)									
7	Insulation to earth (kV)	Highest voltage for equopment(kV)		12			40.5			72.5			126
		Power frequency withstand voltage (kV/1min)	To ground	75			200			325			550
			Between phases	7			200			325			550
			Between max. and min. taps	54			90			140			175
		Lightning impulse withstand voltage (1.2/50μs)	To ground	35			85			140			230
			Between phases	35			85			140			230
			Between max. and min. taps	18			30			45			55
8	Drying temperature(˚C)			Vacuum					Vapor				
				110					125				
9	Operating method			Manual operation on top;Manual operation at side;Motor driving at side									
10	Partial discharge (pC)			≤ 50									

Remark:

1. **For linear (IV) and single-bridging (V), the max.rated through current can be up to 2000A and the highest voltage for equipment can be reached to 126kV**
2. **For Y-D transform (VI) and series-parallel (VIII), the max.rated through current can be up to 1000A and the highest voltage for equipment is 40.5kV**
3. **For double-bridging (VII), the max.rated through current can be up to 1000A and the highest voltage for equipment can be up to 126kV**
4. **For reversing (II), the max.rated through current can be up to 1600A and the highest voltage for equipment can be up to 126kV**

Table2 (continued) Tap changer technical data

Item	Type			WSG (3 phases), Type A						
1	Phase			3						
2	Max. rated through current(A)			250	300	400	500	600	800	1000
3	Short circuit current test (kA)		Thermal (3s)	5	5.4	6	7	8	10	12
			Dynamic (Peak)	12.5	13.5	15	17.5	20	25	30
4	Connection			Linear (IV), single-bridging (V), reversing (II)						
5	Frequency (Hz)			50 or 60						
6	Maximum operation positions			5(IV) 7(V)						
7	Insulation to earth (kV)	Highest voltage for equopment(kV)		12		40.5		72.5		126
		Power frequency withstand voltage (kV/1min)	To ground	75		200		325		550
			Between phases	7		200		325		550
			Between max. and min. taps	54		90		140		175
		Lightning impulse withstand voltage (1.2/50μs)	To ground	35		85		140		230
			Between phases	35		85		140		230
			Between max. and min. taps	18		30		45		55
8	Drying temperature(˚C)			Vacuum				Vapor		
				110				125		
9	Operating method			Manual operation on top;Manual operation at side;Motor driving at side						
10	Partial discharge (pC)			≤ 50						

Table 2 (continued) Tap changer technical data

Item	Type			WDG (single phase), Type B									
1	Phase			1									
2	Max. rated through current(A)			250	300	400	500	600	800	1000	1250	1600	2000
3	Short circuit current test (kA)	Thermal (3s)		5	5.4	6	7	8	10	12	14	16	20
		Dynamic (Peak)		12.5	13.5	15	17.5	20	25	30	35	40	50
4	Connection			Linear (IV), single-bridging (V)									
5	Frequency (Hz)			50 or 60									
6	Maximum operation positions			5									
7	Insulation to earth (kV)	Highest voltage for equopment(kV)		12		40.5		72.5		126		252	
		Power frequency withstand voltage (kV/1min)	To ground	75		200		325		550		1050	
			Between phases	54		90		140		175		285	
		Lightning impulse withstand voltage (1.2/50μs)	To ground	35		85		140		230		460	
			Between phases	18		30		45		55		90	
8	Drying temperature(℃)			Vacuum					Vapor				
				110					125				
9	Operating method			Manual operation on top;Manual operation at side; Motor driving at side									
10	Partial discharge (pC)			≤ 50									

Remark: 1. partial discharge for 252kV can be less than above value.

Table 2 (continued) Tap changer technical data

Item	Type			WSG (3 phases), Type C								
1	Phase			3-phase								
2	Max. rated through current(A)			250	300	400	500	600	800	1000	1250	1600
3	Short circuit current test (kA)		Thermal (3s)	5	5.4	6	7	8	10	12	14	16
			Dynamic (Peak)	12.5	13.5	15	17.5	20	25	30	35	40
4	Connection			Reversing (II)								
5	Frequency (Hz)			50 or 60								
6	Maximum operation positions			7								
7	Insulation to earth (kV)	Highest voltage for equopment(kV)		12		40.5		72.5		126		
		Power frequency withstand voltage (kV/1min)	To ground	75		200		325		550		
			Between phases	75(D)	65(Y)	200(D)	120(Y)	325(D)	150(Y)	550(D)	150(Y)	
			Between max. and min. taps	54		90		140		175		
		Lightning impulse withstand voltage (1.2/50μs)	To ground	35		85		140		230		
			Between phases	35(D)	30(Y)	85(D)	40(Y)	140(D)	50(Y)	230(D)	50(Y)	
			Between max. and min. taps	18		30		45		55		
8	Drying temperature(˚C)			Vacuum				Vapor				
				110				125				
9	Operating method			Manual operation on top;Manual operation at side;Motor driving at side								
10	Partial discharge (pC)			≤ 50								

3. Tap changer structure

3.1 Structure of type A and type B

Tap changer type A and type B are combined by two parts. One is active part (Fig.1, Fig.2) and another is drive mechanism (Fig.4, Fig.5 and Fig. 6). Operating methods include manual operation on top,manual operation at side with top driving, manual operation at side with bottom driving (only for type A and type B),and motor driving at side .

3.1.1 Manual operation on top

3.1.1.1 The flanges of type A and type B tap changers (See Fig. 15) are connected to the welded flange of transformer by pressure ring. They can be adjusted in circumferential direction to avoid deviation of mounting.

3.1.1.2 Hand crank is flexible which can be dismantled during out of operation.

3.1.1.3 Limit mechanism is equipped on the flange to avoid over-ride operation.

3.1.2 Manual operation at side with top driving (See Fig. 16)

3.1.2.1 Manual operation at side with top driving includes geneva box, worm wheel box, driving shaft and SL mechanism. SL mechanism is constituted by tank, tank cover, internal gear mechanism and tap position indication device and so on. Manual operation mechanism turns 10 revolutions for one tap change operation.

3.1.2.2 Manual operation at side with bottom driving (suitable for type A and type B tap changers) (See Fig. 16)

3.1.2.3 Manual operation at side with bottom driving includes gear box, transmission shaft, flange (as same as the flange manual operation mechanism on top)

3.1.3 Motor driving at side (See Fig. 18)

3.1.3.1 Motor driving mechanism at side includes geneva box, worm wheel box, transmission shaft, motor drive unit CMA7. Motor driving mechanism turns 33 revolutions for one tap change operation (suitable for type A and type B tap changers).

3.2 Structure of type C tap changer

Type C tap changer is an integral structure (Fig. 3) which is suitable for standard tank type and bell

type transformers. Positioning and limit devices are equipped on Manual operation mechanism on top.

4. Tap changer installation

4.1 Installation of type A and type B tap changer (installed between two adjacent windings)

4.1.1 Firstly check if the tap changer body and manual driving mechanism are on the middle position (the default position of the tap changer should be the middle position)

4.1.2 Tap changer body should be mounted between two supporting wooden bars. Connect the leads and check the correctness.

4.1.3 252kV single phase drum type tap changer: the inspection window of main insulating cylinder is between the fixed contact 3 and 4 in the circumferential direction. The relative location between main insulating cylinder inspection window and shielding mechanism inspection window is as shown in Fig. 8 .

Notice: During installation, make sure the inspection window of the shielding cylinder face the coil of the phase which is connected to the tap changer. If it can not meet the requirement, remove six M12 nylon bolts which is used to fix shielding cylinder and main insulating cylinder. Then rotate the shielding cylinder by 120 degrees to make the inspection window face the coil and fix it by six M12 nylon bolts.

The shielding cylinder only can be rotated within the scale of 120° towards right and left side of main insulating cylinder inspection window respectively. To be sure not to rotate the shielding cylinder randomly because of potential connection wires between it and fixed contacts.

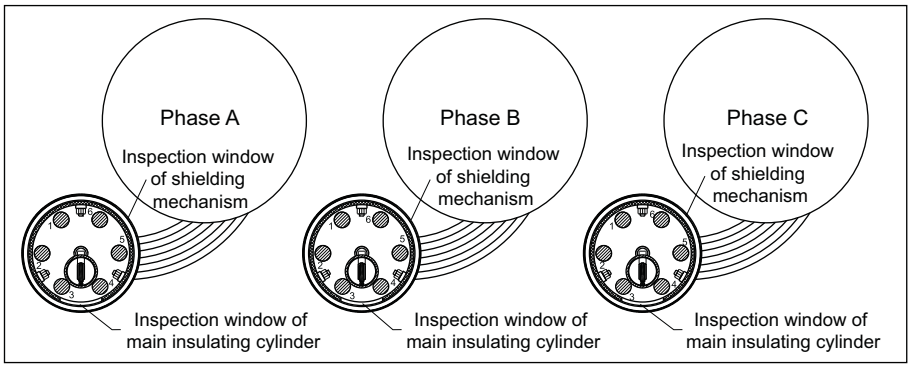


Fig. 8 Schematic diagram of relative position of 252kV drum type single-phase off-circuit tap changer against transformer

4.1.4 Installation of top driving mechanism: Cut the driving insulating shaft to right length according to requirement and rivet it. Then connect it to the tap changer body in right direction to make the joint pin of the tap changer body completely insert the recessed groove of the driving mechanism.

Connections should be reliable (See Fig. 9, 10, 11). Fix the head flange after ensuring no force against the insulating shaft in all circumferential direction. Make sure tap position in tap changer body is same as what is indicated in the operation mechanism.

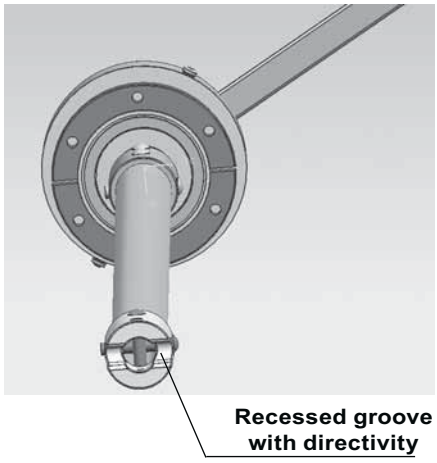


Fig.9 Manual driving mechansim

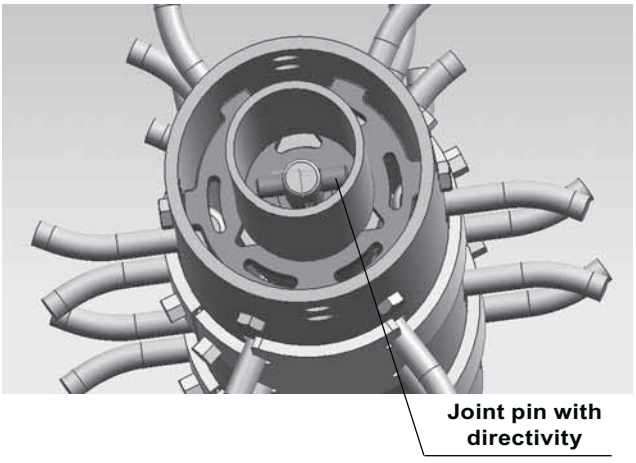


Fig.10 Tap changer body

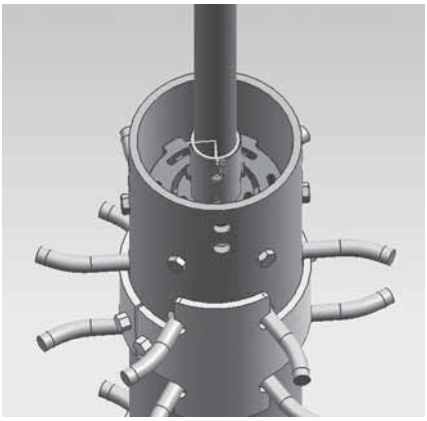


Fig.11 Connection between tap changer body with manual driving mechanism

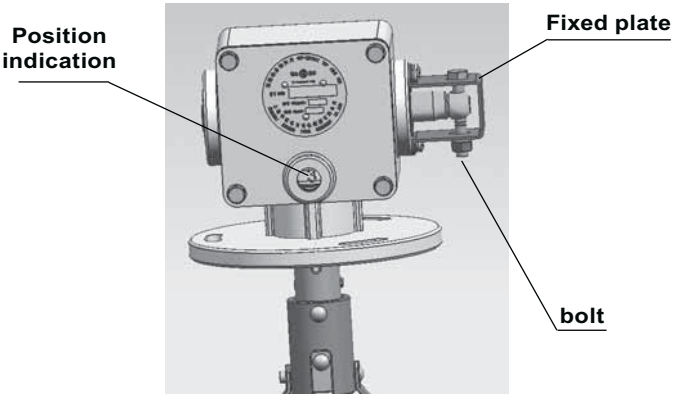


Fig.12 Geneva box

4.1.5 Installation of Side-operation with top driving (manual driving or motor driving)

4.1.5.1 Cut the driving insulating shaft to the right length according to requirement and rivet it with geneva box (pay attention to directivity, referred to Fig.11). Make the joint pin of the tap changer body completely insert into recessed groove of the driving mechanism. Connection

should be reliable. Fix the geneva box after ensuring no force against to the insulating shaft in all circumferential direction. Check if the geneva box is same as tap position indicated in the tap changer body..

4.1.5.2 Vertical connection between worm wheel box and driving mechanism.

4.1.5.3 Dismantle fixed plate out of the geneva box and bolts (Fig.12). **Notice: the horizontal output shaft of the geneva box can not be rotated at the moment.** Connect the geneva box and worm wheel box horizontally.

4.1.5.4 Check if the tap positions indicated in tap changer body, geneva box and driving mechanism are same.

4.1.5.5 Measure the transformer ratio on each tap position after manually operating the driving mechanism of manual operation or motor driving at side for a complete cycle. Attention:

1. Align the horizontal shaft of geneva box and horizontal output shaft of worm wheel box. Ensure the size of the driving shaft and leave 2mm space. Connect the geneva box with the worm wheel box after cutting the square shaft to required length. Adjust the horizontal position to make the output shaft of geneva box, driving shaft and driving shaft of worm wheel box in a line.

2. Shaft of the driving mechanism must be vertical to ground and aligned with vertical driving shaft of bevel gear box. Ensure the size of driving shaft and leave 2mm space. Connect the driving mechanism with worm wheel box after cutting the square shaft to required length.

4.1.6 Installation of manual operation at side with bottom driving: refer to 4.1.4 and 4.1.5 (See Fig.17).

4.2 Installation of type C tap changer (tap changer mounted on one side of transformer)

4.2.1 Tap changer installation in the standard tank type transformer
Clean the surface of all the seals before installation and place oil-proof gasket on the installation flange of transformer. Then lift the tap changer into the transformer tank slowly. During lifting, pay attention not to damage the wire connecting terminals and shield covers. Fix the tap changer on the installation flange of transformer after ensuring the installation location of the tap changer correct.

4.2.2 Tap changer installation in the bell type transformer
4.2.2.1. Place the tap changer vertically. Remove the socket head screws for connecting the

middle flange and supporting flange below the head flange. Take out the middle flange and keep spare parts well.

4.2.2.3 Lift up the tap changer, and place the supporting flange on the temporary bracket of the transformer. Adjust the relative location of the supporting flange and head flange, and then fix them.. If the relative location of the supporting flange and head flange is difficult to adjust, pre-equip the bell type tank cover and transformer active part for better adjusting.

Process of pre-equipping: Lift the bell type tank cover of transformer and cover the transformer. Clean the seal surface and place the seal ring. Fix the middle flange on the installation flange of the transformer.

Lift the tap changer with two lifting rings on the supporting flange, adjust the relative position. Fix the tap changer on the middle flange. Then clean the seal surface, place the seal ring and at last install the head flange.

Notice: three red triangle marks on the installation flange, middle flange and head flange should be aligned. (Fig.22)

(a) All the tap leads must be fastened.

(b) Assembly of tap leads must not yield pulling force against tap changer.

(c) Connect the grounding lead between the head flange of the tap changer and tank cover of the transformer.

5. Tap changer operation

5.1 Drying process

To ensure the electrical insulation strength of tap changer, the tap changer should be dried together with the transformer. And the drying process is as same as transformer's.

5.1.1 After drying, tap changer can not be operated without oil unless that all the contacts are lubricated with transformer oil.

5.1.2 After drying, tap changer should be immersed in the transformer oil immediately.

5.1.3 For manual operation on top and manual operation at side with bottom driving mechanisms, after drying, properly fasten the round studs and 6 fixed bolts on the pressure ring and press the

seal ring tightly.

5.1.4 The transformer oil must meet the requirement of relevant standard, especially for the insulation strength and moisture content.

5.2 Tap changer operation

Warning: Tap changer only can be operated when the HV and LV sides of transformer are both de-energized.

Before commissioning, tap changer should be performed several cycles of operations to clean the contacts surface.

5.2.1 Operations of type A and type B tap changer (tap changer mounted between two adjacent coils)

5.2.1.1 Manual driving on top mechanism: firstly take off the rain-proof shield, remove the positioning screw and change the tap to the required position by hand crank. Ensure the positioning screw is aligned to the positioning hole. Repeat the above procedure for further tap change operation.

5.2.1.2 Manual operation at side with bottom driving: same as 5.2.1.1.

5.2.1.3 Manual operation at side with top driving: open the hand crank cover on the manual driving mechanism and take out the positioning piece, insert hand crank and turn 10 revolutions. Check if the tap position is correct through the inspection window. After confirming correct, continually operate the hand crank until the red arrow on the cover stops at red line on the indication plate,then pull out the hand crank and insert the positioning piece to finish one tap change operation. Transformer is recommissioned after passing DC resistance test.

5.2.1.4 Operation of motor driving at side: terminals inside motor drive unit CMA7 with auxiliary passive contacts of transformer circuit breaker, When the circuit breaker makes, motor drive unit can not be operated (protective switch of motor trips off). Press the buttons of "1-N" or "N-1" on the motor drive unit cabinet to change taps and finish one tap change operation.

5.2.2 Operation of type C tap changer (tap changer mounted on one side of transformer).

5.2.2.1 Operation of manual operation on top:
Screw off the positioning screw and insert the hand crank to operate 1.5 revolutions (triangle mark is almost aligned with a red indication line). After proper adjusting, insert positioning pin into

positioning hole and finish one tap change operation.

Notice: Positioning bolt must be inserted in the positioning hole on the circumference of indication flange.

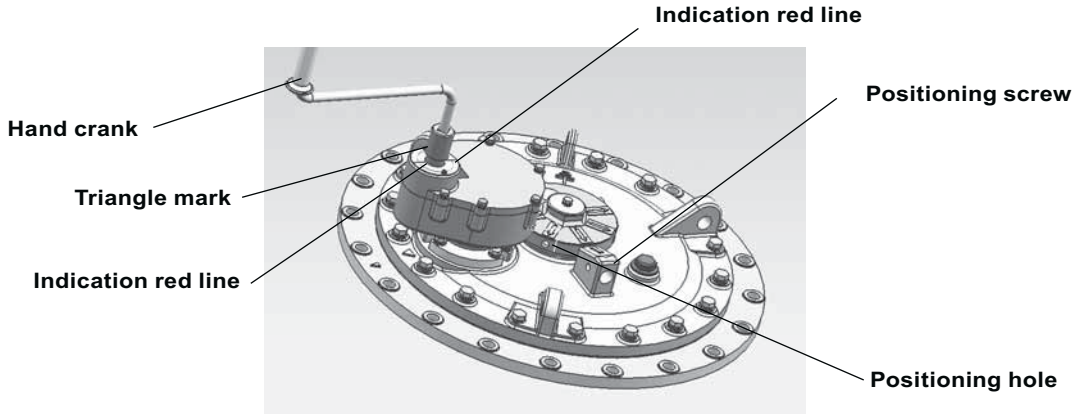


Fig. 13 Positioning screw

6. Tap changer maintenance

6.1 Pay attention to the maintenance for 252kV single-phase drum type tap changer: remove six M12 nylon bolts connecting shielding mechanism with main insulating cylinder. Then rotate the shielding mechanism to make all the inspection windows be aligned. Dismantle the insulating plate (See Fig.14) on the main insulating cylinder and the internal structure is exposed. After maintenance, assemble all the components successively and make the inspection windows on main insulating cylinder and shielding cylinder be aligned to the windings which is connected with tap changer.

Notice: the shielding cylinder only can be rotated within 120° towards left or right side of the main insulating cylinder inspection window respectively. To be sure not to rotate the shielding cylinder randomly because of potential connection wires connected between it and fixed contacts. Make sure the inspection window of shielding cylinder face to the coil connecting with the tap changer after maintenance

6.2 Tap changer must be operated at least 3 cycles of operations every two years in order to clean the surface of contacts.

6.3 If tap changer has remained on a certain tap position for one year, several cycles of operations should be performed before changing the tap position.

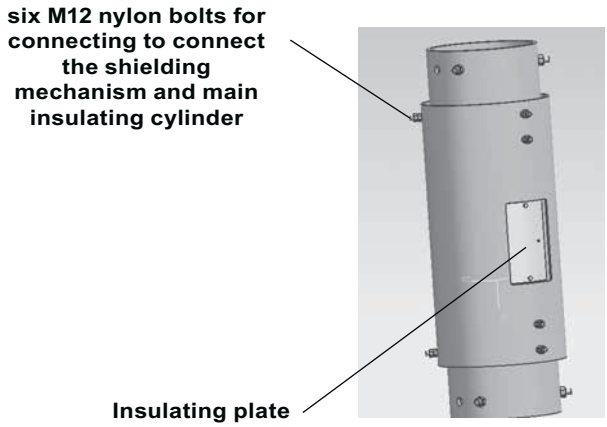


Fig. 14 Aligned position of shielding mechanism inspection window and main insulating cylinder inspection window

Fig. 15 Position for maintenance

6.4 Check if the connection of grounding lead is reliable.

6.5 During the maintenance of transformer, tap changer shall also be maintained for checking whether the fasteners are loose and contact are in good condition..

Notice: If tap changer is exposed in the air for a long time which exceeds the time stipulated in transformer operation manual, then tap changer should be dried together with transformer.

7. Documents delivered with tap changer

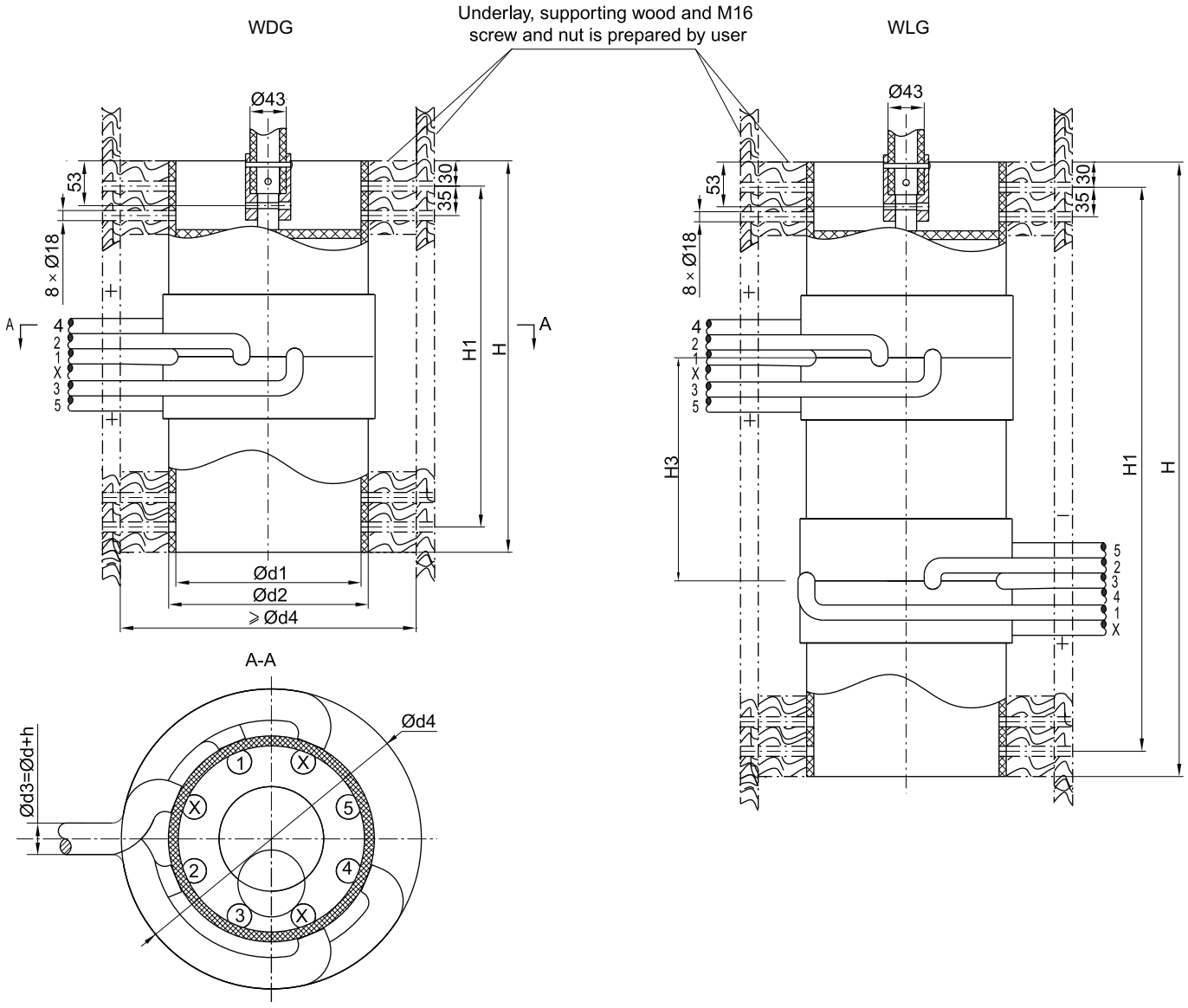
7.1 Qualified certificate

7.2 Packing list

7.3 Tap changer operation manual

8. Appendixes

1. Type A, WDG+WLG IV / 250A-600A, linear regulation, overall dimensions

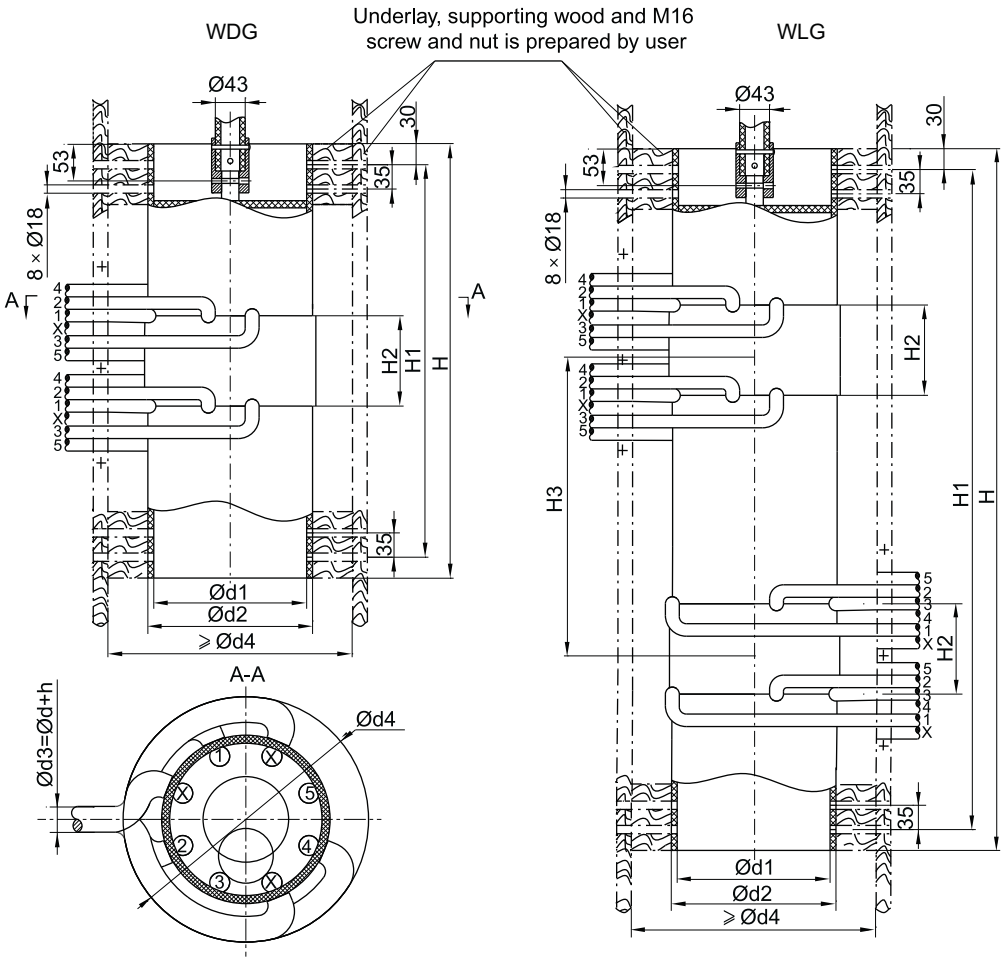


Type	Dimensions (mm)								operation position(n)
	H	H1	H3	ød/S(sectional area)	ød1	ød2	ød4	h	
WDGIV-250~300/12~40.5 - 5×5A	505	445	-	250A:12.5/70 300A:14.5/95 400A:17.5/120 500A:18.7/150 600A:21.7/185	200	217	d4=d2+2d3+δ(δ≥60)	Thickness of papering h=6(12kV-40.5kV) h=12(72.5kV-126kV)	5
WLGIV-250~300/12~40.5 - 5×5A	770	710	295						
WDGIV-400~600/12~40.5 - 5×5A	505	445	-		220	237			
WLGIV-400~600/12~40.5 - 5×5A	770	710	265						
WDGIV-250~300/72.5~126 - 5×5A	505	445	-		200	217			
WLGIV-250~300/72.5~126 - 5×5A	920	860	445						
WDGIV-400~600/72.5~126 - 5×5A	505	445	-		220	237			
WLGIV-400~600/72.5~126 - 5×5A	960	900	455						

1. All connections have been done inside the tap changer, only tap leads should be connected to the transformer winding(except special design)

2. Length of tap lead is one meter.

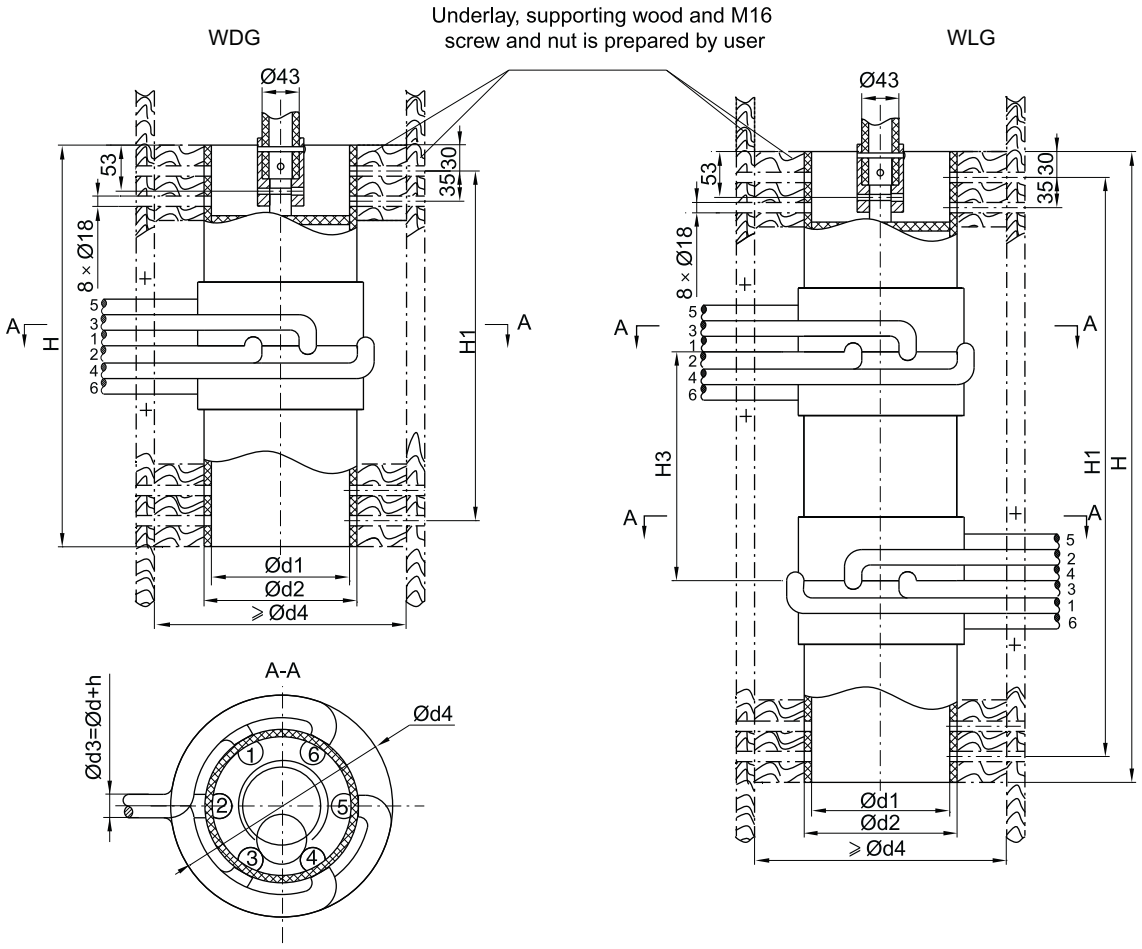
2. Type A, WDG+WLG IV / 800A-2000A,linear regulation, overall dimensions



Type	Dimensions (mm)									operation
	H	H1	H2	H3	ød/S(sectional area)	ød1	ød2	ød4	h	position(n)
WDGIV-800~1000/12~40.5 - 5×5A	550	490	110	-	800A:17.5/120 1000A:18.7/150 1250A:21.7/185 1600A:24.7/240 2000A:26/300	220	237	d4=d2+2d3+δ (δ ≥60)	Thickness of papering h=6(12kV-40.5kV) h=12(72.5kV-126kV)	5
WLGIV-800~1000/12~40.5 - 5×5A	860	800		310						
WDGIV-1250/12~40.5 - 5×5A	625	565	130	-						
WLGIV-1250/12~40.5 - 5×5A	1010	950		430						
WDGIV-1600/12~40.5 - 5×5A	625	565	175	-						
WLGIV-1600/12~40.5 - 5×5A	1010	950		385						
WDGIV-2000/12~40.5 - 5×5A	670	610	220	-						
WLGIV-2000/12~40.5-5×5A	1100	1040		430						
WDGIV-800~1000/72.5~126 - 5×5A	550	490	110	-						
WLGIV-800~1000/72.5~126 - 5×5A	1050	990		500						
WDGIV-1250/72.5~126 - 5×5A	625	565	130	-						
WLGIV-1250/72.5~126 - 5×5A	1160	1100		580						
WDGIV-1600/72.5~126 - 5×5A	625	565	175	-						
WLGIV-1600/72.5~126 - 5×5A	1200	1140		575						
WDGIV-2000/72.5~126 - 5×5A	670	610	220	-						
WLGIV-2000/72.5~126 - 5×5A	1290	1230		620						

1. All connections have been done inside the tap changer, only tap leads should be connected to the transformer winding(except special design)
2. Length of tap lead is one meter.

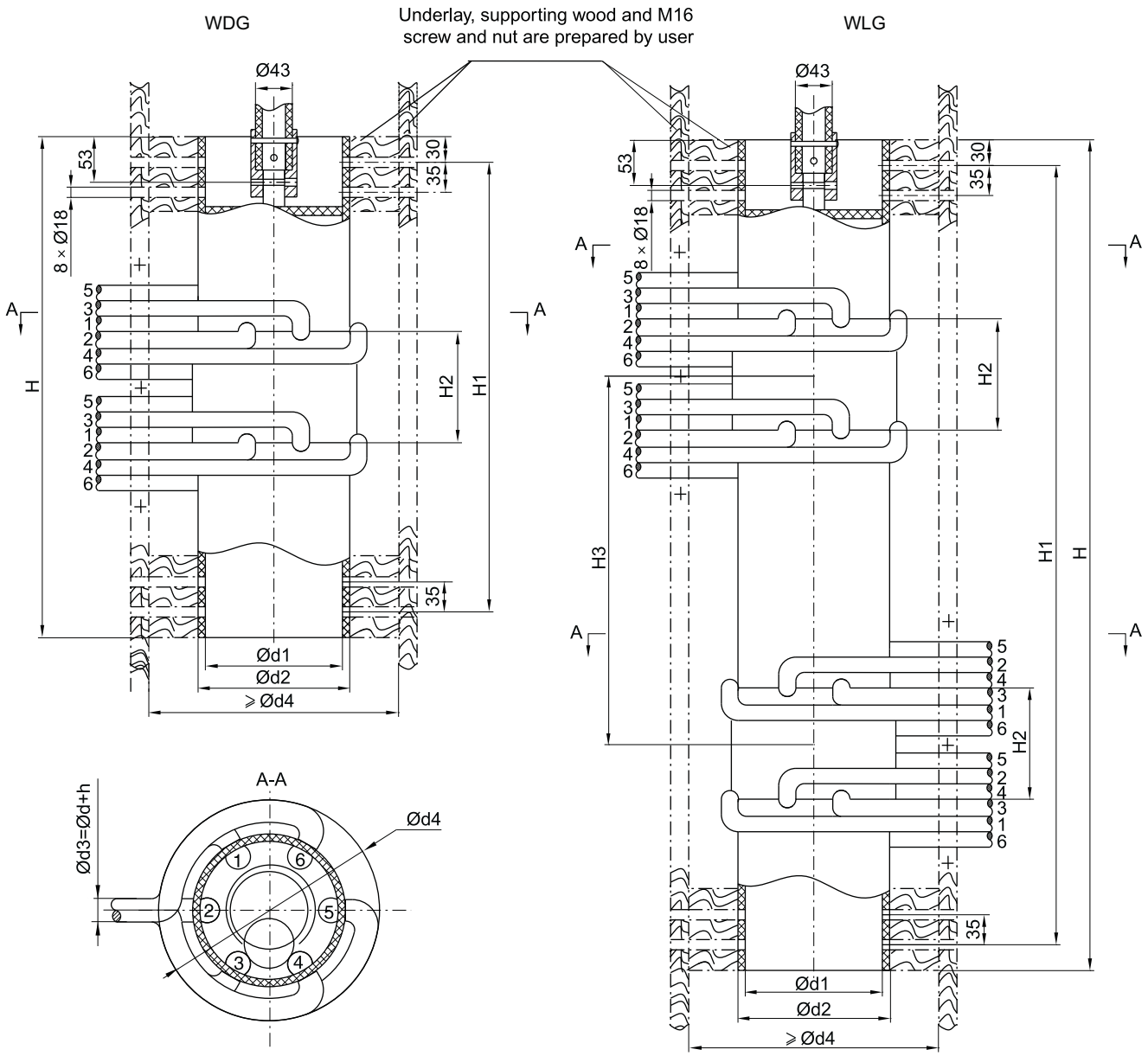
3. Type A, WDG+WLG V / 250A-600A, single-bridging, overall dimensions



Type	Dimensions (mm)								operation position(n)
	H	H1	H3	ød/S(sectional area)	ød1	ød2	ød4	h	
WDGV-250~300/12~40.5 - 6×5(4×3)A	465	405	-	250A:12.5/70 300A:14.5/95 400A:17.5/120 500A:18.7/150 600A:21.7/185	160	177	d4=d2+2d3+δ (δ ≥60)	Thickness of papering h=6(12kV-40.5kV) h=12(72.5kV-126kV)	5
WLGV-250~300/12~40.5 - 6×5(4×3)A	730	670	295						
WDGV-250~300/12~40.5 - 8×7A	465	405	-		220	237			
WLGV-250~300/12~40.5 - 8×7A	730	670	295						
WDGV-400~600/12~40.5 - 6×5(4×3)A	465	405	-		160	177			
WLGV-400~600/12~40.5 - 6×5(4×3)A	730	670	265						
WDGV-400~600/12~40.5 - 8×7A	465	405	-		220	237			
WLGV-400~600/12~40.5 - 8×7A	730	670	265						
WDGV-250~300/72.5~126 - 6×5(4×3)A	465	405	-		160	177			
WLGV-250~300/72.5~126 - 6×5(4×3)A	880	820	445						
WDGV-250~300/72.5~126 - 8×7A	465	405	-		220	237			
WLGV-250~300/72.5~126 - 8×7A	880	820	445						
WDGV-400~600/72.5~126 - 6×5(4×3)A	465	405	-		160	177			
WLGV-400~600/72.5v126 - 6×5(4×3)A	930	870	465						
WDGV-400~600/72.5~126 - 8×7A	465	405	-		220	237			
WLGV-400~600/72.5~ 126 - 8×7A	930	870	465						

1. Length of tap lead is one meter.

4-1.Type A, WDG+WLG V / 800A-2000A single-bridging, overall dimensions

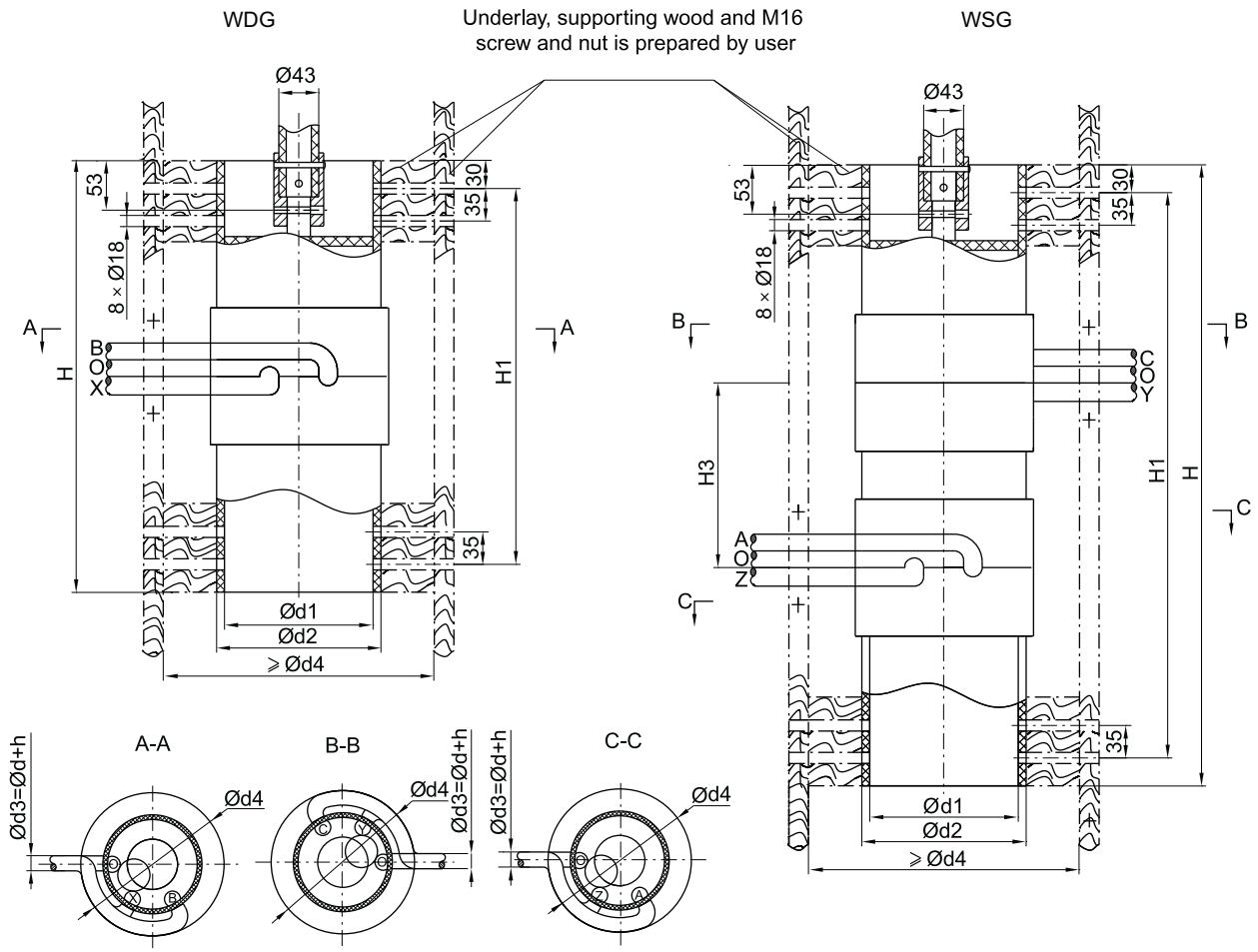


4-2.Type A, WDG+WLG V / 800A-2000A,single-bridging, overall dimensions table

Type	Dimensions (mm)									operation
	H	H1	H2	H3	ød/S(sectional area)	ød1	ød2	ød4	h	position(n)
WDGV-800~1000/12~40.5 - 6×5(4×3)A	510	450	110	-	800A:17.5/120 1000A:18.7/150 1250A:21.7/185 1600A:24.7/240 2000A:26/300	160	177	d4=d2+2d3+δ (δ≥60)	Thickness of papering h=6(12kV-40.5kV) h=12(72.5kV-126kV)	5
WLGV-800~1000/12~40.5 - 6×5(4×3)A	820	760		310						
WDGV-800~1000/12~40.5 - 8×7A	510	450	110	-		220	237			
WLGV-800~1000/12~40.5 - 8×7A	820	760		310						
WDGV-1250/12~40.5 - 6×5(4×3)A	585	525	130	-		160	177			
WLGV-1250/12~40.5 - 6×5(4×3)A	970	910		430						
WDGV-1250/12~40.5 - 8×7A	585	525	130	-		220	237			
WLGV-1250/12~40.5 - 8×7A	970	910		430						
WDGV-1600/12~40.5 - 6×5(4×3)A	585	525	175	-		160	177			
WLGV-1600/12~40.5 - 6×5(4×3)A	970	910		385						
WDGV-1600/12~40.5 - 8×7A	585	525	175	-		220	237			
WLGV-1600/12~40.5 - 8×7A	970	910		385						
WDGV-2000/12~40.5 - 6×5(4×3)A	630	570	220	-		160	177			
WLGV-2000/12~40.5 - 6×5(4×3)A	1060	1000		430						
WDGV-2000/12~40.5 - 8×7A	630	570	220	-		220	237			
WLGV-2000/12~40.5 - 8×7A	1060	1000		430						
WDGV-800~1000/72.5~126 - 6×5(4×3)A	510	450	110	-		160	177			
WLGV-800~1000/72.5~126 - 6×5(4×3)A	1020	960		510						
WDGV-800~1000/72.5~126 - 8×7A	510	450	110	-		220	237			
WLGV-800~1000/72.5~126 - 8×7A	1020	960		510						
WDGV-1250/72.5~126 - 6×5(4×3)A	585	525	130	-		160	177			
WLGV-1250/72.5~126 - 6×5(4×3)A	1120	1060		580						
WDGV-1250/72.5~126 - 8×7A	585	525	130	-		220	237			
WLGV-1250/72.5~126 - 8×7A	1120	1060		580						
WDGV-1600/72.5~126 - 6×5(4×3)A	585	525	175	-		160	177			
WLGV-1600/72.5~126 - 6×5(4×3)A	1170	1110		585						
WDGV-1600/72.5~126 - 8×7A	585	525	175	-		220	237			
WLGV-1600/72.5~126 - 8×7A	1170	1110		585						
WDGV-2000/72.5~126 - 6×5(4×3)A	630	570	220	-		160	177			
WLGV-2000/72.5~126 - 6×5(4×3)A	1260	1200		630						
WDGV-2000/72.5~126 - 8×7A	630	570	220	-		220	237			
WLGV-2000/72.5~126 - 8×7A	1260	1200		630						

1. Length of tap lead is one meter.

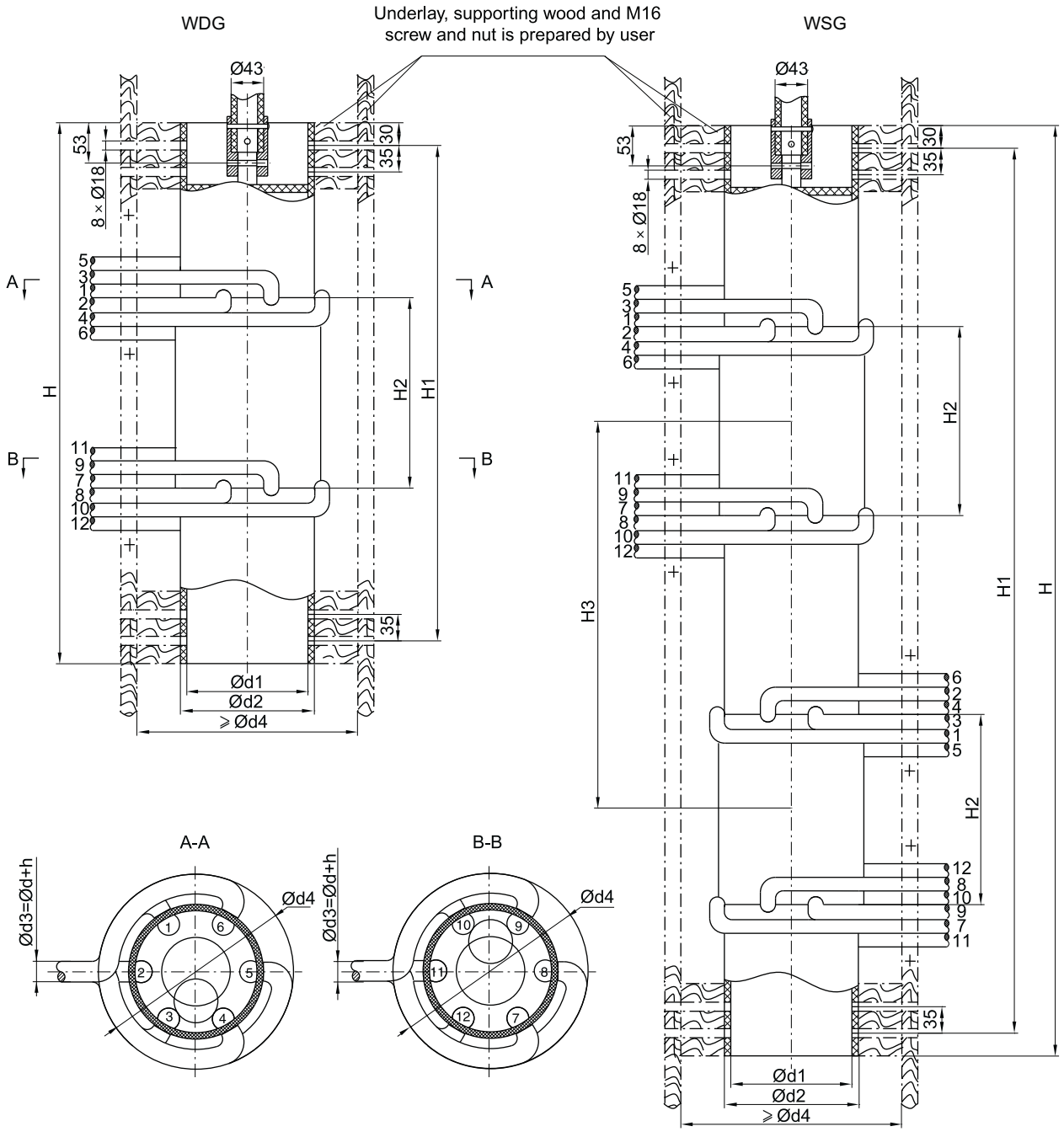
5. Type A,WDG+WLG VI / 250A-2000A,Y-D transform, overall dimensions



Type	Dimensions (mm)								operation position(n)
	H	H1	H3	ød/S(sectional area)	ød1	ød2	ød4	h	
WDGVI-250-300/12 - 3×2A	465	405	-	250A:12.5/70	160	177	d4=d2+2d3+δ (δ ≥60)	Thickness of papering h=6(12kV-40.5kV)	2
WLGVI-250-300/12 - 3×2A	670	610	235	300A:14.5/95					
WDGVI-400-600/12 - 3×2A	465	405	-	400A:17.5/120					
WLGVI-400-600/12 - 3×2A	670	610	205	500A:18.7/150					
WDGVI-800-1000/12 - 3×2A	510	450	-	600A:21.7/185					
WLGVI-800-1000/12-3×2A	760	700	250	800A:24.7/240 1000A:26/300					

1. for 3 phase “O” is the neutral point which is connected by user (Otherwise specified).
2. Length of tap lead is 1 meter.

6-1.Type A, WDG+WLG VII / 250A-1000A,double-bridging, overall dimensions

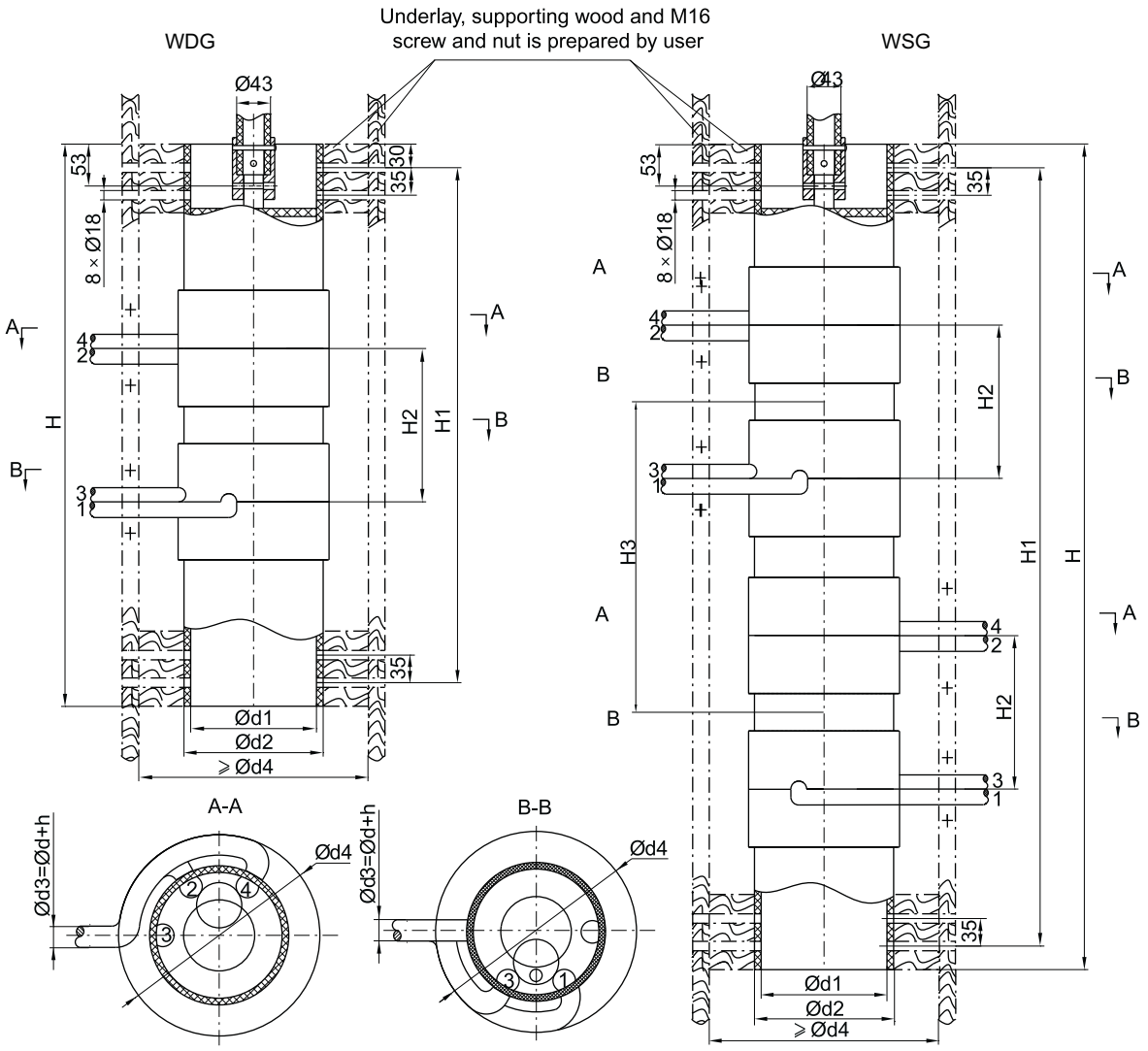


6-2. Type A,WDG+WLG VII / 250-1000A,double-bridging,overall dimension table

Type	Dimensions (mm)									operation
	H	H1	H2	H3	ød/S(sectional area)	ød1	ød2	ød4	h	position(n)
WDGVII-250~300/12~40.5 - 6×5(4×3)A	715	655	220	-	250A:12.5/70 300A:14.5/95 400A:17.5/120 500A:18.7/150 600A:21.7/185 800A:24.7/240 1000A:26/300	160	177	d4=d2+2d3+δ (δ≥60)	Thickness of papering h=6(12kV-40.5kV) h=12(72.5kV-126kV)	5(3)
WLGVII-250~300/12~40.5 - 6×5(4×3)A	1230	1170		575						
WDGVII-400~600/12~40.5 - 6×5(4×3)A	715	655	250	-						
WLGVII-400~600/12~40.5 - 6×5(4×3)A	1230	1170		515						
WDGVII-250~300/12~40.5 - 8×7A	715	655	220	-		200	217			7
WLGVII-250~300/12~40.5 - 8×7A	1230	1170		575						
WDGVII-400~600/12~40.5 - 8×7A	715	655	250	-		220	237			
WLGVII-400~600/12~40.5 - 8×7A	1230	1170		515						
WDGVII-800~1000/12~40.5 - 6×5(4×3)A	805	745	295	-						5(3)
WLGVII-800~1000/12~40.5 - 6×5(4×3)A	1410	1350		605						
WDGVII-800~1000/12~40.5 - 8×7A	805	745		-						7
WLGVII-800~1000/12~40.5 - 8×7A	1410	1350		605						
WDGVII-250~300/72.5~126 - 6×5(4×3)A	790	730	295	-		160	177			5(3)
WLGVII-250~300/72.5~126 - 6×5(4×3)A	1530	1470		800						
WDGVII-400~600/72.5~126 - 6×5(4×3)A	790	730	325	-						
WLGVII-400~600/72.5~126 - 6×5(4×3)A	1580	1520		790						
WDGVII-250~300/72.5~126 - 8×7A	790	730	295	-		200	217			7
WLGVII-250~300/72.5~126 - 8×7A	1530	1470		800						
WDGVII-400~600/72.5~126 - 8×7A	790	730	325			220	237			
WLGVII-400~600/72.5~126 - 8×7A	1580	1520		790						
WDGVII-800~1000/72.5~126 - 6×5(4×3)A	880	820	370	-						5(3)
WLGVII-800~1000/72.5~126 - 6×5(4×3)A	1760	1700		880						
WDGVII-800~1000/72.5~126 - 8×7A	880	820		-						7
WLGVII-800~1000/72.5~126 - 8×7A	1760	1700		880						

1. Length of tap lead is one meter.

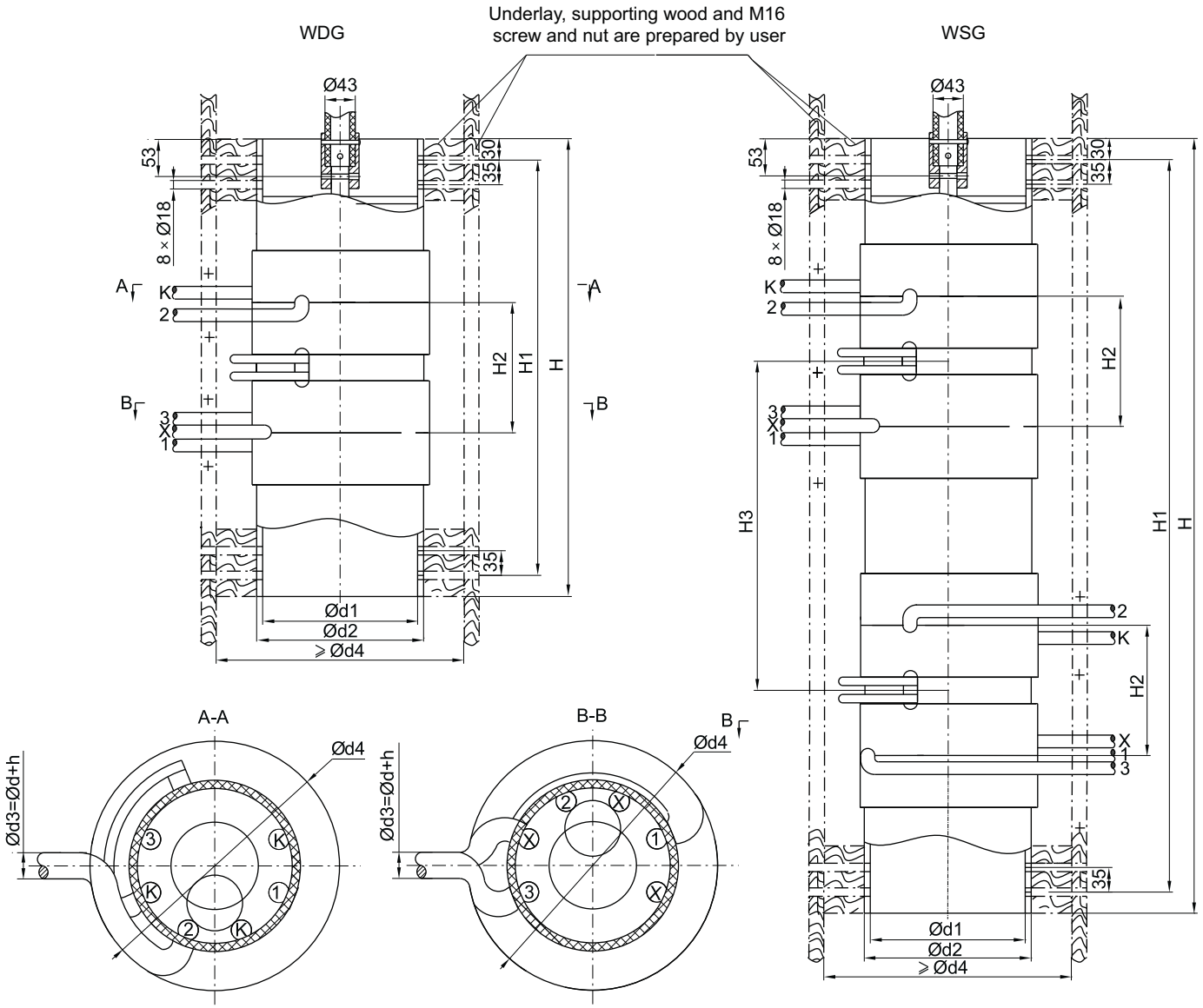
7. Type A,WDG+WLG VIII / 250A-1000A, serial-parallel transform,overall dimensions



Type	Dimensions (mm)									operation
	H	H1	H2	H3	ød/S(sectional area)	ød1	ød2	ød4	h	position(n)
WDGVIII-250~300/12 - 3×2A	655	595	160	-	250A:12.5/70 300A:14.5/95 400A:17.5/120 500A:18.7/150 600A:21.7/185 800A:24.7/240 1000A:26/300	160	177	d4=d2+2d3+δ (δ ≥60)	Thickness of papering h=6(12kV-40.5kV)	2
WLGVIII-250~300/12 - 3×2A	1050	990		455						
WDGVIII-400~600/12 - 3×2A	655	595	190	-						
WLGVIII-400~600/12 - 3×2A	1050	990		395						
WDGVIII-800~1000/12 - 3×2A	745	685	235	-						
WLGVIII-800~1000/12 - 3×2A	1230	1170		485						
WDGVIII-250~300/40.5 - 3×2A	730	670	235	-						
WLGVIII-250~300/40.5 - 3×2A	1260	1200		590						
WDGVIII-400~600/40.5 - 3×2A	730	670	265	-						
WLGVIII-400~600/40.5 - 3×2A	1260	1200		530						
WDGVIII-800~1000/40.5 - 3×2A	820	760	310	-						
WLGVIII-800~1000/40.5 - 3×2A	1440	1380		620						

1. All connections have been done inside the tap changer, only tap leads should be connected to the transformer winding(except special design)
2.Length of tap leads is 1m

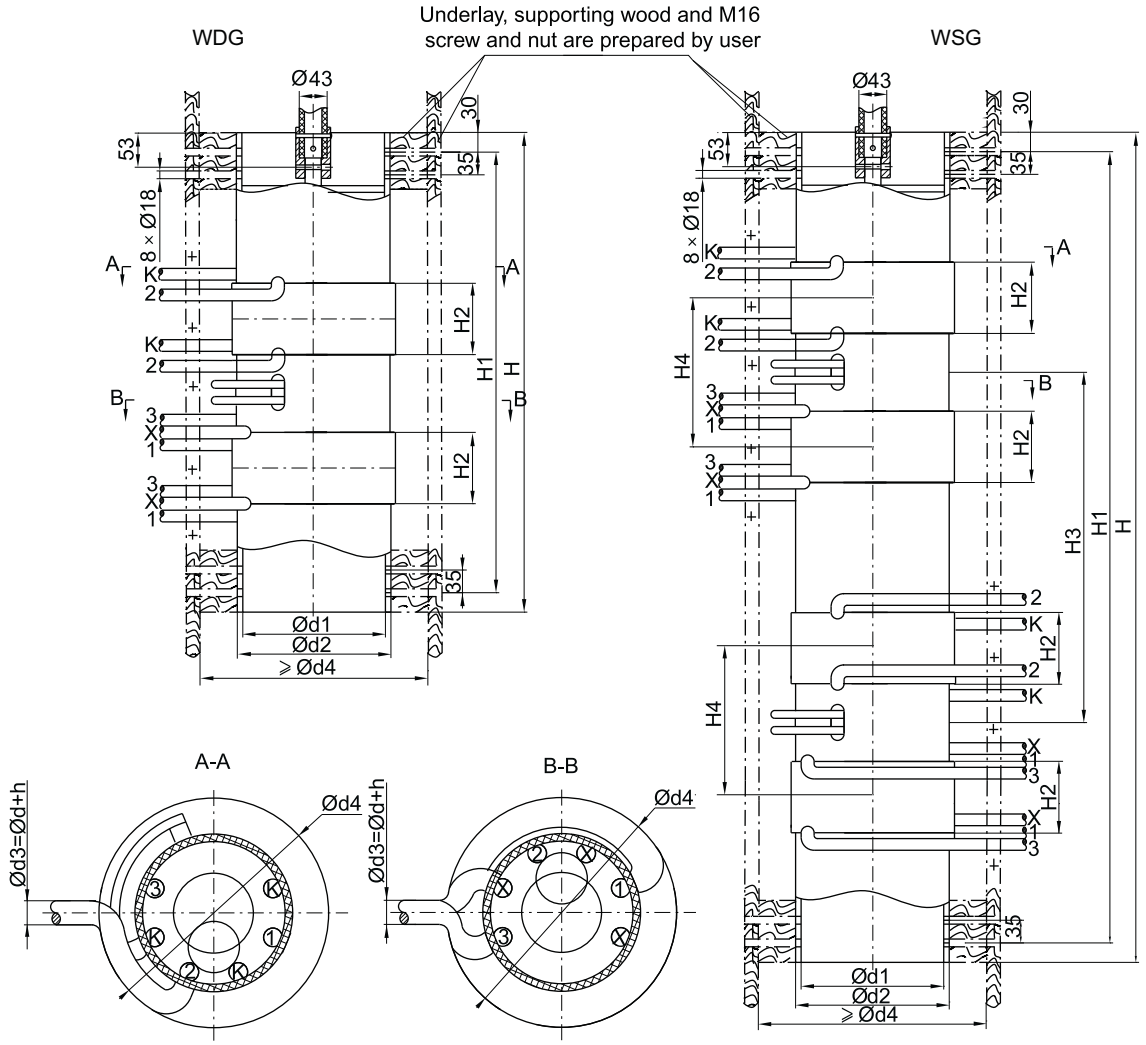
8. Type A,WDG+WLG II / 250A-600A,reversing,overall dimensions



Type	Dimensions (mm)									operation
	H	H1	H2	H3	ød/S(sectional area)	ød1	ød2	ød4	h	position(n)
WDGII-250~300/12~40.5-4×5(5×7)A	650	590	155	-	250A:12.5/70 300A:14.5/95 400A:17.5/120 500A:18.7/150 600A:21.7/185	200	217	d4=d2+2d3+ δ (δ ≥60)	Thickness of papering h=6(12kV-40.5kV) h=12(72.5kV-126kV)	5(7)
WLGII-250~300/12~40.5-4×5(5×7)A	1100	1040		510						
WDGII-400~600/12~40.5-4×5(5×7)A	650	590	185	-		220	237			
WLGII-400~600/12~40.5-4×5(5×7)A	1100	1040		450						
WDGII-250~300/72.5~126-4×5(5×7)A	650	590	155	-		200	217			
WLGII-250~300/72.5~126-4×5(5×7)A	1250	1190		660						
WDGII-400~600/72.5~126-4×5(5×7)A	650	590	185	-		220	237			
WLGII-400~600/72.5~126-4×5(5×7)A	1290	1230		640						

1. Length of tap leads is 1m.
2.Take 4 × 5(± 2) as an example in above drawing , 5 × 7 is ±3 steps

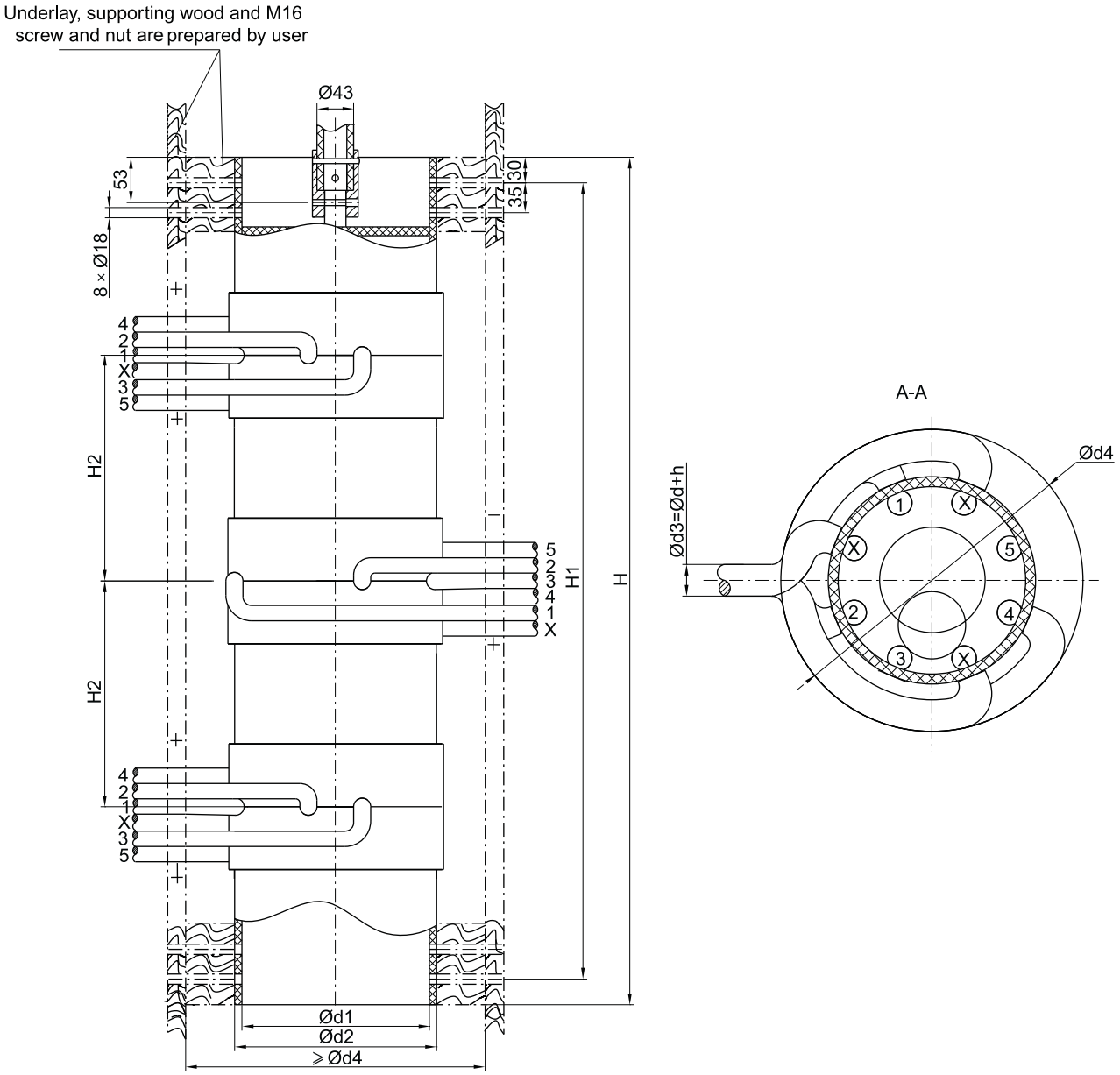
9. Type A,WDG+WLG II / 800A-1600A,reversing,overall dimensions



Type	Dimensions (mm)										operation position(n)
	H	H1	H2	H3	H2	ød/S(sectional area)	ød1	ød2	ød4	h	
WDGII-800~1000/12~40.5-4×5(5×7)A	740	680	110	-	230	800A:17.5/120 1000A:18.7/150 1250A:21.7/185 1600A:24.7/240 2000A:26/300	220	237	d4=d2+2d3+δ (δ ≥60)	Thickness of papering h=6(12kV-40.5kV) h=12(72.5kV-126kV)	5(7)
WLGII-800~1000/12~40.5-4×5(5×7)A	1280	1220		540							
WDGII-1250/12~40.5-4×5(5×7)A	800	740	130	-	260						
WLGII-1250/12~40.5-4×5(5×7)A	1400	1340		600							
WDGII-1600/12~40.5-4×5(5×7)A	890	830	175	-	305						
WLGII-1600/12~40.5-4×5(5×7)A	1580	1520		690							
WDGII-800~1000/72.5~126-4×5(5×7)A	740	680	110	-	230						
WLGII-800~1000/72.5~126-4×5(5×7)A	1470	1410		730							
WDGII-1250/72.5~126-4×5(5×7)A	800	740	130	-	260						
WLGII-1250/72.5~126-4×5(5×7)A	1590	1530		790							
WDGII-1600/72.5~126-4×5(5×7)A	890	830	175	-	305						
WLGII-1600/72.5~126-4 × 5(5×7)A	1770	1710		880							

1. Length of tap leads is 1m.
2.Take 4 × 5(± 2) as an example in above drawing , 5 × 7 is ± 3 steps

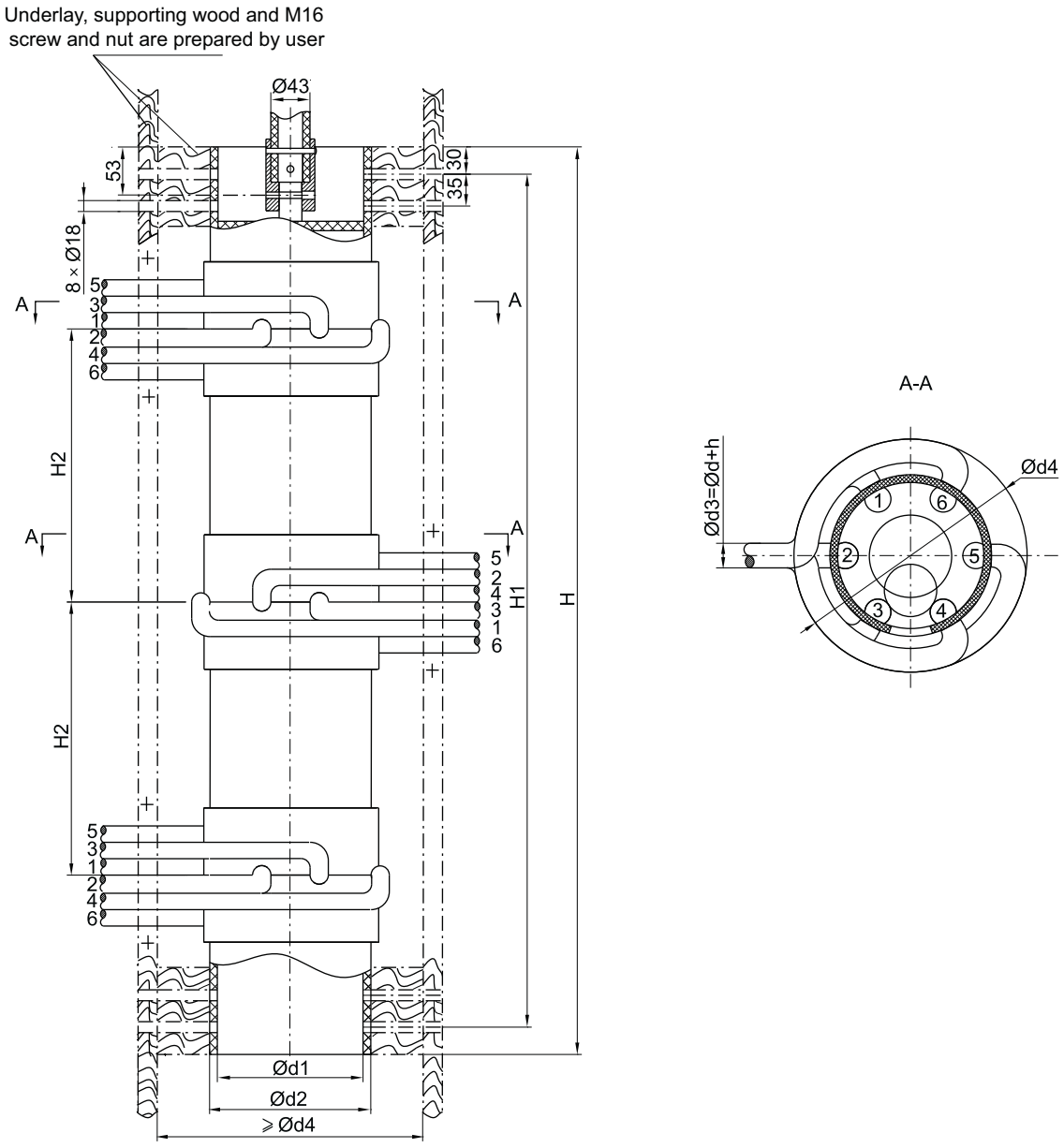
10. Type A, WSG IV / 250-1000A, linear, overall dimensions



Type	Dimensions (mm)								operation position(n)
	H	H1	H2	ød/S(sectional area)	ød1	ød2	ød4	h	
WSGIV250~300/12~40.5 - 5×5A	1035	975	280	250A:12.5/70 300A:14.5/95 400A:17.5/120 500A:18.7/150 600A:21.7/185 800A:24.7/240 1000A:26/300	220	200	d4=d2+2d3+δ (δ ≥60)	Thickness of papering h=6(12kV-40.5kV) h=12(72.5kV-126kV)	5
WSGIV400~600/12~40.5 - 5×5A	1035	975	265		220	237			
WSGIV800~1000/12~40.5 - 5×5A	1170	1110	310						
WSGIV250~300/72.5~126 - 5×5A	1335	1275	430		200	200			
WSGIV400~600/72.5~126 - 5×5A	1415	1355	455		220	237			
WSGIV800~1000/72.5~126-5×5A	1550	1490	500						

1. All connections have been done inside the tap changer, only tap leads should be connected to the transformer winding(except special design)
2. Length of tap lead is one meter.

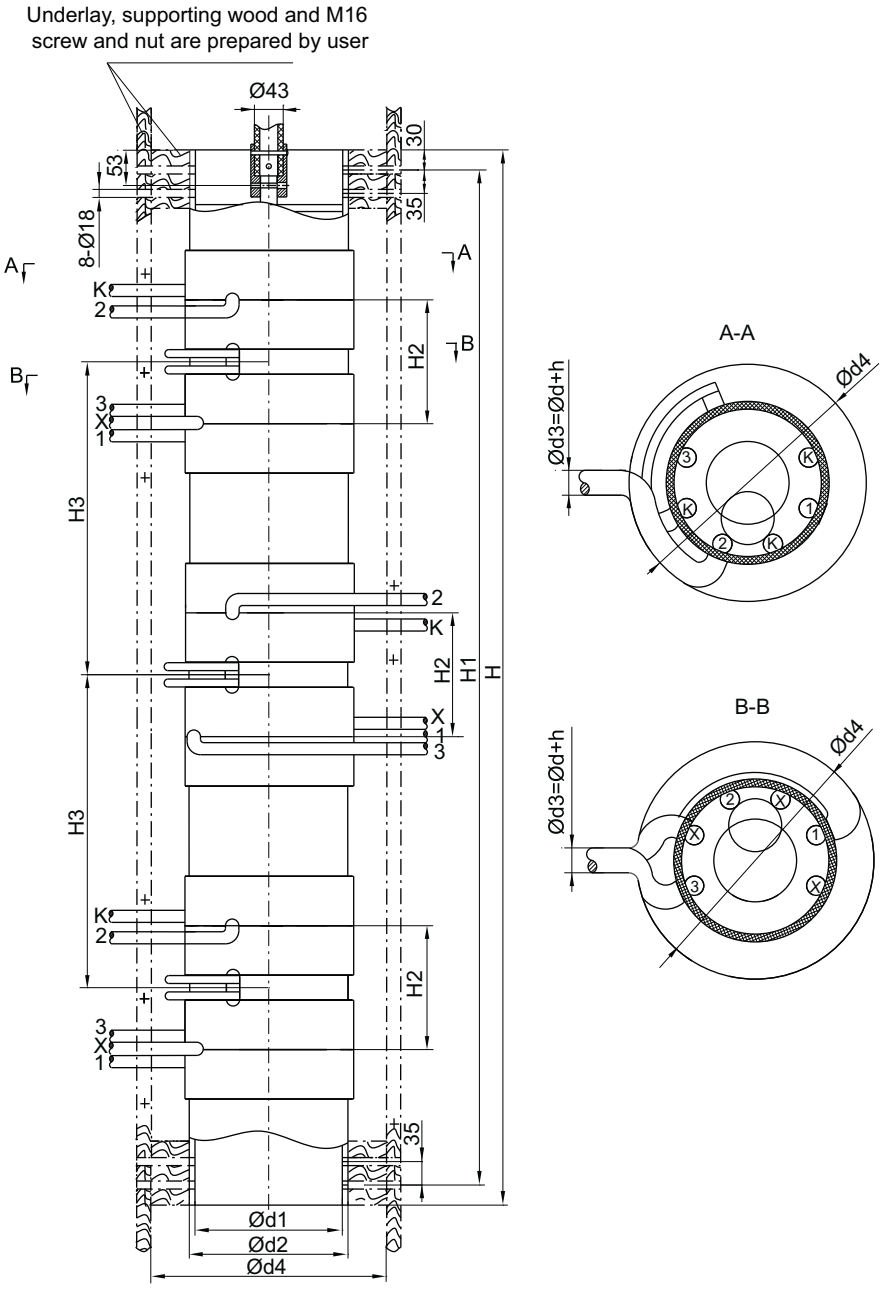
11. Type A, WSG V / 250A-1000A, single-bridging, overall dimensions



Type	Dimensions (mm)								operation position(n)
	H	H1	H2	ød/S(sectional area)	ød1	ød2	ød4	h	
WSGV-250~300/12~40.5 - 6×5A	995	935	280	250A:12.5/70 300A:14.5/95 400A:17.5/120 500A:18.7/150 600A:21.7/185 800A:24.7/240 1000A:26/300	160	177	d4=d2+2d3+δ (δ ≥60)	Thickness of papering h=6(12kV-40.5kV) h=12(72.5kV-126kV)	5
WSGV-400~600/12~40.5 - 6×5A	995	935	265						
WSGV-800~1000/12~40.5 - 6×5A	1130	1070	310						
WSGV-250~300/72.5~126 - 6×5A	1295	1235	430						
WSGV-400~600/72.5~126 - 6×5A	1395	1335	465						
WSGV-800~1000/72.5~126 - 6×5A	1530	1470	510						

1. Length of tap lead is one meter.

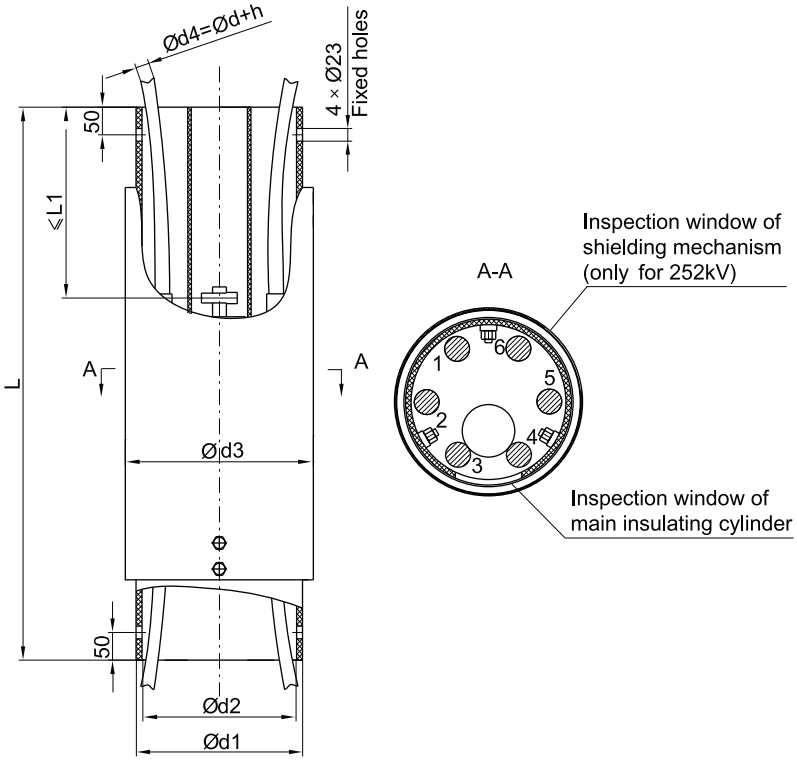
12. Type A,WSG II / 250A-1000A,reversing,overall dimensions



Type	Dimensions (mm)									operation
	H	H1	H2	H3	ød/S(sectional area)	ød1	ød2	ød4	h	position(n)
WSGII-250~300/12~40.5-4×5(5×7)A	1550	1490	155	480	250A:12.5/70	200	217	d4=d2+2d3+δ (δ ≥60)	Thickness of papering h=6(12kV-40.5kV) h=12(72.5kV-126kV)	5(7)
WSGII-400~600/12~40.5-4×5(5×7)A	1550	1490	185	450	300A:14.5/95	220	237			
WSGII-800~1000/12~40.5-4×5(5×7)A	1820	1760	230	540	400A:17.5/120	220	237			
WSGII-250~300/72.5~126-4×5(5×7)A	1910	1850	155	660	500A:18.7/150	200	217			
WSGII-400~600/72.5~126-4×5(5×7)A	1930	1870	185	640	600A:21.7/185	220	237			
WSGII-800~1000/72.5~126-4×5(5×7)A	2200	2140	230	730	800A:24.7/240 1000A:26/300	220	237			

1. Length of tap leads is 1m.
2.Take 4 × 5(± 2) as an example in above drawing , 5 × 7 is ± 3 steps

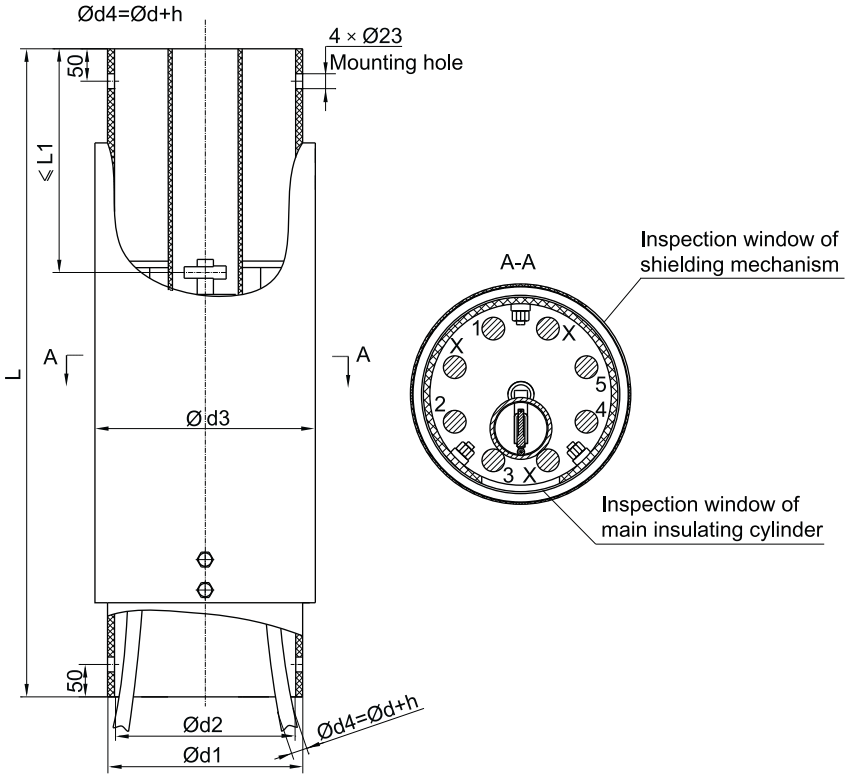
13. Type B, WDG V / 250-2000A,single-bridging, overall dimensions



Type	Dimensions (mm)							operation	Lead
	L	L1	ød/S(sectional area)	ød1	ød2	ød3	h	position(n)	come out
WDGV-250~300/12~40.5-6×5B	600	≤178	250A:12.5/70 300A:14.5/95	237	220	250	h=12(72.5kV-126kV) h=20(252kV)	5	from bottom
WDGV-400~600/12~40.5-6×5B			400A:17.5/120 500A:18.7/150 600A:21.7/185						
WDGV-800/12~40.5-6×5B	700		17.5/120						from two ends
WDGV-1000/12~40.5-6×5B			18.7/150						
WDGV-1250/12~40.5-6×5B			21.7/185						
WDGV-1600/12~40.5-6×5B			24.7/240						
WDGV-2000/12~40.5-6×5B			26/300						
WDGV-250~300/72.5~126-6×5B	700	≤207.5	250A:12.5/70 300A:14.5/95						from bottom
WDGV-400~600/72.5~126-6×5B			400A:17.5/120 500A:18.7/150 600A:21.7/185						
WDGV-800/72.5~126-6×5B			17.5/120						from two ends
WDGV-1000/72.5~126-6×5B			18.7/150						
WDGV-1250/72.5~126-6×5B	800		21.7/185						
WDGV-1600/72.5~126-6×5B			24.7/240						
WDGV-2000/72.5~126-6×5B			26/300						
WDGV-250~300/252-6×5B	1000	≤372.5	250A:12.5/70 300A:14.5/95	300	280	340	h=6(12kV-40.5kV) Thickness of papering		from bottom
WDGV-400~600/252-6×5B			400A:17.5/120 500A:18.7/150 600A:21.7/185						
WDGV-800/252-6×5B			17.5/120						from two ends
WDGV-1000/252-6×5B			18.7/150						
WDGV-1250/252-6×5B			21.7/185						
WDGV-1600/252-6×5B			24.7/240						
WDGV-2000/252-6×5B			26/300						

1. Length of tap lead is one meter.

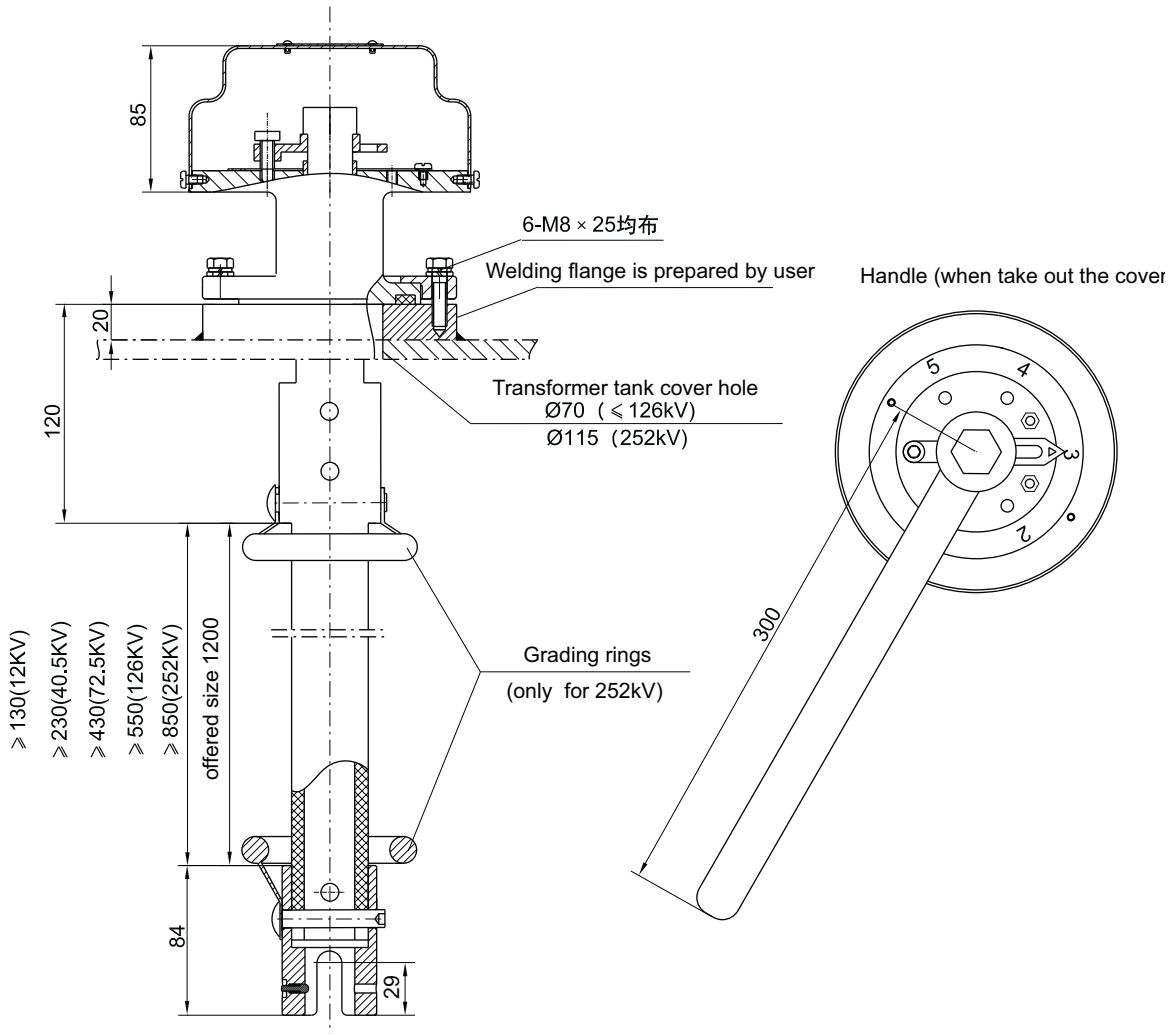
14. Type B, WDG IV / 250A-2000A,linear,overall dimensions

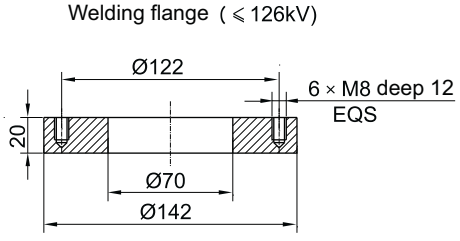


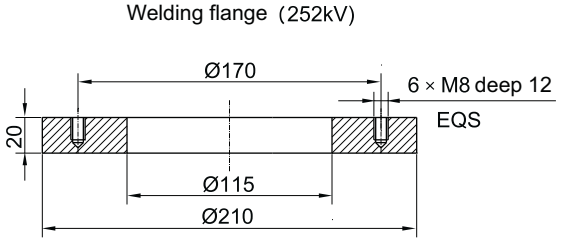
Type	Dimensions (mm)							operation	Lead
	L	L1	ød/S(sectional area)	ød1	ød2	ød3	h	position(n)	come out
WDGIV-250~300/252-5×5B	1000	≤372.5	250A:12.5/70,300A:14.5/95	300	280	340	Thickness of papering h=6(12kV-40.5kV) h=12(72.5kV-126kV) h=20(252kV)	5	from bottom
WDGIV-400~600/252-5×5B			400A:17.5/120 500A:18.7/150 600A:21.7/185						
WDGIV-800/252-5×5B			17.5/120						from two ends
WDGIV-1000/252-5×5B			18.7/150						
WDGIV-1250/252-5×5B			21.7/185						
WDGIV-1600/252-5×5B			24.7/240						
WDGIV-2000/252-5×5B			26/300						

1. Length of tap lead is one meter.

15. Mechanism for manual operation on top, overall dimensions (for type A and type B)

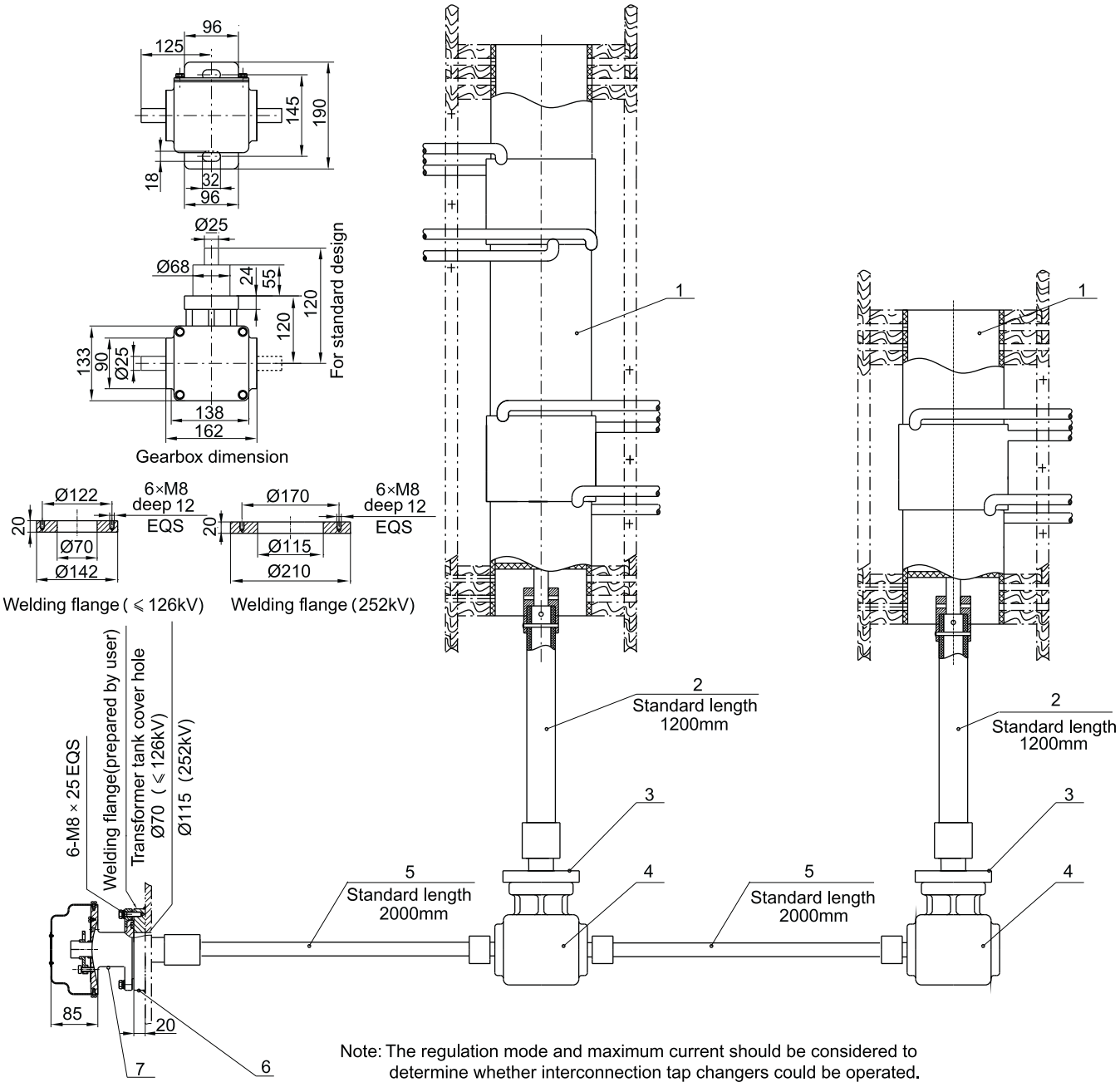






Unit: mm

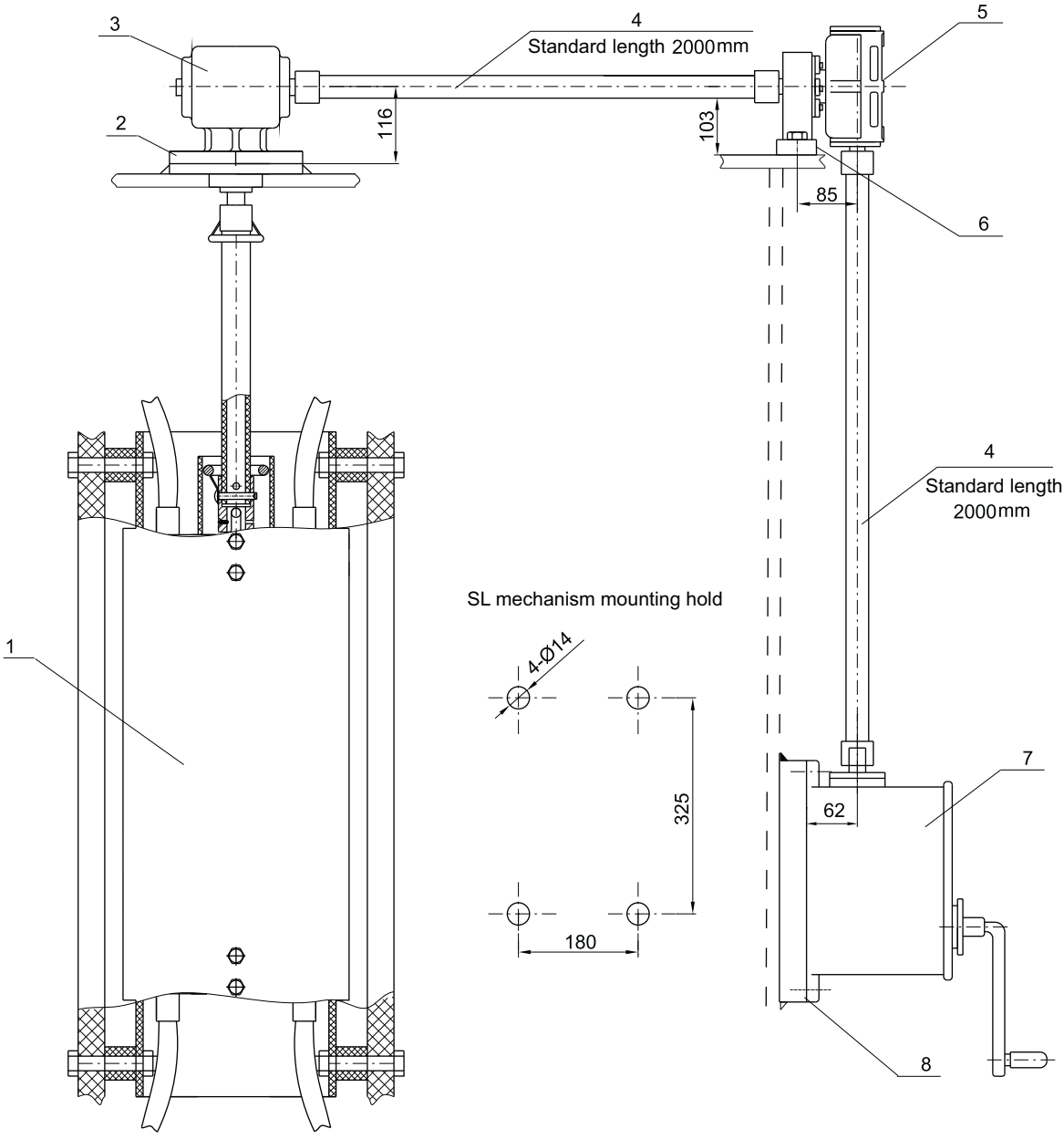
16. Manual operation at side with bottom driving and two tap changers gang-operated, installation drawings (for type A and type B)



1. Tap changer active part
2 . Insulating shaft
3. Installation supporting plate
4. Gearbox
5. Driving shaft
6. Welding flange(prepared by user)
7. Flange

Unit: mm

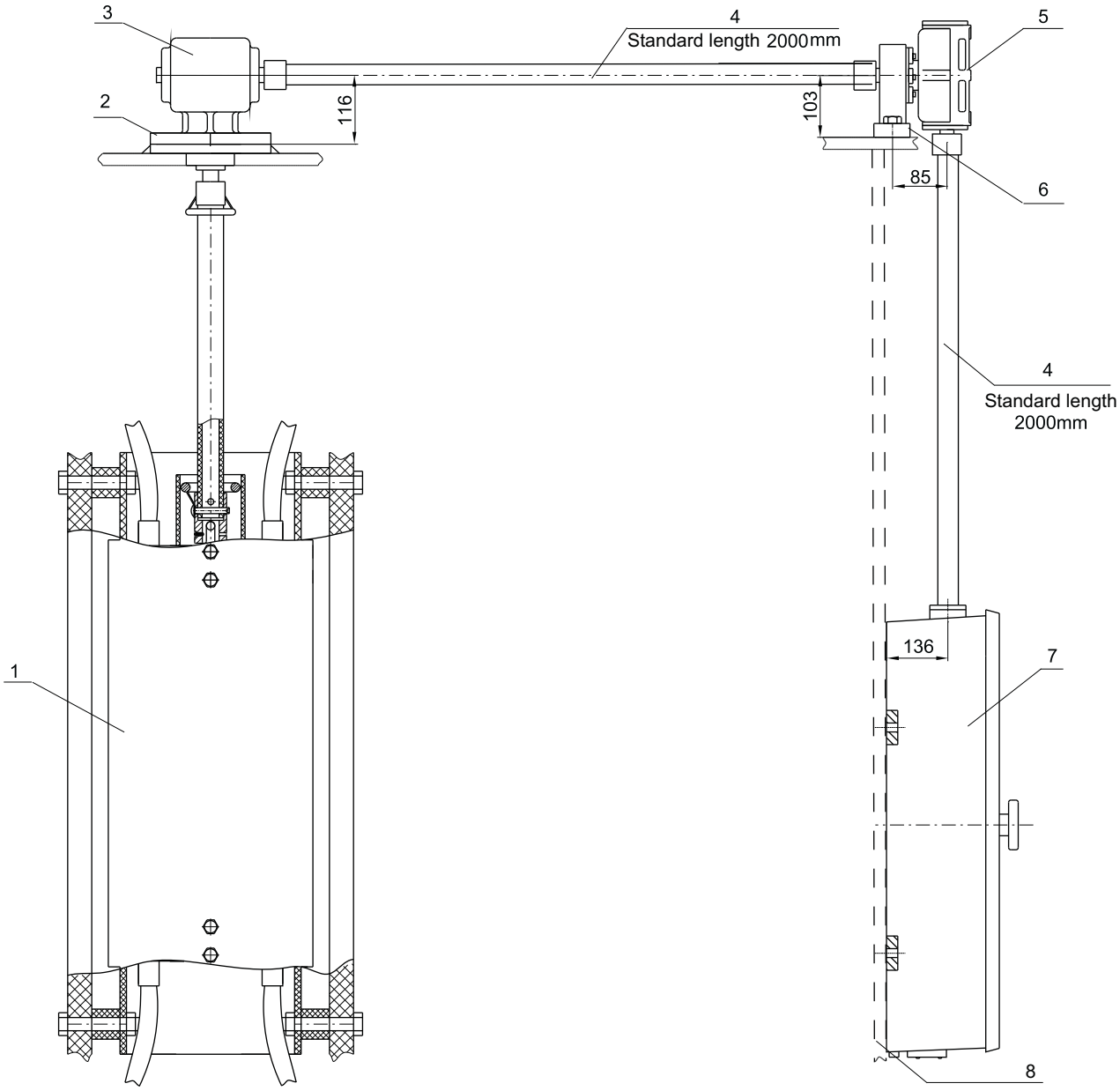
17. Manual operation at side with top driving, installation drawings (for type A and type B)



1. Tap changer active part
2. Welding flange(prepared by user)
3. Geneva mechanism
4. Driving shaft
5. Worm wheel box and its steady
6. Installation supporting plate (prepared by user)
7. SL mechanism
8. Installation supporting plate (prepared by user)

Unit: mm

18. Motor driving at side, installation drawings (for type A and type B)

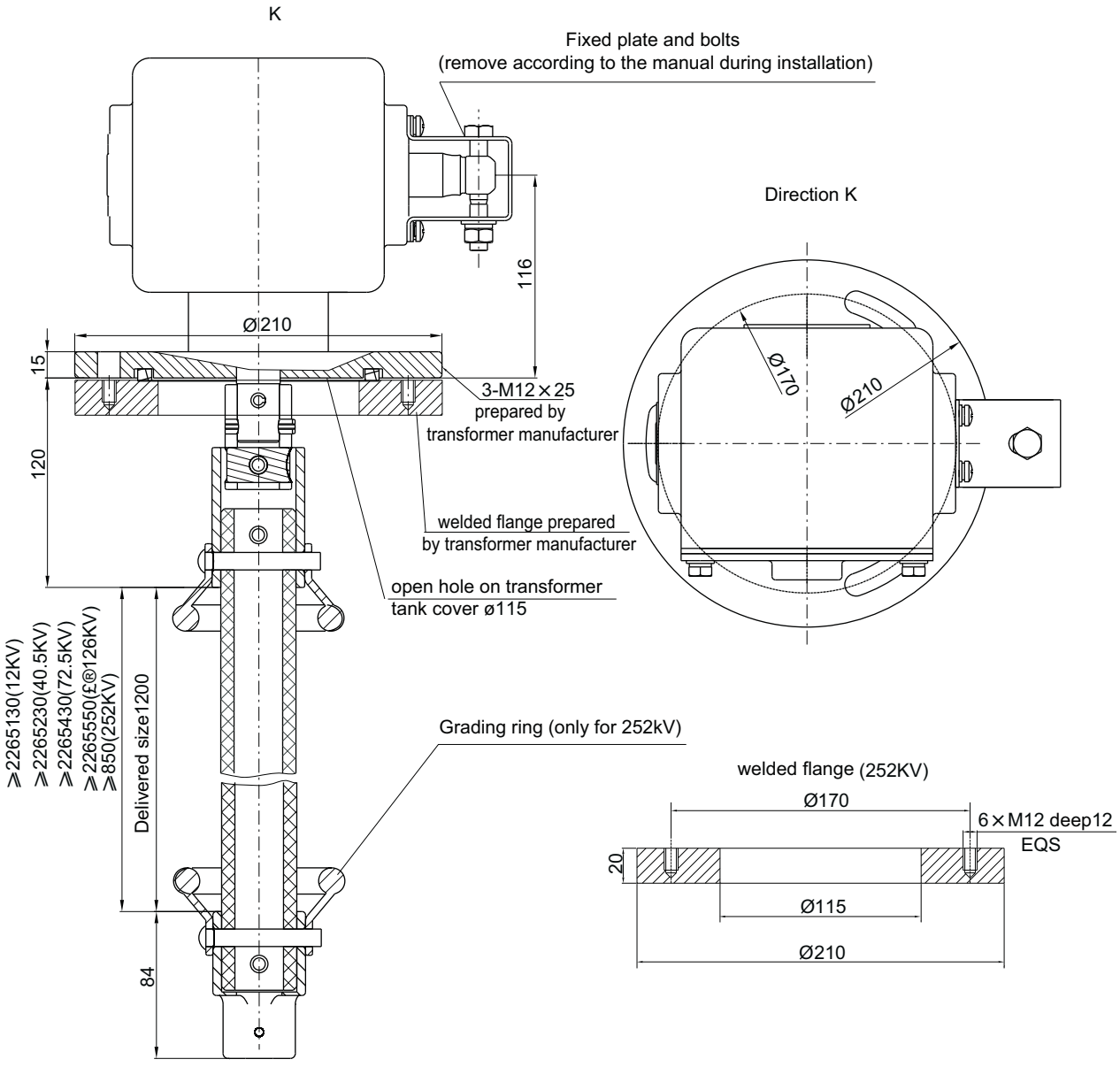


1. Tap changer active part
2. Welding flange(prepared by user)
3. Geneva wheelbox
4. Driving shaft
5. Worm wheel box and supporting base
6. Installation supporting plate (prepared by user)
7. CMA7 motor drive unit
8. Inatallation supporting plate (prepared by user)

Remark: According to users' different requirements, offer relative operation mechanism and matched indicator &controller

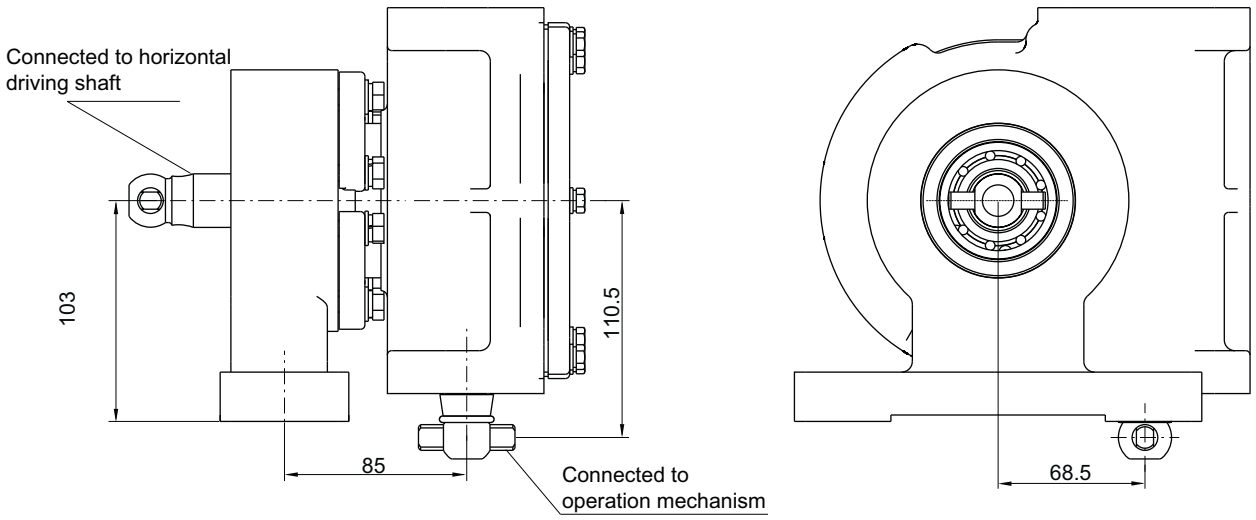
Unit: mm

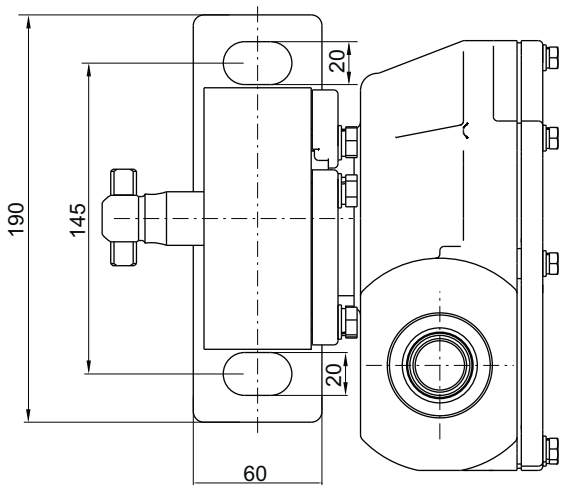
19. Geneva wheel,overall dimensions



Unit: mm

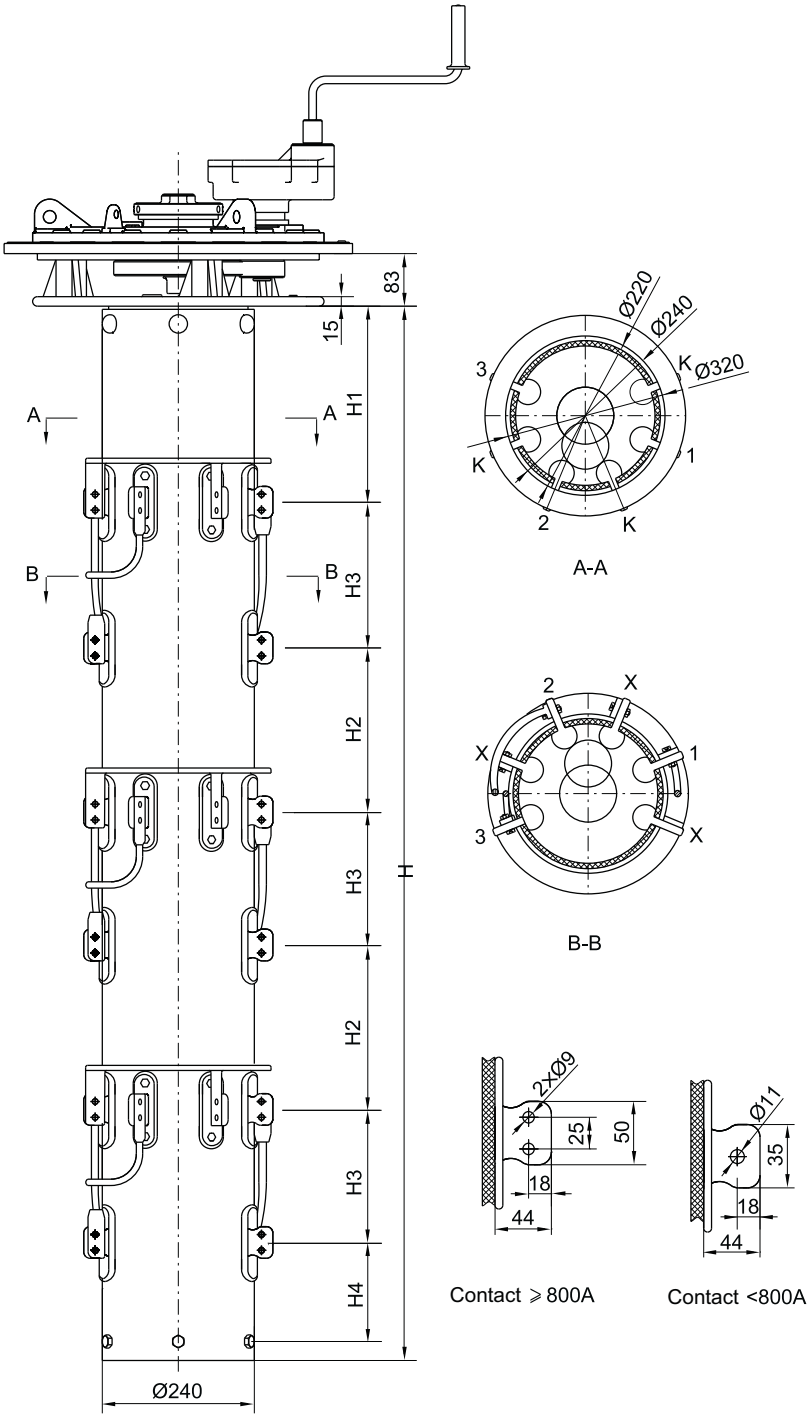
20. Worm gear and supporting base, overall dimensions





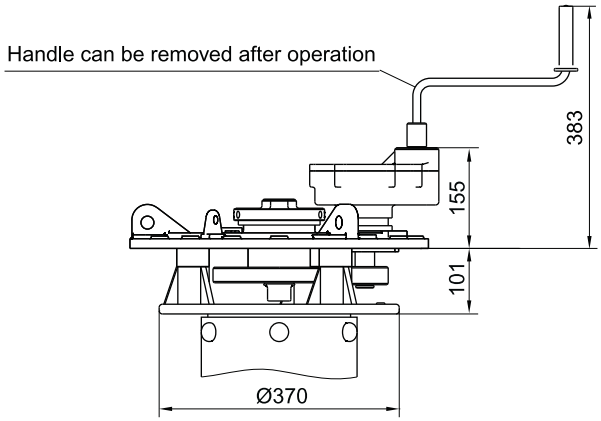
Unit: mm

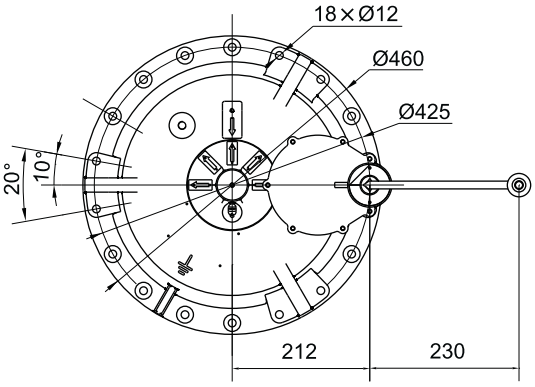
21. Type C, WSG II / 400A-1600A, reversing, overall dimensions



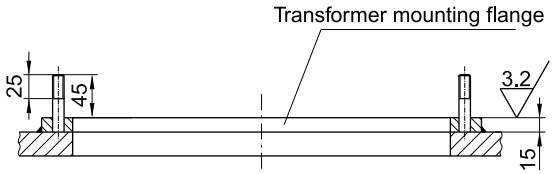
Type	Dimensions (mm)					operation position(n)
	H	H1	H2	H3	H4	
WSGII-400~600/12~40.5-4×5C(5×7)C	1418	285.5	215	185	132.5	5(7)
WSGII-800~1000Y/12~40.5-4×5C(5×7)C	1688	308	260	230	155	
WSGII-1250Y/12~40.5-4×5C(5×7)C	1868	323	290	260	170	
WSGII-1600Y/12~40.5-4×5C(5×7)C	2138	345.5	335	305	192.5	
WSGII-400~600Y/72.5~126-4×5C(5×7)C	1652	400	270	185	137.5	

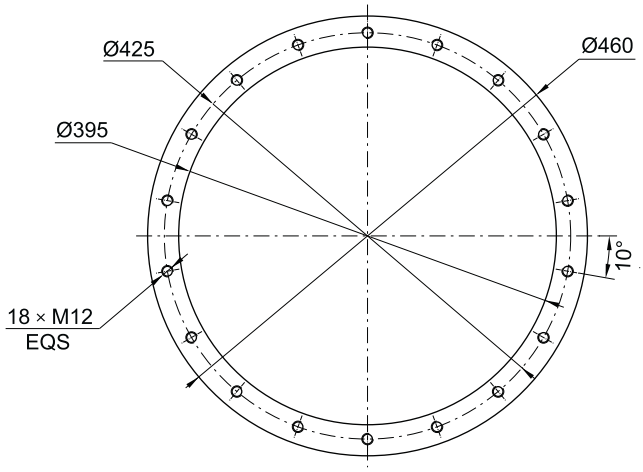
22. Manual operation on top (for standard tank type), head flange overall dimensions (only for type C)





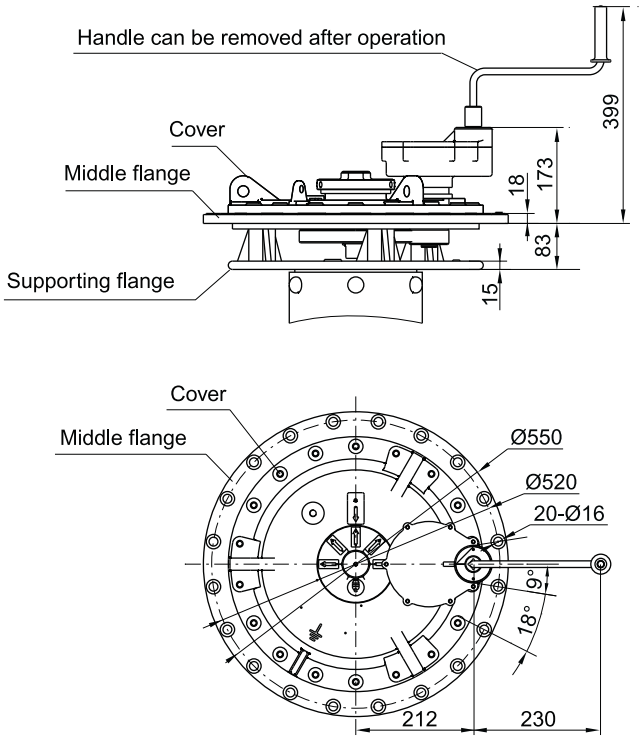
23. Transformer mounting flange, standard tank type, overall dimensions



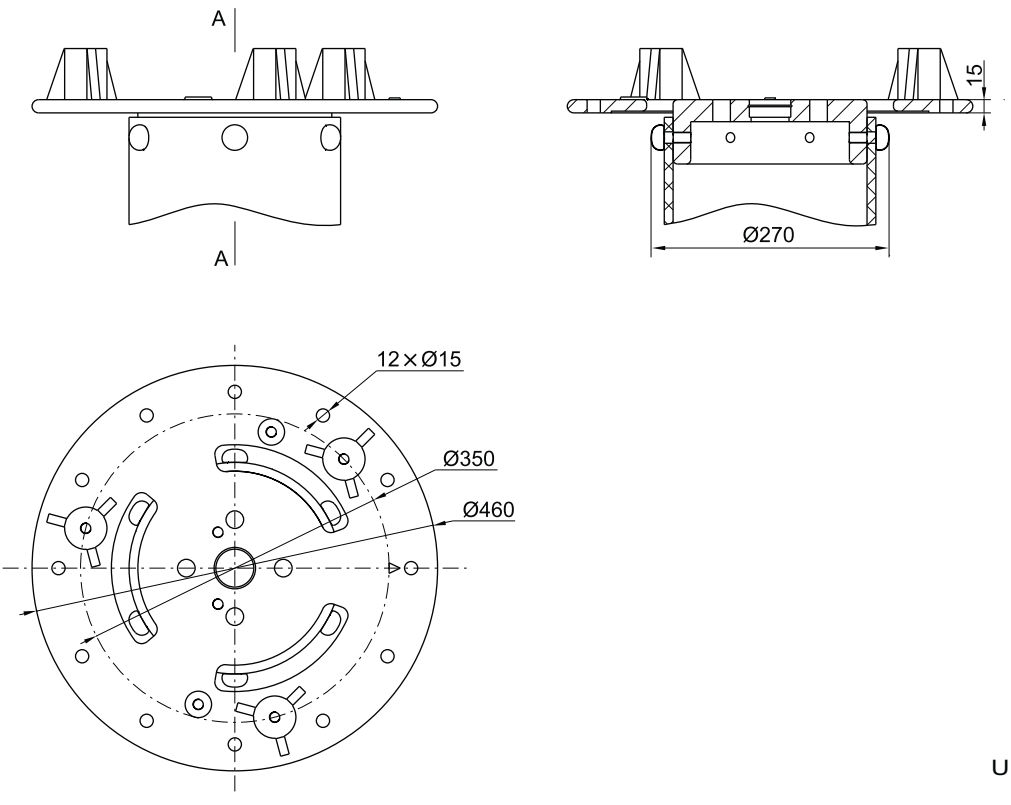


Unit: mm

24. Manual operation on top (for bell type), head flange overall dimensions

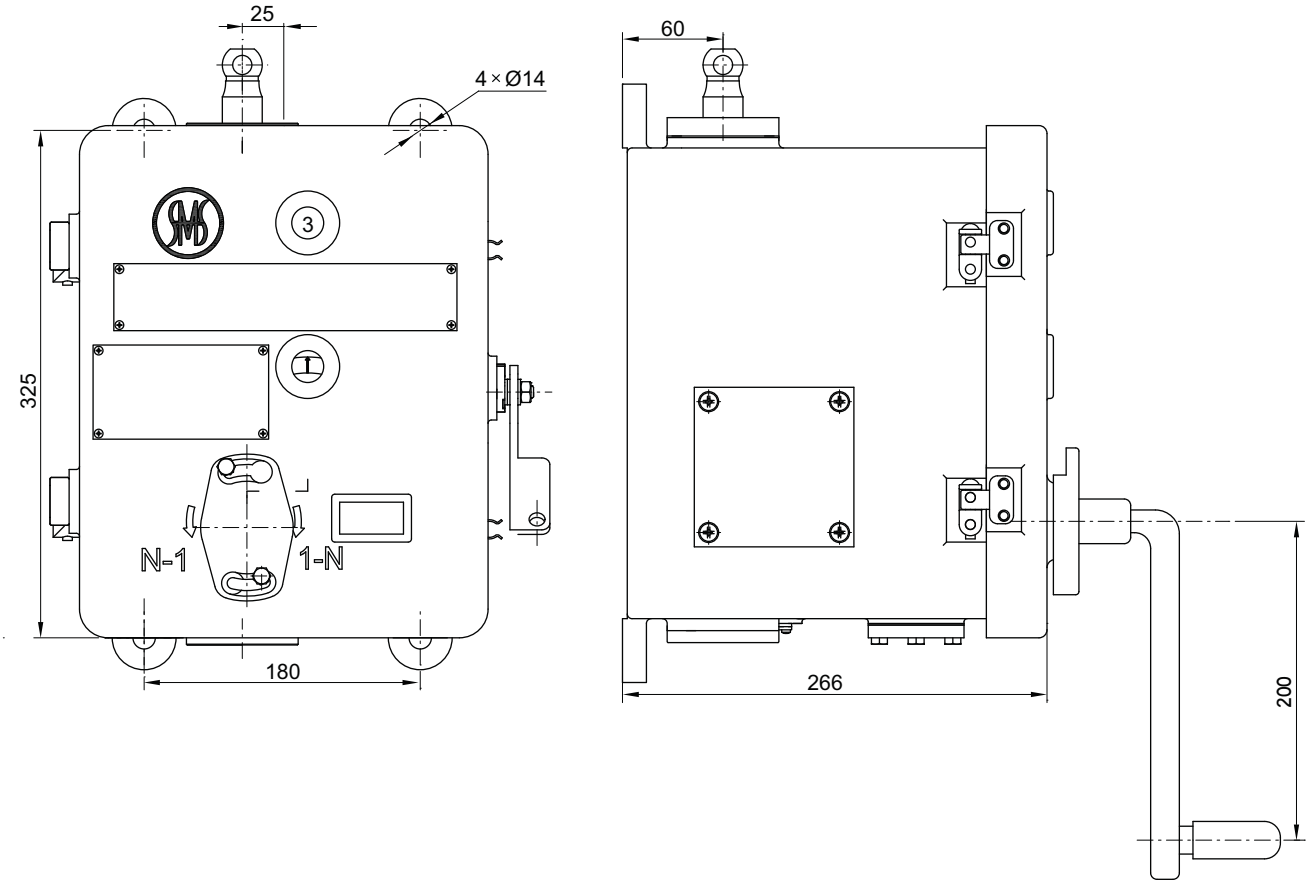


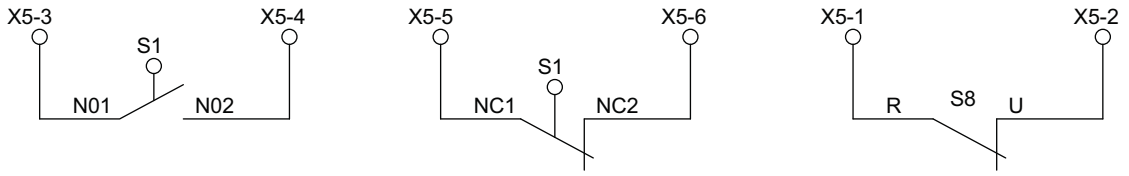
25. Bell-type supporting flange, overall dimensions (only for type C)



Unit: mm

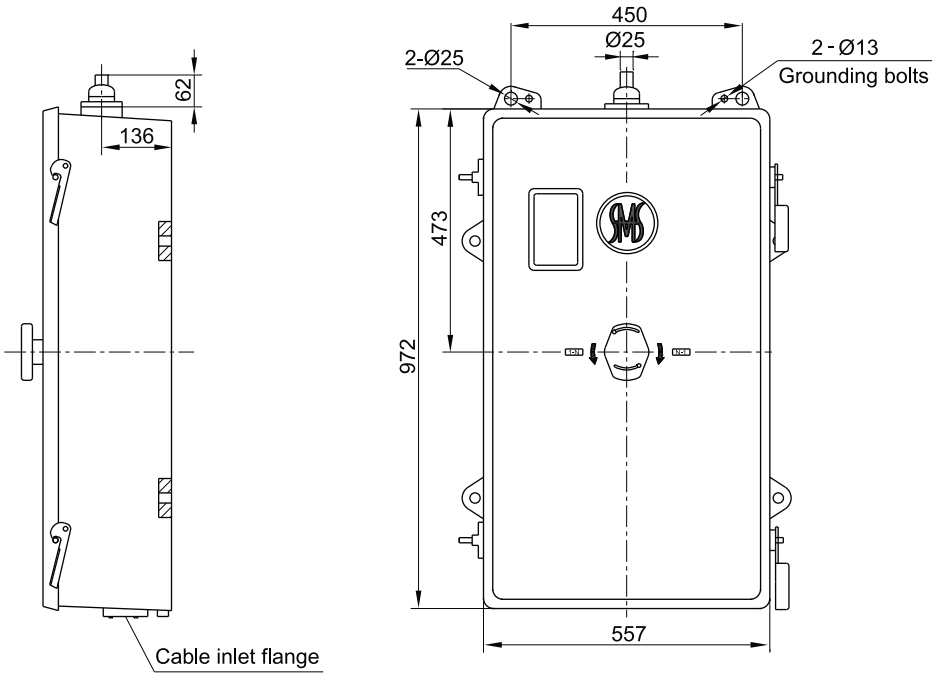
26. SL operating mechanism,overall dimensions

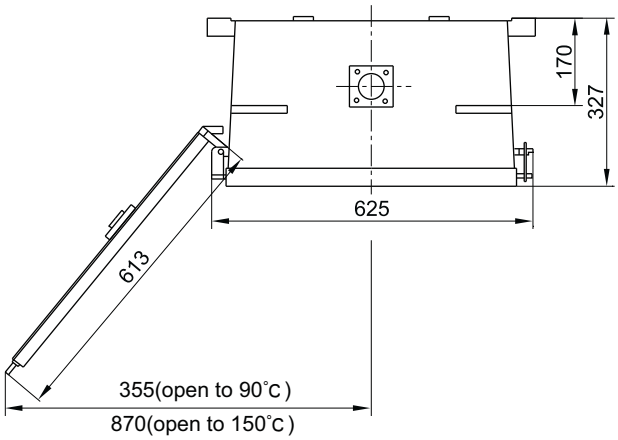


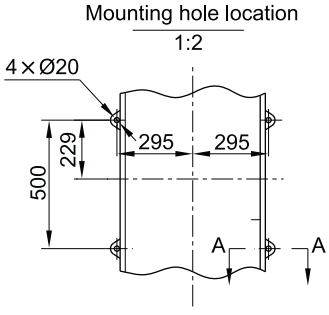


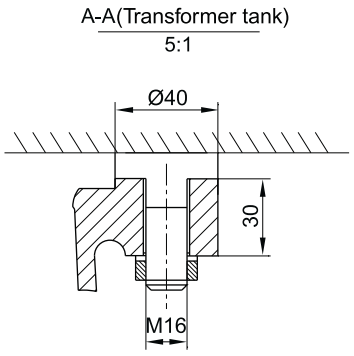
S1-NO1，S1-NO2 for in-operation signal，S1-NC1，S1-NC2 for operation in-position signal Leads out S8-R、S8-U from manual mechanism to terminals X5-1，X5-2, If handle crank is inserted in, then X5-1、X5-2 break; If handle crank is taken out, then X5-1、X5-2 close,User should take this terminal as blockout for manual mechanism and circuit breaker of transformer

27. CMA7 motor drive unit, overall dimensions





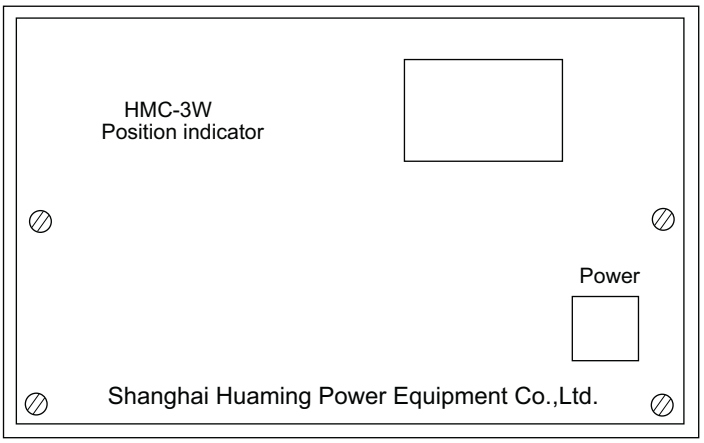




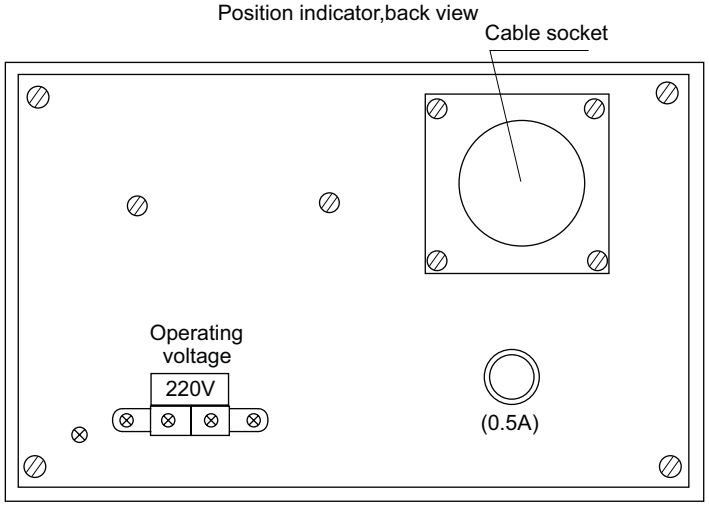
Unit: mm

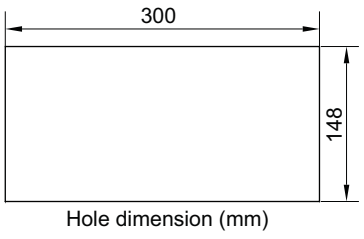
28. HMC-3W position indicator, overall dimensions

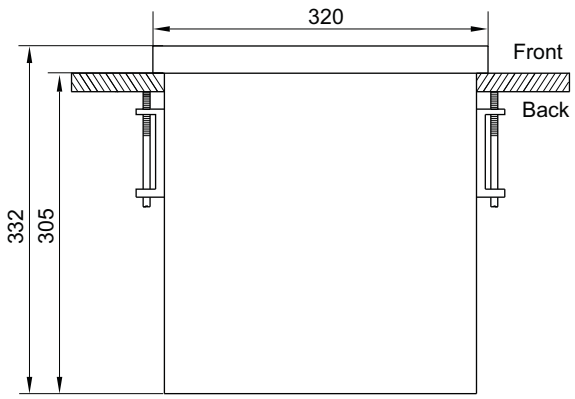
Position indicator, front view



Position indicator,back view







Unit: mm

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