

Spannungslose Umsteller für Dreiphasen-Verteiler-Transformatoren (Typ KDV)

Off-Circuit Tap Changers for Threephase Distribution Transformers (Type KDV)

APPLICATION AND CONSTRUCTION

This range of rotary off-circuit tap changers includes high electrical strength contact boards which combine electrical and mechanical reliability with versatility of application and ease of connection to transformer tapping leads.

- The changer connections are made by shorting two solid brass studs on the contact board, with a copper ring tensioned by a helical spring, contact being maintained by a free sliding brass bobbin.
- The assembly is retained by washers either side of the contact ring to prevent lateral movement, finally being secured by special application pins.
- The changer is suitable for use in transformer oil and synthetic insulating media.

24 kV 100 A

The 24 kV changer is supplied in single, three and six board versions. We can provide universal arrangements which can be operated from either end of the changer or right control device / left control device versions.

- The contact boards have seven studs giving a maximum of six positions. There are two mounting bracket options, "odd-leg" for standard mounting or "equal angle" for mounting in either the standard position or at 90°.
- The single board switch is available with a short bracket and support or without bracket which includes an in-line support when internal tank is a premium.

44 kV 100 A

The 44 kV changer is supplied in single, three and six board versions.

- With the comprehensive symmetry of the arrangement control device versions are not required.
- Due to the elevated voltages applied the contact boards are larger than for the 24 kV changer and making best use of the extra area. 7 changer positions are available.

44 kV 200 A

A special 200 A version of the 44 kV changer is available by mounting pairs of contact boards back to back linked with copper bars. Taking not much more space than a conventional arrangement it provides a solution for high current applications. Also available is a right angle drive unit and a modified control device assembly to give increased operating torque.

BEARING

The bearing should be welded to the outside of the transformer tank prior to assembly of the control device and indicator plate. The position of the indicator plate fixing holes must be as illustrated in drawing 5342. The bearing is provided with a recess at each fixing hole for the O-ring seals. Good positioning in all planes is essential for successful changer operation and it is recommended to tack the boss in position using a suitable jig prior to fully welding.

O-RINGS

O-ring seals are provided to fit into the bearing during assembly of the control device. For standard transformers, oil Nitrile O-Rings are provided. For synthetic insulating media Viton O-rings are supplied. O-Rings should be lubricated with insulant before assembly. Where the changer is to operate in air the seals should be suitably greased before assembly.

CONTROL DEVICE

The control device assembly is a set of components to be fitted to the bearing after it has been welded to the transformer tank. The control device assembly is retained by a split pin on the inside of the transformer tank after first taking up any slack in the assembly using the shim washers provided.

The control device assembly is provided with facilities to enable the changer to be locked on any tapping position by means of a padlock with a shackle diameter of 6-9,5 mm. The standard changer has a maximum of six tapping positions available on the 24 kV model and seven positions on the 44 kV model. If fewer

active positions are required spare stop rivets can be fitted into the appropriate hole in the indicator plate.

RIGHT-ANGLE DRIVE

The right-angle drive assembly is designed to be fitted where required between the changer and the control device assembly. It requires a single hole support at earth potential.

DRIVE SHAFT

Square steel 10 mm – can be cut to any length if required. The maximum length of shaft should be limited to 600 mm.

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TESTS

24 KV MODEL

Overvoltage withstand test in air at 28 kV rms power-frequency test voltage between phases and earth for one minute.

Overvoltage withstand test in air at 11 kV rms power-frequency test voltage between adjacent contacts for one minute.

Overvoltage withstand test in transformer oil at 50 kV rms power-frequency test voltage between phases and to earth for one minute.

Impulse withstand test in transformer oil at 125 kV peak lightning impulse withstand voltage between phases and to earth.

Impulse withstand test in transformer oil at 72 kV peak lightning impulse withstand voltage between adjacent contacts.

Temperature rise test in transformer oil at 100°C.

Mechanical endurance test: changer was rotated 1.500 times by 360°.

Short circuit test at 2.5 kV rms 50 Hz for 2 sec. in transformer oil between two adjacent contacts shorted by the contact ring.

44 KV MODEL

Overvoltage withstand test in transformer oil at 95 kV rms power-frequency test voltage between phases and earth for one minute.

Overvoltage withstand test in transformer oil at 35 kV rms power-frequency test voltage between adjacent contacts for one minute.

Impulse withstand test in transformer oil at 250 kV peak lightning impulse withstand voltage between phases and to earth.

Impulse withstand test in transformer oil at 100 kV peak lightning impulse withstand voltage between adjacent contacts.

Temperature rise test in transformer oil at 100°C.

Mechanical endurance test: changer was rotated 1.500 times by 360°.

Short circuit test at 2.5 kV rms 50 Hz for 3 sec. in transformer oil between two adjacent contacts shorted by the contact ring.

INSTALLATION, COMMISSIONING AND MAINTENANCE

INSTALLATION

- Cut a clearance hole in the transformer tank to a maximum size of 35 mm. Weld the bearing boss to the tank wall ensuring the tapped indicator plate mounting holes are positioned as drawing 5342. The bearing face must be parallel to the tank wall in both planes. Test the weld for leaks. Ensure the bearing face, recess and bore are masked off during sandblasting and painting.
- Mount the changer onto the winding using the integral bracket. The drive end coupling cap should face the bearing boss. Connect the winding tails to the phase contact boards using brass washers and locknuts (not supplied unless requested).
- Unpack the control device assembly. Lubricate one O-ring and, after ensuring bearing recess is perfectly clean, place O-ring in position. Limit changer positions by inserting spare stop rivets into indicator plate as required. Secure the rivet by punching on the smaller I/D side. Ensure rivet is in the correct position and is the correct way around before carrying out this operation. Fit indicator plate onto bearing using screws provided. Insert the control device assembly into the bearing. From the tank side lubricate the second O-ring and slide over the shaft and onto the bearing recess. Thread onto the shaft the brass shim washers and the spacer. Enough shim washers should be used to ensure a tight fit of the complete assembly when positioning the coupling cap. Fit the coupling cap using the split pin provided. Secure the split pin by opening it with long nose pliers. Check the operation of the assembly is smooth in rotation and no end play should be apparent. Check for the changer positions to be limited correctly.

- Cut square steel drive shaft to suit. The length should be such that it fits reasonably tightly between the coupling caps. Ensure the control device and changer contacts are in the correct positions before fitting.

COMMISSIONING

- Rotate the changer a few times clockwise and counter-clockwise to check operation.
- Place the changer in the required position. Lock using a suitable padlock inserted into the control device aperture.

MAINTENANCE

- It is recommended that the tap changer be operated up and down the tapping range several times to clean of any accumulation of foreign material which may be on the contact faces. This operation should be carried out each time a new tap position is set, or at least once a year even if it is not necessary to change the tap position.

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