

For 3 phase oil immersed distribution transformer

# **Installation, Operation and Maintenance Manual**

**Malco Engineering (Pvt) Limited**

## 1. Applicable Scope

This manual is compiled for installation, operation and maintenance of type S-M, 3 phase oil immersed power transformer, its capacity & voltage are equal to and under 1600 kVA and 6, 10, 11kV, and it's suitable for Torrid Zone. After normally transportation, these series transformers have no need of suspending core & check, you can have the dismantled components & parts assembled, and then carry out the acceptance test, if qualified, then the transformer can be brought into operation.

## 2. Conditions of service

### 2.1 Normally:

2.1.1 Altitude: Up to 1,000 m above sea level

2.1.2 Ambient temperature:

Max. + 45<sup>0</sup>C

Average (daily, Max.) + 40<sup>0</sup>C

Average (yearly, Max.) + 35<sup>0</sup>C

Min. -20<sup>0</sup>C

2.1.3 Environment: outdoor

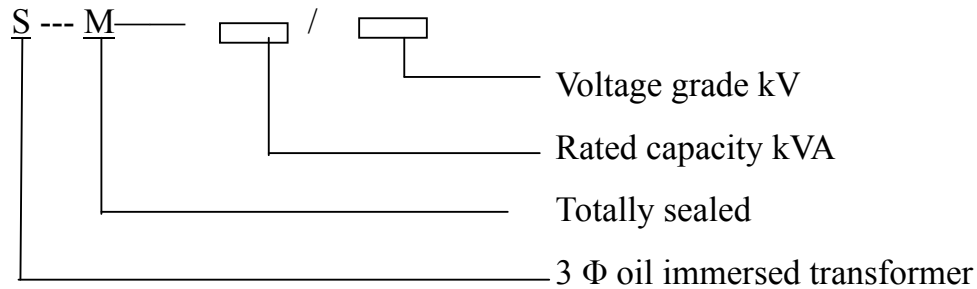
2.1.4 Symmetrical characteristic for multi-phases power:

The supply voltage of 3 phase transformer should be approximately symmetry.

### 2.2 Specially:

If the conditions of service provided by customer haven't been included in the item 2.1, it may be consulted between manufacturer and customer.

### 3. Explanation for the model of product



### 4. Technique parameters

- 4.1 Rated capacity: 30kVA~1600 KVA  
Voltage grade: 11 kV  
Tap voltage:  $\pm 2 \times 2.5 \%$   
Phases: 3  
Frequency: 50 HZ  
Connect diagram: Dyn11 or Yyn0  
Performance data: see table 1

- 4.2 Insulation level: 11 kV: LI75 AC35;

#### 4.3 Temperature rise limit:

The temperature rise of top oil: 55 K

The temperature rise of LV & HV coils: 60 K

- 4.3 The appearance of product, see attached figure, the outline dimensions, see table 2:

### 5. Transportation and load and unload

- 5.1 When in transportation, the Dehydrating Breather disconnected with the conservator by a plate cover so as to avoiding the leakage of tank oil.

- 5.2 The transportation of power transformer should mainly depend on highway, shipping and railway, for this series of transformer it should be full of insulation oil during transportation. The other attached parts such as the Dehydrating Breather, fittings and documents should be packed in another box, and be dispatched along with the transformer.
- 5.3 Unload from the container the forklift could be used. Please be careful in avoiding touching the corrugation radiator
- 5.4 When the transformers are to be lifted by crane, 4 hooks of the tank wall should all bear the weight at the same time. The 4 hooks can bear the gross weight of the transformer. The angle included between the hawser and vertical line should be less than  $15^{\circ}$ .

## **6. Acceptance and store**

When customer receives the transformer, they should firstly verify the name plate to distinguish whether the model and specifications conform to the requirement of the order or not, then check that whether the attached articles and documents are complete or not, according to the ex-factory data sheet, finally inspect the following items:

- 6.1 Does any oil leakage exist?
- 6.2 Do the product and the attached parts be damaged?
- 6.3 During the transformer are stored, the oil level of transformer should always be kept above the tank cover, and the stored transformer should be inspected regularly.

## **7. Installation and maintenance**

- 7.1 Disassembly the plate cover between the Dehydrating Breather and the tube connector according to the drawing. The cover board in the breather connecting tube is only used for seal the tube during transportation. Disassembly the cover when assembly the breather and be carefully the sealed ring should be in good position.
- 7.2 After the transformer is transported in its service position the job test should be carry out before transformer electrifying. Before testing pay attention to the followings:
  - 7.2.1 Open the gland of pressure release valve. ( for large than the 315kVA)
  - 7.2.2 Make the bushings to be full of oil.
- 7.3 Check the oil level in the tank conservator oil gauge, when the oil lower than the minimum level, open the plug in the top of conservator and pour the qualified oil in to normal level and then close the plug.
- 7.4 For the transformer without tank conservator there is oil gauge in top cover of the tank, when the color of oil level gauge shows green, it indicates the oil level in normal condition; when it shows half green & half red, it indicates that the operation of transformer is in normal condition; when it shows red, it indicates that the oil level is lower than regular condition. Then open the plug of oil level gauge, pour the qualified oil into it until normal level.
- 7.5 Before replenishing the insulation oil, pay attention to the model of the added oil, it should be better to use the same type oil.
- 7.6 Take the sample of transformer oil and then make test

## **8. Job test and service alive.**

- 8.1 After installation finished, the following test should be carried out before

putting into operation:

8.1.1 Measure the insulation resistance.

8.1.2 Measure the D.C resistance.

8.1.3 Power frequency test withstander voltage.

The value of voltage should be 85 % of the voltage in ex-factory test (refer to the ex-factory test report for 11kV test voltage is 30kV).

The duration of the test should be 1 minute. Please clean by dry fabric the HV bushing before take the test.

8.1.4 If the transformer oil is newly poured, above-mentioned test should be carried out after 10 hours of the pour.

8.2 When the test has been passed, following checks should be made:

8.2.1 Check around the transformer to find whether there is anything irrelevant or not.

8.2.2 The earth connecting should be in good state

8.2.3 The safety device of the pressure relief valve should be opened.

8.3 Energize the transformer in no load condition.

8.4 If the result of energized test is good, then add load and put into operation.

8.5 The level indication of oil level gauge should be inspected regularly during operation.

**MALCOTransformers.**

**Table 1—Performance data**

Type	Rated capacity (kVA)	Rated voltage			Vector Group	No-load loss (w)	Load loss (w)	No-load current (%)	Impedance voltage (%)	Noise (dB)
		H.V (kV)	Tapping range	L.V (kV)						
S-M-30/10	30	11	+/-5%	0.415	Y,yn0	150	660	2.1	4.5	44
S-M-50/10	50		or		or	190	960	2.0		
S-M-63/10	63		+/-2x2.5%		D,yn11	220	1140	1.9		
S-M-80/10	80					260	1360	1.8		
S-M-100/10	100		320		1650	1.6	48			
S-M-125/10	125		370		2000	1.5				
S-M-160/10	160		440		2400	1.4				
S-M-200/10	200		520		2800	1.3	49			
S-M-250/10	250		610		3350	1.2				
S-M-315/10	315		730		3950	1.1				
S-M-400/10	400		880		4600	1.0	51			
S-M-500/10	500		1100		5650	1.0				
										53
										55

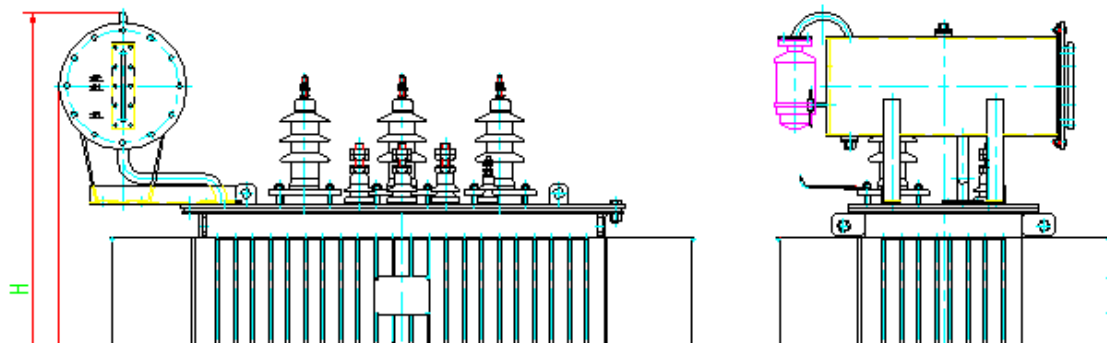
**MALCOTransformers.**

S-M-630/10	630					1300	6800	0.9	5	57
S-M-800/10	800					1550	8200	0.8		
S-M-1000/10	1000					1900	11300	0.7		
S-M-1250/10	1250					2100	13000	0.6	5	59
S-M-1600/10	1600					2600	15500	0.6		
S-M-2000/10	2000					2760	19920	0.6		

The tolerance of the No-load loss and load loss permitted is 15% of aforesaid.

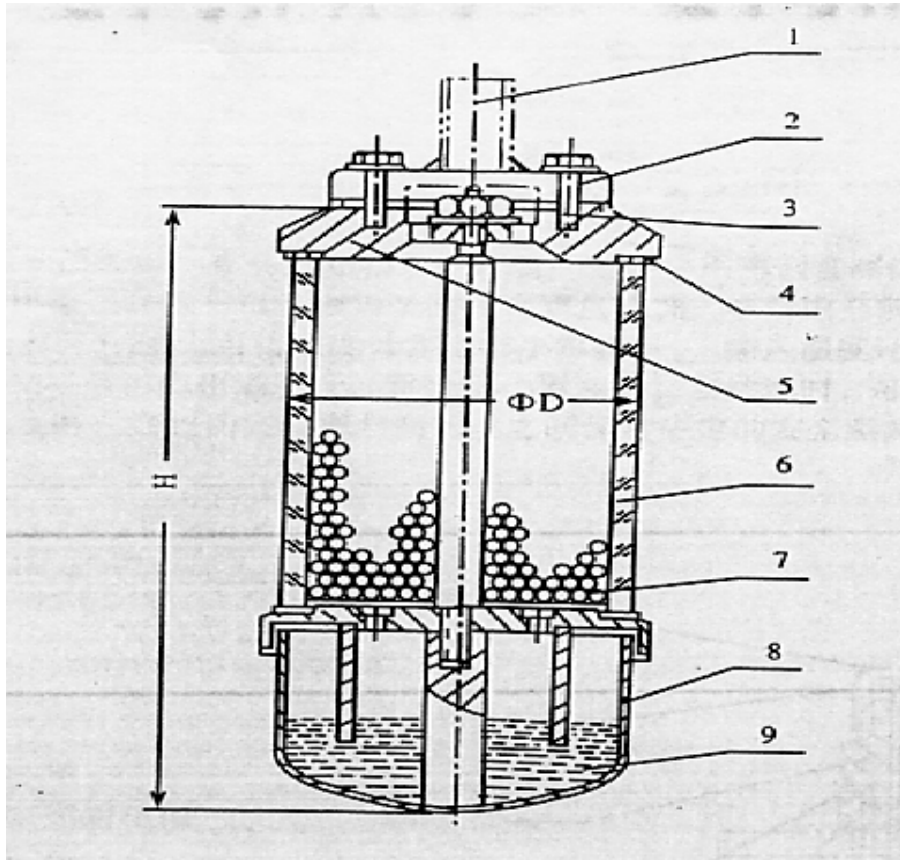
table 2——the outline dimensions

Product model	outline dimensions			Installation dimensions				weight	
	L	W	H	A	B	C1	C2	oil	total
	mm	mm	mm	mm	mm	mm	mm	liter	Kg
<b>S-M-100/11</b>	1095	770	1255	400	450			130	555
<b>S-M-200/11</b>	1405	730	1390	550	550			190	875
<b>S-M-300/11</b>	1415	760	1400	550	650			240	1210
<b>S-M-400/11</b>	1550	840	1510	660	750			260	1460
<b>S-M-500/11</b>	1620	880	1550	660	750			290	1580



Outline drawings

Attached enclosure: Structure of Dehydrating Breather



1. Flag of conservator. 2. Connecting bolts 3. Nut. 4. Sealing ring. 5 Flag  
6. Glass tube. 7. Silicon bolus. 8. Bottom cover. 9. Transformer oil

Note:

There is a plate cover between flag of conservator and the Dehydrating Breather during transportation to avoiding oil leakage. According to the item 7.1 disconnecting the plate cover and filling the bottom cover 9 with transformer oil from the conservator.