

TEST REPORT

Padmount Transformer

3 Phase 1000kVA 13800x4800D - 480y V

P.O. No. : DS21-211

Jul. 2023

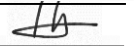


Tested by : Kang, Min-Jae



date : 2023-07-19

Checked by : Ha, Jae-gyeong



date : 2023-07-19

Approved by : Kim, Seung-Hwan



date : 2023-07-19

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1. Rating

1. Phase	:	3 Ø	2. Capacity	:	1,000 kVA
3. Rated frequency	:	60 Hz	4. Vector Group	:	Dyn1
5. Cooling method	:	ONAN	6. Core type	:	Wound
7. Rated voltage	(High voltage / Low voltage)	:	13800 x 4800 / 480	V	
8. Rated current	(High voltage / Low voltage)	:	41.8 x 120.3 / 1202.8	A	
9. Insulation level	(High voltage / Low voltage)	:	95 / 30	kV(BIL)	
10. Oil volume	:	440 GAL	11. Total weight	:	11795 lbs
12. Serial No.	:	OP1000-2323			
13. Date of manufacture	:	Jul. 2023			
14. Standard	:	IEEE C57.12.00			

2. Measurement of voltage ratio

DUAL Switch POS. 2

Tolerance : ± 0.5%

Tap Voltage				Rated ratio	Measured value						Results
HV		LV			H1 phase		H2 phase		H3 phase		
No.	Voltage	No.	Voltage		Ratio	Error(%)	Ratio	Error(%)	Ratio	Error(%)	
A	14400	-	480	51.962	51.890	-0.14	51.885	-0.15	51.890	-0.14	<i>Good</i>
B	13800	-	480	49.796	49.744	-0.11	49.740	-0.11	49.742	-0.11	
C	13200	-	480	47.631	47.600	-0.07	47.598	-0.07	47.600	-0.07	
D	12470	-	480	44.997	45.028	0.07	45.026	0.06	45.028	0.07	
E	12000	-	480	43.301	43.312	0.02	43.310	0.02	43.312	0.02	

DUAL Switch POS. 1

Tap Voltage				Rated ratio	Measured value						Results
HV		LV			H1 phase		H2 phase		H3 phase		
No.	Voltage	No.	Voltage		Ratio	Error(%)	Ratio	Error(%)	Ratio	Error(%)	
-	4800	-	480	17.321	17.294	-0.15	17.292	-0.16	17.293	-0.16	<i>Good</i>

3. Check of phase relationship

Dyn1

Good

4. Measurement of winding resistance

DUAL Switch POS. 2

Ambient temperature : 29 °C

Tap No.	Tap Voltage	Measured value(Ω)					
		H1-H2		H2-H3		H3-H1	
		at 29°C	at 55°C	at 29°C	at 55°C	at 29°C	at 55°C
A	14400	0.789550	0.870370	0.790900	0.871858	0.787200	0.867780
B	13800	0.757650	0.835205	0.758850	0.836528	0.755450	0.832780
C	13200	0.723950	0.798055	0.725200	0.799433	0.721850	0.795740
D	12470	0.687150	0.757488	0.688350	0.758811	0.685150	0.755283
E	12000	0.659500	0.727008	0.660800	0.728441	0.657500	0.724803

DUAL Switch POS. 1

Ambient temperature : 29 °C

Tap No.	Tap Voltage	Measured value(Ω)					
		H1-H2		H2-H3		H3-H1	
		at 29°C	at 55°C	at 29°C	at 55°C	at 29°C	at 55°C
-	4800	0.088175	0.097201	0.088410	0.097460	0.088015	0.097024

Tap No.	Tap Voltage	Measured value(Ω)					
		x1-x2		x2-x3		x3-x1	
		at 29°C	at 55°C	at 29°C	at 55°C	at 29°C	at 55°C
-	480	0.00064165	0.00070733	0.00063375	0.00069862	0.00064740	0.00071367

5. Insulation Resistance Measurement

- 1) Winding insulation resistance measurement - 2500V, 1000G Ω Meter.

HV Winding to LV Winding	:	29600 M Ω
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HV Winding to Earth	:	16200 M Ω
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LV Winding to Earth	:	15200 M Ω
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- 2) Core & Clamp insulation resistance measurement - 1000V, 1G Ω Meter.

Core- Earth	:	>1000 M Ω
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Clamp- Earth	:	>1000 M Ω
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Core- Clamp	:	>1000 M Ω
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6. Measurement of no-load loss and current

Test frequency 60 Hz, Ambient temperature : 29 °C

LV side connection at rated voltage 480 V, Tap No: C

Items	Guaranteed value	Measurement value	Results
No-load loss (W)	-	1404	Good
No-load current (%)	-	0.27	

7. Load losses and impedance voltage

Reference temperature : 55 °C at. 13800-480V

Items	Tap No.	Voltage	Guaranteed	Measurement	Results
Load loss (W)	A	14,400	-	4775	<i>Good</i>
	B	13,800	-	4892	
	E	12,000	-	5554	

Reference temperature : 85 °C

Items	Tap No.	Voltage	Guaranteed	Measurement	Results
% Impedance (%)	A	14,400	-	5.71	<i>Good</i>
	B	13,800	5.75±7.5%	5.75	
	E	12,000	-	6.06	

Reference temperature : 55 °C at. 4800-480V

Items	Tap No.	Voltage	Guaranteed	Measurement	Results
Load loss (W)	C	4,800	-	4584	<i>Good</i>

Reference temperature : 85 °C

Items	Tap No.	Voltage	Guaranteed	Measurement	Results
% Impedance (%)	C	4,800	-	5.19	<i>Good</i>

8. Efficiency & Voltage regulation

Reference temperature : 55 °C at. 13800-480V

Items	Guaranteed value	Measurement value	Results
Efficiency (at 100% load)	-	99.37 %	<i>Good</i>
Efficiency (at 50% load)	99.43 %	99.48 %	
Voltage regulation at power factor 1.0	-	0.68 %	

Reference temperature : 55 °C at. 4800-480V

Items	Guaranteed value	Measurement value	Results
Efficiency (at 100% load)	-	99.40 %	<i>Good</i>
Efficiency (at 50% load)	-	99.49 %	
Voltage regulation at power factor 1.0	-	0.62 %	

9. Temperature rise test

(Type test)

Items	Guaranteed value	Measurement value	Results
Insulation oil	65 °C	57.9 °C	<i>Good</i>
H.V. windings	65 °C	59.6 °C	
L.V. windings	65 °C	58.8 °C	

10. Applied voltage test

Items	Test voltage(kV)	Duration(sec.)	Results
HV side	34	60	<i>Withstood</i>
LV side	10	60	

11. Induced voltage test

Supply	Test voltage(kV)	Duration(sec.)	Frequency(Hz)	Results
LV	0.96	40	180	<i>Withstood</i>

12. Lightning impulse test

	Test voltage(kV)	Test sequence	Results
HV Line	95	FW-FW	<i>Withstood</i>
HV Neutral	-	-	
LV Line	-	-	
LV Neutral	-	-	

13. Insulation power factor test

Reference temperature : 20 °C

Items	Test voltage (kV)	Measurement value	Results
H-G	10	0.33	<i>Good</i>
H-L	10	0.22	
L-G	3	0.40	

14. Oil leakage test

Test result : Passed

One transformer tank with other fittings and radiator were over pressured to normal pressure plus 0.50 kgf/cm² for 12 hours.

After this test, the completed transformer with accessories proved no leaks.

#96



HC Transformer & Switchgear

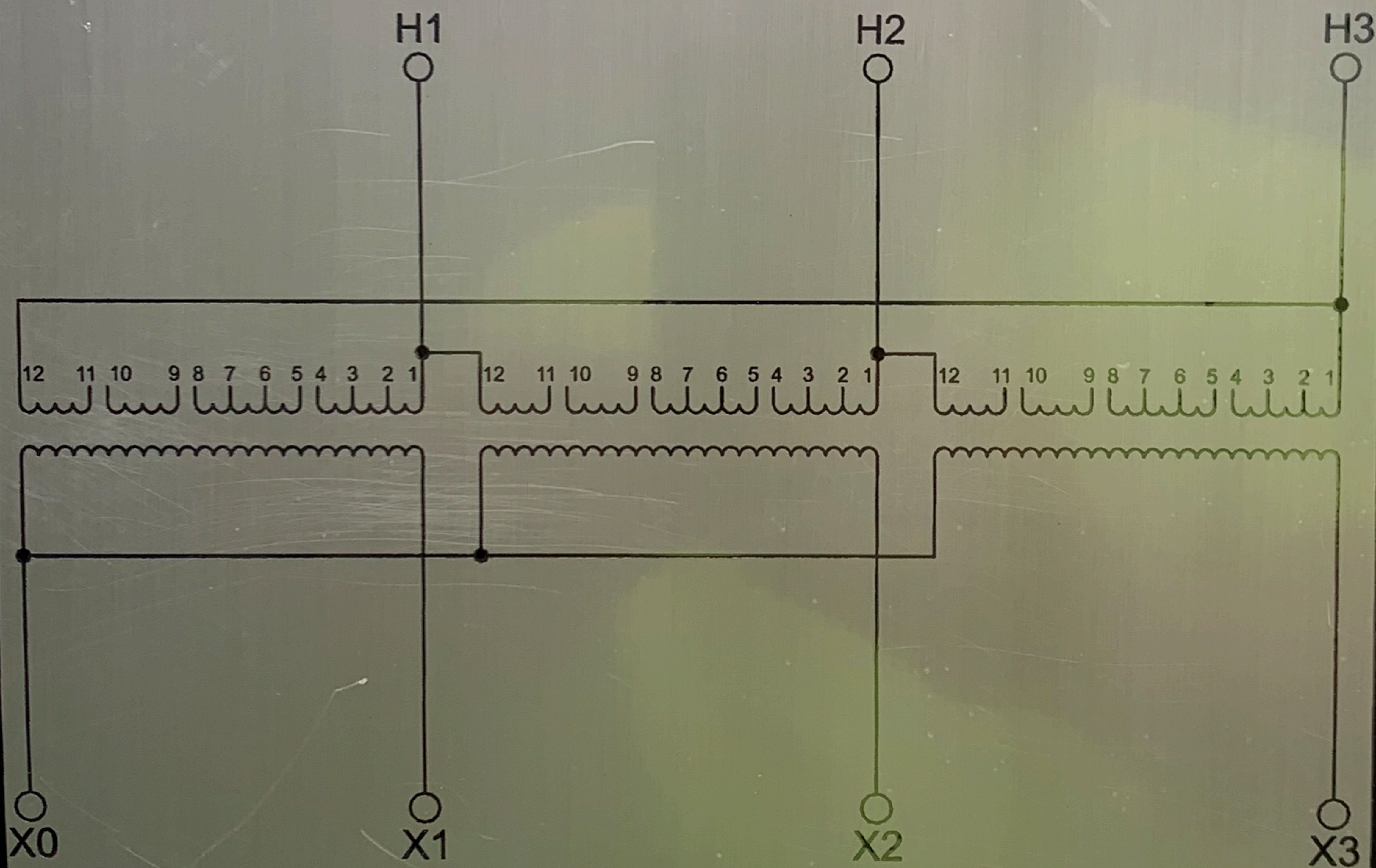
WINDING PADMOUNTED TRANSFORMER
 13800 x 4800 DELTA VOLTS 65°C AVG. RISE 1000 kVA ONAN
 480 Y/277 VOLTS

THREE PHASE 60 HERTZ SERIAL NO. OP1000-2323

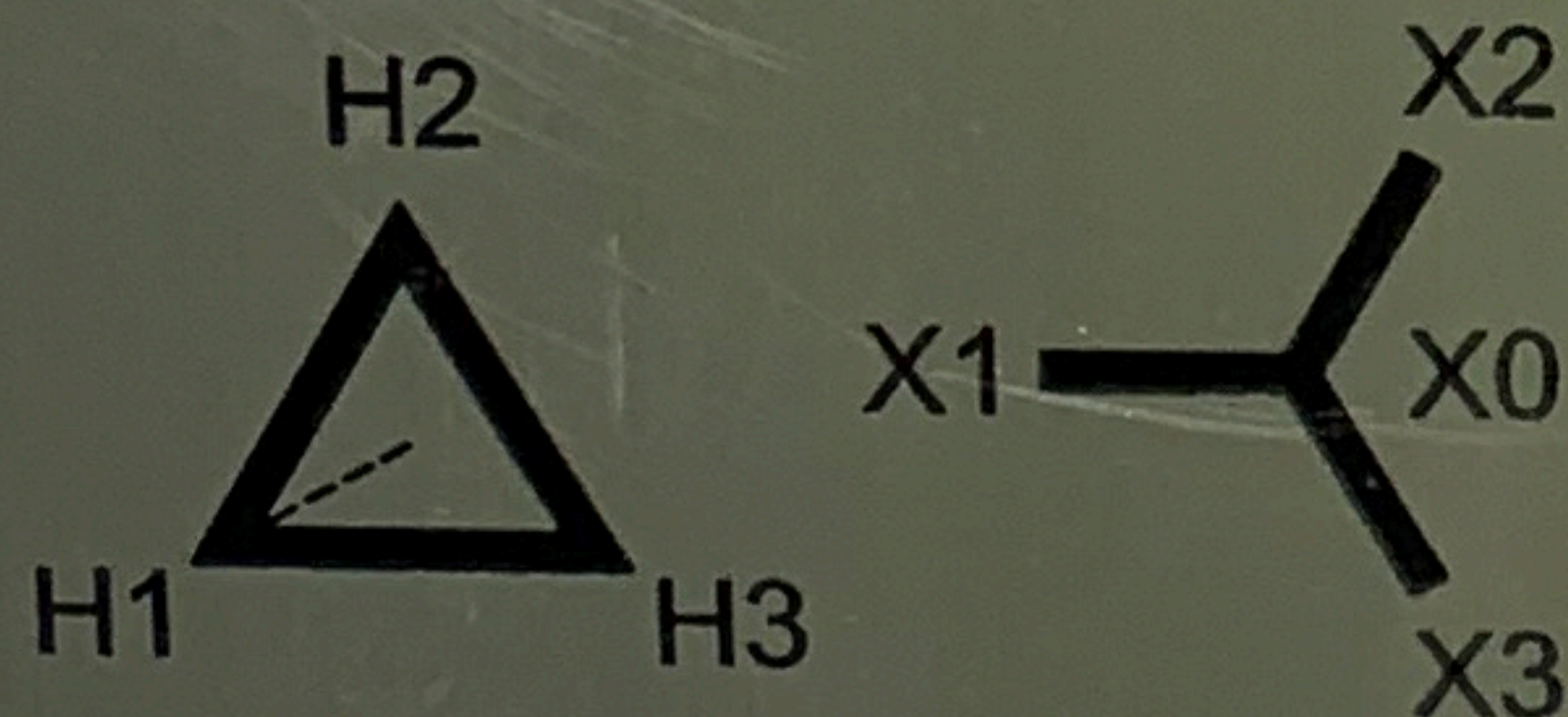
OIL IMMERSSED TRANSFORMER MFG. DATE 07.2023

IMPEDANCE 3.75 % AT 1000 KVA
 FULL WAVE IMPULSE TEST LEVEL : HV 95 kV, LV 30 kV
 APPROXIMATE WEIGHT IN LBS :
 CORE AND COIL 5,600 TANK AND FITTINGS 3,005 OIL 3,190 TOTAL 11,795
 GALLONS OF INSULATION OIL :
 TANK 425 RADIATOR 15 TOTAL 440

DO NOT ATTEMPT TO HANDLE, INSTALL, USE OR SERVICE THIS TRANSFORMER BEFORE READING INSTRUCTION BOOK. TO DO SO MAY LEAD TO BODILY INJURY OR PROPERTY DAMAGE OR BOTH



PHASOR DIAGAM :



WINDING	VOLTS	AMPS AT 1000kVA	TAP CHANGER		DUAL SWITCH	
			POS.	CONNECT	POS.	CONNECT
HV1 DELTA	14400	40.1	A	4 - 5	2	8 - 9 10 - 11
	13800	41.8	B	5 - 3		
	13200	43.7	C	3 - 6		
	12470	46.3	D	6 - 2		
	12000	48.1	E	2 - 7		
HV2 DELTA	4800	120.3	A	4 - 5	1	1 - 9 - 11 8 - 10 - 12
LV WYE	480	1202.8				

* NOTE
 .1TAP CHANGER ON 13800V ONLY

TRANSFORMER IS ONAN
 CONDUCTOR MATERIAL - HV WINDING AL, LV WINDING AL
 TRANSFORMER WILL BE FILLED WITH TYPE II MINERAL OIL CONTAINING LESS THAN 2 PPM PCB
 UNTANKING WEIGHT (HEAVIEST PIECE) 5,445 LBS
 THE 25 °C LIQUID LEVEL IS 10 INCHES BELOW TOP OF HIGHEST MANHOLE FLANGE
 LIQUID LEVEL CHANGES 0.4 INCHES FOR EACH 10 °C CHANGE IN AVERAGE LIQUID TEMPERATURE
 THIS TRANSFORMER TANK IS DESIGNED
 TO WITHSTAND COMPLETE VACUUM AND AN INTERNAL PRESSURE OF 7 PSI
 THE TRANSFORMER MUST NOT BE ENERGIZED FROM ANY VOLTAGE SOURCE
 WHEN DE-ENERGIZED TAP CHANGERS ARE OPERATED
 THE TRANSFORMER IS DESIGNED
 FOR OPERATION BETWEEN PRESSURE LIMITS OF 10 PSI POSITIVE AND 8 PSI NEGATIVE
 THE LV WINDING NEUTRAL MUST BE PERMANENTLY GROUNDED
 EITHER DIRECTLY OR THROUGH A LOW IMPEDANCE



2016DOE COMPLIANT
 MANUFACTURED BY IEN HANCHANG, SOUTH KOREA

UNIT 96



UNIT 96

DFSU6873736
OP1000-2323



DUAL VOLTAGE SWITCH

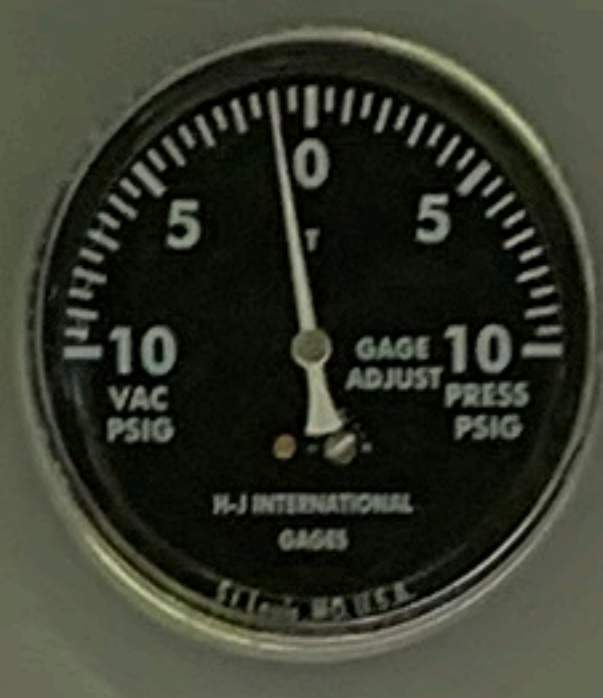
TAP CHANGER

H1

H2

H3

⏚



X0

X1

X2

X3

A horizontal row of four electrical terminals, each with a metal housing and a brass-colored terminal post. The terminals are labeled X0, X1, X2, and X3 from left to right. A braided metal shielded cable is connected to the X0 terminal.

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