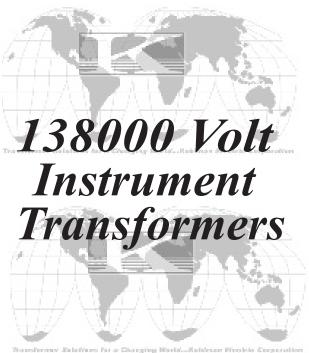


# Kuhlman Electric Corporation









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## **UTE-145-OH Voltage Transformer**

Outdoor 138kV, 650kV BIL, Single & Dual Ratios (w/ Tertiary)
Oil-Filled, Wound Type, Metering/Relaying

138000 Volt
March 2008

#### application

The UTE-145-OH outdoor voltage transformer is rated for use on 138,000 volt systems with 650kV BIL. Primary line to ground connected voltage ratios are available from 700:1 to 1200:1 for use on 138,000 volt systems, at 60 Hertz (Hz). This oil-filled voltage transformer will operate with high accuracy for metering or relay applications.

#### mechanical description

The tank is steel plate, pressure and vacuum tight and hermetically sealed at the factory to prevent breathing and oil contamination. The dome is corrosion resistant aluminum and contains stainless steel expansion bellows to allow for the expansion/contraction of oil for temperature and load fluctuations. The bellows maintain constant pressure on the oil under various ambient and load conditions to allow for horizontal shipment. Base/Tank components are shot-blasted, washed and coated with a heavy galvanized finish, effectively making the unit paint-free. The primary bushing is ANSI 70 Gray, high strength porcelain with a high degree of stability for transportation and seismic withstand. The primary terminal is a tin-plated copper alloy NEMA4-hole pad. The secondary terminals are M8 hex head bolts with associated hardware located inside a hinged cover, terminal box with three (3) 1 1/2" NPT conduit hubs. The ground terminal is an integral NEMA 2-hole configuration on the VT base. The unit is fitted with a 5kV H<sub>2</sub> terminal, oil level indicator, and oil sampling valve.

#### accuracy performance

The UTE-145-OH will operate with 0.3 Class accuracy for metering applications with burdens of 0, W, X, M, Y, Z and ZZ. Upon request, 0.15 Class metering accuracy is available with burdens of 0, W, X, M, Y and Z. The transformer is accurate from 90% to 110% of rated primary voltage.

#### mounting

The UTE is designed for mounting on substations structures in an upright position with four mounting holes in the base.



#### testino

The unit is individually tested per the IEEE C57.13 standard, including applied and induced voltage, accuracy and polarity. Additional tests include dissipation and partial discharge tests. Partial discharge testing is performed to guarantee the unit is free of partial discharge through 135% of the nominal system voltage.

#### options

The UTE is available with dual system voltage ratings, an additional secondary winding (3 total), Extra Creep Bushing, Polymer Bushing, Stainless Steel Tank, and/or -50°C oil. Contact factory for other needs.

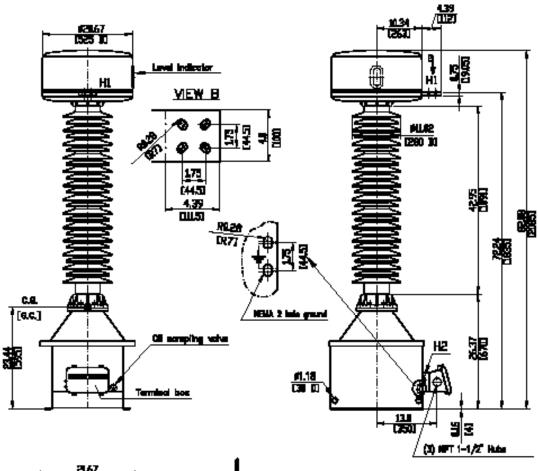
ORDERING IN	FO FOR U	<b>HIGH ACCUF</b>	RACY UTE-145-OH			
Ratio	Primary	Secondary	Catalog Number	Accuracy/ Burden	Catalog Number	Accuracy/ Burden
700/1200:1:1	80500	115/67.08 & 115/67.08	L741200T0	0.3 0,W,X,M,Y,Z,ZZ		0.15 0,W,X,M,Y,Z
700/1200:1 & 700:1:1	80500	115/67.08 & 115 & 115	L741200T0-812	0.3 0,W,X,M,Y,Z,ZZ	Contact	0.15 0,W,X,M,Y,Z
350/600:1 & 700/1200:1	40250 80500	115/67.08 or 115/67.08	TBD	0.3 0,W,X,M,Y 0.3 0,W,X,M,Y,Z,ZZ	factory	0.15 0 to X, 0.3 Y 0.15 0 to Z, 0.3 ZZ

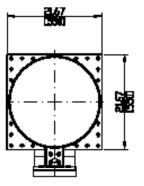
- Thermal Burden Rating (Typical): 5000VA. For 7500VA rated VT, contact factory.
- Overvoltage Ratings: 1.1x cont., 1.9x 8 hours.
- IC Approval AE-0503 noted by bold catalog number.



## **UTE-145-OH Voltage Transformer**





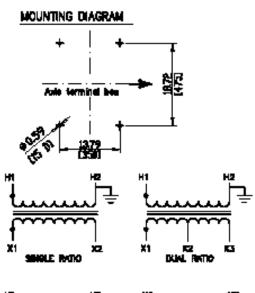


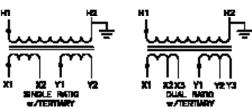
## NOTES

- 1, THREE VEATHERPROOF BLANKING PLUGS ARE FURNISHED IN TERMINAL BOX.
- SECONDARY TERMINALS ARE M8 HEX HEAD BOLTS WITH ASSOCIATED HARDWARE.
- 3. GROUND PAD HARDVARE IS SUPPLIED ONLY VHEN GROUND CONNECTORS ARE REQUESTED AND SUPPLIED WITH THE UNIT.

## **SPECIFICATIONS**

- 1. APPROX. NET VEIGHT 661 LBS. (300 kg)
- 2. APPROX. DIL 20 GAL. (75 L)
- 3. CREEPAGE 144" (3660mm)
- 4. STRIKE 42.91" (1090mm)







## **DDB-145 Capacitive VT**

Outdoor 138kV, 650kV BIL, Single & Dual Ratios (w/ Tertiary)
Oil-Filled, Wound Type, Metering/Relaying

138000 Volt
March 2008

## application

The DDB-145 outdoor coupling capacitive voltage transformer is rated for use on 138,000 volt systems with 650kV BIL. Primary line to ground connected voltage ratios are available from 700:1 to 1200:1 for use on 138,000 volt systems, at 60 Hertz (Hz). This oil-filled coupling capacitive voltage transformer will operate with high accuracy for metering, monitoring, carrier communication, or relay applications.

## mechanical description

The transformer contains mechanically stabilized capacitor layers, a multi-tap inductive voltage transformer, and a reactor for calibration of the voltage output built into a fully insulated, oil-filled base assembly. The tank is steel plate, pressure and vacuum tight and hermetically sealed at the factory to prevent breathing and oil contamination. The dome is aluminum and contains stainless steel expansion bellows to allow for the expansion/contraction of oil for temperature and load fluctuations. The bellows maintain constant pressure on the oil under various ambient and load conditions to allow for horizontal shipment. Tank components are shot-blasted, washed and coated with a heavy galvanized finish, effectively making the unit paint-free. The primary bushing is ANSI 70 Gray, high strength porcelain with a high degree of stability for transportation and seismic withstand. The primary terminal is a tin-plated copper alloy stud supplied with a NEMA 4-hole pad connector. The secondary terminals are M8 hex head bolts with associated hardware located inside a removable cover, terminal box with a 1 ½" conduit opening in the bottom plate. The ground terminal is an integral NEMA 2-hole configuration on the base. The unit is fitted with a reconnectable ground terminal, for direct tank ground connection or for use with carrier accessories for high frequency injection, a voltage tap ground switch, oil level indicator, and oil sampling valve.

## accuracy performance

The DDB-145 will operate with 0.3 Class accuracy for metering applications with burdens of 0, W, X, M, Y, Z and up to ZZ and 0.6 Class accuracy for relaying applications with burdens of 0, W, X, M, Y, Z and up to ZZ. Upon request, 0.15 Class metering accuracy is available and burden capability up to Z on each secondary winding. The transformer is accurate from 90% to 110% of rated primary voltage.



#### mounting

The DDB is designed for mounting on substations structures in an upright position with four mounting holes in the base.

#### testing

The unit is individually tested per the ANSI C93.1 standard, including applied and induced voltage, accuracy and polarity. Additional tests include dissipation and partial discharge tests. Partial discharge testing is performed to guarantee the unit is free of partial discharge through 135% of the nominal system voltage.

## options

The DDB is available with an additional secondary winding (3 total), Extra Creep Bushing, Polymer Bushing, Stainless Steel Tank, Carrier Accessories (Drain Coil, Carrier Ground Switch, Spark Gap), and/or -50°C oil. Line traps also available. Contact factory for other needs.

ORDERING INFO FOR DDB-145						
Capacitance	Rat	io - 700/1200:1:1	Catalog	Accuracy/		
(pF) Primary		Secondary	Number	Burden		
2900	2900 80500 115/67.08 & 115/67.08		L76029P1200N	1.2 0,W,X,M,Y,Z		
2900	80500	115/67.08 & 115/67.08	L76029R1200N	0.6 0,W,X,M,Y,Z		
2900	80500	115/67.08 & 115/67.08	L76029M1200N	0.3 0,W,X,M,Y,Z		
7000	80500	115/67.08 & 115/67.08	L76070R1200N	0.6 0,W,X,M,Y,Z		
7000	80500	115/67.08 & 115/67.08	L76070M1200N	0.3 0,W,X,M,Y,Z		
7500	80500	115/67.08 & 115/67.08	L76075R1200N	0.6 0,W,X,M,Y,Z		
7500	80500	115/67.08 & 115/67.08	L76075M1200N	0.3 0,W,X,M,Y,Z		
17700	80500	115/67.08 & 115/67.08	L76177M1200N	0.3 0,W,X,M,Y,Z		
17700	80500	115/67.08 & 115/67.08	L76177Z1200N	0.3 0,W,X,M,Y,Z,ZZ		

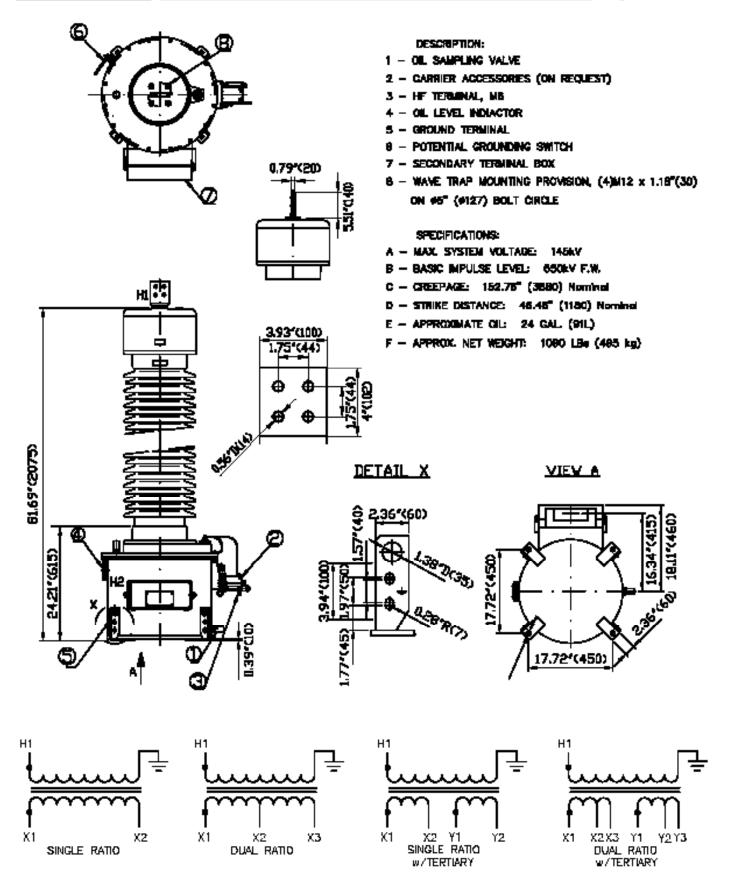
<b>HIGH ACCUI</b>	RACY DDB-145
Catalog Number	Accuracy/ Burden
Contact factory for cataloging information	 0.15 0,W,X,M,Y  0.15 0,W,X,M,Y  0.15 0,W,X,M,Y 0.15 0,W,X,M,Y

- Thermal burden rating (Typical): 1000VA (1500VA for 0.3 ZZ rated units).
- Overvoltage Ratings: 1.1x cont., 1.4x 1 min.
- Units available with carrier accessories. Change last letter of catalog number from N to C.



## **DDB-145 Capacitive VT**









## COF(CXM)-650 Current Transformer

Outdoor 138kV, 650kV BIL, Single, Dual & Multi Ratios Oil-Filled, Wound Type, Metering/Relaying 138000 Volt
March 2008

## application

The COF(CXM)-650 outdoor current transformer is rated for use on 138,000 volt systems with 650kV BIL. Primary current ratios are available from 5:5 to 3000:5 at 60 Hertz (Hz) with a Rating Factor of up to 4.0 (3200A max). This oil-filled current transformer will operate with high accuracy for metering or relay applications.

## mechanical description

The tank dome is fabricated from carbon or stainless steel, depending on current rating. The units are pressure and vacuum tight and hermetically sealed at the factory to prevent breathing and oil contamination. Tank components are washed and coated with anticorrosive iron phosphate and then finished with ANSI 70 Gray baked-on electrostatic polyester powder. The bushing is ANSI 70 Gray, high strength porcelain with a high degree of stability for transportation and seismic withstand. The primary terminals are tin plated aluminum, NEMA 4-hole pads (copper for units rated ≥2000A). A bypass protector is provided for all units rated below 1200:5 to protect from transients. The secondary terminals are #10 slotted screws on a short circuiting terminal block located behind a removable cover in the CT base with three (3) 1 1/2" NPT conduit hubs. The ground terminal is a stainless steel NEMA 2-hole pad. The unit is fitted with a pressure relief valve, oil level gauge, and 1/2" drain valve.

### accuracy performance

The COF-650 will operate with 0.3 Class accuracy for metering applications with burdens of B0.1 to B1.8. The unit can be designed with relay accuracy up to C800. The transformer is accurate through its Rating Factor, and can be used continuously to this level. The CXM-650 will operate with 0.15 Class high accuracy for metering applications with burdens of B0.1 to B1.8. The transformer maintains 0.15 Class accuracy from 0.5% of I<sub>nom</sub> through its Rating Factor, and can be used continuously to this level.



#### mounting

The COF(CXM) is designed for mounting on substations structures in an upright position with four mounting holes in the base.

#### testing

The unit is individually tested per the IEEE C57.13 standard, including applied and induced voltage, accuracy and polarity. Additional tests include dissipation and partial discharge tests. Partial discharge testing is performed to guarantee the unit is free of partial discharge through 135% of the nominal system voltage.

### options

The COF(CXM) is available with an Extra Creep Bushing, Polymer Bushing, Stainless Steel Tank, 4kV spark gap and/or -50°C oil. The unit can be offered in single, dual or multiple core designs. Contact factory for other needs.

ORDERING INFO FOR COF-650					HIGH ACCURACY CXM-650			
Ratio	Catalog Number	Accuracy/ Burden	Rating Factor		Catalog Number	0.15 B1.8 Acc Range	Rating Factor	
5:5	L950005SA	0.3 B1.8	1.5		L890005SA	0.025 to 20A	4.0	
10:5	L950010SA	0.3 B1.8	1.5		L890010SA	0.05 to 40A	4.0	
:	:	:	:		:	:	:	
150:5	L950150SA	0.3 B1.8	1.5		L890150SA	0.75 to 600A	4.0	
200:5	L950200SA	0.3 B1.8	1.5		L890200SA	1 to 800A	4.0	
:	:	:	:		:	:	:	
3000:5	L953000SA	0.3 B1.8	1.0		L893000SA	15 to 3200A	1.07	
5/10:5	L950010DA	0.3 B1.8/B1.8	2.0/1.5					
10/20:5	L950020DA	0.3 B1.8/B1.8	2.0/1.5					
:	i :	:	:					
100/200:5	L950200DA	0.3 B1.8/B1.8	2.0/1.5					
150/300:5	L950300DA	0.3 B1.8/B1.8	2.0/1.5					
:	i :	:						
1000/2000:5	L952000DA	0.3 B1.8/B1.8	2.0/1.5					
1500/3000:5	L953000DA	0.3 B1.8/B1.8	2.0/1.0					

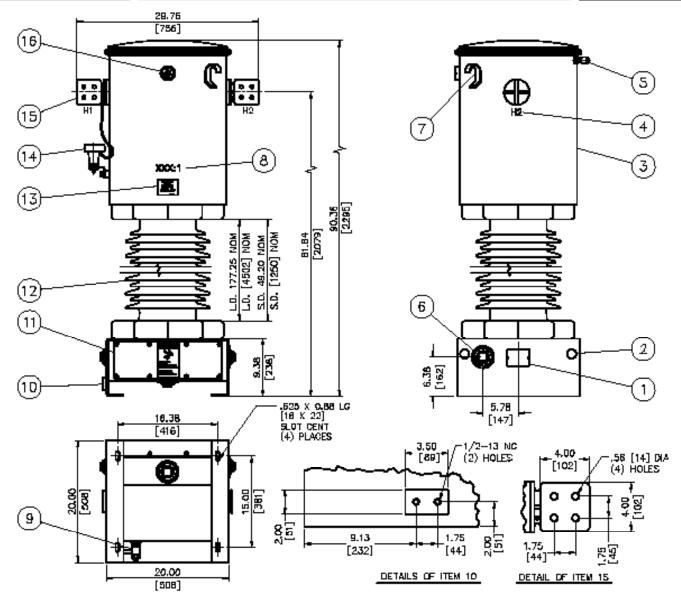
<sup>-</sup> Available in multi-ratio designs (full tap ratings same as single ratio above).

<sup>- 1</sup> Second Thermal/Mechanical Rating: Single Ratio (150x Inom), Dual Ratio (75x full winding Inom), 144kA max.



## COF(CXM)-650 Current Transformer





16	OIL LEVEL CAUGE	1
15	TIN PLATED PRIMARY TERMINAL	2
14	BYPASS PROTECTOR	1
13	NON-PCB DECAL	1
12	PORCELAIN BUSHING, LIGHT CRAY GLAZE	1
11	SEC. TERM, COMPARTNENT WITH HV WARNING DECAL	1
10	NEMA STD. GROUND PAD	1
8	1/2" DRAIN VALVE	1
8	RATIO IDENTIFICATION STENCIL	1
7	TANK LIFTING EAR	2
6	1-1/2" NPT CONDUIT HUBS	В
5	PRESSURE RELIEF VALVE	1
4	POLARITY MARKER STENCIL	2
3	18.0° DIA TANK	1
2	1.5 DIA LIFTING HOLES	4
1	BAR-CODED NAMEPLATE	1
ITEM	DESCRIPTION	ďΥ

#### NOTE

 SECONDARY TERMINALS TERMINATE TO A SHORT CIRCUITING TERMINAL BLOCK PENN UNION TYPE: 6000 SCS.

### SPECIFICATIONS:

- 1. BUSHING LEAKAGE DISTANCE——177.25" [4502 mm] NOM 171.28" [4350 mm] MIN 2. BUSHING STRIKE DISTANCE——49.20" [1250 mm] NOM 47.84" [1215 mm] MIN
- 3. TOTAL WEIGHT ----1100 LBS. [498 KG] APPROX.
- 4. OIL VOLUME ------- 42 GAL. [159 LT] APPROX.

NOTE: OUTLINES ARE FOR REFERENCE ONLY. CONTACT FACTORY FOR ACTUAL DESIGN DRAWINGS.





## SSVT-650 Station Service VT

Outdoor 138kV, 650kV BIL, Power Winding, Single & Dual Ratios (w/ Tertiary)
Oil-Filled, Wound Type, Control Power/Metering/Relaying

138000 Volt
March 2008

## application

The SSVT-650 outdoor station service voltage transformer is rated for use on 138,000 volt systems with 650kV BIL. The unit is a station service voltage transformer with power and can be supplied with metering rated secondary winding(s). It provides a convenient and cost effective means of serving small power and/or metering requirements directly from a transmission line. Standard 125/250V nominal power winding designs are available with thermal ratings of 25, 50, 100 kVA and higher. Primary voltage measurement ratios are available from 700:1 to 1200:1 for use on 138,000 volt systems, at 60 Hertz (Hz). This oil-filled station service voltage transformer will provide control power and can provide high accuracy for metering or relay applications.

## mechanical description

The tank and expansion chambers are steel plate, pressure and vacuum tight and hermetically sealed at the factory to prevent breathing and oil contamination. Expansion chambers allow for the expansion/contraction of oil for temperature and load fluctuations. Tank components are washed and coated with anticorrosive iron phosphate and then finished with ANSI 70 Gray bakedon electrostatic polyester powder. The primary bushing is ANSI 70 Gray, high strength porcelain with a high degree of stability for transportation and seismic withstand. The primary terminal is a stainless steel, NEMA 4-hole pad. The secondary station service power terminals are 1"-14 externally mounted studs housed in an ANSI 4X low voltage terminal box separate from metering with a removable plate and 6" x 20" opening in the bottom for conduit entry. They are offered with high conductivity, tin plated aluminum, 2-hole set screw connectors suitable for 1/0 to 750MCM conductors terminals. The neutral, tank ground connector accepts 1/0 to 750 MCM conductors. The secondary metering terminals are 1/2"-20 copper studs with associated hardware located inside a removable terminal box with three (3) 1 1/2" NPT conduit hubs. The ground terminal is a stainless steel NEMA 2-hole pad. The unit is fitted with a 5kV H<sub>o</sub> Bushing, pressure relief valve, oil level gauge, 3/4" oil fill plug, and 3/4" drain valve.

## accuracy performance

The SSVT-650 will operate with nominal 125/250V control power output and if specified, a 0.15 Class metering accuracy for burdens of 0, W, X, M, Y, Z and ZZ. The transformer is accurate from 90% to 110% of rated primary voltage. Unique to the SSVT design is the ability to power motor loads of up to 10% of the transformer kVA rating and metering/relaying simultaneously.



#### mounting

The SSVT is designed for mounting on substations structures in an upright position with four mounting holes in the base.

### testing

The unit is individually tested per the IEEE C57.13 standard, including applied and induced voltage, accuracy and polarity. Additional tests include dissipation and partial discharge tests. Partial discharge testing is performed to guarantee the unit is free of partial discharge through 135% of the nominal system voltage.

### options

The SSVT is available with an Extra Creep Bushing, Polymer Bushing, Stainless Steel Tank and/or Dome, one or two secondary metering windings, one or two CTs, de-energized taps and/or -50°C oil. Other secondary terminal connectors include Clamp Type for up to 1000MCM or NEMA 4-hole Pads. Contact factory for other needs.

	ORDERING INFO FOR SSVT-650								
	kVA Primary Secondary Volts Rating Voltage Power° Metering		Catalog	Metering					
			er° Metering w/o Metering w/ Meterin		w/ Metering*	Accuracy/Burden			
	25	80500	125/250	115/67.08	L99N646025B	L99M646025B	0.15 0,W,X,Y,Z,ZZ		
	50	80500	125/250	115/67.08	L99N646050B	L99M646050B	0.15 0,W,X,Y,Z,ZZ		
	100	80500	125/250	115/67.08	L99N656100B	L99M656100B	0.15 0,W,X,Y,Z,ZZ		
	100	00300	123/230	113/07.00	L9911000100D	L99101000 100D	0.100, 0, 0, 1, 2, 22		

<sup>\*</sup>For two metering secondaries, change M to D in catalog no.

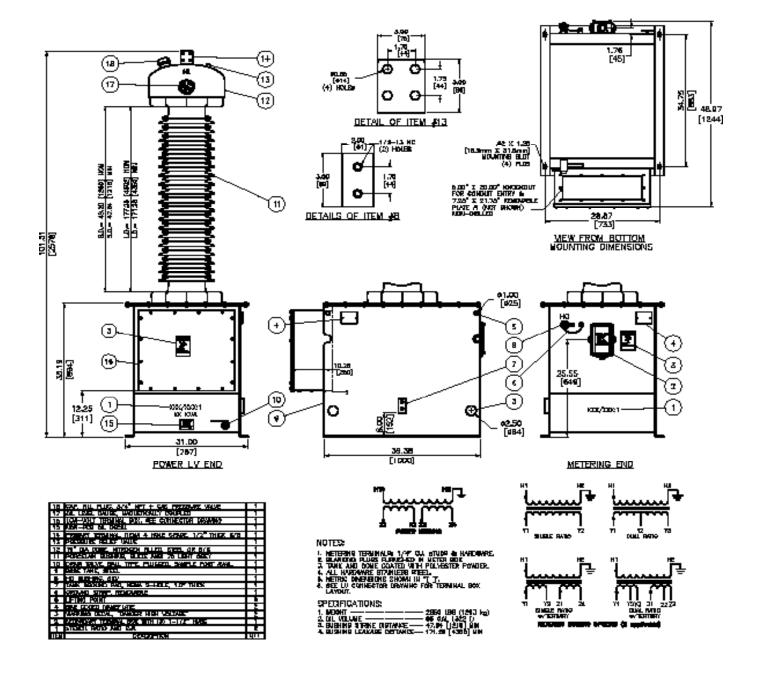
<sup>-</sup> Overvoltage Ratings: 1.1x cont., 1.73x 1 min.



<sup>°</sup>Nominal output. Actual rated output is supplied on unit nameplate.

## SSVT-650 Station Service VT









## KA-145(KXM-650) 1 Ø Metering Unit

Outdoor 138kV, 650kV BIL, Single, Dual & Multi Ratios Oil-Filled, Wound Type, 1Ø Metering 138000 Volt
March 2008

### application

The KA-145(KXM-650) outdoor single phase metering unit is rated for use on 138,000 volt systems with 650kV BIL. Primary current ratios are 5:5 to 4000:5 for 60 Hertz (Hz) with a Rating Factor of up to 4.0 (4800A max). Primary line to ground rated voltage ratios are available from 700:1 to 1200:1 for use on 138,000 volt systems. This oil-filled metering unit will operate with high accuracy for metering applications.

#### mechanical description

The transformer contains two fully insulated coils for both current and voltage measurement. The tank is steel plate, pressure and vacuum tight and hermetically sealed at the factory to prevent breathing and oil contamination. The dome is corrosion resistant aluminum and contains stainless steel expansion bellows to allow for the expansion/contraction of oil for temperature and load fluctuations. The bellows maintain constant pressure on the oil under various ambient and load conditions to allow for horizontal shipment. Tank components are shot-blasted, washed and coated with a heavy galvanized finish, effectively making the unit paint-free. The primary bushing is ANSI 70 Gray, high strength porcelain with a high degree of stability for transportation and seismic withstand. The primary terminals are tin plated aluminum, NEMA 4-hole pads (copper for units rated above 1800A). An adjustable primary spark gap is provided for all units to protect from high transients. The secondary terminals are M8 hex head bolts with associated hardware located inside a hinged cover, terminal box with three (3) 1 1/2" NPT conduit hubs. The ground terminal is an integral NEMA 2-hole configuration on the tank wall. The unit is fitted with a 5kV Ho terminal, oil level indicator, and oil sampling valve.

#### accuracy performance

The KA-145 will operate, for the current transformer, with 0.3 Class accuracy for metering with burdens of B0.1 to B1.8. The CT is accurate through its Rating Factor, and can be used continuously to this level. The unit will operate, for the voltage

transformer, with 0.3 Class accuracy for metering with burdens of 0, W, X, M, Y, Z and ZZ. The VT is accurate from 90% to 110% of rated primary voltage. The KXM-650 will operate, for the current transformer, with 0.15 Class high accuracy for metering applications with burdens of B0.1 to B1.8. The transformer maintains 0.15 Class accuracy from 0.5% of  $I_{\rm nom}$ through its Rating Factor, and can be used continuously to this level. The unit can be provided, for the voltage transformer, with 0.15 Class accuracy for metering with burdens of 0, W, X, M, Y and Z. The VT is accurate from 90% to 110% of rated primary voltage.

#### mounting

The KA(KXM) is designed for mounting on substation structures in an upright position with four mounting holes in the base.



#### testina

The unit is individually tested per the IEEE C57.13 standard, including applied and induced voltage, accuracy and polarity. Additional tests include dissipation and partial discharge tests. Partial discharge testing is performed to guarantee the unit is free of partial discharge through 135% of the nominal system voltage.

#### options

The KA(KXM) is available with an Extra Creep Bushing, Polymer Bushing, Stainless Steel Tank, and/or -50°C oil. The unit can be offered in single, dual or multiple core designs. Contact factory for other needs.

ORDERING IN	IFO FOR KA-145		HIGH ACCURACY KXM-650
Voltage	Ratio* - 700/1200:1:1	Accuracy/Burden	Accuracy/Burden
Ratings	Pri*:Sec - 80500:115/67.08 & 115/67.08	0.3 0,W,X,M,Y,Z,ZZ	0.3 0,W,X,M,Y,Z,ZZ

Current Ratio	Catalog Number	Accuracy/ Burden	Rating Factor	Catalog Number	0.15 B1.8 Acc Range	Rating Factor
5:5	L751200T005S	0.3 B1.8	1.5	L751200T005X	0.025 to 20A	4.0
10:5	L751200T010S	0.3 B1.8	1.5	L751200T010X	0.05 to 40A	4.0
:	:		:			:
100:5	L751200T100S	0.3 B1.8	1.5	L751200T100X	0.5 to 400A	4.0
150:5	L751200T150S	0.3 B1.8	1.5	L751200T150X	0.75 to 600A	4.0
	<b>:</b>		:	:		:
4000:5	L751200T402S	0.3 B1.8	1.0	L751200T402X	20 to 4800A	1.2
5/10:5	L751200T005D	0.3 B1.8/B1.8	2.0/1.5			
10/20:5	L751200T010D	0.3 B1.8/B1.8	2.0/1.5			
:	<b>:</b>	:	:			
2000/4000:5	L751200T202D	0.3 B1.8/B1.8	2.0/1.0			

- \* Available in other Primary Voltage Ratings. Thermal Burden Rating (Typical): 3000VA.
- Overvoltage Ratings: 1.1x cont., 1.9x 8 hours.
- 1 Second Thermal/Mechanical Rating: KA (75x full winding Inom), KXM (150x Inom), 80kA max.



## KA-145(KXM-650) 1 Ø Metering Unit



