

Lindsey Sensors

Advanced Measurement Technology
for Smart Grid Applications



OVERHEAD &
UNDERGROUND
15kV CLASS TO 46kV
TRUSTED
PROVEN
RUGGED
RELIABLE
ACCURATE

LINDSEY
H1

LINDSEY

Quality and Innovation in Transmission & Distribution Since 1947

Lindsey 200 Amp Underground Voltage Sensors



BUSHING WELL

LINDSEY #9542 Deadbreak "T" Voltage Sensor
Lindsey # 9542 is an IEEE 386 type 200 Amp 15 kV bushing deadbreak "T" voltage sensor that provides a 1% accurate AC analog output voltage with an included 10 foot watertight connecting cable

Part Number	Output Voltage	Device Impedance
Lindsey # 9542/0111	0-5 Volts AC	1 Megohm
Lindsey # 9542/0511	0-120 Volts AC	1 Megohm

LOADBREAK BUSHING INSERT

LINDSEY #9532 Loadbreak Elbow Voltage Sensor
Lindsey # 9532 is an IEEE 386 type 200Amp 15 kV load break Elbow voltage sensor that provides a 1% accurate AC analog output voltage with an included 10 foot watertight connecting cable

Part Number	Output Voltage	Device Impedance
Lindsey # 9532/0111	0-5 Volts AC	1 Megohm
Lindsey # 9532/0511	0-120 Volts AC	1 Megohm

Lindsey Underground Power Supply

Self contained 12 volt DC power source provides 5 ampere hours of continuous energy in event of loss of input power for pad mount control/communication system

The Lindsey UG power supply (P/N 9251) uses a split-core CT to generate DC energy to power customer's control/communication system and simultaneously, it also charges a built-in 12V 5AH sealed Lead Acid battery. In the event of loss of input power, the self contained battery can provide more than 10 hours of energy for the control/communication system. The CT harvests the power from any phase of the 200A/600A underground cable system. Minimum of 80A line current is required to run the power supply with one CT. The system has a water-resistant design to avoid moisture.



Specifications:
DC voltage output: up to 14V, 2.5A max
Built-in battery: 12V, 5AH
Dimensions in inches:
9 1/2 L x 7 5/8" W x 4 5/8" H
Operating temperature: -20F to 140F
Power supply/CT weight: 15 lbs
US Patent #7633262 and other Patents Pending

Elbow Sense

Current and Voltage Sensors for 600 Amp “T” Body Underground Power Monitoring Systems

Lindsey ElbowSense™ voltage plug sensors and current ring sensors fit standard 600 A T body connectors. These sensors are easily retrofitted to existing pad mount or submersible equipment using standard hot stick tools. Both voltage plug sensors and current ring sensors are provided with a 10 foot waterproof, corrosion resistant, cable and connector in a standard 10 foot length.



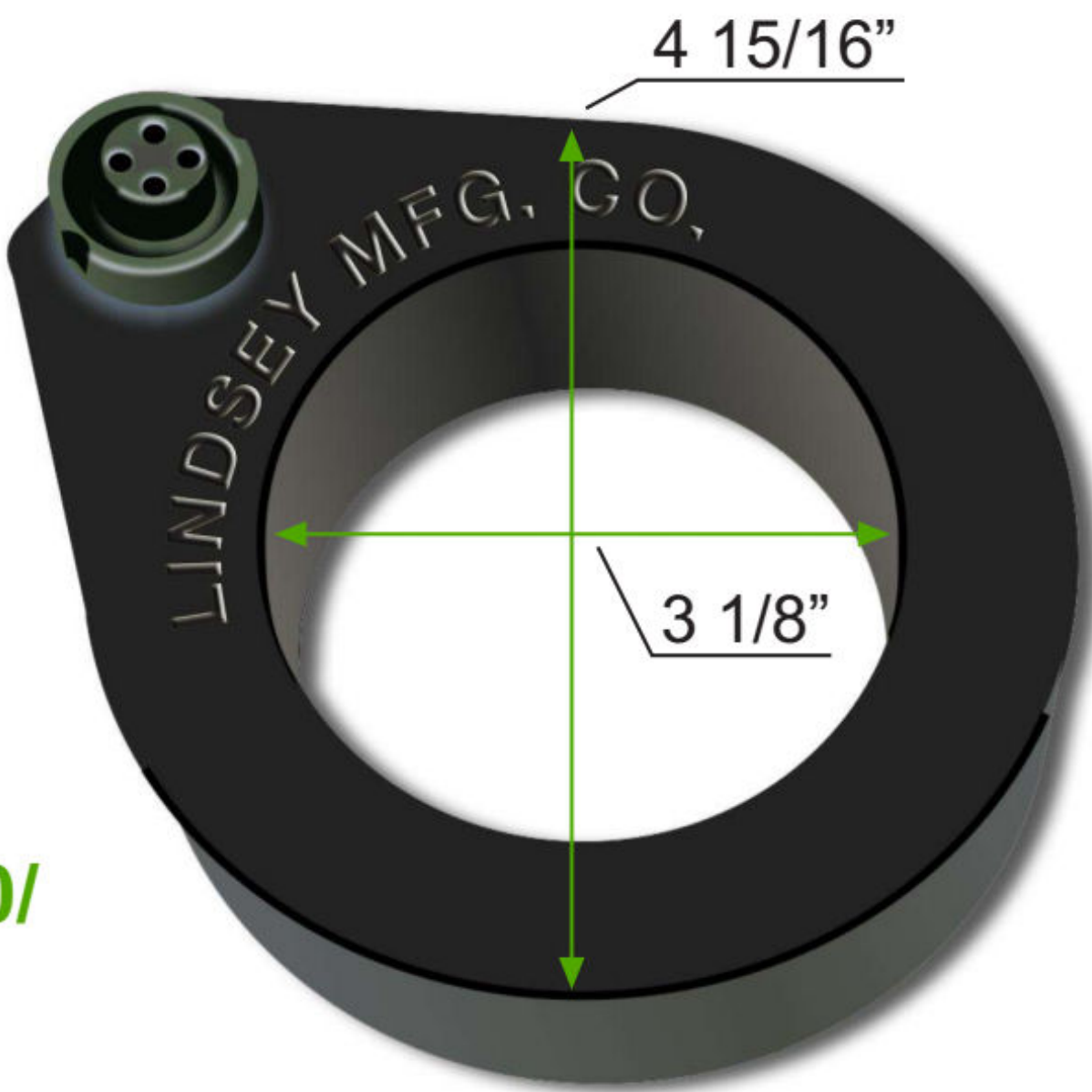
Voltage Sensor Spec. #955x/

Output Impedance: Standard calibration is for a 1 megohm load, other calibrations optional

Accuracy: +1%

Phase Shift: 0 degrees nominal +0.5 degrees

Insulation Class:	15kV	25kV	35kV
BIL (kV):	95	125	150
Weight (lbs):	8	8	13



Current Ring Sensor Spec. #9510/

Accuracy: +0.3% Standard Ring, +1 0% Split Current Ring

Phase Shift: 0 degrees nominal, + 0.5 degrees

Operating Temperature Range: -40°C to +65°C

Ratio:	600Amp : 10Volt	600Amp : 5Amp	600Amp : 1Amp	300Amp : 5Amp
Burden:	10,000 Ohms, MIN.	0.9 Ohms, Max.	22.5 Ohms, Max.	0.22 Ohms, Max.
Max Open Circuit Voltage @ 600 Amps:	10	14.5	88	8

Splitcore Current Sensors



Neutral Current Sensor
#R-22981



Medium Voltage Smart Grid Sensors

Current and or Voltage Sensors for Distribution Protection and Smart Grid applications up to 46kV and 600A

How to Order

96 6 2 / S 1 2 0 1

Connector

Blank=Standard ITT Cannon Connector
A=Amphenol Connector
C=Cast-in Cable

Tube

0=1.185" I.D. Stainless Steel Tube
1=1.185" I.D. S.S. tube with S.S. bonding clamp
2=Aluminum bus bar, 2 hole pads
3=Aluminum bus bar, 4 hole pads
4= Multicore Keeper

Choke Type

0=none used
C=clamp mount, included

Voltage Divider Ratio

0=none	5=60:1
1=1400:1	6=120:1
2=2200:1	8=200:1
3=3300:1	x=Special
4=10000:1	

Current Output Signal

0=none	4=600A:1A
1=600A:10V	5=300A:5A
2=600A:6V	6=300A:10V
3=600A:5A	x=Special

Top Configuration

C=Clamp Top (not available with 9680)
S=Substation / Switchgear Top / Busbar
E=Multicore

Leakage Distance

0=standard	15kV,=13"
2=extra 6"	25kV,=20"
3=extra 9"	35kV,=29"
4=extra 12"	46kV,=33"

Insulation Class

5=15kV (110kV BIL)
6=25kV (150kV BIL)
7=35kV (200kV BIL)
8=46kV (250kV BIL)
- Not available in Multicore Style
x=Special

Distribution Class CVMI

Example: 9660/C120C0 - 25kV Clamp Top Style CVMI, standard leakage distance, 600A:10V current output signal, 2200:1 voltage divider ratio with 9602 clamp choke and 1.185" I.D. Stainless Steel tube.



Clamp Top CVMI for replacing any horizontal or vertical line post insulator.



Substation/Switchgear style CVMIs are used where a conductor can be threaded through and clamped to the stainless steel tube.



Multicore Style



Bus Bar style CVMIs are equipped with standard 2 or 4 hole NEMA pads.

Voltage Accuracy:
1% All Models

Current Accuracy:
Current Voltage Phase Shift
1.5 degrees or less

Medium Voltage Smart Grid Multicore Sensors



No Need to Dead End or Cut Conductor to Install

ELECTRICAL RATINGS:	9650/E1004	9660/E1004	9670/E1004
INSULATION CLASS	15kV	25kV	35kV
IMPULSE (BIL)	110kV	150kV	200kV
LEAKAGE DISTANCE (in)	16.4	24.5	35.3
DRY ARC DISTANCE (in)	8.8	12.6	16.3
OVERALL HEIGHT (in)	13.2	16.7	20.8
WITHSTAND* (60Hz, 1 min.)	34kV	40kV	50kV
CORONA (extinction)	11kV	19kV	26kV
LOW FREQ. DRY FLASHOVER	80kV	110kV	125kV
LOW FREQ. WET FLASHOVER	60kV	85kV	100kV

****NOTE:** Withstand test is not performed on sensors with a voltage divider.
Specify 50hZ, 60hZ.*

Specify 50hZ or 60hz

CURRENT SIGNAL OUTPUT:

RATIO: 600 Amps : 10 Volt
OUTPUT BURDEN/LOAD: Calibrated for a 10,000 Ohm or greater load
ACCURACY: ± 1%
PHASE SHIFT: 0 degrees nominal, ± 1.5 degrees
OPEN CIRCUIT VOLTAGE: 10 Volts at 600 Amps line current.

VOLTAGE SIGNAL OUTPUT	9650/E1104A	9650/E1204A	9650/E1304A
OUTPUT IMPEDANCE: Calibrated for a 1 megohm load			
ACCURACY: ±1%			
PHASE SHIFT: 0 degrees nominal, ±1.5 degrees			

Calibration of current and voltage signals is virtually **unaffected** by conductor material, size, temperature, armor rod, adjacent phases, line angle or insulator contamination.

MECHANICAL:

INSULATION CLASS	15kV	25kV	35kV
CANTILEVER STRENGTH - (Ultimate, lbs.)	2,800	2,800	2,800
WEIGHT (lbs.)	39	49	59
SHIPPING WEIGHT (lbs.)	44	54	64

ENVIRONMENT:

Temperature: -40°C to +65°C.
Humidity: 95%

CONDUCTOR DIAMETER RANGE:

The two-sided keeper is made of aluminum and can accommodate a 0.25 inch to 1.25 inch diameter conductor.

BASIC CONSTRUCTION:

The Multicore Sensor is molded from POLYSIL, a high dielectric strength, anti-tracking polymer concrete developed by Lindsey Manufacturing Company under EPRI contract.

Voltage Monitoring Insulators (SVMI)

Smart Grid Overhead Voltage Monitoring Insulators

Voltage Monitoring Insulators (SVMI) Insulation Class 25 kV

Operating Voltage L – L [kV]	Operating Voltage L – G [kV]	AC Output Voltage [V]	Load (instrument) Impedance Greater Than	Lindsey Part Number
24.94	14.4	120	1 M	9326
24.94	14.4	120	500k	932X/120/500k
16.42	9.48	120	5 M	932X/79/5M
17.3	10.0	120	1.4 M	932X/83.3/1.4M
23.0	13.28	120	1 M	932X/110.6/1M
24.94	14.4	6.55	1 M	932X/2200/1M

Voltage Monitoring Insulators (SVMI) Insulation Class 35 kV

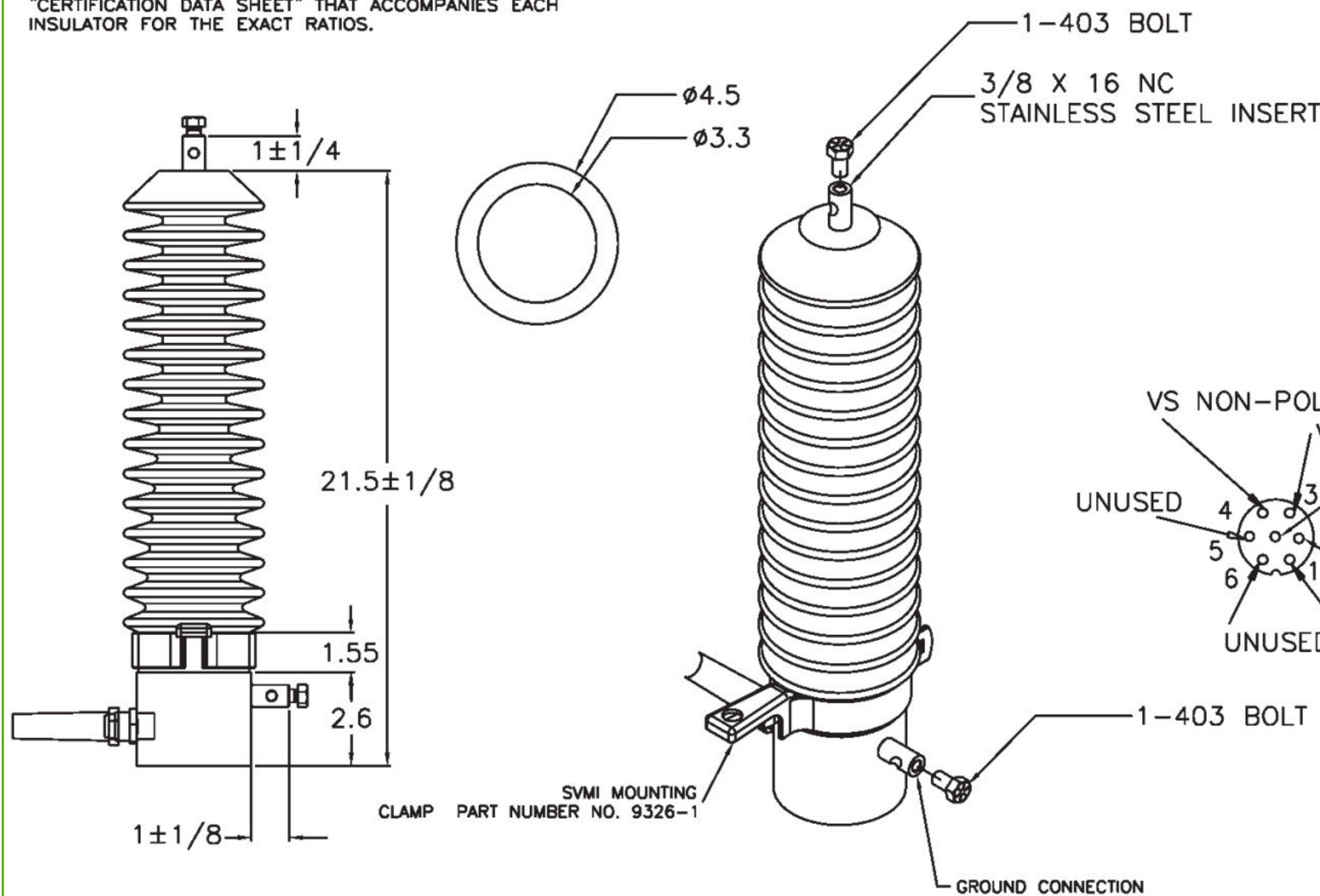
Operating Voltage L – L [kV]	Operating Voltage L – G [kV]	AC Output Voltage [V]	Load (instrument) Impedance Greater Than	Lindsey Part Number
34.5	19.92	120	1 M	9337
34.5	19.92	120	500k	933X/166/500k
27.6	15.94	120	1 M	933X/132.8/1M
34.5	19.92	6.0	1 M	933X/3300/1M

Voltage Accuracy: 1% All Models

NOMINAL OUTPUT RATIO:

CURRENT NONE
VOLTAGE 166:1
ACCURACY..... 2%

THESE ARE THE NOMINAL OUTPUT RATIOS, REFER TO THE "CERTIFICATION DATA SHEET" THAT ACCOMPANIES EACH INSULATOR FOR THE EXACT RATIOS.



SVMI INFORMATION

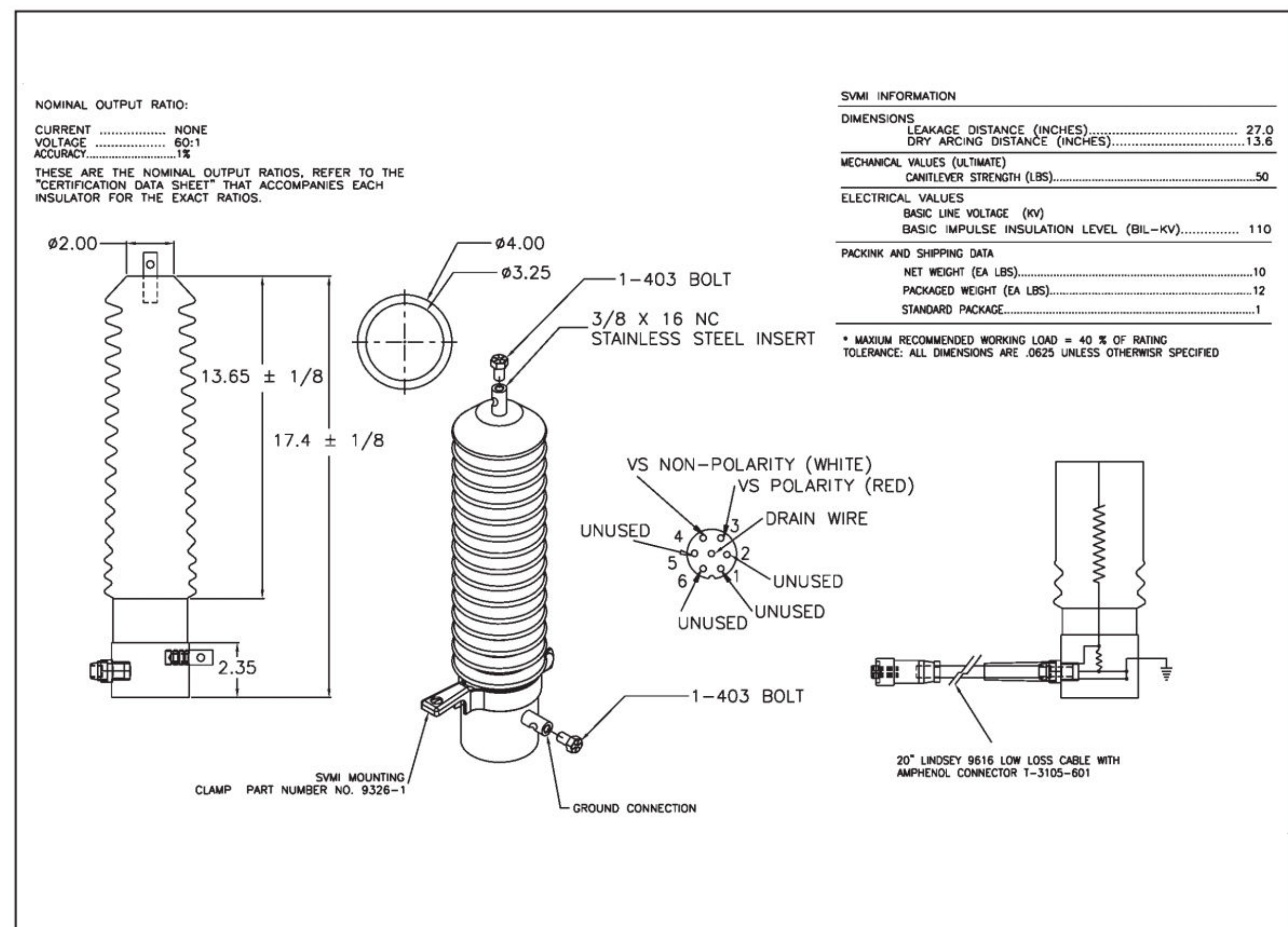
DIMENSIONS	
LEAKAGE DISTANCE (INCHES).....	37.25
DRY ARCING DISTANCE (INCHES).....	17.25
MECHANICAL VALUES (ULTIMATE)	
CANILEVER STRENGTH (LBS).....	50
ELECTRICAL VALUES	
BASIC LINE VOLTAGE (KV)	
BASIC IMPULSE INSULATION LEVEL (BIL-KV).....	200
PACKING AND SHIPPING DATA	
NET WEIGHT (EA LBS).....	17.2
PACKAGED WEIGHT (EA LBS).....	20
STANDARD PACKAGE.....	1

* MAXIMUM RECOMMENDED WORKING LOAD = 40 % OF RATING
TOLERANCE: ALL DIMENSIONS ARE .0625 UNLESS OTHERWISE SPECIFIED

Voltage Monitoring Insulators (SVMI)

Voltage Monitoring Insulators (SVMI) Insulation Class 15 kV

Operating Voltage L – L [kV]	Operating Voltage L – G [kV]	AC Output Voltage [V]	Load (instrument) Impedance Greater Than	Lindsey Part Number
12.47	7.2	120	1 M	9315
12.47	7.2	120	2 M	931X/60/2M
12.47	7.2	120	5 M	931X/60/5M
12.47	7.2	120	500k	931X/60/500k
12.47	7.2	120	240k	931X/60/240k
13.2	7.62	120	1M	931X/63.5/1M
13.2	7.62	120	2.2M	931X/63.5/2.2M
13.2	7.62	120	240k	931X/63.5/240k
13.8	7.97	120	1M	931X/66.4/1M
13.8	7.97	120	240k	931X/66.4/240k
14.4	8.3	120	240k	931X/69.3/240k
11.95	6.9	120	1M	931X/57.5/1M
10.4	6.0	120	2.2M	931X/50/2.2M
11.4	6.6	120	1M	931X/55/1M
12.47	7.2	5.1	1M	931X/1400/1M
12.47	7.2	3.3	1M	931X/2200/1M



Voltage Monitoring Transducers (VMT)

Interface Lindsey Standard Voltage Monitoring Insulators (SVMI) to any protection relay

- **3-phases in a single package.**
- **Metering-grade accuracy.**
- **Wide bandwidth provides resolution to the 70th harmonic.**
- **Integral power supply accepts 120VAC, 24VDC or 48VDC.**

The VMT provides an optimum interface between Lindsey Voltage Monitors and Electric Utility Low Impedance protection relays, metering devices, and other IEDs. It features three channels to accommodate a typical 3-phase voltage monitoring.

Dimensions:

4" wide x 10" long x 2" high
 2.25 pounds

Electrical Specifications:

Input & Output voltage:
 120 VAC nominal.
 Maximum output: 150 VAC.
 Maximum input: 1,000 VAC,
 1,000 VDC

Protection relay burden:

greater than 10k Ohm

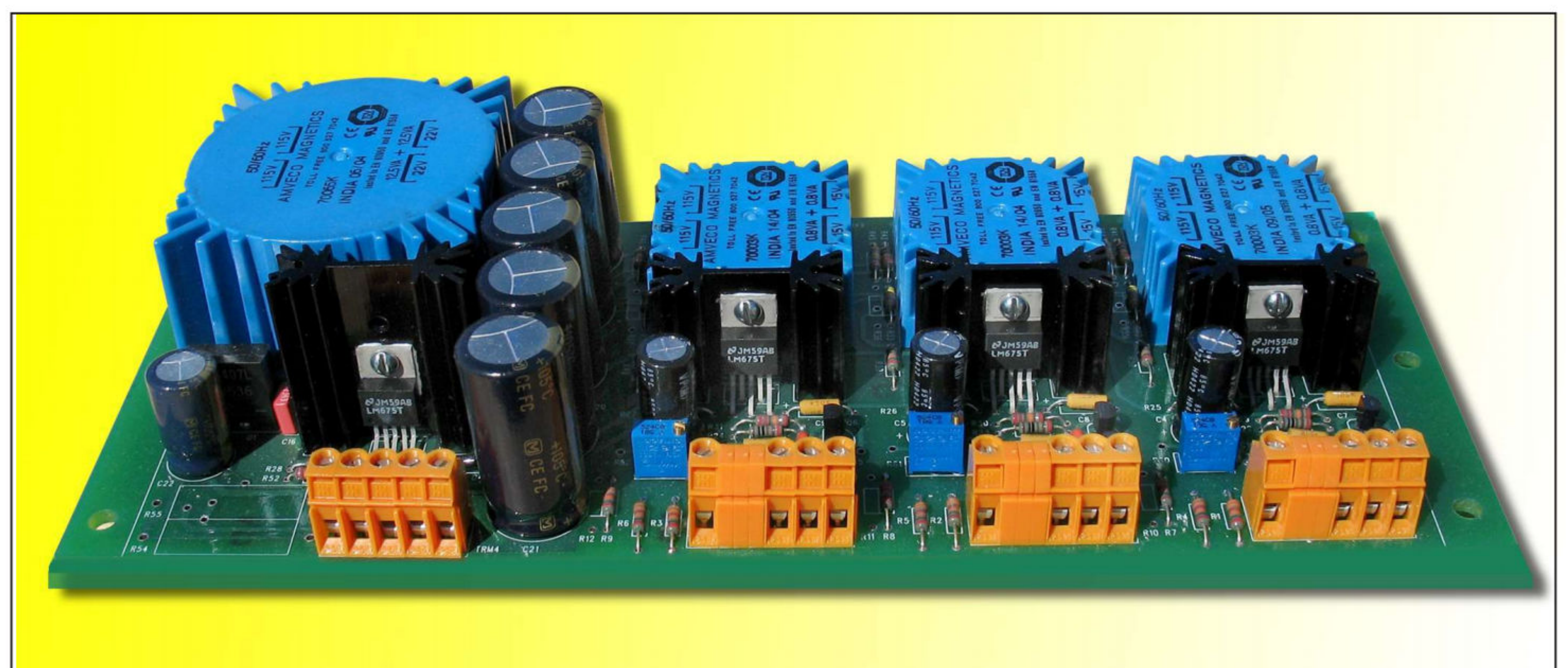
Frequency bandwidth:

30Hz – 4.2kHz.
 Control power: 120VAC, 135mA
 Operating range:
 90 VRMS – 126VRMS
 24VDC, 420mA
 48VDC, 200mA

Power outage run-through:

>15 cycles

Under loss of control power, signal output shall continue, uninterrupted, for a minimum of 1/4 second (does not apply to 48VDC power).



Dynamic Real Time Transmission Line Clearance and **Security** Monitor

Conductor Clearance/Sag
Conductor Temperature
Conductor Vibration
AC Current
Tower Security Intrusion Alarm
Tower Security Tampering Alarm

Corona Free @ 500 kV, Live Line
Installation with Hot Sticks
or Bare Hand

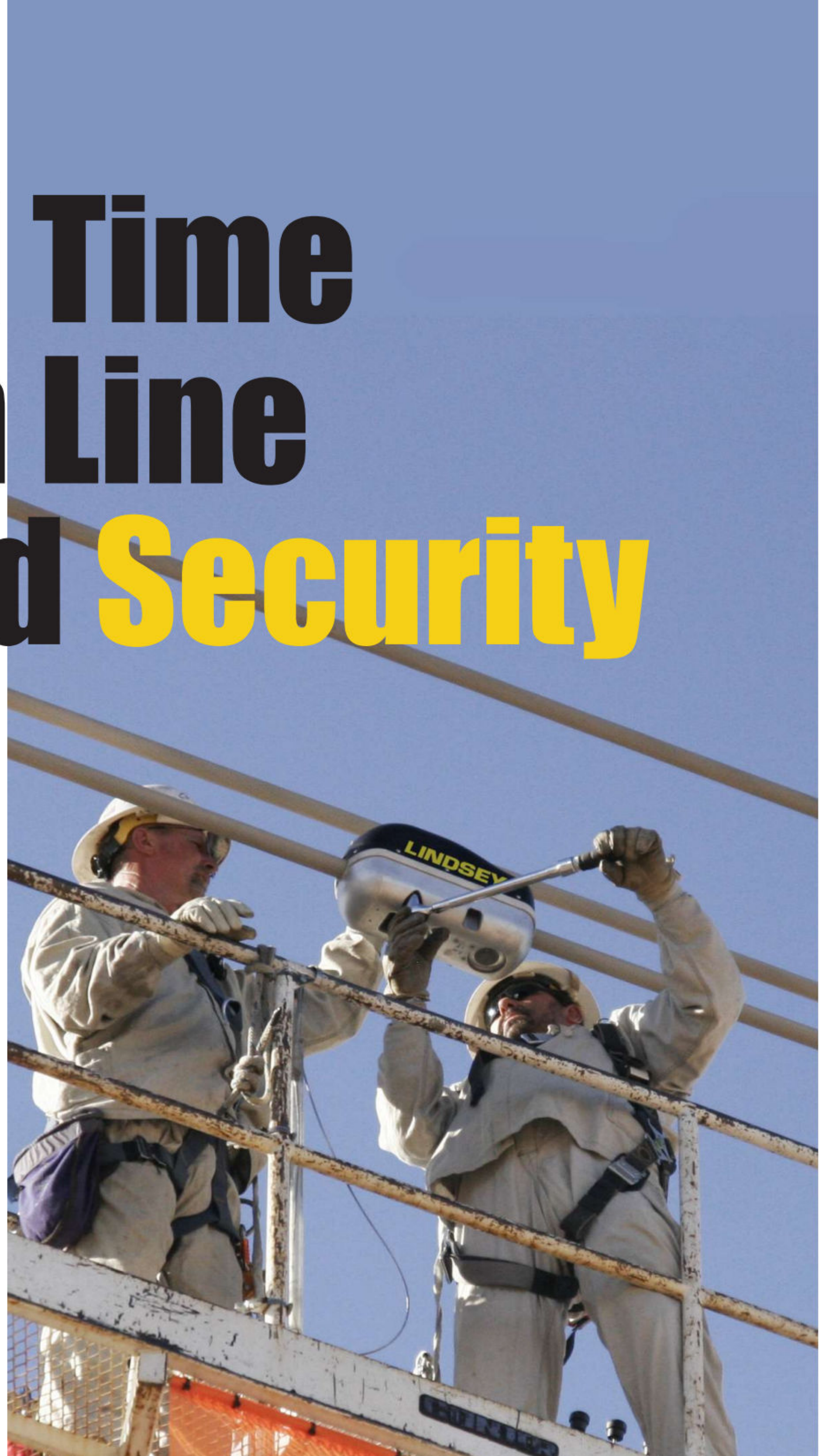
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Self Powered Wireless Reporting
over the entire transmission line



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Specifications

	Specification
Communication frequency band	915MHz +/- 13MHz
Direct communication range	1.0 mile min
Conductor current	100A to 1500A
Conductor voltage	750kV max
AC frequency	50Hz - 60Hz
Conductor temperature	250°C max
Ambient temperature	180°C max
Conductor size	1" to 1.8 in dia
Vibration sensor frequency	1kHz max
Tilt-pitch	-90° to +90°
Angle-roll	-90° to + 90°
Height sensor accuracy	+/- 4 in in 120Ft
Operating ambient temperature	-40°F to 122°F
Dimensions	16.5(L) x 6.75(W) x 8.75(H) in
Weight	<25lbs