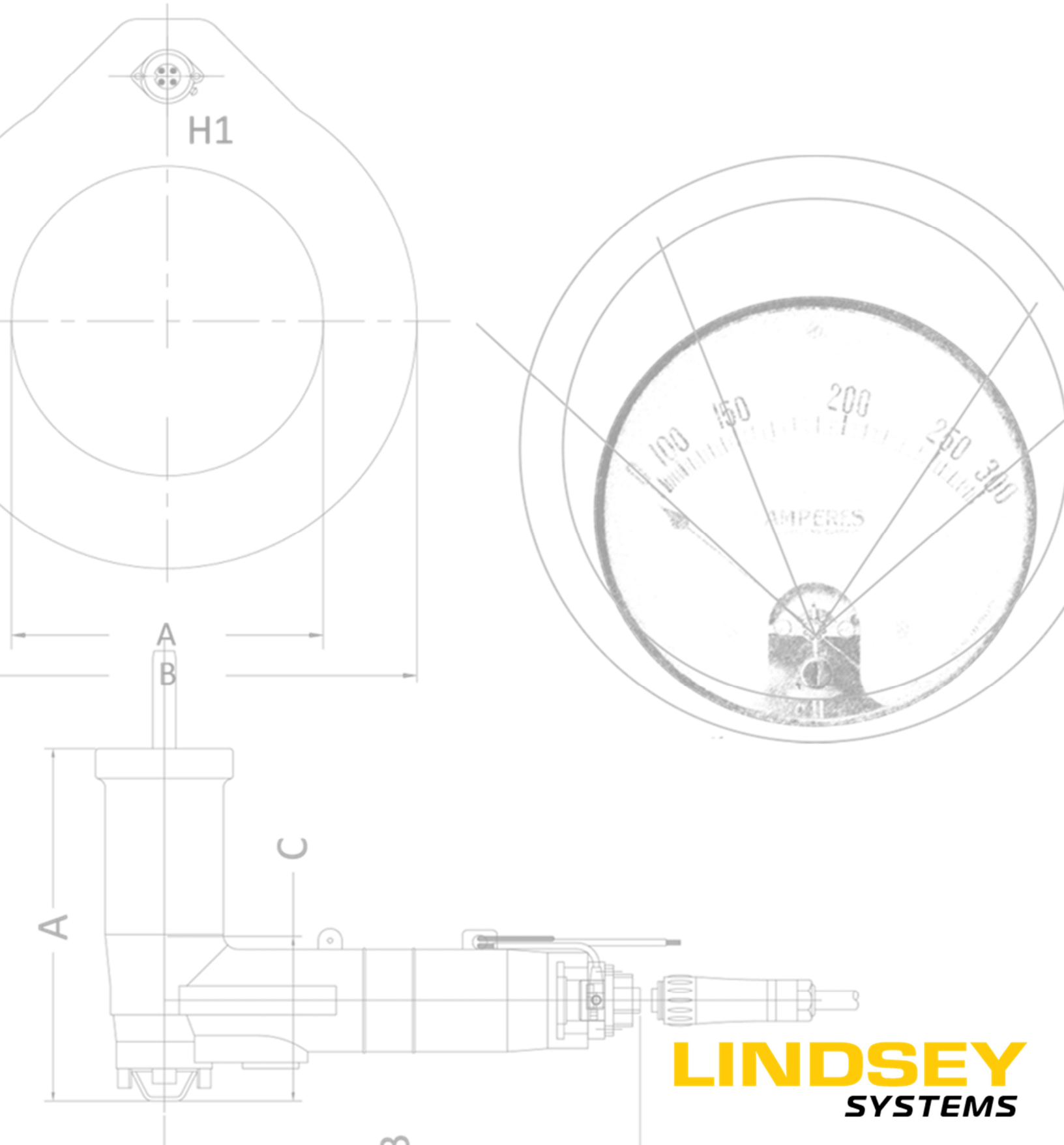


Lindsey Sensors

Metering Class Voltage and Current Sensors for Underground Distribution



LINDSEY
SYSTEMS

Metering Accuracy Voltage and Current Sensors

For almost 40 years, voltage and current sensors by Lindsey Systems have served a crucial role in medium voltage distribution networks. Well-known for exceptional reliability and long life, they can now be depended upon for their accuracy in pad-mount and underground applications requiring either 0.15% or 0.3% accuracy for metering and revenue metering applications.

Sensing Elements

All Lindsey Systems' sensors use one or more of the following voltage and current sensing elements.

Voltage Sensing

High precision resistive voltage divider networks are used in all voltage sensors to provide exceptionally accurate analog voltage outputs.

All ElbowSense™ voltage sensors for pad-mount and underground applications are available for metering applications with 0.15% or 0.3% accuracy. Standard 0.5% accuracy versions are also available. See Lindsey's general sensor catalog for these products.

Voltage sensors with 0.15% accuracy are indicated by the presence of an orange band around the sensor. Sensors with 0.3% accuracy feature a yellow band.

All voltage sensor outputs are linear with the primary voltage level applied. High ratio (\Rightarrow 1400:1) sensors have flat frequency response through the 20th harmonic with zero phase shift providing excellent harmonic performance.

Current Sensing

Lindsey's metering accuracy current sensors utilize high efficiency iron core window CTs to produce high accuracy measurements with flat frequency response through 9 kHz (\pm 2% @ 9 kHz) making them ideal for harmonic measurement applications.

The 95M and 95SM series current sensors offer 0.3% accuracy per IEEE C57.13 standards. The 95R and 95SR series current sensors meet the 0.15S accuracy definition per IEEE C57.13 and 0.1% accuracy class per IEC 61689-02.

Sensor Cables and Junction Boxes

Achieving the performance and accuracy of Lindsey Systems' sensors requires the use of cable systems which will not degrade their performance. The impedance characteristics of Lindsey cables are included in the sensor's design and calibration process. Lindsey produces a wide range of cables ranging from single-phase, to prefabricated 7-to-1 cables encompassing voltage, current, and neutral sensors.

For more information and other options, refer to Lindsey's Sensor Cable Assemblies catalog, publication 09B-004 available on the Lindsey website.

Cable Features

- Controlled impedance across the sensor's operating temperature range.
- Proper signal segregation and shielding within the cable to eliminate crosstalk and ensure low noise.
- A selection of cable termination options.

Note: Sensor accuracy is the variation from the as-tested output ratio (as stamped on each sensor's nameplate) across the stated accuracy temperature range. For more information, refer to Lindsey Systems' publication number 09R-017 SENSOR ACCURACY.

ElbowSense™ Underground Metering Class Voltage Sensors

Lindsey Systems offers a wide range of metering class voltage sensors contained in familiar IEEE Std. 386 underground componentry. These sensors are suitable for pad-mount, metal-clad, submersible and underground applications. All sensors contain precision resistive voltage dividers to provide metering accuracy of either 0.15% or 0.3% voltage sensing with flat frequency response through the 20th harmonic. Sensors provides an AC voltage output proportional to phase-to-ground voltage.

These higher accuracy sensors are ideal for metering or other applications that would benefit from higher accuracy, such as Volt/VAR Optimization (VVO).

Physical Configurations:



200A Dead-Break T-Body
Available in 15kV

These sensors are ideal where spare bushing wells are not available and all cable circuits are already terminated with elbow connectors.



200A Load-Break Elbow
Available in 15kV & 25kV

Ideal for applications where connection can be made via a spare bushing well or suitable T-body connector. The sensors may also be applied with a reducing insert on 600A cable systems.

Specifications

Voltage Accuracy	0.15% or 0.3%		
Ratio	By Catalog Number		
Operating Temperature Range	-45°/+80°C		
Stated Accuracy Temperature	-40°/+55°C		
Insulation Class	15kV	25kV	35kV
Impulse (BIL)	95	125	150
Max Line-Ground (kV)	8.66	15.76	21.94
Corona (kV extinction)	11	19	26
Weight (lbs./kg)			
Elbow Sensors	4/1.8	4/1.8	4/1.8
T-body Sensors	4/1.8	N/A	N/A
Plug Sensors	8/3.6	8/3.6	9/4.1

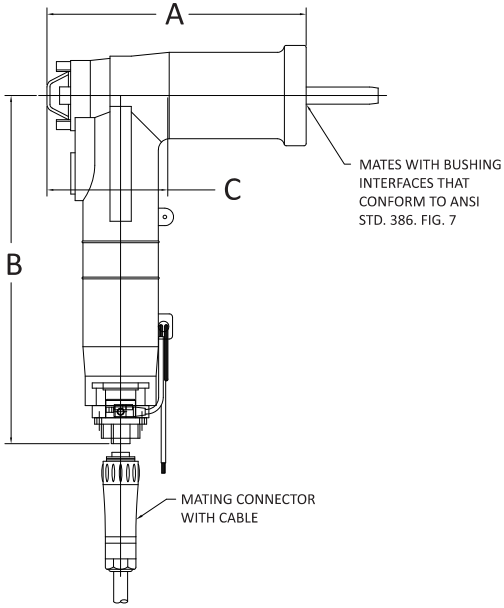


600/900A Plug Voltage
Available in 15kV, 25kV & 35kV

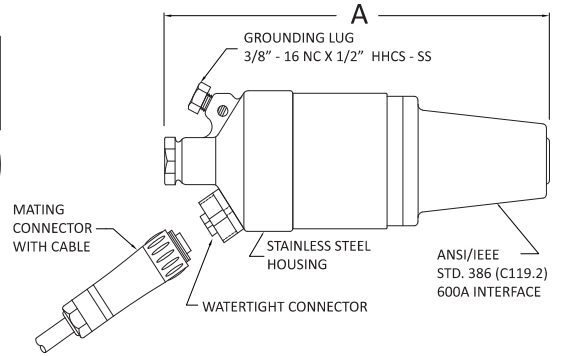
These stainless-steel sensors fit standard 600/900A T-body connectors.

ElbowSense™ Metering Accuracy Voltage Sensor Dimensions

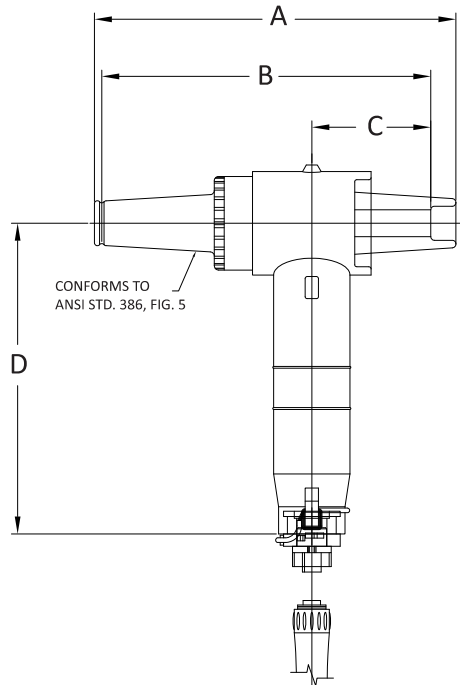
Load-Break Elbow Sensor



Plug-Style Sensor




T-Body Dead-Break Sensor



ElbowSense™ Voltage Sensor Ordering

Part Number Sequence: **A B C / O D E F**

A		B		C		/ O	D		E	
Family		Type		Voltage Class			Ratio		Output Options	
95M ElbowSense 0.3% Accuracy		3	200A Elbow	200A Elbow			1	1400:1	1	2 Contact socket for pad-mount, supplied with a cable of length F
95R ElbowSense 0.15% Accuracy		4	200A T-Body	2	15kV		2	2200:1		 <p>F</p> <p>Cable Length</p> <p>F represents cable length in 10 ft. increments.</p> <p>Example: If F=1, the cable length</p>
		5	600/900A Plug	3	25kV		3	3300:1		
				4	35kV		5	60:1		
				200A T-Body			6	120:1		
				2	15kV		7	166:1		
				600/900A Plug			X	Special (consult factory)		
				2	15kV					
				3	25kV					
				4	35kV					
Example										
95R42/0111										
95R		4		2		/O	1		1	

Example: 95R42/0111 is a 15kV class, 200A dead-break, 0.15% accuracy, T-body sensor with a 1400:1 ratio output, cast-in socket and supplied with a matching 10 foot cable.

Sensor Dimensions	A	B	C	D
Inches (mm)				
Elbow Sensor, 15kV	7.0 (178)	10.0 (253)	3.5 (88)	-
Elbow Sensor, 25kV	7.7 (196)	10.0 (253)	3.9 (99)	-
T-Body Sensor, 15kV	10.3 (263)	9.4 (239)	3.4 (86)	8.9 (226)
Plug Sensor, 15kV	9.4 (238)	3.3 (83)	-	-
Plug Sensor, 25kV	9.4 (238)	3.3 (83)	-	-

ElbowSense™ Metering Class Current Sensors

Lindsey Systems offers metering class accuracy current for use in underground, pad-mount, and specific metal-enclosed applications. All current sensors are rated 600V and are intended to be used with either insulated medium voltage conductors.

ElbowSense Ring-Style and Slim Ring-Style Current Sensors

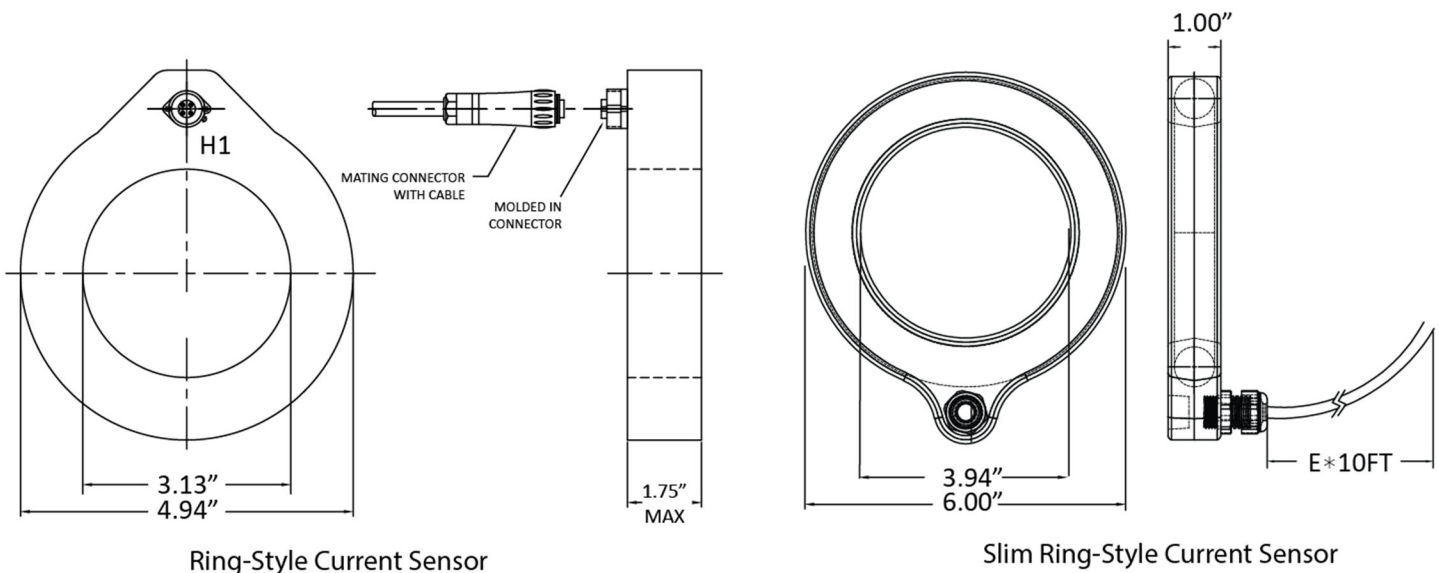
This air-core CT based sensor is watertight and suitable for use in pad-mount, metal-clad, and submersible vault applications. It offers high accuracy, no phase shift, and flat harmonic response through the 80th harmonic.

The M series current sensors offer 0.3% accuracy per IEEE Standard C57.13.

The R series current sensors meet the 0.15S accuracy definition per IEEE C57.13 and 0.1% accuracy class per IEC 61689-02.

Ring-Style sensors are available with cast-in cables or connectors. Slim Style sensors are only available with cast-in cables.

Pigtail cable is included per ordered part number.



ElbowSense™ Metering Accuracy Current Sensor Ordering

Part Number Sequence: A B 10 / C 0 D E

A		B		10 /		C		0		D		E	
Family		Sensor Type		Current Output Signal		Connector		Cable Length					
95 Ring-Style	R	IEEE C57.13 0.15S and IEC 61689-2 0.1 Accuracy		3	600A:5A	1	Cast-in connector	1	10 ft. (3m)				
95S Slim Ring-Style	M	IEEE C57.13 0.3 Accuracy		4	600A:1A	2	Cast-in pigtail cable of length "E"	2	20 ft. (6m)				
				5	300A:5A			X	X = Length in multiples of 10 ft.				
Example													
95R10/3011													
95	R	10/		3	0	1	1						

Example: 95R10/3011 is a ring-style metering accuracy current sensor, 600A:5A ratio, with a cast-in connector and supplied with a matching 10-ft cable.

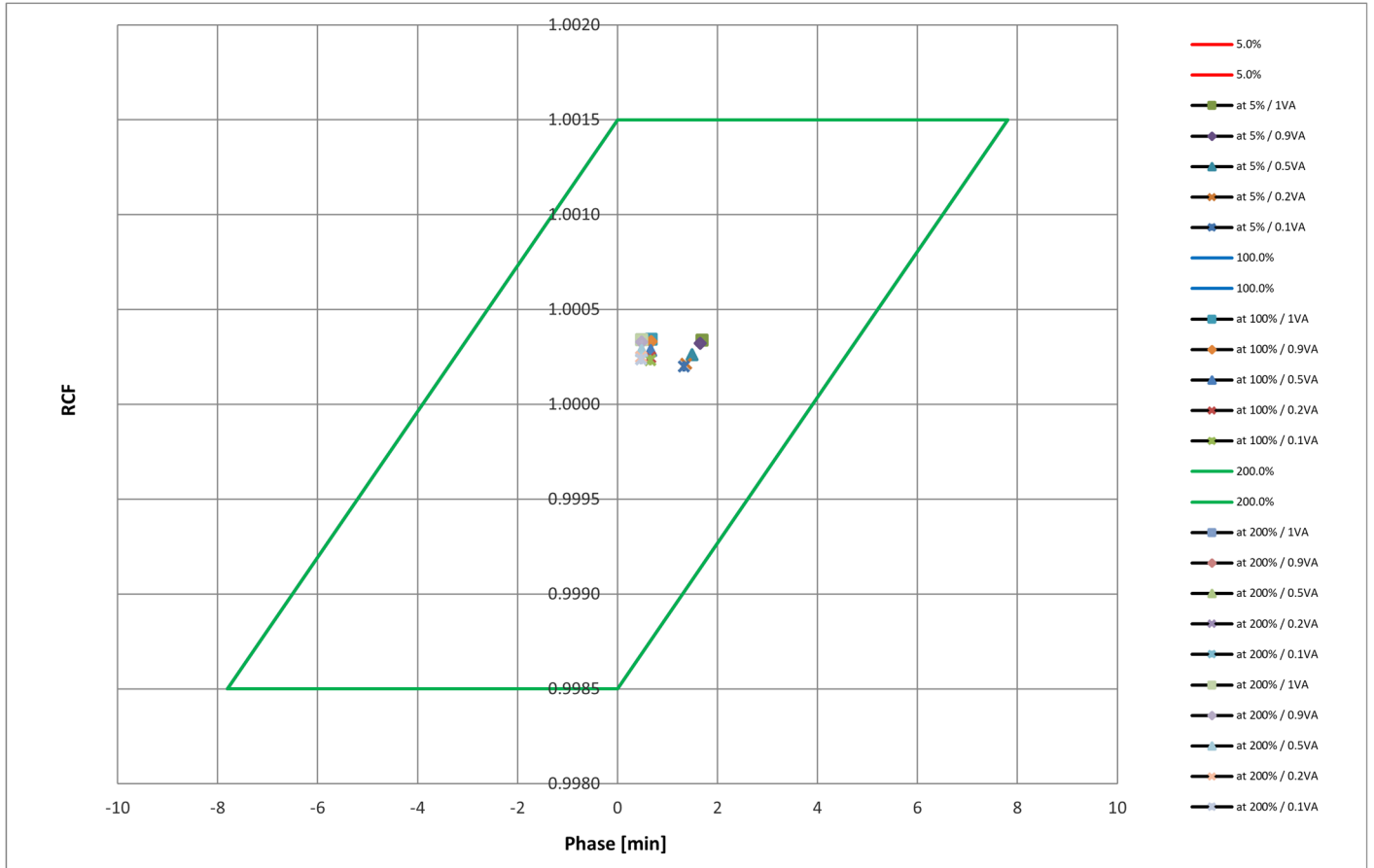
Note: For other options, contact the Factory.

ElbowSense Current Sensor Specifications

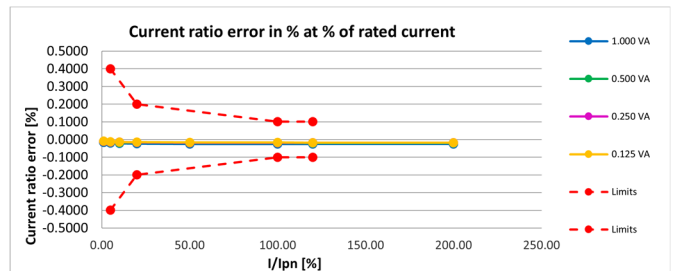
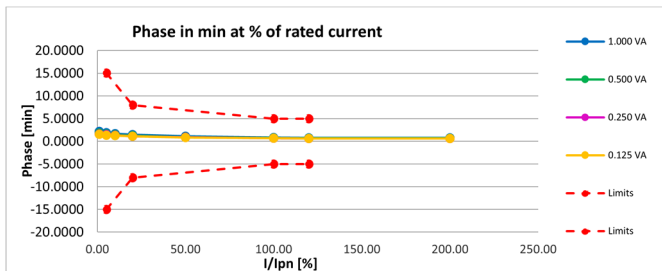
Sensor Style	Ring-Type		
Ratio	600A:5A	600A:1A	300A:5A
Burden	See Plots		
Accuracy	IEEE Std C57.13 0.15S or 0.3 IEC Std 61689-2 0.1		
Phase Shift	0 degrees nominal, +/- 0.5°		
Operating Temperature Range	-45°C / +80°C		
Stated Accuracy Temperature	-40°C / +55°C		

Accuracy Plots for 0.15S Metering Class Current Sensor 600A:1A P/N 95R10/410X (-40°C to +55°C)

IEEE C57.13.6 0.15S Accuracy Class Plot

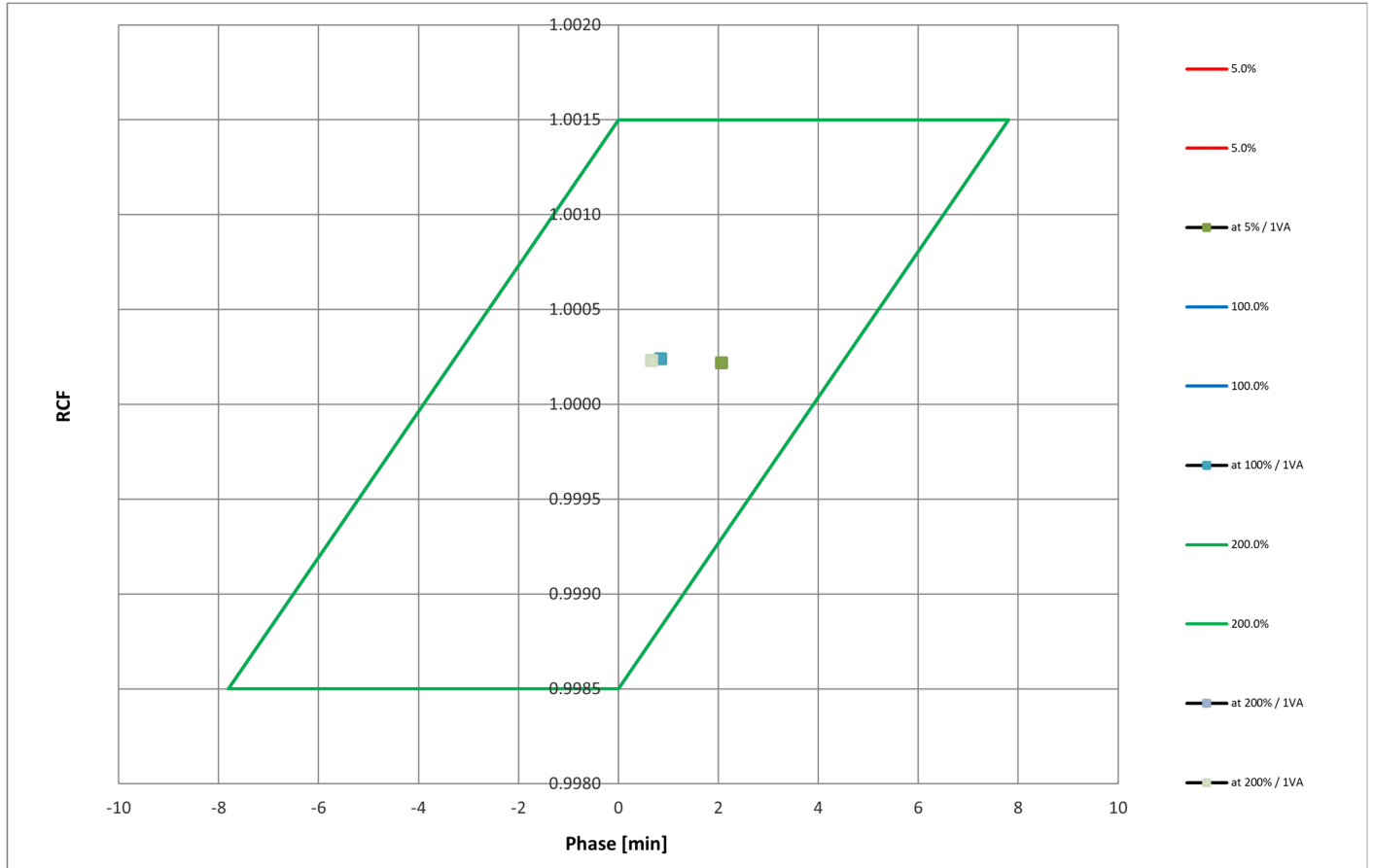


IEC 61869-2 0.1% Accuracy Plots

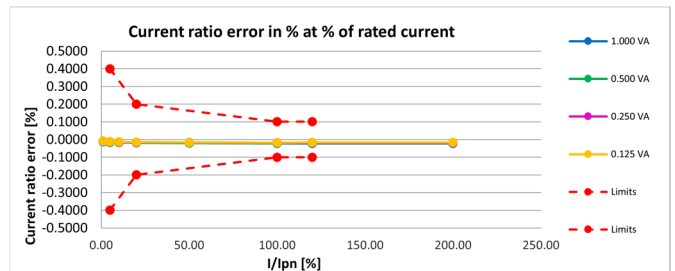
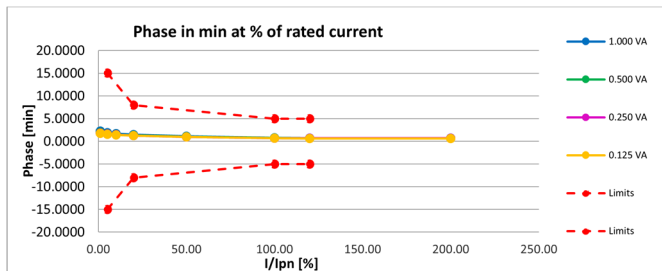


Accuracy Plots for 0.15S Metering Class Current Sensor 600A:5A P/N 95R10/301X (-40°C to +55°C)

IEEE C57.13.6 0.15S Accuracy Class Plot

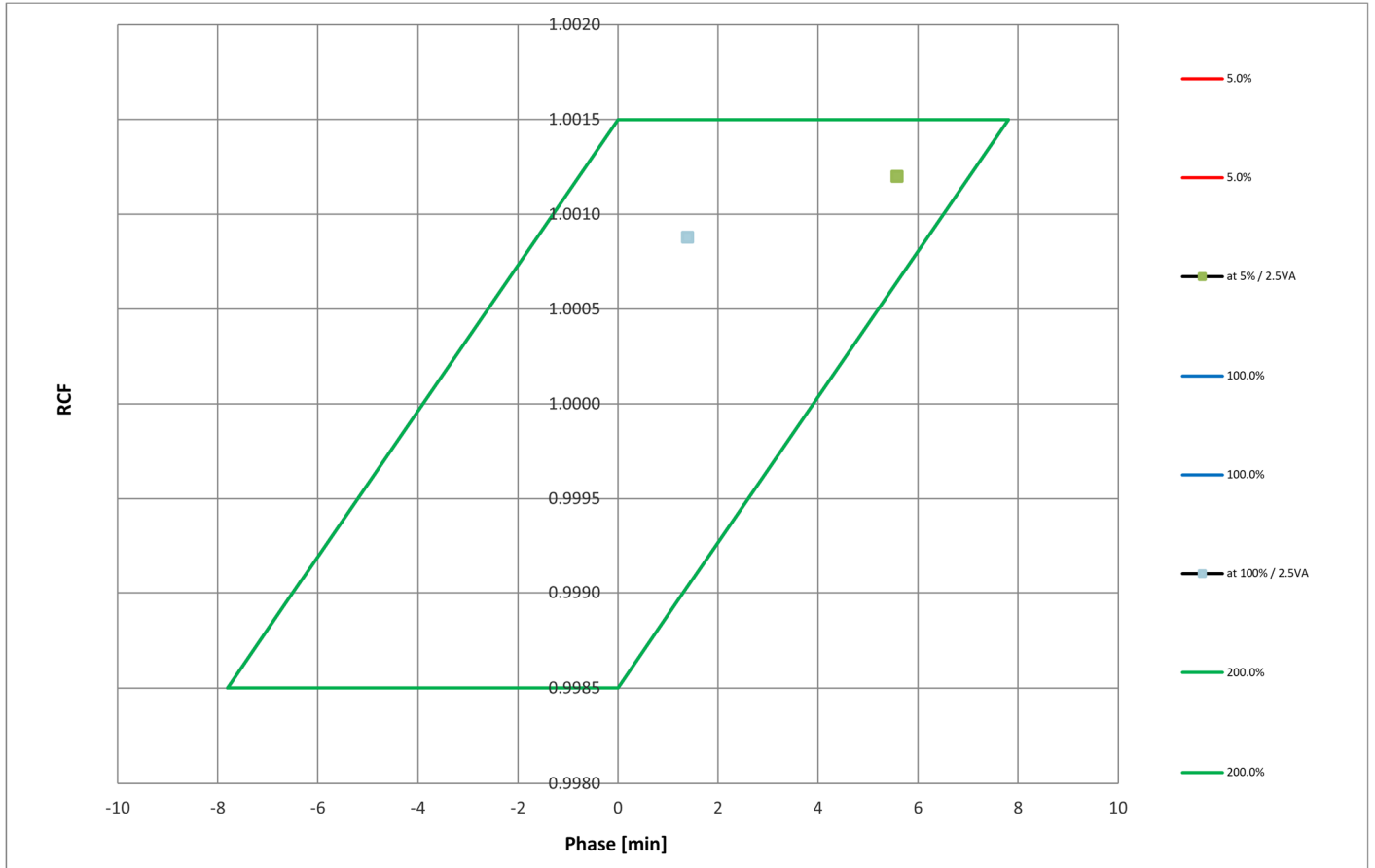


IEC 61869-2 0.1% Accuracy Plots

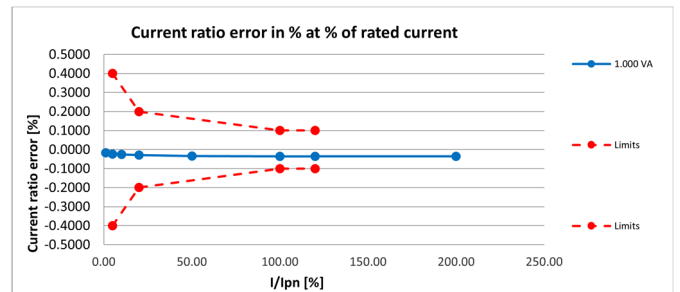
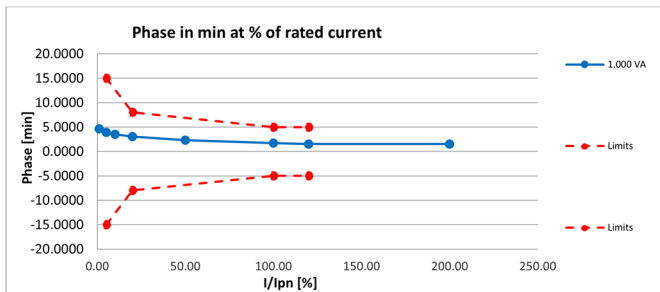


Accuracy Plots for 0.15S Metering Class Current Sensor 300A:5A P/N 95R10/501X (-40°C to +55°C)

IEEE C57.13.6 0.15S Accuracy Class Plot

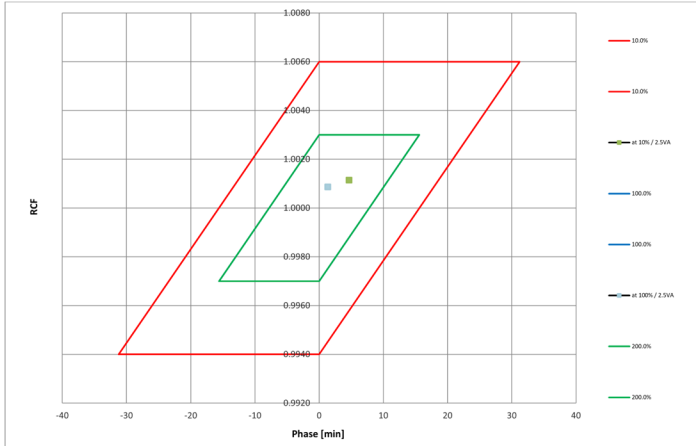


IEC 61869-2 0.1% Accuracy Plots

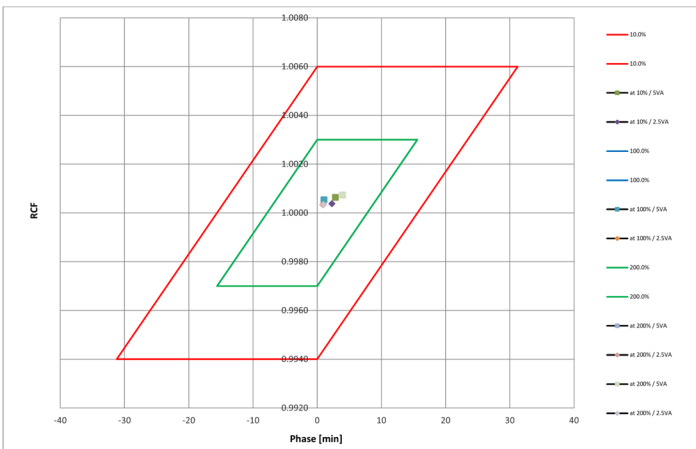


Accuracy Plots for 0.3% Metering Class Current Sensors P/N 95R10/501X (-40°C to +55°C)*

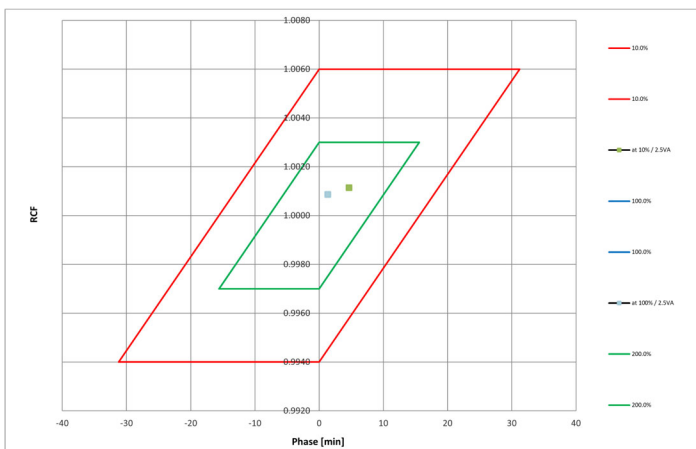
600A:1A Current Sensor P/N 95M10/411X Accuracy Class Plot



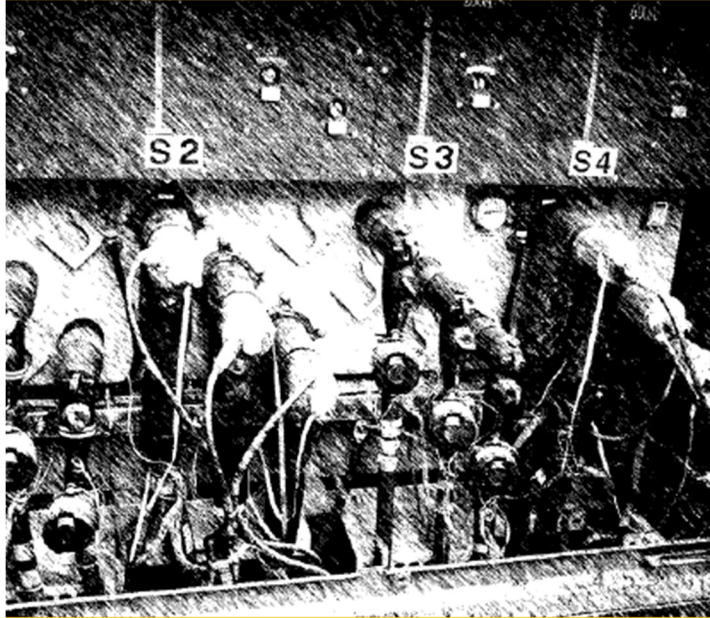
600A:5A Current Sensor P/N 95M10/511X Accuracy Class Plot



300A:5A Current Sensor P/N 95M10/511X Accuracy Class Plot



*IEEE C57.13.6 Plots Shown.



About Lindsey Systems

Lindsey Systems is recognized globally as an innovator in the electric power industry. As a supplier of systems, products, and product solutions for the transmission and distribution of electricity, Lindsey enables utilities to meet the challenges of the modern-day electrical grid.

With over 75 years of experience and a reputation as a thought leader in the industry, Lindsey Systems' products are known around the world for reliability and performance.

Lindsey is ISO-9001, ISO-14001 and CSA W47.2 Certified.

For more information, visit www.Lindsey-USA.com.

Thoughtful Solutions™ in Medium Voltage Sensors

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Publication Number 09B-053 METERING UNDERGROUND • March 2025

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