



# SUPERBUTE™

Current and Voltage Transformers up to 69 kV

SUPERBUTE dry-type instrument transformers are engineered and rigorously tested to provide a measurable difference in reliability and durability. Since the very first unit produced in 1955, SUPERBUTE instrument transformers have provided utilities with a number of benefits for enhanced safety and a lower total cost of ownership. SUPERBUTE is designed to meet IEEE C57.13 standards and ANSI standard mounting provisions, terminals, and construction.



GE's SUPERBUTE family of products supports system voltages up to and including 69 kV. The unique design of the SUPERBUTE family addresses the challenges with traditional voltage and current instrument transformers.

GE's SUPERBUTE product range includes specifications suitable for a wide range of revenue metering, protection and control applications. Common uses include:

- Substation metering and relaying
- Primary metering cabinets
- Pole-top primary metering assemblies
- Control power for reclosers, capacitors, and other distribution equipment
- Current or voltage sensing for switchgear, circuit breakers, and other control equipment



## Features

GE's SUPERBUTE product range consists of Inductive Voltage Transformers and Current Transformers:

- Indoor and outdoor designs
- Rated voltages up to 69 kV
- Rated basic insulation levels (BIL) up to 350 kV
- Relay class ratings up to T800
- Standard & Special High Accuracy metering classes

# SUPERBUTE

## Instrument Transformers

Rugged. Reliable. Proven.

Instrument transformers perform a critical role in the management of power delivery systems by providing the inputs to measurement, protection and control equipment. Therefore, accurate, reliable performance with a long-service life is vital. GE's SUPERBUTE™ dry-type instrument transformers are engineered and rigorously tested to provide a measurable difference in reliability and durability. Since the very first unit produced in 1955, SUPERBUTE instrument transformers have provided utilities with a number of benefits for enhanced safety and a lower total cost of ownership.

### Key Benefits

#### Longer Product Life

Field studies and accelerated life testing has shown an average operating life of more than 40 years, with reliability measures 3 times better than published industry benchmarks

#### Enhanced Safety

Internal insulation is made from epoxy resin which is encapsulated in tough, elastic butyl rubber, dampening and minimizing the impact of high energy events

#### Environmentally Friendly & Minimum Maintenance

Unique dry-type construction ends oil leakage problems, eliminates breakage and vandalism issues, and does not support combustion

#### Lower Total Cost of Ownership

Eliminates the need for oil testing or filtering, and the compact design and mounting flexibility allows for more economical installations such as on existing steel structures, inside a cabinet, or on a pole

#### Fast Delivery

Extensive vertical integration within the factory allows for standard lead times of 4-6 weeks, nearly half the industry average

### Applications

GE's SUPERBUTE product range consists of Inductive Voltage Transformers and Current Transformers rated at 69 kV, 350 kV BIL and below. Both indoor and outdoor designs are available, with specifications suitable for operating revenue meters, instruments, relays and control devices.

Common applications include:

- Substation metering and relaying
- Primary metering cabinets
- Pole-top primary metering assemblies
- Control power for reclosers, capacitors, and other equipment
- Current or voltage sensing for switchgear, circuit breakers, and other control equipment



Imagination at work



### Tough & Resilient Butyl Rubber

- GE's proprietary butyl rubber formula is combined with epoxy for enhanced safety and durability
- Offers superior resistance to thermal and mechanical shocks and environmental extremes
- Does not easily chip or crack
- Performs well at -50°C and in other severe environments
- Non-arc tracking
- Does not support combustion

### Superior Design Features

- Unique primary winding designs ensure accurate, reliable performance
- Lattice-type winding in voltage transformers optimizes the distribution of internal voltage stress allowing for longer-life
- Station-class current transformers have built-in surge protection to quickly clear dangerous fault conditions
- High accuracy and extended range ratings are available for improved revenue metering accuracy
- Extra creep distances allow for use in environmentally severe conditions and in high altitude installations

### Advanced Product Testing

- Tested beyond IEEE® C57.13 requirements to ensure manufacturing consistency and maximum life expectancy
- Select units are 100% impulse tested as short-term reliability screen
- Accelerated life testing in place since 1988 to ensure robust process control
- Several decades of field observation and statistical reliability analysis of large product installations have helped continually improve products and processes



### Product Application

Instrument transformers are used by electrical utilities with other power delivery equipment to step-down line voltage and current for revenue metering, or for input into protection and control devices. Reliable instrument transformer performance is vital to delivering uninterrupted service. Instrument transformers must be able to withstand voltage surges, transients, and other electrical grid events. When installed outdoors, they also must be able to withstand extreme hot to cold temperatures, snow and ice, wind, lightning strikes, ultraviolet radiation and corrosive atmospheres. All these factors provide challenges against unit longevity and reliable operation.

When considering instrument transformers for new installations or when upgrading existing infrastructure, customers focus on the following criteria of:

- Product safety
- Ease of installation
- Life expectancy
- Total ownership cost

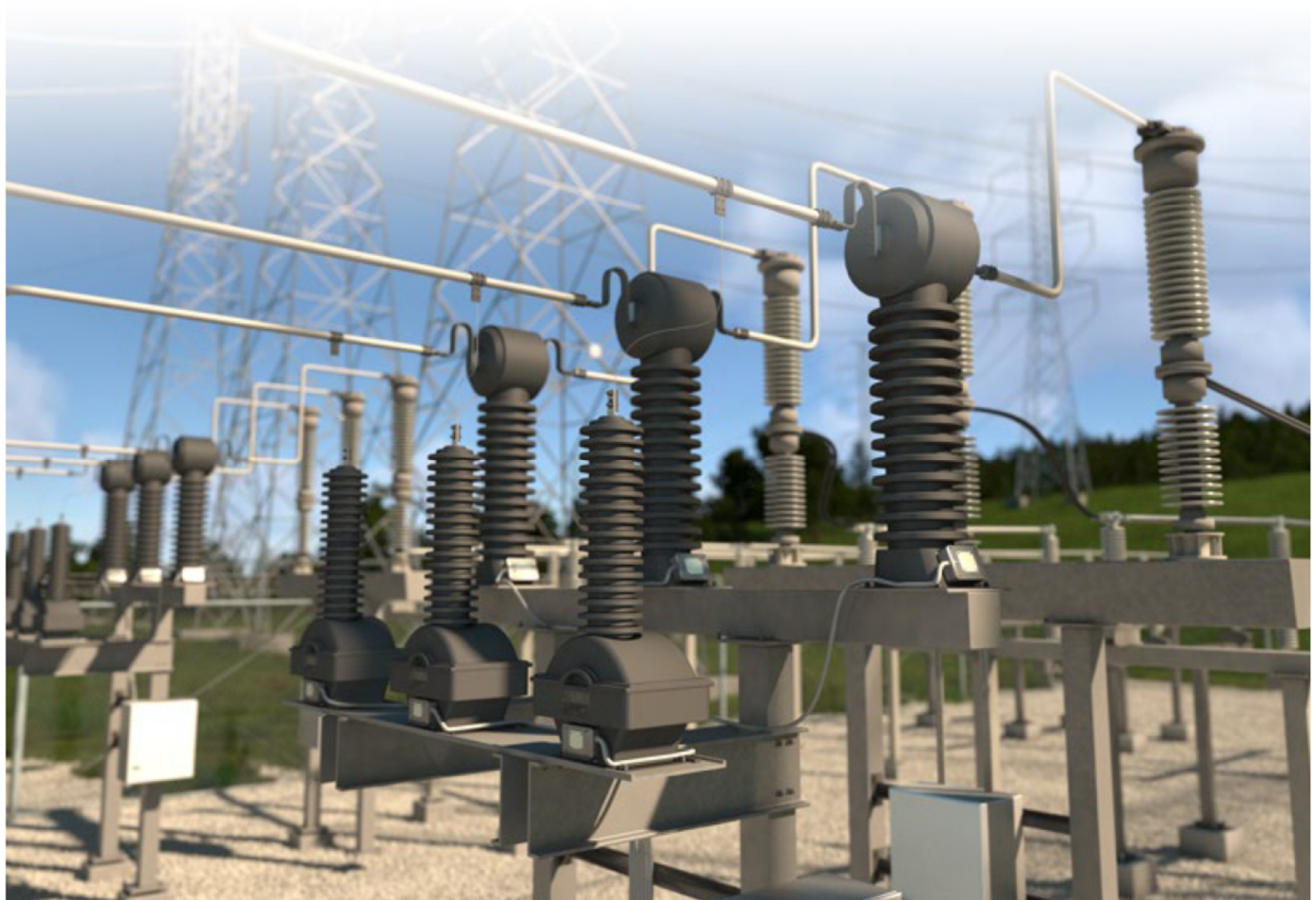
### GE's Solution

GE's SUPERBUTE dry-type butyl rubber voltage and current transformers for transmission, distribution and industrial applications provide seamless integration into electrical infrastructure with ease of installation, long life expectancy and low total cost of ownership.

The SUPERBUTE family of products supports system voltages up to and including 69 kV. The unique design of the SUPERBUTE family addresses the challenges with traditional voltage and current instrument transformers.



*Front Row, Left to Right: Model JVM5 Indoor PT, Model JCM3 Bar-Type CT, Model JCK5 Distribution-Class CT, and Model JKM5 Indoor CT  
Back Row: Model JW5 Distribution-Class Outdoor VT*



*Model JVS-350 and JKW-350 Station-Class Outdoor Instrument Transformers*

## SUPERBUTE Advantage

### Proprietary butyl rubber formula provides enhanced safety and durability

The insulation system of SUPERBUTE current and voltage transformers is made with a unique and innovative combination of epoxy resin plus tough and resilient butyl rubber to increase safety and offer superior protection for the unit against the harsh outdoor elements.

#### HY-BUTE 60™ butyl rubber as the external insulation

The outer shell of SUPERBUTE transformers are made with GE's proprietary formula of butyl rubber, which is called HY-BUTE 60. This material adds the following timeless advantages over epoxy resins or porcelains designs:

- Encapsulating the unit with a tough, elastic rubber provides an inherent safety advantage as it dampens the severity of any potential failure
- Unique chemistry provides for non-arc tracking surface, significantly reducing risk of failure from flashover
- Legendary durability as this material does not easily chip, crack, or shear
- Will not stress crack due to the external environment, even in extreme conditions such as -50°C
- Maintains hydrophobicity over the life of the transformer
- Does not support combustion
- Does not oxidize or corrode



*GE's proprietary formula of non-arc tracking butyl rubber showed no carbonization after 4,000 hours in salt-fog testing, compared to standard butyl rubber which failed after 107 hours or standard porcelain which failed after 400 hours under the same conditions*

#### Epoxy as the internal insulation

Epoxy takes the place of oil as the internal insulation and winding impregnation. The advantage of this design includes:

- Reduced footprint with a compact design with up to 30% less height than the leading oil-filled designs
- High tensile strength which allows for mounting in any position including vertical, horizontal, upside down, or at any angle
- Environmentally friendly design eliminates hidden costs associated with traditional liquid-filled designs such as:
  - oil-leakage problems
  - oil filtering or testing
  - construction requirements for a large installation space or dedicated support structure



*Cross section of a JVS350 station-class voltage transformer showing epoxy encapsulated with HY-BUTE 60 butyl rubber shell*



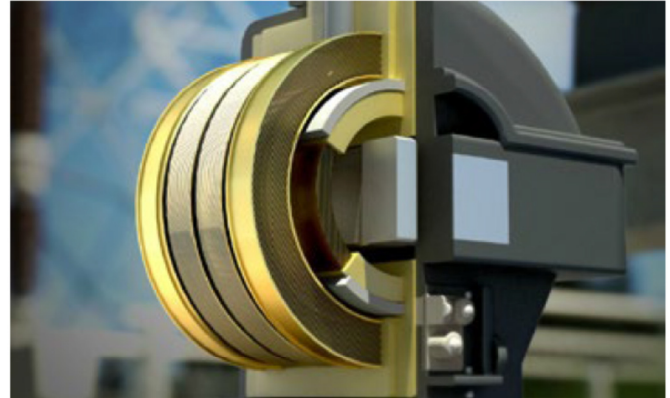
## SUPERBUTE Advantage

### Superior primary winding design and extra creep distance ensure accurate, reliable performance in harsh conditions

SUPERBUTE instrument transformers are designed for quality and reliability with features engineered to withstand high voltage stresses and extreme environmental conditions, while delivering the highest accuracies possible, all within a compact design. The result is a reliable, long-lasting, easy to handle design that ultimately lowers total cost of ownership.

#### Lattice-type windings for voltage transformer

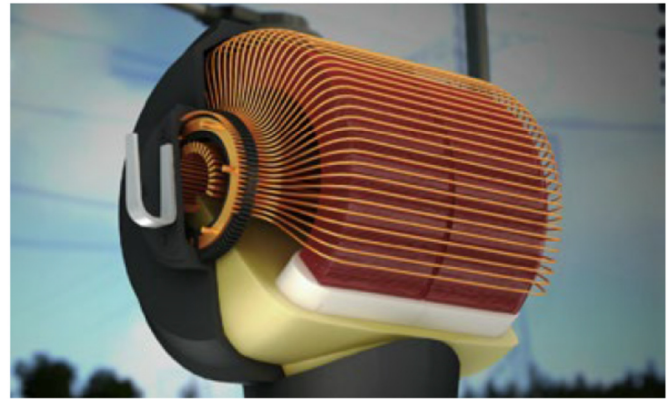
Originally patented by GE, lattice-type windings have precise controlled positioning and distribution of each turn to reduce maximum voltage stress within the winding. This unique design also minimizes the possibility of partial discharges within the winding. The coil configuration, and the outer electrostatic shields distribute steep voltage fronts across the coil to reduce concentration of stress.



Lattice-type winding in a JVS350 station-class VT

#### Built-in surge protection for current transformers

A unique multi-gap type primary by-pass on current transformers 600 amps and below protects windings during line disturbances or steep current wave fronts. The gaps are factory adjusted to fire at 5000-7500 crest volts, thereby by-passing surge currents up to 100 times rated, which could otherwise result in excessive voltages across the primary winding.



Multi-gap type primary in a JKW350 station-class CT

#### High accuracy, extended range ratings for current transformers

The use of high accuracy instrument transformers with solid-state metering allows for improved billing accuracy and/or the potential to reduce inventory requirements. GE offers high accuracy and extended range ratings which meet the accuracy needed for these applications. Since introducing the first dry-type high-accuracy transformer solution in 1991, GE's high accuracy product line has grown to a portfolio that includes a wide variety of voltage classes up to and including 69 kV.

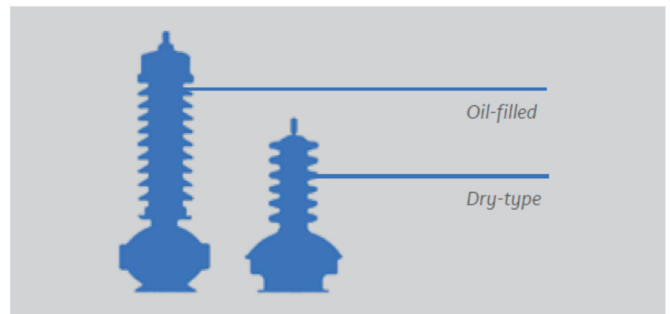
#### Compact size & mounting flexibility

SUPERBUTE transformers require up to 30% less height and up to 40% less floor space compared to the leading oil-filled designs, and can be mounted in any position. This allows substation design flexibility including mounting on a substation steel structure or a pole.

#### Extra creep & strike

Even with 30% less height, standard units can be used in environmentally severe conditions and in high altitude (10,000 ft) applications. Station class units have creep distances that exceed the requirements for even the next-level voltage class.

BIL (kV)	SUPERBUTE Station-Class Creepage (in.)	IEEE Required Creepage (in.)
110 kV	20.4 - 24	11
150 kV	27 - 44	17
200 kV	35 - 56	26
250 kV	48 - 71	35
350 kV	66 - 86	48



SUPERBUTE transformers are more compact and lower profile when compared to liquid filled transformers

## Tested above and beyond IEEE C57.13 requirements to ensure manufacturing consistency and maximize life expectancy

All SUPERBUTE instrument transformers are designed and tested per IEEE C57.13 standards and the manufacturing facility is ISO<sup>®</sup> 9001 certified. In addition to IEEE routine testing requirements, GE instrument transformers undergo additional testing designed to ensure manufacturing consistency and maximize life expectancy. This includes an accelerated life test program that has been in place since 1988 as a weekly audit for process control. This database of information is now quite mature and is used to help predict in service results. Decades of field performance with a large installed base combined with statistical reliability analysis has helped GE continually improve our products and processes, and stay ahead of ever-increasing customer expectations.

### IEEE C57.13 routine factory tests

- Applied Potential – check insulation between windings and windings to ground
- Induced Potential – checks insulation within windings
- Accuracy and Polarity – checks ratio and phase angle and highest and lowest rated burdens
- Certified test reports and electronic test data available upon request

### GE specific routine tests

- Select units are 100% impulse tested as short-term reliability screen
- Partial discharge per GE proven test method (ionization)

### Field performance tracking

- Establishes benchmark for reliability
- Helps GE demonstrate produce performance
- Helps customer pinpoint system problems
- Correlated to GE accelerated life test results



*Impulse and partial discharge testing a 72.5 kV, 350 kV BIL substation-class PT. Both chop wave and full wave impulse testing is performed as a routine test on all SUPERBUTE units 8.7 kV and above*



# SUPERBUTE Product Overview

## Inductive Voltage Transformers

### Outdoor Voltage Transformers

Outdoor voltage transformers are available at 5-69 kV and 60-350 kV BIL. These units are offered in two distinct sizes for efficient sizing:

#### Station class

Higher burden, higher thermal rating, and extra creep distance for metering and/or relaying applications in substations or installations where higher ratings are required such as high altitude or high contamination locations.





#### Distribution class

Compact designs, with lighter burden and thermal rating for more efficient application to solid-state metering and other modern relay and control power installations.

Product Class	5 kV	8.7 kV	15 kV	25 kV	35 kV	46 kV	69 kV
Station Class		JVW4	JVW5	JVS150 JVT150	JVS200 JVT200	JVS250 JVT250	JVS350 JVT350
							
BIL		75 kV BIL	110 kV BIL	150 kV BIL	200 kV BIL	250 kV BIL	350 kV BIL
Accuracy, kVA Rating		0.3Z, 1.5 kVA	0.3Z, 1.5 kVA	0.3ZZ, 3 kVA	0.3ZZ, 3 kVA	0.3ZZ, 4.5-5 kVA	0.3ZZ, 4.5-5 kVA
Creep Distance		20.4" Creep	20.4" Creep	27-27.5" Creep	35-36" Creep	48-50" Creep	64-66" Creep
Net Weight		105 lbs	105 lbs	225-230 lbs	235-240 lbs	420-520 lbs	430-560 lbs
Accubute™ (.15S Class)		JVW4A	JVW5A				
Distribution Class	JVW3		JVW110	JVW6	JVW7		
							
BIL	60 kV BIL		110 kV BIL	125 - 150 kV BIL	150-200 kV BIL		
Accuracy, kVA Rating	0.3Y, 0.75 kVA		0.3Y, 1 kVA	0.3Y, 0.75 kVA	0.3Y, 0.75 kVA		
Creep Distance	13.5" Creep		20.4" Creep	21" Creep	26.5" Creep		
Net Weight	44 lbs		100 lbs	105 lbs	140 lbs		
Accubute™ (.15S Class)				JVW6A	JVW7A		

### Indoor Voltage Transformers

Indoor Voltage Transformers are available at 5-25 kV system voltage and 60-150 kV BIL.

Product Class	5 kV	8.7 kV	15 kV	25 kV
Indoor	JVM3	JVM4	JVM5	JVM6
				
BIL	60 kV BIL	75 kV BIL	110 kV BIL	125 kV BIL
Accuracy, kVA Rating	0.3Y, 0.75 kVA	0.3Z, 1.5 kVA	0.3Z, 1.5 kVA	0.3Y, 0.75 kVA
Net Weight	33 lbs	85 lbs	85 lbs	95 lbs
Accubute™ (.15S Class)		JVW4A	JVW5A	

\*High accuracy versions available in most designs, designated with an "A" in the model name for 0.15 class (e.g. JVW5A)

# Current Transformers

## Outdoor Current Transformers

Outdoor current transformers are available in Bar-Type and Window-Type styles, 5-15 kV, 60 kV-110 kV BIL, up to 4000 A. Outdoor wound-type current transformers (CTs) are available 5-69 kV, 60-350 kV BIL, up to 1200 A. Wound-type units are available in two distinct sizes:

### Station class

Station class CT's have a versatile design that is suitable for metering and/or relaying applications. Units are larger in size, have additional creep distance, and are rated for heavier metering burdens.

### Distribution class

Distribution class CT's are more compact and are designed specifically for maximum efficiency in solid-state revenue metering applications. These CT's generally do not have a relay rating.

Product Class	5 kV	8.7 kV	15 kV	25 kV	35 kV	46 kV	69 kV
Station Class	JKW3	JKW4	JKW5	JKW150	JKW200	JKW250	JKW350
							
BIL	60 kV BIL	75 kV BIL	110 kV BIL	150 kV BIL	200 kV BIL	250 kV BIL	350 kV BIL
Accuracy , Rating Factor*	0.3B1.8, RF 1.5	0.3B1.8, RF 1.5	0.3B1.8, RF 1.5	0.3B1.8, RF 2.0/1.5	0.3B1.8, RF 2.0/1.5	0.3B1.8, RF 2.0/1.5	0.3B1.8, RF 2.0/1.5
Relay Class	T100	T100	T200	T200/T400	T200/T400	T200/T400	T200/T400
Creep Distance	12.5" Creep	12.5" Creep	24" Creep	44.1" Creep	56.6" Creep	71.0" Creep	86.6" Creep
Net Weight	40 lbs	40 lbs	60 lbs	323 lbs	348 lbs	543 lbs	593 lbs
Accubute™ (.15S Class)	JKW3A	JKW4A	JKW5A			JKW250A	JKW350A
*RevenueSense™ (.15% down to 1%)				JKW150ER	JKW200ER	JKW250ER	JKW350ER
Distribution Class	JCK3	JCK4	JCK5	JKW6**	JKW7		
							
BIL	60 kV BIL	75 kV BIL	110 kV BIL	150 kV BIL	200 kV BIL		
Accuracy , Rating Factor*	0.3B0.5, RF 3.0	0.3B0.5, RF 3.0	0.3B0.5, RF 3.0	0.3B0.9, RF 3.0**	0.3B0.5, RF 3.0		
Relay Class	---	---	---	T100 or T200	---		
Creep Distance	15.5" Creep	15.5" Creep	15.5" Creep	24" Creep	27.6" Creep		
Net Weight	35 lbs	35 lbs	35 lbs	80 lbs	72 lbs		
Accubute™ (.15S Class)				JKW6A			
*RevenueSense™ (.15% down to 1%)				JKW6ER	JKW7ER		
Bar Type	JCW3	JCW4	JCW5				
Bar Type, Special High Accuracy	JCW3A	JCW4A	JCW5A				
Window Type	JCD3	JCD4	JCD5				
Window Type, Special High	JCD3A	JCD4A	JCD5A				

\*High accuracy versions available in most designs, designated with an "A" in the model name for 0.15S class, or "ER" for High Accuracy Extended Range

\*\*Model JKW6 has several variations available, many of which meet station class performance including a B1.8, RF 1.5 option



## Indoor Current Transformers

Indoor Current Transformers are available 5-15 kV system voltage and 60-150 kV BIL. Product types include wound type up to 1200 A, and window-type or bar-type up to 4000 A.

Product Class	5 kV	8.7 kV	15 kV
Wound Type	JKM3	JKM4	JKM5



BIL	60 kV BIL	75 kV BIL	110 kV BIL
Accuracy , Rating Factor*	0.3B1.8, RF 1.5	0.3B1.8, RF 1.5	0.3B1.8, RF 1.5
Relay Class	T100	T100	T200
Net Weight	30 lbs	30 lbs	49 lbs
Accubute™ (.15S Class)	JKM3A	JKM4A	JKM5A
Bar type	JCM3	JCM4	JCM5
Bar Type, Special High Accuracy	JCM3A	JCW4A	JCW5A
Window Type	JCB3	JCB4	JCB5
Window Type, Special High Accuracy	JCB3A	JCB4A	JCB5A

\*High accuracy versions available in most designs, designated with an "A" in the model name for 0.15S class, or "ER" for Extended Range (e.g. JKW5A)

## Combination CT/VT

### Outdoor CT/VT

Designed for outdoor service, a combination voltage transformer (VT) and current transformer (CT) is typically used for primary metering applications. GE's RevenueSense™ CT design provides 0.15 accuracy from 1% of rated current through rating factor.

Product Class	15 kV
Distribution Class	JBW5ER



BIL	110 kV
Accuracy , Rating Factor*	0.15B0.5, RF 3.0
Relay Class	---
VT Thermal Rating	500 VA
Creep Distance	25.6"
Net Weight	145 lbs

# Superbute™ Instrument Transformers



## Substation Class Dry-Type Instrument Transformers

From the arctic cold, to the desert heat, to the salty coastal air. Through lightning, snow storms, and hail. Since 1965, Superbute dry-type transformers have given utilities superior performance and reliability in even the harshest of operating conditions. GE's Superbute products offer the following unique features:

### Maximum Reliability

Unique design features such as GE's lattice wound primary coil and HyBute60™ insulating material provide for reliable operation and long service life. Proven field experience with field studies showing of 40 to 60 year life expectancy and observed field failure rates 3X better than traditional oil-filled transformers.

### Improved Safety

GE's resilient butyl rubber insulation allows for a failure mode that is typically passive & self-contained, eliminating risks such as porcelain or metal projectiles, oil spills, or fire hazard, all which can accompany an oil-filled unit failure.

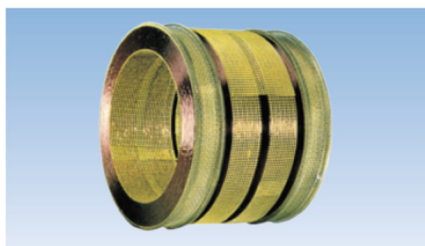
### Mounting Convenience and Minimum Maintenance

Dry-type construction ends oil leakage problems. Tough butyl rubber will not easily chip or crack. Corrosion resistant construction defies moisture and oxidation. Smaller footprint, less height and less weight, high cantilever strength and no oil all allow for convenient installation onto existing structures.

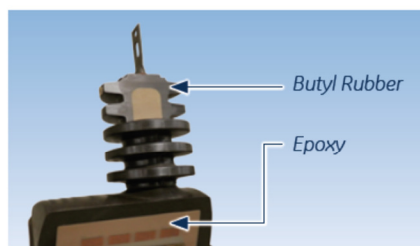
### Extra Creep

Superbutes can be used in environmentally severe and high altitude applications, thanks to extra creep distance which exceeds that of any leading oil-filled design.

## Advanced Rugged Design

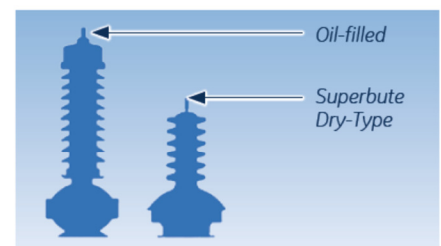


The primary coil is the most critical component of any voltage transformer. GE's lattice wound primary coil, patented in 1967, is the secret to the legendary durability of GE Superbute product.



Outer shell is HyBute60 butyl rubber; a hydrophobic, non-arc tracking material proven to be superior in handling mechanical and environmental extremes.

Internally filled with epoxy for high dielectric strength and mounting flexibility.



Even with their nice, compact size (up to 30% lower profile), Superbutes have more creep distance than oil-filled designs. This is an important factor in providing superior performance in coastal installations and other extreme environments.





## Voltage Transformers

MODEL	BIL (KV)	RATED PRIMARY VOLTAGE	NOMINAL SYSTEM VOLTAGE	RATIO (PRI:SEC) <sup>1</sup>	THERMAL RATING 30°C AMB	CREEP DISTANCE	APPROX. WEIGHT (LB.)		AVAILABLE IEEE METERING CLASSES AND BURDENS, 60HZ	
							(SHIP)	(NET)	STANDARD	HIGH ACC. <sup>2</sup>
<b>Single Bushing (for line to ground connection, only)</b>										
JVS-150	150	14400	24000	120/200 & 120/200:1	3000VA	27"	270	230	0.3 ZZ	0.15 Z
JVS-200	200	20125	34500	175/300 & 175/300:1	3000VA	36"	280	240	0.3 ZZ	0.15 Z
JVS-250	250	27600	46000	240/400 & 240/400:1	5000VA <sup>1</sup>	50"	480	420	0.3 ZZ	0.15 Z
JVS-350	350	40250	69000	350/600 & 350/600:1	5000VA <sup>1</sup>	64"	490	430	0.3 ZZ	0.15 Z
<b>Two Bushing (for line to line connection)</b>										
JVT-150	150	24000	24000	200 & 200:1	3000VA <sup>2</sup>	26"	265	225	0.3 ZZ	0.15 Z
JVT-200	200	34500	34500	300 & 300:1	3000VA <sup>2</sup>	36"	275	235	0.3 ZZ	0.15 Z
JVT-250	250	46000	46000	400:1	4500VA	52"	580	520	0.3 ZZ	0.15 Z
JVT-350	350	69000	69000	600:1	4500VA	66"	620	560	0.3 ZZ	0.15 Z

- To achieve 5000VA when using a 67.08 volt tap, loading must not exceed 3000VA on the 67.08 volt tap. If all load is on one 67.08 volt tap, thermal rating is 4000VA.
- With both secondary windings in parallel. When windings are used separately, the rating is 1500VA per winding. If only one winding is used separately, the rating is 2000VA.

JVS-200



JVT-200



## Current Transformers

MODEL	BIL (KV)	NOMINAL SYSTEM VOLTAGE	RATIO (PRI:SEC) <sup>1</sup>	CREEP	APPROX. WEIGHT (LB.)		AVAILABLE IEEE METERING CLASSES AND BURDENS, 60HZ	
					(SHIP)	(NET)	STANDARD	HIGH ACC. <sup>2</sup>
JKW-150	150	24000	25/50:5 50/100:5 75/150:5 100/200:5	26"	378	323	0.3 B1.8 (both ratios)	0.15S B0.5 (high ratio <sup>3</sup> )
JKW-200	200	34500	150/300:5 200/400:5 300/600:5	35"	403	348		
JKW-250	250	46000	400/800:5 500/1000:5 600/1200:5	48"	633	543		
JKW-350	350	69000	800/1600:5 1000/2000:5 1500/3000:5	64"	683	593		

- Also available as single ratio, upon request.
- Contact factory for availability of "Extended Range", 0.15% accuracy from 1% of rated primary current thru rating factor.
- Low ratio (tap) is rated 0.15 B0.5 if primary current is less than 600A, otherwise 0.15S B0.5.

JVS-350



JVT-350



JKW-200



JKW-350



## Current Transformer Relay Class (60Hz), Thermal & Mechanical Ratings

CONNECTION	RATED PRIMARY AMPS	RELAY CLASS	RATING FACTOR, 30°C AMBIENT	ONE SECOND THERMAL LIMIT AMPS	MECHANICAL LIMIT AMPS
High Ratio (X1-X3)	50A thru 2000A	T400	1.5	75 x Rated	85 x Rated
Low Ratio (X2-X3)	25A thru 1000A	T200	2	75 x Rated	170 x Rated
	1500A	T400	1.5	75 x Rated	170 x Rated

Digital Energy

Toll Free: +1 877-605-6777

Direct: +1 678-844-6777

gedigitalenergy@ge.com

[GEDigitalEnergy.com](http://GEDigitalEnergy.com)