

# Reclosers

## “Slip-On” Bushing CT Kits KA712L1S, KA712L2S, KA712L3S, and KA712L5S Installation Instructions and Technical Data

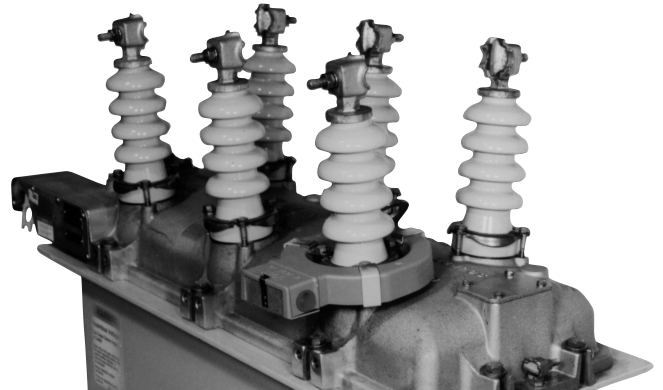
Service Information

# S280-90-5



**Figure 1.**  
Multi-Ratio, “Slip-On” CT kit.

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**Figure 2.**  
CT properly installed on bushing.

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**TABLE 1**  
Kit Parts

Part Description	KA712L1S	KA712L2S	KA712L3S	KA712L5S
Current transformer assembly (CT)	1	1	1	1
Cover assembly / nameplate	1	1	1	1
Clamp	3	3	3	1 short, 2 long
Washer	3	3	3	3
Eyebolt	1	—	1	1
Palnut	1	—	1	1

**Note:** If desired, connect set of 3 BCTs for kit KA712L2S with wiring kit KA895RS. Contact your Cooper Power Systems representative for additional information.

**TABLE 2**  
Kit Description and Application

Catalog Number	Kit Description	Single-Phase Reclosers	Three-Phase Reclosers***	Sectionalizers	Switches
KA712L1S	Multi-ratio (450:5 ratio) “Slip-on” Bushing CT	E, 4E, L, V4L, V4E, VXE	3H, 6H, V6H	GN3, GV*, GN3E, GN3VE	TSC, VRV
KA712L2S (see note)	Multi-ratio (600:5 ratio) “Slip-on” Bushing CT	DV	R**, RE, RX, RXE, RV, RVE, W, WE, WV27, WV38X, WVE27, WVE38X, VW, VWE, VWV27, VWV38X, VWVE27, VWVE38X	GW, GWC	F
KA712L3S	Multi-ratio (600:5 ratio) “Slip-on” Bushing CT	D	—	—	—
KA712L5S	Multi-ratio (600:5 ratio) “Slip-on” Bushing CT	VXE	—	—	—

\* Not applicable above Serial No. 1000.

\*\* Not applicable below Serial No. 3733.

\*\*\* Installing this kit on all three phases of a three-phase recloser requires three kits (one kit for each phase).

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## SAFETY FOR LIFE



Cooper Power Systems products meet or exceed all applicable industry standards relating to product safety. We actively promote safe practices in the use and maintenance of our products through our service literature, instructional training programs, and the continuous efforts of all Cooper Power Systems employees involved in product design, manufacture, marketing, and service.

We strongly urge that you always follow all locally approved safety procedures and safety instructions when working around high voltage lines and equipment and support our “Safety For Life” mission.

## SAFETY INFORMATION

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians who are familiar with this equipment should install, operate, and service it.


*A competent technician has these qualifications:*


- *Is thoroughly familiar with these instructions.*
- *Is trained in industry-accepted high- and low-voltage safe operating practices and procedures.*
- *Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.*
- *Is trained in the care and use of protective equipment such as flash clothing, safety glasses, face shield, hard hat, rubber gloves, hotstick, etc.*


Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

### Hazard Statement Definitions

This manual may contain four types of hazard statements:

 **DANGER:** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

 **WARNING:** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **CAUTION:** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

**CAUTION:** Indicates a potentially hazardous situation which, if not avoided, may result in equipment damage only.

### Safety Instructions

Following are general caution and warning statements that apply to this equipment. Additional statements, related to specific tasks and procedures, are located throughout the manual.



**DANGER:** Hazardous voltage. Contact with hazardous voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high and low voltage lines and equipment.

G103.3



**WARNING:** Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this manual. Improper operation, handling or maintenance can result in death, severe personal injury, and equipment damage.

G101.0



**WARNING:** This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply can result in death, severe personal injury, and equipment damage.

G102.1



**WARNING:** Power distribution equipment must be properly selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install, or maintain power distribution equipment can result in death, severe personal injury, and equipment damage.

G122.2

## PRODUCT INFORMATION

### Introduction

*Service Information* S280-90-5 provides installation instructions and technical data for the Kyle® KA712L1S, KA712L2S, KA712L3S, and KA712L5S “Slip-On” Bushing CT kits.

**Note:** Users intending to install the “Slip-On” Bushing CT kit on all three phases of a three-phase recloser must order three kits (one kit per phase).

**Note:** If desired, connect set of 3 BCTs for kit KA712L2S with wiring kit KA895RS. Contact your Cooper Power Systems representative for additional information.

### Read This Manual First

Read and understand the contents of this manual and follow all locally approved procedures and safety practices before installing or operating this equipment.

### Additional Information

These instructions cannot cover all details or variations in the equipment, procedures, or process described nor provide directions for meeting every possible contingency during installation, operation, or maintenance. For additional information, contact your Cooper Power Systems representative.

In addition to this manual, also refer to the appropriate service manual for the model being equipped with the kit.

### Acceptance and Initial Inspection

Each “Slip-On” Bushing CT kit is in good condition at the factory and when accepted by the carrier for shipment.

Upon receipt, inspect the carton for signs of damage. Unpack the kit(s) and inspect it thoroughly for damage incurred during shipment. If damage is discovered, file a claim with the carrier immediately.

### Handling and Storage

Be careful during handling and storage of the kit to minimize the possibility of damage. If the kit is to be stored for any length of time prior to installation, provide a clean, dry storage area.

### ANSI Standards

Kyle reclosers are designed and tested in accordance with ANSI standards C37.60 and C37.85 and ANSI guideline C37.61.

### Quality Standards

The Quality System at the Cooper Power Systems, Kyle Distribution Switchgear plant is certified to the ISO 9001 standard.

### Description

The slip-on, multi-ratio bushing current transformers are especially designed for use with numerous Kyle® single- and three-phase distribution switchgear for load metering at the equipment location. The CT is available only as a kit for field installation. The kit consists of the epoxy-encapsulated, current-transformer assembly, cover assembly/nameplate, three clamps and washers for attaching the CT to the bushing clamping bolts of the switchgear unit, and an eyebolt lifting lug with a palnut, if applicable (Figure 1 and Table 1). An eyebolt and palnut are supplied with kits KA712L1S, KA712L3S, and KA712L5S for replacement of the standard fabricated lifting lug, to allow additional clearance for the CT on the head.

Refer to Table 2 for the appropriate application of each kit.

Product Type	Model	Service Information
Single-Phase Reclosers	E, 4E, L D, DV VXE V4L, V4E	S280-10-8 S280-20-1 S280-16-1 S280-10-8
Three-Phase Reclosers	3H 6H, V6H R RE RX RXE RV RV Serial No. 4111 and after RVE W, WV27, WV38X VW, VWV27, VWV38X WE, WVE27, WVE38X, VWE, VWVE27, VWVE38X	S280-10-4 S280-10-14 S280-30-2 S280-40-3 S280-30-8 S280-40-7 S280-30-4 S280-30-9 S280-40-5  S280-30-1 S280-40-2
Sectionalizers	GN3 GN3E, GN3VE GV Serial No. 1302 and above GV Serial No. 2265 and above GW GWC	S270-10-8 S270-15-1 S270-20-2 S270-20-3 S270-20-3 S270-21-1
Switches	F TSC VRV	S260-50-1 S260-20-10 S260-20-6

## INSTALLATION PROCEDURE

Refer to the appropriate service information instruction manual for the step-by-step procedures to remove the recloser from service. Refer to the **Product Information** section of this manual for specific service manual information.

**IMPORTANT:** Remove the recloser from service and transport it to a clean suitably equipped service center prior to installing the kit.

**WARNING:** Hazardous voltage. De-energize the switchgear before installing this kit. Follow all locally approved safety practices and procedures when working around high voltage lines and equipment. Failure to comply can result in contact with high voltage, which will cause death or severe personal injury. T232.3

**CAUTION:** Follow all locally approved safety practices when lifting and mounting the equipment. Use the tapped lifting provisions provided. Lift the load smoothly and do not allow the load to shift. Improper lifting can result in equipment damage. G126.0

To begin the installation process:

1. Bypass, trip, and de-energize the recloser.
2. Disconnect the lead wires from the bushings.
3. Carefully transport the unit to a suitable service facility.

**Note:** If the recloser is equipped with extra-creepage bushings, it may be necessary to remove the bushings when installing the "slip-on" bushing CT. This may require the tank to be dropped.

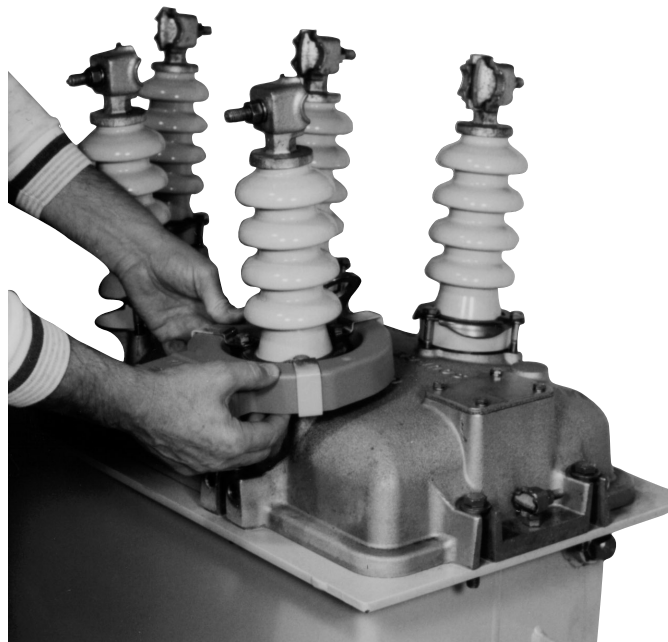
**CAUTION:** Equipment damage. Refer to the specific switchgear unit maintenance manual for tanking/untanking procedures and related instructions. Failure to follow these instructions could result in equipment damage or personal injury. T238.0

4. For kit KA712L2, skip Step 4. Continue with Step 5.

This step is only applicable to kits KA712L1, KA712L3, and KA712L5:

Remove the fabricated lifting lug from the head and substitute the eyebolt lug, locking it in position with the palnut.

5. Slip the CT over the top of the bushing and position it at the base of the bushing with the terminal box positioned outboard and the black-epoxy-side down.
6. Loosen the three bushing clamping bolts and attach the CT by slipping the slotted end of the clamp under the lockwasher while clipping the other end to the CT (Figure 3). Position the clamp so the top surface of the CT is at the level of the bushing clamps in order to maintain the BIL rating of the switch gear unit.



**Figure 3.**  
Mounting clamp is clipped to CT assembly and attached under bushing clamping bolt.

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For kit KA712L5, position the shorter clamp closest to the eyebolt lifting lug and position the two longer clamps towards the outside of the head casting.

**Note:** Make sure the insulation coating on the CT end of the clamp is intact and undamaged. If bare metal on this end of the bracket touches the head, a "shorted-turn" effect is produced which affects the CT output and accuracy.

**CAUTION:** Equipment Damage. Do not attempt to mount the bushing CT by drilling or tapping into the CT ring assembly. Perforation of the CT ring can damage the internal windings and cause ingress of moisture. Failure to comply can result in equipment damage and misoperation. T298.0

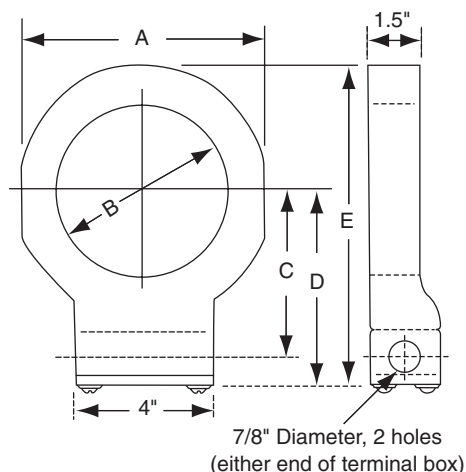
7. Retighten all three bushing clamping bolts evenly, a little at a time. Refer to Table 3 for the appropriate bushing bolt torque specifications.
8. Snap the cover assembly over the terminal connectors of the CT housing. A properly installed CT kit is shown in Figure 2.

## Connections

Connections to the CT are made in the junction box. Terminal connections for the various ratios are shown on the inside of the junction-box cover. The junction box has 7/8 in. diameter holes at either end which will accommodate standard 1/2 in. conduit fittings or Pyle-National, DS series cable-sealing grips (if rubber-covered cable is used for the meter leads).

**IMPORTANT:** Do not remove the shorting lead across CT terminals until external connections are made.

## DIMENSIONS



Dimension	Multi-Ratio 450:5	Multi-Ratio 600:5
A	6 15/16	7 3/4
B	4 3/4	5 1/2
C	4 7/8	5 9/32
D	5 5/8	6 1/16
E	9 1/8	9 15/16

**TABLE 3**  
**Bushing Bolt Torque Specifications**

Model	Bushing Bolts Applied Torque Ft. • Lbs.
3H	6-10
GN3E, GN3, GN3VE, 6H, V6H	6-10
GV	6-10
L, E, 4E, V4L, V4E, VXE-15, VXE-27	6-10
VWE, VWVE27, VWVE38X, R, RE, RX, RXE, WV27, WV38X GWC, GW, RV, RVE, W, WE, WVE27, WVE38X, VRV, VW, VWV27, VWV38X	10-15

## ELECTRICAL DATA AND CHARACTERISTICS

The current transformers have four taps to provide the following ratios within a  $\pm 5\%$  accuracy for conventional metering.

### Multi-Ratio 450:5

Catalog Number: KA712L1S

DC Resistance	Current Ratio	Connection Terminals
.034 $\Omega$ 40T	100:5	B-C
.014 $\Omega$ 18T	150:5	C-D
.024 $\Omega$ 29T	200:5	A-B
	250:5	B-D
	300:5	A-C
	450:5	A-D

Winding - NO. 14 AWG

### Multi-Ratio 600:5

Catalog Numbers: KA712L2S, KA712L3S,  
and KA712L5S

DC Resistance	Current Ratio	Connection Terminals
.047 $\Omega$ 40T	100:5	C-D
.070 $\Omega$ 60T	200:5	A-B
.021 $\Omega$ 18T	300:5	B-C
	400:5	B-D
	500:5	A-C
	600:5	A-D

Winding - NO. 16 AWG

All CTs can carry 150% of rated secondary current continuously.

**Note:** Physical construction requires an irregular turns ratio for some windings to provide  $\pm 5\%$  accuracy at all ratios.

## Correction Curves

If accuracies greater than the nominal  $\pm 5\%$  are desired, typical correction curves for the CTs at all ratios are shown in Figures 4 and 5. The correction curves are drawn for three different transformer burdens:

Curve 1: 0.4  $\Omega$  impedance

Curve 2: 0.21  $\Omega$  impedance

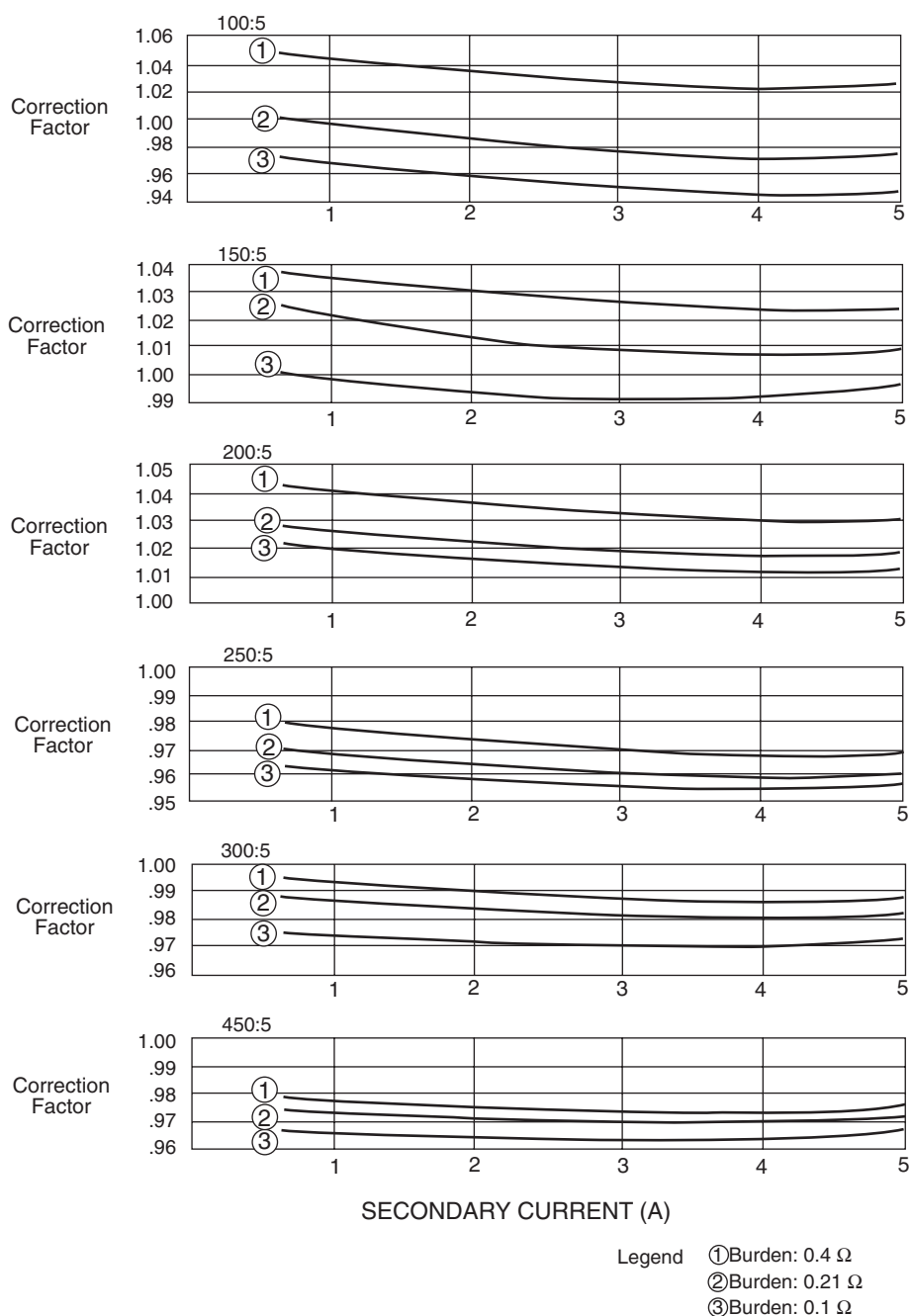
Curve 3: 0.1  $\Omega$  impedance

The 0.21  $\Omega$  burden represents the impedance of a Sangamo Type ADS meter with a 5 A scale and instantaneous elements. The 0.4  $\Omega$  burden represents

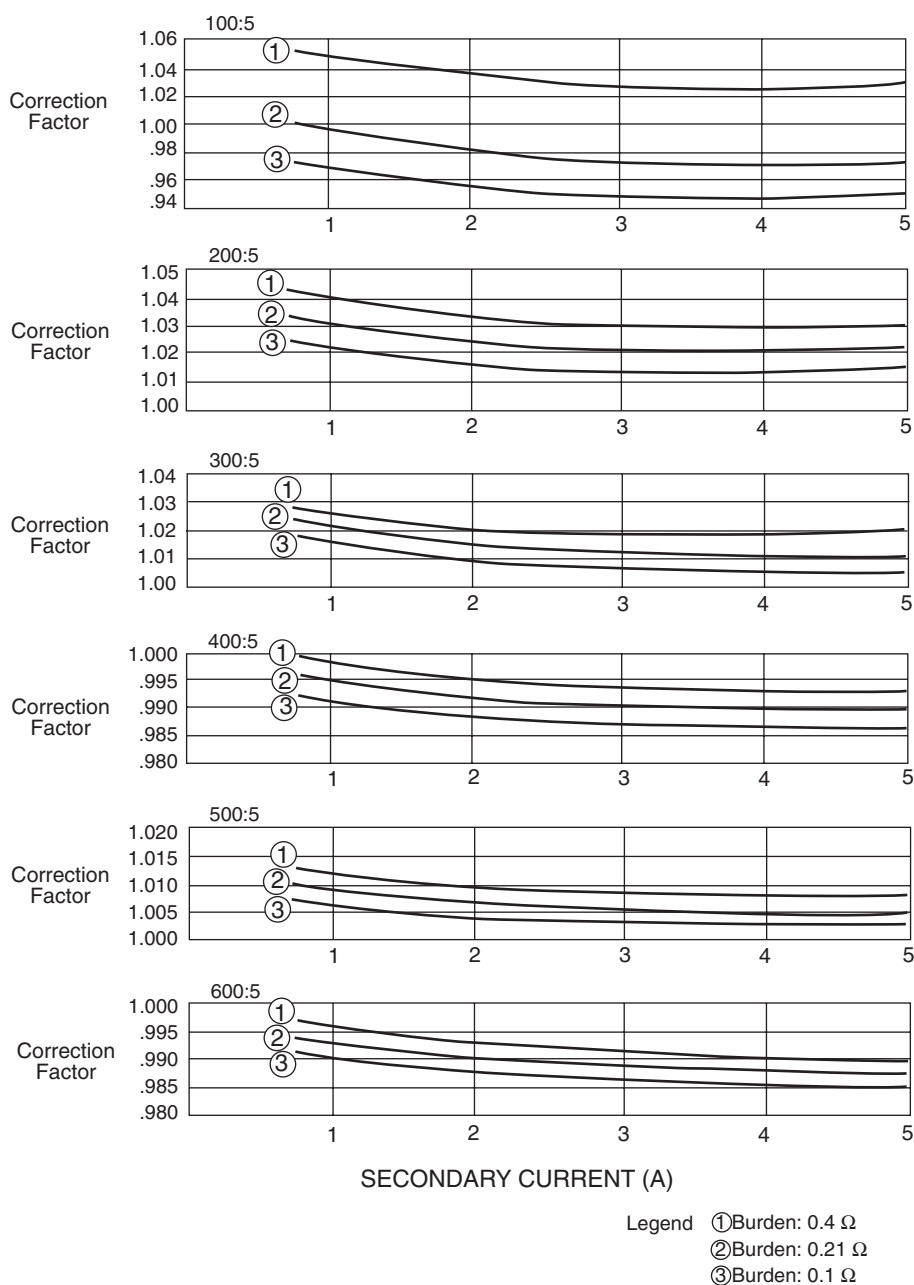
the impedance of this same meter with a total of 40 feet of No. 16 AWG conductor leads (meter 20 feet from CT). The 0.1  $\Omega$  burden curves are included to allow for interpolation for other meter loads.

## How to Use the Correction Curves

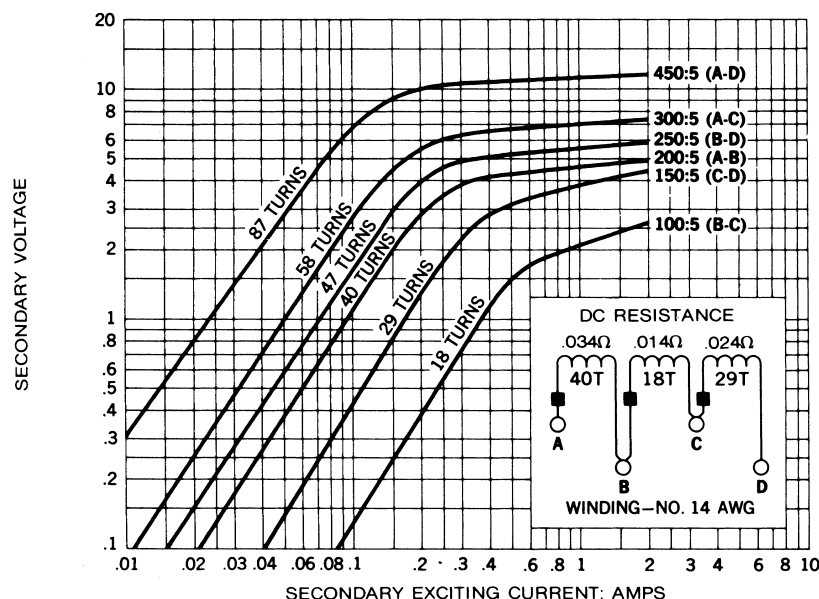
Assume a total burden of 0.4  $\Omega$  (Curve 1) with the meter connected to KA712L1S for a 100:5 A ratio, and reading 3 A. From the appropriate curve the correction factor is 1.024; the corrected secondary current is  $3/0 \times 1.024 = 3.072$  A; and the actual primary current is  $3.072 \times 100/5 = 61.4$  A.



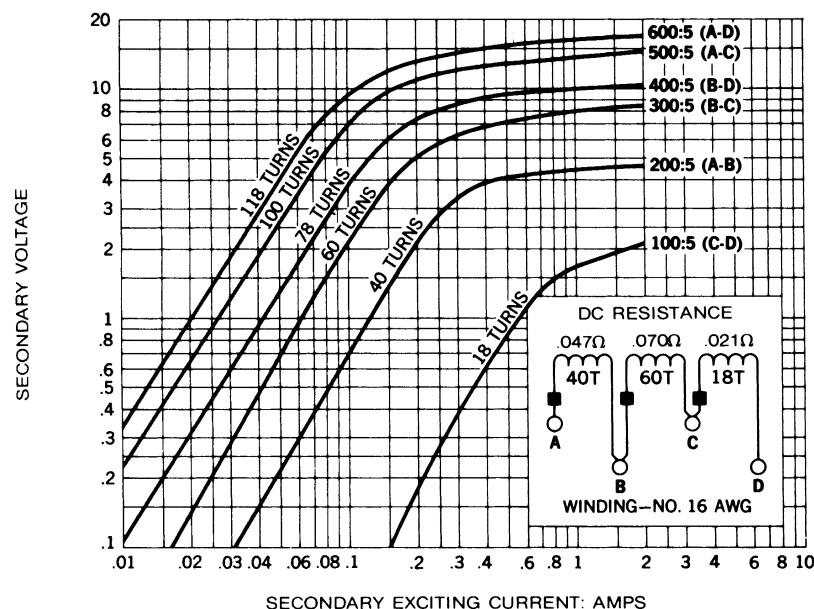
**Figure 4.**  
Correction curves for 450:5 multi-ratio bushing current transformer, Catalog No. KA712L1S.



**Figure 5.**  
Correction curves for 600:5 multi-ratio bushing current transformer, Catalog Numbers KA712L2S, KA712L3S, and KA712L5S.



**Figure 6.**  
Typical secondary excitation curves for 450:5 Multi-ratio "Slip-on" Bushing Current Transformer, Catalog No. KA712L1S.



**Figure 7.**  
Typical secondary excitation curves for 600:5 Multi-ratio "Slip-on" Bushing Current Transformer, Catalog Numbers KA712L2S, KA712L3S, and KA712L5S.



## CT Excitation Curves

For specific applications at burdens different from those plotted on the correction curves, the secondary excitation curves (Figures 6 and 7) can be used. These curves plot the CT secondary voltage versus the exciting current of the CTs for all ratios. For a given secondary load the secondary voltage is the product of the secondary impedance and the actual secondary current. Using this voltage, the secondary exciting current can be determined from the appropriate curve. The total secondary current is the sum of the meter reading and the exciting current. Multiplying this total secondary current by the actual turns ratio of the CT winding will give the actual primary current.

## How to Use the Excitation Curves

Using the same assumptions as in the example for the correction curves; namely CT KA712L1S, 100:5 A tap, 0.4 Ω burden and 3 A meter reading, the secondary voltage is  $3 \times 0.4 = 1.2$  V. From the curve, this voltage produces an exciting current of 0.41 A, and the total secondary current will be  $3 + 0.41 = 3.41$  A. Multiply this by the turns,  $3.41 \times 18 = 61.38$  the actual primary current.

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