LEM~flex AC Current Probe

Model RR 5000-SK

Three Phase, Current Probe
Manual Item No. 040684
Rev. C

Installation, Operation
and Service Instructions

WARRANTY

This product is warranted to be free from defects in material and workmanship for a period of eighteen (18) months from the date of shipment.

Correction shall be in the form of repair or replacement of the defective items or components, freight paid by the customer both ways. Such correction shall constitute a fulfillment of all LEM DynAmp, Inc. liabilities in respect to said items and components. In no event shall LEM DynAmp, Inc. be liable for consequential damage.

THE NOISE SPECIFICATION IN THE MANUAL IS NOT CORRECT. THE NOISE SPECIFICATION SHOULD BE: "<10mVac MAXIMUM".

REVISION HISTORY

Page	Rev.	Revision Summary	Date
all	New	First Issue	02/95
all	A	Revised and converted to Word format	10/96
Front	B	Warranty Statement	05/97
8	C	Specification Change	08/97
Front	C	Warranty Statement	08/97

TABLE OF CONTENTS

LIST OF FIGURES

LEM-flex AC Current Probe
Models RR 5000-SK
Installation, Operation and Service Instructions

1-1. SAFETY SUMMARY

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific *WARNINGS* given elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument.

The LEM assumes no liability for the customer's failure to comply with these requirements.

! ! WARNING ! !
(Do not use until you have read this!)

Hazardous potentials may exist in the vicinity of the desired current measurements. Use locally approved safety procedures when working near hazardous potentials. It is recommended not to install the LEM~flex around a live bus that is at a hazardous potential. If installation is not possible when the bus is inactive or power is turned off, always use appropriate gloves and/or equipment approved for working around hazardous potentials when installing the LEM~flex in the vicinity of these hazardous potentials.

The LEM~flex AC Transducer and interconnection cable uses double insulation to protect the operator from possible hazardous potentials of the bus. The electronics package is not double insulated. Make sure the electronics package is well away from the bus. The current probe is rated for Installation Category III, Pollution Degree 2. The maximum voltage to earth rating for the transducer and cable is $600V_{AC}$.

1-2. SAFETY SYMBOLS

General definitions of safety symbols used on equipment or in manual.

⎓ Direct current (power line).

⧈ Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION.

⚠ Caution (refer to accompanying documents).

1-3. OVERVIEW and DESCRIPTION

The LEM~flex AC Current Probes are assemblies similar in purpose to CTs or current transformers used to measure 3-phase AC currents. Figure 1-1 shows the RR 5000-SK Current Probe Electronics Package. It measures AC currents as low as several amps to a maximum of 5.0kA rms. The current probe outputs are analog voltages proportional to the AC currents in the three conductors. The output signals are isolated from the hazardous conductor potentials and are an exact replica of the AC current waveforms in the conductors. The output signals are available via a 7 position connector that is easily connected to a readout device (see Figure 1-2 for Output Signal Pin Assignment). The power for the current probe is provided from the readout device via the output connector.

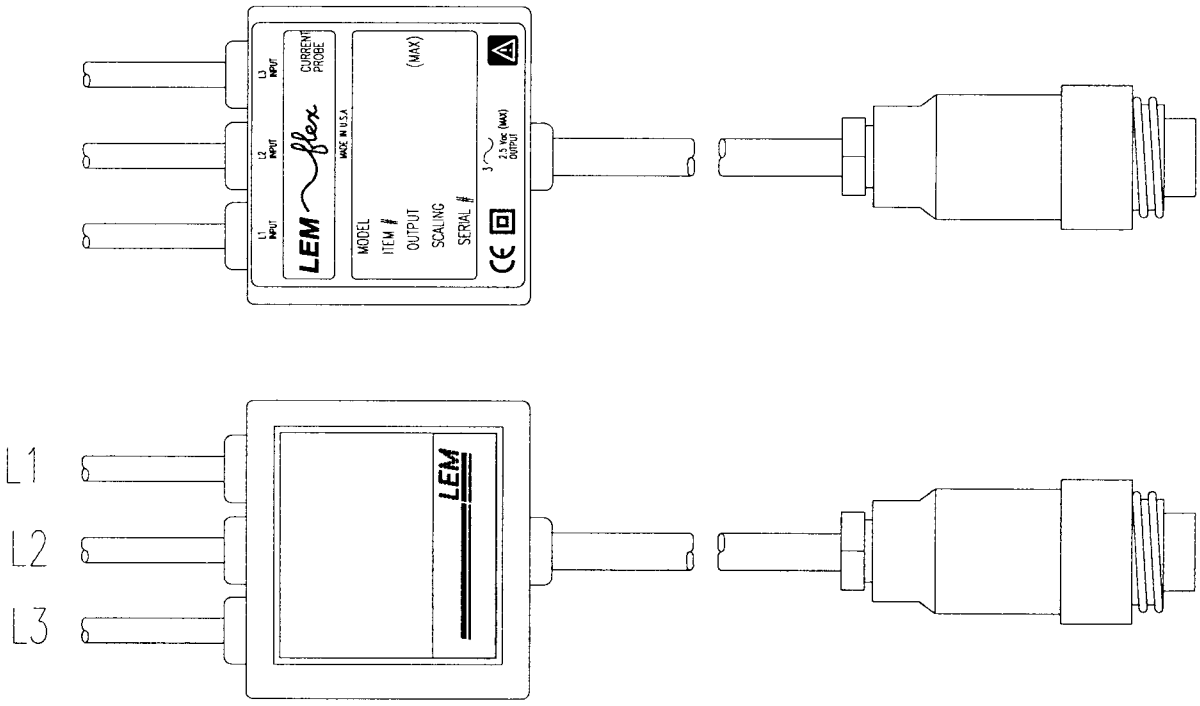

Figure 1-1.
RR 5000-SK Current Probe Electronics Package

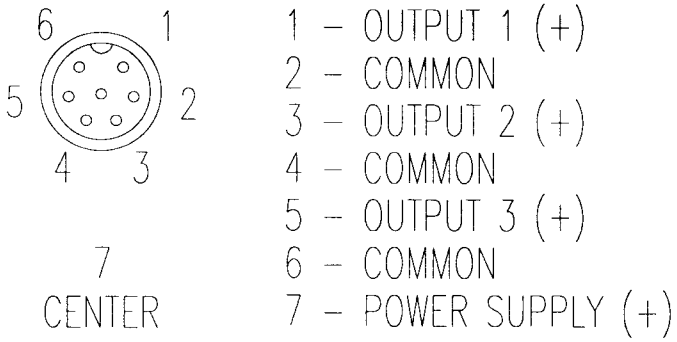

Figure 1-2.
Output Signal Pin Assignment

1-4. LEM ~ flex AC CURRENT TRANSDUCER

The three phase current probe design utilizes the light weight and flexibility of the LEM ~ flex AC current transducers. Each transducer is a versatile current probe that may be wrapped around most conductors. The transducer has a preset bend that allows the transducer to be more easily maneuvered around the conductors (see Figure 1-3 for Typical LEM ~ flex Transducer). It's application versatility and isolation rating clearly distinguish the LEM ~ flex Transducer from other current measuring methods. The measuring transducer is constructed from non-ferrous materials, minimizing any circuit loading.

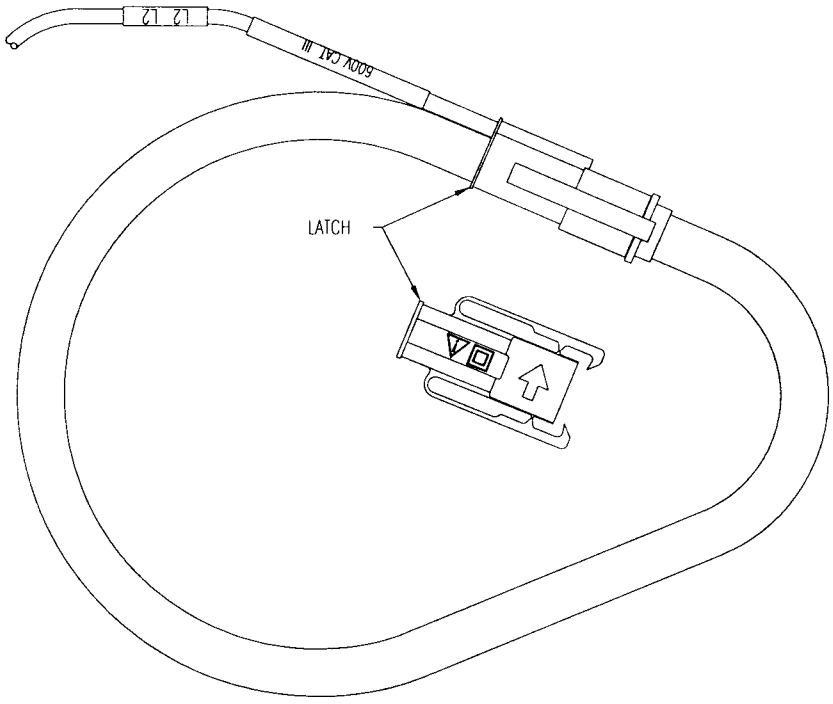

Figure 1-3.
Typical LEM ~ flex Transducer

The frequency response of the current probe is rather wide compared to conventional CTs. This allows the user to monitor a much wider range of line harmonic components than conventional CTs allow. The LEM ~ flex Transducer was designed to be very flexible, larger in aperture and smaller in cross section than many conventional CTs. This allows measurements in tight places as never before possible.

1-5. POWER SUPPLY

The LEM ~ flex AC Current Probes receives it's operating power from the readout device. The standard power connection is via the output signal cable (see Figure 1-2). The current probe will operate with power supply voltages between $+5.0V_{DC}$ and $+11.5V_{DC}$. The current required is less than 10mA.

1-6. INSTALLATION

The current probe was designed to allow the operator to connect this measurement device around a conductor without disconnecting the conductor as many CTs presently require. Even though the LEM~flex Transducer output is AC, there are instances where the user will want to orient the transducer so that proper polarity will exist at the output terminals. This is done by installing the transducer around the conductor with the molded-in arrow on the latch (see Figure 1-3) pointing in the direction of conventional current flow. Conventional current flow is defined as current flowing from the positive to the negative potential.

The LEM~flex Transducer must be installed with the interconnection cable on the outside of the loop when the latch is engaged. The polarity arrow, the double insulation, and the warning symbols will all be on the outside of the loop. It should also be noted that the current probe will produce twice the output voltage if you wrap the transducer around the conductor twice.

There is minimal shock hazard using a LEM~flex AC Current Probe. Each transducer has been Hi-Pot tested to several thousand volts with no voltage breakdown. This particular characteristic allows high-current measurement (with a wide frequency bandwidth) of conductors at less than $600V_{AC}$ potential to earth.

! ! WARNING ! !

Hazardous potentials may exist in the vicinity of the desired current measurements. Use locally approved safety procedures when working near hazardous potentials. It is recommended not to install the LEM~flex around a live bus that is at a hazardous potential. If installation is not possible when the bus is inactive or power is turned off, always use appropriate gloves and/or equipment approved for working around hazardous potentials when installing the LEM~flex in the vicinity of these hazardous potentials.

Do not exceed the minimum bending radius of the LEM~flex AC current transducer when installing the transducers around the conductors. Exceeding the bending radius will degrade the measurement accuracy.

Make sure the LEM~flex AC Current Transducers and their output cables are clean before installing them around the conductors. If the transducers and cables are not clean, the contaminants on them may provide a conductive path for a high-voltage breakdown. Also, check the transducer and output cables for cuts and abrasions. The transducer should not be used if damaged.

1-7. MAINTENANCE

Preventive maintenance primarily consists of cleaning the transducers and cables to prevent surface contamination. Use a mild detergent and water to clean the transducers and cables. Remove the detergent with clear water, then wipe dry with a clean cloth.

NOTE

The use of solvents as cleaners is not recommended unless thoroughly tested and found harmless to all surfaces and parts. Do not submerse the LEM ~ flex Transducers or the electronics package into water or other fluids.

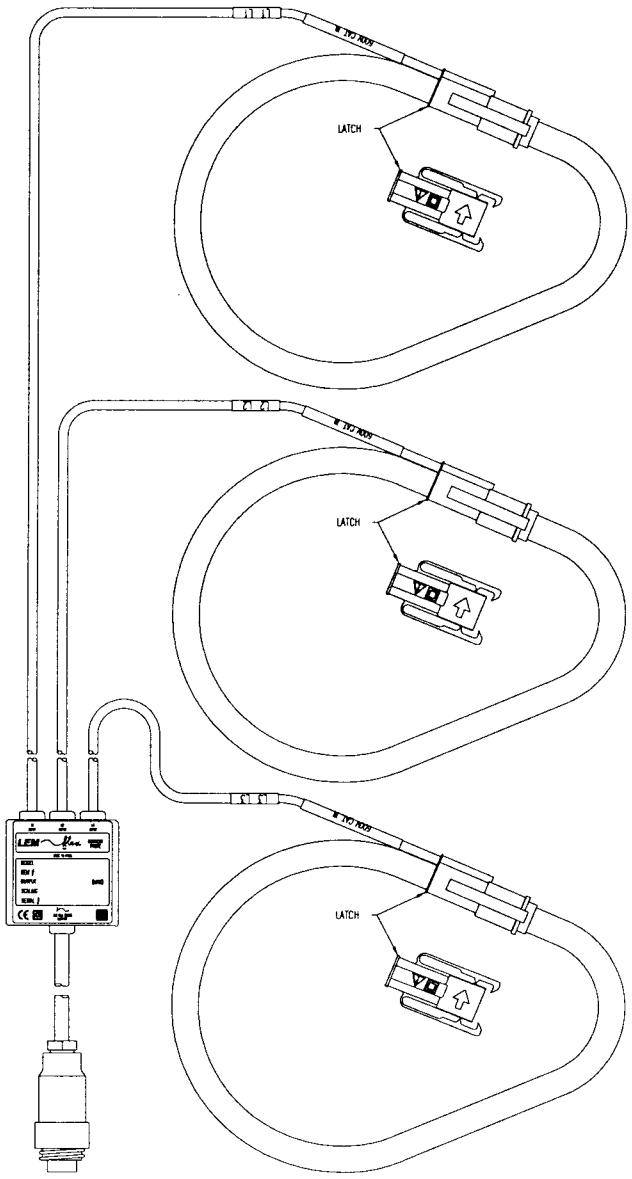

Figure 1-4.
RR 5000-SK Current Probe

2-1. SPECIFICATIONS

The specifications for the LEM ~ flex AC Current Probes are given in table 2-1.

Table 2-1
LEM ~ flex AC Current Probe Specifications

SIGNAL CONDITIONER:	
Input:	Three LEM ~ flex Transducers
Output:	2.5VAC or ±3.5VPK full scale @ 5VDC in 7.0VAC or ±9.9VPK full scale @ 11.5VDC in Load > 1000 ohm
Output Connection:	Pigtail Cable with Connector Length = 6 in. (152mm) Connector - Amphenol # T3104 021
Scaling:	RR 5000-SK 0.50mV per amp
Accuracy:	±1.0% of full scale
Linearity:	±0.2% of reading 10%...100% of full scale
Repeatability:	±0.1% of reading 10%...100% of full scale
Frequency Response:	8Hz to 7kHz
Phase error:	< ±0.5° maximum 50-60 Hz
Noise:	<2.0mV ac maximum
DC offset:	<5.0mV dc maximum
Temperature range:	Operational 0°C to 70°C (32°F to 158°F) Gain Change ±0.08%/°C maximum DC offset ±0.3mV/°C maximum
Power:	$+4.7V_{DC}$ ...+11.5VDC via pigtail cable
Material:	ABS Plastic
Dimensions:	2.4H x 2.3W x 1.0D inches (61.0H x 58.4W x 25.4D) mm
Weight:	0.1 lbs. (0.045 kg)

Table 2-1

LEM ~ flex AC Current Probe Specifications (continued)

TRANSDUCER:	
Material:	TPE rubber, Polypropylene
Minimum bending radius:	1.5 in. (38.1 mm)
Cable O.D.	0.625 in. (15.87 mm)
Coupling O.D.	0.875 in. (22.20 mm)
Connecting Cable:	Length 78.7 in. (2.0m) shielded
Temperature:	Operational -20°C to 90°C (-4°F to 194°F)
Position Sensitivity:	$< \pm 2.0\%$ with measured bus $>$ 1" from head
External Magnetic Field:	$< \pm 1.0\%$ with external bus $>$ 8" from head
Standard Size:	Length 24 in. (610 mm)
	I.D. 6.0H x 8.5W inches (152.4H x 215.9W) mm
	O.D. 7.1H x 9.6W inches (180.3H x 243.8W) mm
Weight:	0.4 lbs. (0.18 kg)
Safety Rating:	Double Insulated Installation Category III, Pollution Degree 2, 600VAC to Earth
Working Voltage:	600VAC to Earth
Head/Cable Test:	5550VAC for 1 minute surface to output

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MANUAL ADDENDUM SHEET

Current Probe, RR 5000-SK/SP3, /SP4

DWG No. 06A041072 Rev. B

02/06/96

Abstract:

This addendum provides information documenting modifications, additions, changes, and deletions to "standard product" hardware, drawings, and manual text which apply to this "special product".

Overview of Modifications:

This modification changes a standard three phase RR 5000-SK Current Probe into a single phase RR 5000-SK/SP3 or a RR 5000-SK/SP4 Current Probe.

Modifications: