

MAGNELAB RCS-5A SERIES THREE-PHASE INTEGRATOR AND AMPLIFIER INSTALLATION INSTRUCTIONS

1. Intended use of equipment and safety information

The Magnelab RCS 5A is designed to provide users with an easy to install, plug and play, retrofit solution that can be used with any power meter or equipment with a 5A current input from a Current Transformer (CT). The flexibility of the Magnelab RopeCT reduces the complexity and allows it use to be used for a variety of applications and configurations where special constraints may limit the use of other CT solutions. The Magnelab RCS 5A is a configurable unit that can measure current from 2.5-50000A making it ideal for any system that operates at both 50Hz and 60Hz further adding to its flexibility

Please read this manual carefully before installation, operation and maintenance of the RCS-5A Rogowski Coil Integrator Kit.

The following symbols in this manual are used to provide warning of danger or risk during the installation and operation of the unit.



Electric Shock Symbol: Carries information about procedures which must be followed to reduce the risk of electric shock and danger to personal health.



Safety Alert Symbol: Carries information about circumstances which if not considered may result in injury or death.



This mark indicates that this product is UL listed.

Installation and maintenance of the RCS 5A should only be performed by qualified, competent professionals who have received training and should have experience with high voltage and current devices.

Magnelab shall not be responsible or liable for any damages caused by improper meter installation and/or operation.

WARNING: Disconnect power supply before making electrical connections.

WARNING: Current Transformers (CT's) should be installed by trained electrician or technician.

WARNING: The secondary circuit of a CT should not be opened when current is flowing through the primary circuit.

Manufacturer Name and Address

Magnelab, Inc.
600 Weaver Park Rd.
Longmont, CO 80501

2. Technical Specifications

Specifications	Measurements
Current Measurement Range	2.5A – 60000A
Output Current	0-6A _{RMS} (0-5A _{RMS} Nominal)
Sensing Range	500A, 1000A, 2500A, 5000A, 10000A, 25000A and 50000A (selectable)
Maximum Burden	1.8VA per channel
Maximum Output Impedance	50m Ω
Measurement Channels	3 (three-phase or single-phase)
Frequency	45Hz to 65Hz
Accuracy	±1% Full Scale Error
Channel Cross Talk	<-60dB
Maximum Operating Temperature	55°C (131°F)
Mounting Rail	DIN TS-35/7.5 or 15
Lead Wires	3x 18 AWG 12" Black and White UL AWM Style 1015

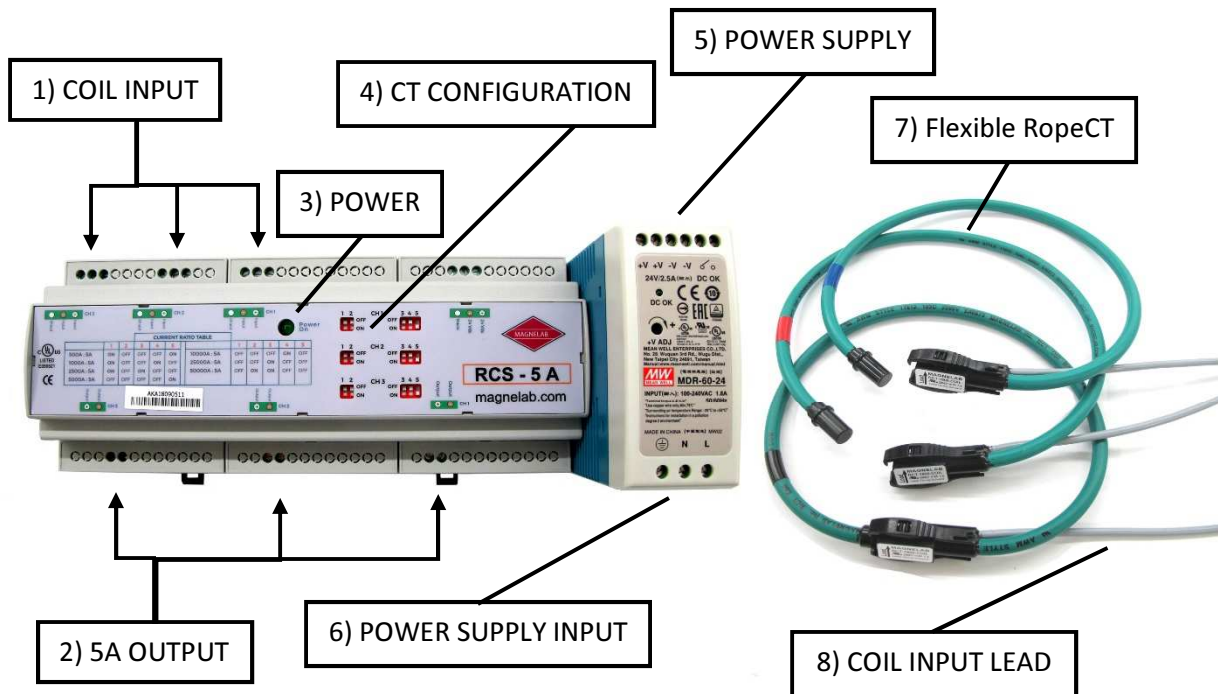
3. Equipment Ratings

- a. **Supply voltage**
 - i. **Voltage range:** 24V DC ±5%
 - ii. **Frequency range:** DC only
 - iii. **Current rating requirement:** 0.9A DC @ 24V DC
- b. **Description of all input and output connections:** screw terminal blocks suitable for wire gauges up to 14 AWG.
 - i. **Input (6 terminals):** for connection of up to 3 Rogowski coil type current sensors or similar devices, nominal input 70mV AC RMS, max input 4.2 V AC RMS.
 - ii. **Output (6 terminals):** for connection to metering device, nominal output 5 A RMS, max output 6 A RMS
 - iii. **Power (2 terminals):** for connection to Class 2 power supply, 9-36 V DC, 0.9 A nominal current
- c. **Rating of insulation of external circuits** – All external circuits must provide isolation of 600V AC RMS to the terminal of the device.
- d. **Environmental conditions** –
 - i. Open Type for use inside overall enclosure.
 - ii. Maximum Temperature 55 °C Ambient
- e. **Operation Requirements** – RCS is only for use with Rope type CT's.

4. Equipment Installation

Please refer to all information in Section 1 regarding safety before beginning installation.

The RCS-5A Kit includes the three phase integrator unit which contains seven configurable CT ratios for each channel. The kit also contains three RopeCT coils that will measure the current (available in an array of sizes from 12" to 48") and the 24Vdc power supply to power the integrator. A set of 3 #18 AWG black and white leads are supplied for convenience. The integrator unit can be surfaced mounted or mounted on a standard DIN rail.

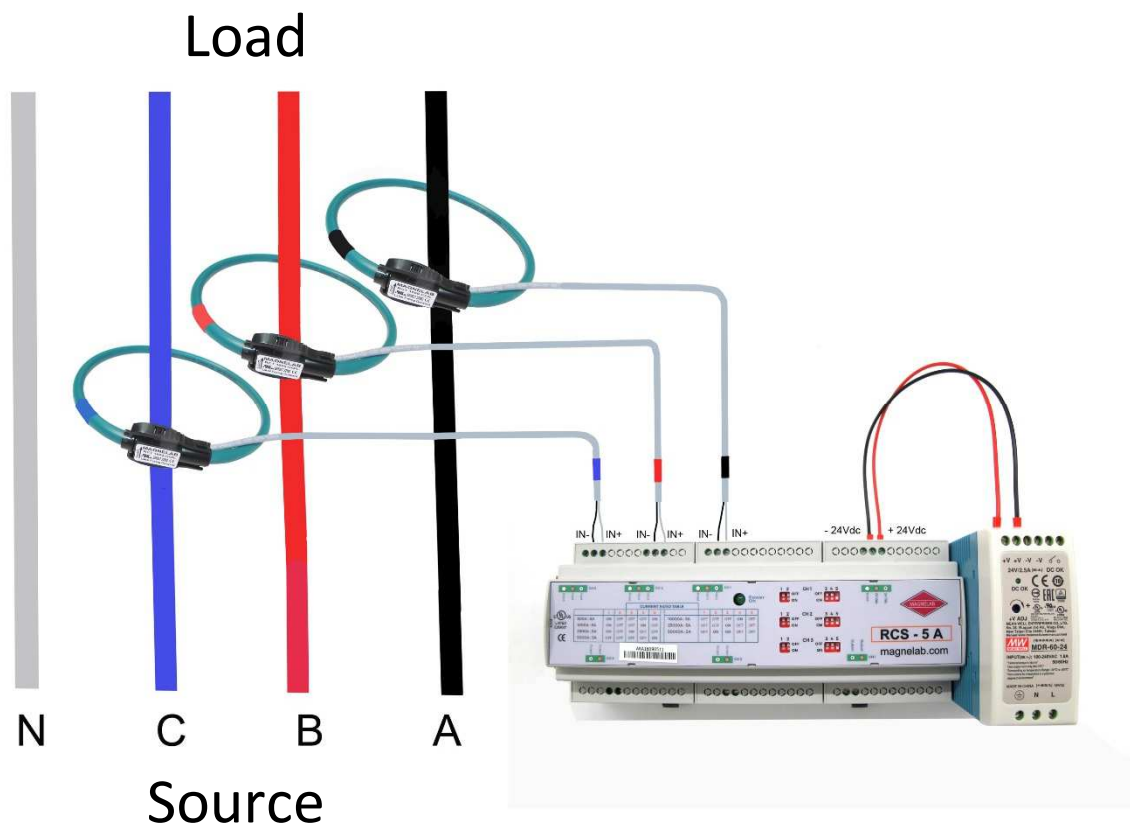


1	RopeCT Coil Input Three Channels for RopeCT input.
2	5A Output Three Channels, 5A Output.
3	Power On Light Indicates that the RCS-5A is powered up.
4	CT Configuration Seven individual field configurable CT ratios for each channel

5	Power Supply RCS-5A integrated power supply.
6	Power Supply Input Power supply input (100-240Vac).
7	Flexible Rogowski Coil Current Transformer RopeCT sizes available from 12-48 inches
8	Coil Input Lead Input lead for connection with RCS-5A integrator.

The RCS-5A is assembled with three RopeCTs connected to the three inputs. However, if the RopeCTs are not attached, or need to be disconnected during the install, the installer can simply reattach them to the corresponding channel. Then the installer will need to wire the 5A output to the power meter or equipment which will take the signal. If the system is single phase or there are two phases only the phases that need CT's will need to be connected to the input of the integrator.

The diagram below illustrates how to connect the integrator.



Input:

The provided RopeCT coils are the input to the integrator. Connect the RopeCT coil leads to the input channel on the integrator. The white leads of the CT are the positive wire and the black lead is the negative wire.

- Connect the white lead to 'IN+' and the black lead to 'IN-'.
- Open the coil by pulling apart the black connector of the CT.
- Install the CT around the conductor to be measured. Verify the CT is installed with the CT facing the same direction as the current flow direction indicated by the arrow on the black connector.
- Re-attach the coil together.
- Repeat above steps if using more than one CT.

Ensure that the CT connected to each channel of the integrator is around the correct phase/line voltage. As shown above, each RopeCT is marked with a color band on the lead and on the body of the CT. Black is Channel 1, Red is Channel 2, and Blue is Channel 3.

Output:

A set of #18 AWG black and white lead wires is included for convenience. They can be used to attach the 5A output to a meter if it can be mounted close enough. If you desire to extend the lead length, the included lead wires should be replaced with larger conductors up to #14 AWG lead wire. The total impedance of the cable and the meter should not exceed the 50 mOhm limit of the RCS-5A to avoid loss of accuracy. Connect each output channel to the meter or equipment with 0-5A input.

- 'OUT+' is to be connected to the positive current output terminal of meter.
- 'OUT-' is to be connected to the negative current output terminal of meter.

Power Supply:

The RCS-5A requires 24Vdc power to operate. There is a 100-240Vac (50/60Hz) adapter that is mounted beside the meter and must be wired to the integrators power supply terminals to provide this power.

- Connect either of the two V+ terminals to the +24Vdc terminal and one of the two V- to the -24Vdc terminal of the RCS-5A
- Connect the input power supply that is between 100-240Vac to the 'L' and 'N' terminals of the power supply.

5. Equipment Operation

The face of the integrator has 3 sets of dip switches that are used to configure the current range that the corresponding channels that will be used to measure.

When the dip switch is in the up position the dip switch is considered to be Off. When the dip switch is in the down position the dip switch is considered as On.

Configure each channels dip switches to output the desired range. For example to measure current rated for 1000A the dip switches 1 through 5 for the three channels must be configured to be 'ON', 'OFF', 'OFF', 'ON' and 'OFF' respectively.

- Enter this current ratio into the meter or equipment so it can read accurately from the integrator.

Current Ratio Table

	1	2	3	4	5
500:5A	ON	OFF	OFF	OFF	ON
1000:5A	ON	OFF	OFF	ON	OFF
2500:5A	ON	OFF	ON	OFF	OFF
5000:5A	OFF	OFF	OFF	OFF	ON
10000:5A	OFF	OFF	OFF	ON	OFF
25000:5A	OFF	OFF	ON	OFF	OFF
50000:5A	OFF	ON	ON	OFF	OFF

For each current range the integrator will be able to measure the current from 0.5% up to 120% of the rated current. That is when the integrator is configured to measure a current rated for 1000A it will measure the current from 5A to 1200A. The integrator will output 5a at the rated current of 1000A and will output its maximum of 6a at 1200A.

The table below provides all the ranges of current that can be measured for each range.

Current Range Setting

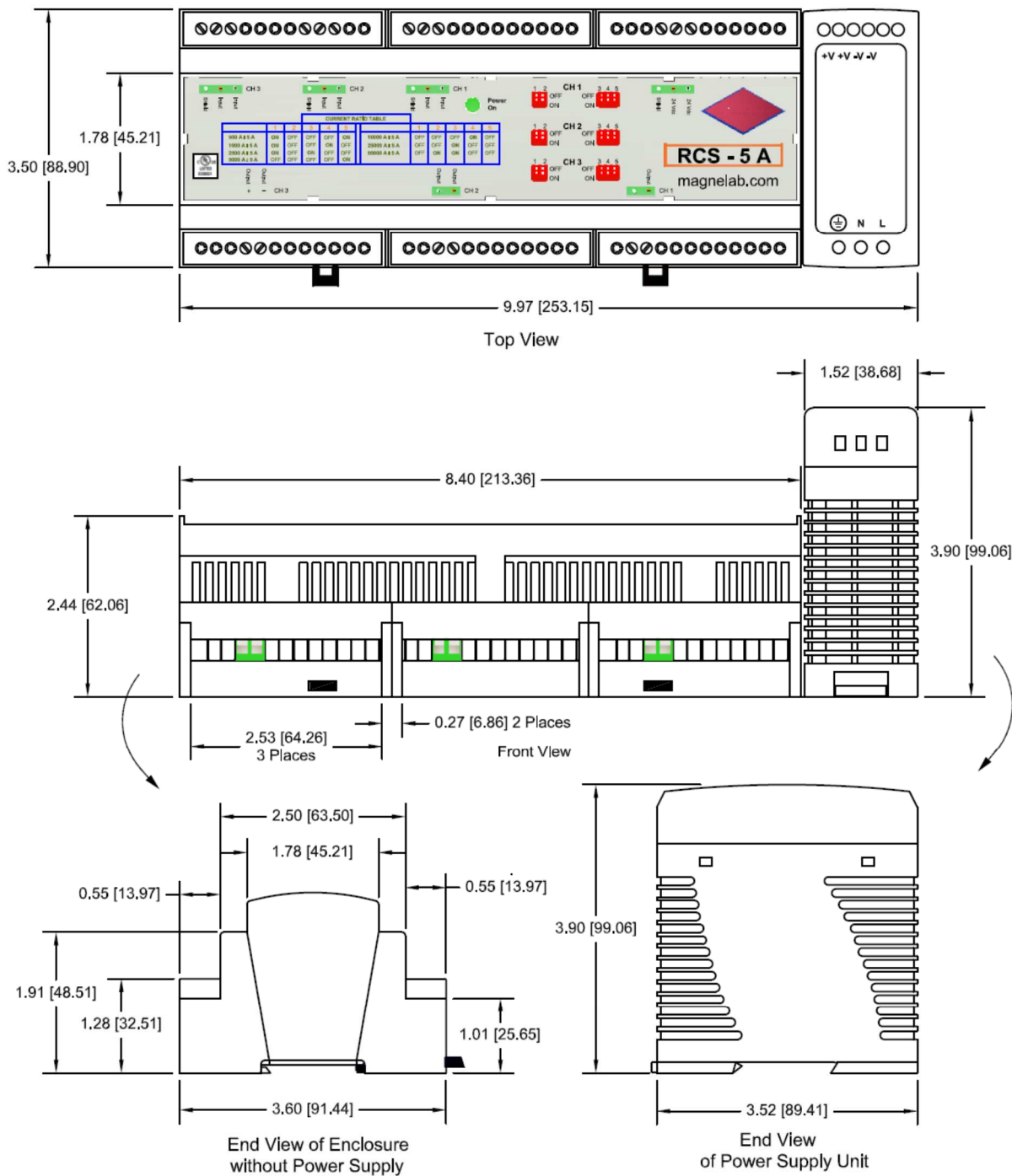
Primary Input (A_{RMS})	Sensing Range (A)	Output	CT Ratio
500	2.5 to 600	5A @ 500A	500:5
1000	5 to 1200	5A @ 1000A	1000:5
2500	12.5 to 3000	5A @ 2500A	2500:5
5000	25 to 6000	5A @ 5000A	5000:5
10000	50 to 12000	5A @ 10000A	10000:5
25000	125 to 30000	5A @ 25000A	25000:5
50000	250 to 60000	5A @ 50000A	50000:5

6. Equipment maintenance and service

Occasionally inspect for damage to insulation on sensors or lead wires to and from the RCS-5A integrator. Contact manufacturer for replacement materials in case of damage.

There are no components within the device that can be serviced by the end user. Please contact the manufacturer if there are issues with the output of the RCS.

7. Dimensional Drawings



Dimensions are in Inches and Millimeters