Powertek

Instructions and installation for the CTA1ph and CTA3ph 0-5A output Rogowski current sensor

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Company Profile

Powertek has two divisions; Powertek US Inc Holbrook NY USA, Powertek UK Ltd Reading United Kingdom. These offices support a network of worldwide service centers, distributors and representatives.

Powertek specializes in the design and manufacture of electrical power, voltage and current measuring instrumentation: Measurement Transducers, Current Probes, Wattmeters, Power Analyzers, phase measuring measurement equipment along with multifunction calibration standards. The Sensor Division offers a range of ac/dc current/voltage sensors, current shunts, wideband current probes, current transformers and ac/dc power related transducers. PC based software solutions allow the Powertek measuring instruments and transducers to be controlled via Ethernet, RS232, RS485 and IEEE-488 interfaces. Various display and storage options are available to suit the customer need. An “in house” software customization service is available.

Powertek’s customer base includes heavy industrial plants, avionics, positional control, military systems, power electronics & power conversion (inverters, switching power supplies, UPS, variable speed motor drives), single/three phase ac motors, ac generators, power transformers, electrical process control equipment, office and household appliance testing, electrical supply utilities and calibration.

All Powertek products are supplied CE marked with measurement uncertainties traceable to UKAS (UK) or NIST (USA) in accordance with ISO9001 2015. Our support includes application support, technical advice, servicing, repair and calibration. Flexible Current Sensing Rogowski coils with 5A output in accordance with ISO9001 2015, Z540, ISO/IEC 17025.

Powertek US Inc is a CAGE coded Military supplier, Cage code 4S5P4. Read more about our activities with US Defense on https://www.sam.gov

Introduction

The CTA3ph module converts and conditions a CTA flexible current sensor voltage output to a 0- 5Arms output. Useful for interfacing Powertek Rogowski coil current sense technology with traditional or 0-5A legacy energy metering. The CTA3ph will produce a linear 0-5A current output proportional to sensor input current voltage. The actual CTA3ph current range is indicated on the transducer rating label. The CTA3ph uses a 1 /5A current transformer to provide its 5Arms output and for added insulation. It is supplied with twin Din Rail power supplies creating ±15.0Vdc to power the conditioning electronics. Typically the CTA3ph device is used where a flexible current sensor requires connection to existing 1A or 5A metering circuits.

Installation, Testing and Safety

Installation should be carried out by authorised personnel, familiar with potential danger of electric shock hazards. The CTA3ph transducer should only be used in dry indoor environments. To prevent damage, check for correct connection of the CTA3ph psu, inputs and outputs. Allow a minimum warm-up period of 5 minutes. Ensure that the CTA3ph casing ventilation slots are not obstructed to prevent the CTA3ph entering overheat thermal shutdown. If the internal fan cannot be heard running, or if airflow cannot be felt, do not use the CTA3ph module.

There is no electrical isolation between any of the CTA3ph terminals, all terminals are referenced to an internal ground. The internal drive amplifier has thermal shutdown protection. There is galvanic isolation between the current sense coil and its output. There is galvanic isolation between the input and output of the 3ph 1/5A output CT.

The CTA can report its health status via red and green LED's and two fault reporting relay contacts. Good health indication shows both LED's are illuminated and relay contacts are closed.

Expected DC rail voltages are 13.5Vdc to 15.4Vdc depending on installation. 13.5Vdc is the factory default setting for 90% of applications.

Recommended fuse protection on the 230/240Vac input is 1Amp rms slow blow or time delay.

CTA3ph 0-5A output “Rope Type” Flexible Current Sensor Specifications

The Powertek CTA3ph flexible sensor & conditioning module are supplied as calibrated sets with a traceable calibrated 0-5Arms output. In addition, these modules can be configured to convert any voltage output current measuring device to a 1A or 5A secondary.

Current Sense coil

- Diameters: 100mm/3.85”, 160mm/6.2”, 220mm/8.6”, 330mm/11.7” clip-around sensor,
- Split core / wrap-around construction
- Sensor Thickness: 8mm/0.31”
- Material: Flexible Thermoplastic rubber, flame retardant UL94V0
- Working voltage: 1000V at 50/60Hz CAT III, tested 7400V 50/60Hz 1 minute

Cable

- 1000V UL style 20940, 5mm dia, 3m, 5m and 10m lengths

Conditioner-amplifier

- Input ranges: From 0-100A to 0-10,000Arms
- Accuracy class options, 10%-100% range: <0.25%, <0.5%, <1.0%
- Casing: Din Rail module UL94V0 and CSA approved polycarb
- Fundamental Frequency: 20Hz to 500Hz
- Bandwidth: 20Hz-500Hz CTA3ph 5A
- Output ratings: 2.5VA (0.1ohm burden), 5VA (0.2ohm burden) or 7.5VA
- Phase shift: <0.04° at 50/60/400Hz
- Input impedance: 100kohm
- Accurate with waveform crest factors: 1.4 - 5
- Health monitoring LEDs and fault reporting relay outputs
- Power: 110Vac-240Vac power, optional 24Vdc, 48Vdc and 125Vdc
- Fuse for 230/240Vac instrument power 1A slow blow or time delay
- Includes: Din Rail, PSUs, conditioner and output transformer (5A)

Environmental

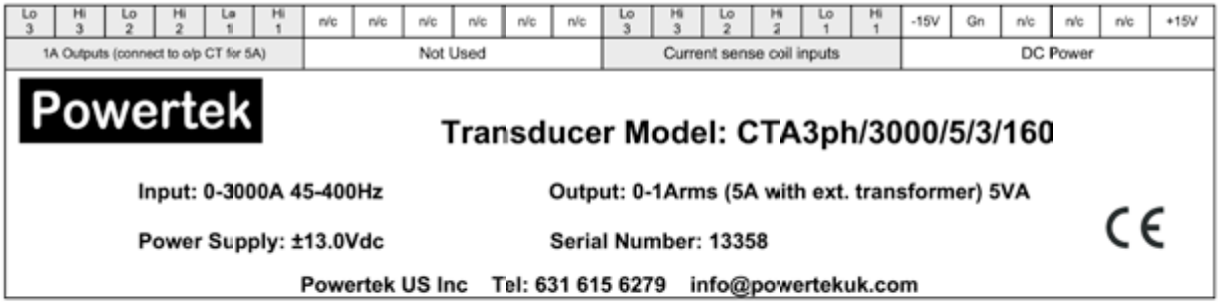
- Operational range -20°C to +65°C

All products have CE, IEC, EN, ASME or BS approvals

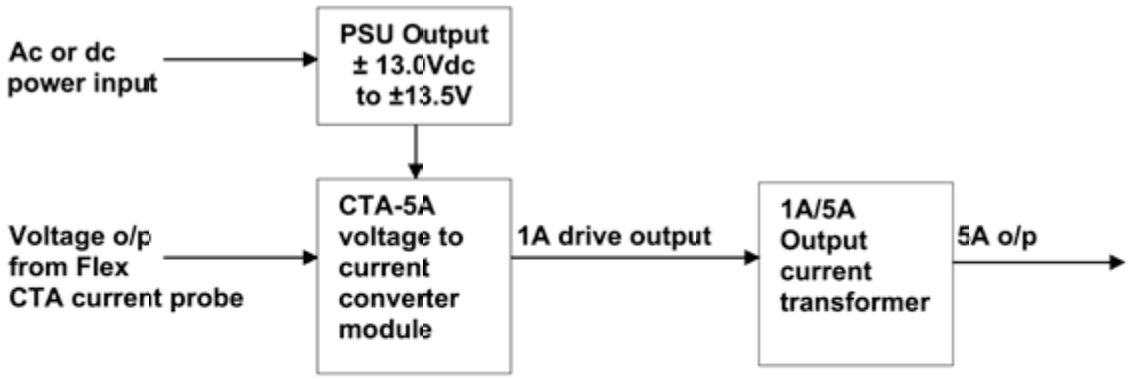
Connections and installation

Screw terminals are provided for the power input and output connections. The terminal block connections are labelled. Usually reference to a user manual is not required as labelling is self explanetory. The CTA3ph is DIN rail or wall mountable.. Only install CTA3ph module and sensors in dry conditions, preferably on insulated cables and busbars.

CTA3ph Connections



CTA3ph Block diagram of operation - for clarity shown as 1 phase



CTA3ph Protection

Max input voltage is 18V ac/dc. Only use with Powertek CTA Sensing Rogowski coils. Accidental connection of input or output terminals to either a DC or AC voltage source, >18Vpk, may result in damage.

Cooling: Ensure that the CTA casing ventilation slots are not obstructed otherwise the CTA3ph may enter overheat / thermal shutdown. If the internal fan cannot be heard running, or if the airflow cannot be felt, do not use the CTA3ph module.

Note: On the signal conditioner, there is no electrical isolation between any of the terminals, all terminals are referenced to an internal ground. The internal drive amplifier has thermal shutdown protection.

Gain and Offset adjust and calibration

The CTA3ph signal conditioners and associated output transformers are supplied calibrated and certified. Internal adjustment of ac gain is possible. These adjustments should only be carried out by factory trained personnel using the correct calibration procedure

.

Although yearly calibration adjustment is not required, it is recommended that yearly comparisons are made to known traceable calibration standards. Refer to maintenance manual

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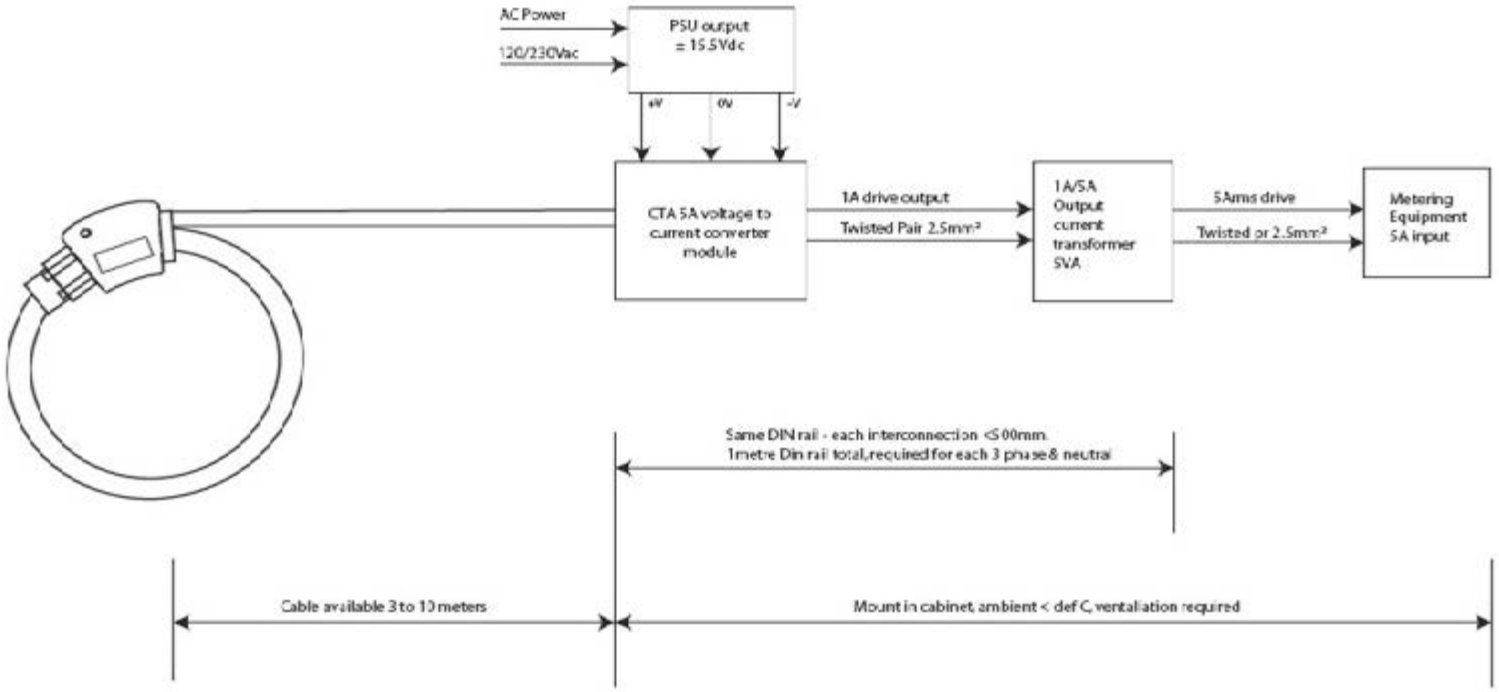
Installation schematic of CTA Flexible Current Sensor Porbes, producing a 1A or 5Arms current output, ensuring compatibility with 1A/5A metering circuits

Diagram below shows how the CTA flexible current probe is used with a CTA module, to produce a standard 1A or 5Arms output (not to scale)



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Title:

Drawing No.

Revision:

Date:

Notes
Rogowski sense coil A marked for each unit
All 3 metre cable length

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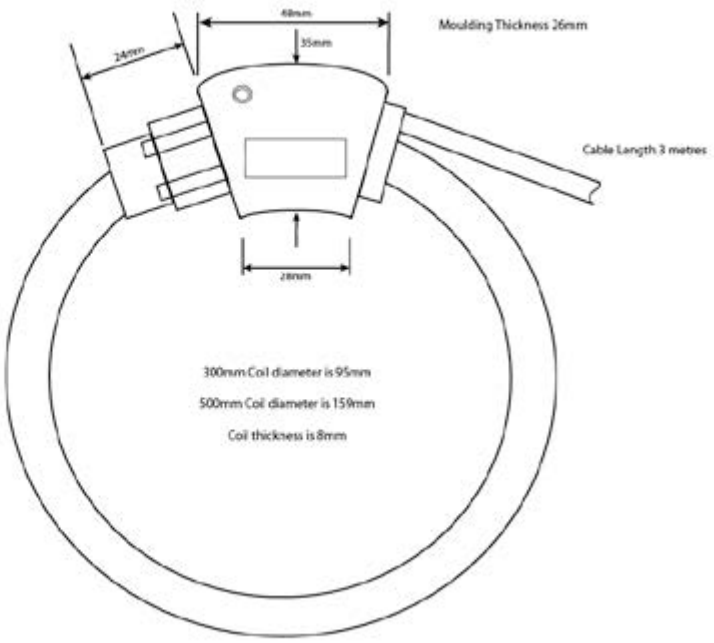
CTA Coil Drawing



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Title:
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Revision:
Date:

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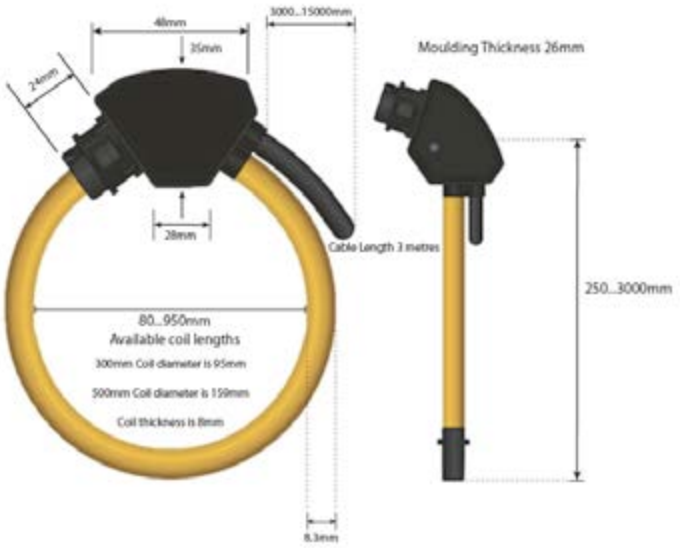
CTA Coil Drawing 2



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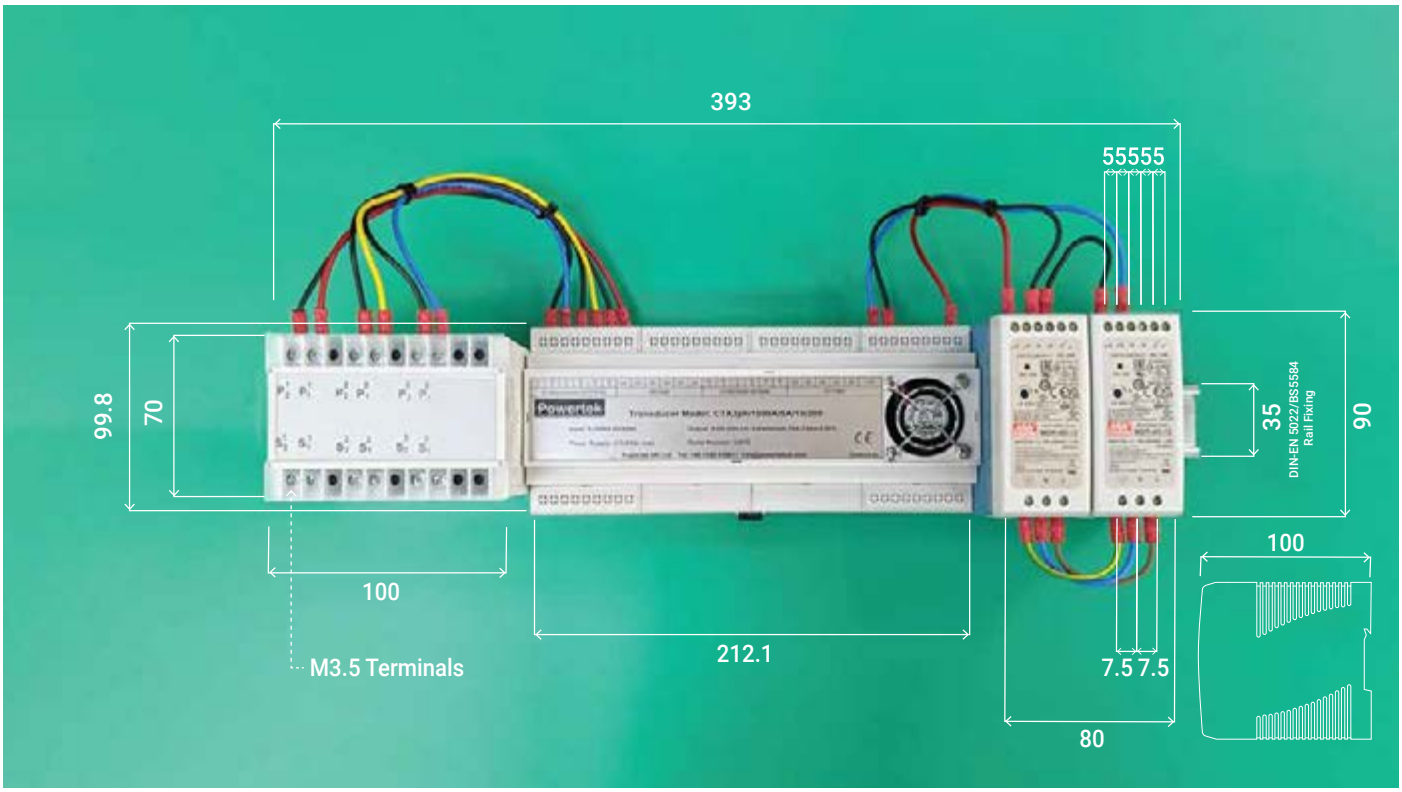
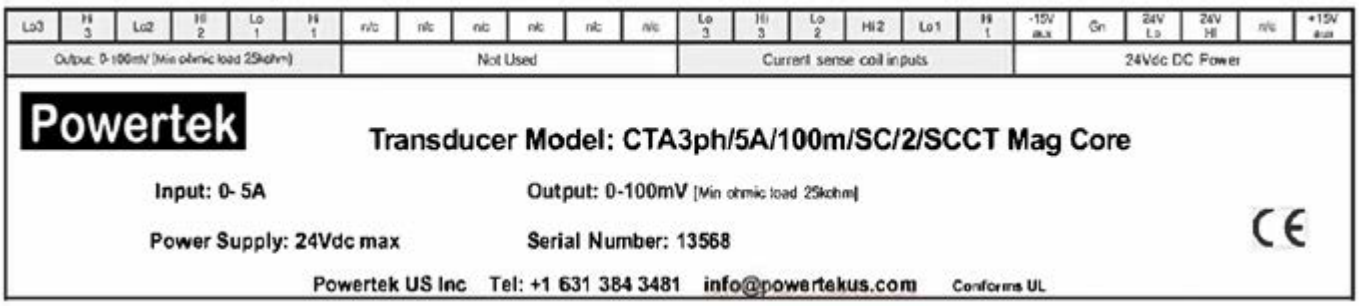
CTA3ph Kit including Signal Conditioner for 0-5A output
Use for three or single phase ac current input from Rogowski Current sense coil





CTA3ph and CTV3ph three phase Integrator signal conditioner - product label will depict the function of each terminal. CTV3ph units do not use an output transformer

Warning: For cooling purposes the clip-in terminal access panels should be configured like the above image, where air enters from the top left and lower left clip in panels, then exits from fan.

All clip in panels should be fitted in this configuration to ensure correct airflow and optimum cooling.

Power Consumption Table

Example: With 4 meters between current transformer and ecosine active sync, the line length in the CT circuit is 8 meters. If 2.5mm² cables are used, the CT output power need to be at least 2.86VA.
Table 18 Power consumption of the CT lines valid for copper wires

Cross section	AWG	Distance between current transformer and ecosine active sync vs. CT 1 Amp Secondary Burden in VA (Twin Wire) (Consider forward and return lines!)					
		10 m	20 m	40 m	60m	80m	100m
1.0 mm^2	18	0.35	0.71	1.43	2.14	2.85	3.57
1.5 mm^2	16	0.23	0.46	0.92	1.39	1.85	2.31
2.5 mm^2	14	0.14	0.29	0.57	0.86	1.14	1.43
4.0 mm^2	12	0.09	0.18	0.36	0.54	0.71	0.89
6.0 mm^2	10	0.06	0.12	0.24	0.36	0.48	0.60
10.0 mm^2	8	0.04	0.07	0.14	0.21	0.29	0.36

Example: With 20 meters between current transformer and ecosine active sync, the line length in the transformer circuit is 40 meters. If 1.5mm² cables are used, the CT output power need to be at least 1.85VA.

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