M2 integrator module

M2 is a integrator module just like a chip, in a compact shield aluminium alloy enclosure, positive-negative power supply.

What does Integrator do?

• Rogowski coil output is weak voltage mV signal,M2 has ability to amplify and convert it to standard signal which could be catched by multimeter and scope.
• Rogowski coil output is proportional to the frequency of the measured current, the signal equalization ensure a linear response on a wide frequency range. M2 allows to use coils on different electrical network frequencies, keeping the same output level over the frequencies.
• An integrator is essential to equalize and shift by 90° the output signal from the Rogowski coils. It consists of an active electronic circuit with negligible offset and a good linearity.

Feature

M2 can be combined with any model and size of Y-FCT or FCT Rogowski coils.
The available values are: 0-2.5V peak.
M2 is best and fastest solution for rogowski power meter and power analyzer.
Due to its specific features, flexible Rogowski coil is an extremely comfortable solution for current measurement and can be used in a number of cases where traditional current transducer is not the adequate solution.

Advantage

• High linearity 0.2%
• weight down to 2g
• Smallest volume in the world
• High bandwidth for measurement 5 to 20kHz

Related Products

A-Y-FCT and A-FCT

Applications

Measuring devices, lab instrumentation
• Power monitoring & control systems
• Harmonics and transients monitoring
• DC ripple measurement
• Welding machine control
• High current measurement

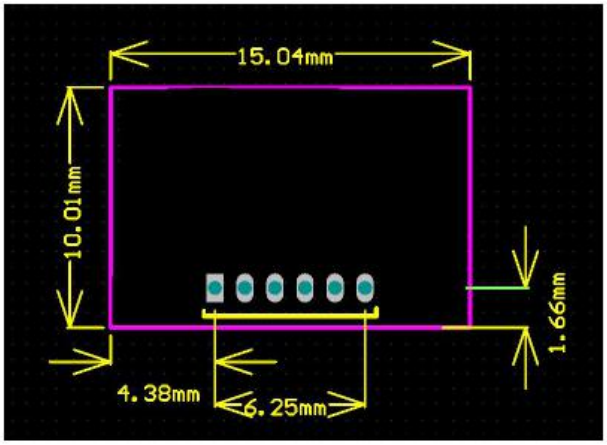
What is a Rogowski coil?

Rogowski coils have been used for the detection and measurement of electric currents for decades. They are based on a simple principle: an “air-cored” coil is placed around the conductor in a toroidal fashion and the magnetic field produced by the current induces a voltage in the coil. The voltage output is proportional to the rate of change of current. This voltage is integrated, thus producing an output proportional to the current.
By using precision winding techniques, especially developed for the purpose, the coils are manufactured so that their output is not influenced by the position of the conductor within the toroid, and to reject interference from external magnetic fields caused, for example, from nearby conductors.

Basically, a Rogowski coil current measuring system consists of a combination of a coil and conditioning electronics.Rogowski coil current transducers are used for the AC measurement.

They can be used in similar circumstances to current transformers but for many applications they have considerable advantages:
• Wide dynamic range.
• High linearity.
• Very useful with large size or awkward shaped conductors or in places with limited access. Thanks to the structure without hard core, the coil can be easily manufactured according to the application or to the available space.
• Unlike traditional current transducers, there is no danger from open-circuited secondaries.
• They cannot be damaged by large overloads.
• They are non-intrusive. They draw no power from the main circuit carrying the current to be measured.
• They are also light weighted and in some applications are light enough to be suspended on the conductor being measured.

The transducer does not measure direct currents but, unlike a current transformer, it can carry out accurate measurements of AC component even if there is a large superimposed DC component, since there is no iron core causing saturation. This feature is particularly useful for measuring ripple currents for example in battery charging systems.



Specification

Model	**M2**	**M3LP**
Rated output	333mV AC rms	0-3V AC(1.25V reference voltage)
Maximum Output(overload)	2.5V AC pp	2.5V AC pp
Power supply	±5V DC	3-5V DC
Power consumption	10mA	10μA
Rated Input	100A 500A 3000A 10000A	
Output tolerance	±5%	
Phase error	≤0.5°	
Linearity	±0.2% of reading(1% to 200% of range)	
Bandwidth	10Hz to 10kHz(-3dB)	
Minimum Current measurement	500mA (Ripple 100mA)	
Output Ripple factor	0.2%	
Response time	≤1us	
Output on 0A （zero drift）	≤1.5mV	
Temperature drift	200ppm/℃	
Weight	2g	
Dimension	86*90*29mm	
Power supply	±2.5V DC	
Operating temperature	-20℃ to 70℃	
Storage temperature	-30℃ to 90℃	
Relative humidity:	80% max.without condensation	
Protection degree:	IP20	
Other requirements,please contact us to OEM.		

Integral module specification

1.M2(duplicate supply)

Pin define:

1 Coil input Positive C+
2 Coil input Negative C-
3 Negative power supply input -（ripple wave as low as possible)
4 Positive power supply input +,(ripple wave as low as possible)
5 Signal GND（GND，connect system ground）
6 Signal output

Attention：

1：4 is positive power supply pin,between power + and GND connect 0.1UF capacitor,as close to power pin.
2： 1 2 pins are rogowski coil input,2 is negative connect shield together,this two pin must be parallel on PCB,there must be no gap between two wire on PCB，don't connect any wires to this two wire
3： PIN 2 and PIN5 inner connect to GND both.
4： 6 pin is after integrated signal

2.M3LP (Low power consumption,single power supply)

Pin define:

1 Coil input Positive C+

2 Coil input Negative C-

3 Vref Reference voltage input（output quality relation to ripple wave quality)

4 Positive power supply input +,(ripple wave as low as possible)

5 Signal GND（GND，connect system ground）

6 Signal output

Attention：

1： 4 is positive power supply pin,between power + and GND connect 0.1UF parallel 10UF capacitor,as close to power pin.。Power consumption increase follow current increase,when primary current is 0,the power consumption is 16μA，when primary current is 1000A,power consumption less than 25μA. Integrator output impedance more than 1MOhms.

2： 1 2 pins are rogowski coil input,2 is negative connect shield together,this two pin must be parallel on PCB,there must be no gap between two wire on PCB，don't connect any wires to this two wire.

3： 6 pin is after integrated signal

4: 3 pin is reference voltage for ADC,request very low ripple wace,recommend use low PPM voltage-regulator diode

5：The outer contour should be 0.5mm more margin.

Order code

Coil:

Coil Model	Coil length (mm)	Output ratio and tolerance	Signal cable length
Code:Y-FCY (without integrator)	**Code:**200(Typical rated 500A) **Code:**350(Typical rated 1500A)	**Code:105** 105mV/kA@50Hz±5%	**Code:-2m** **Code:-5m** **Code:-10m** **Code:-20m**
		Code:100 100mV/kA@50Hz±0.5%	
	Code:510(Typical rated 3kA)	**Code:95** 95mV/kA@50Hz±5%	
		Code:85 85mV/kA@50Hz±0.5%	
	Code:800(Typical rated 10kA)	**Code:50** 50mV/kA@50Hz±5%	
		Code:30 30mV/kA@50Hz±0.5%	
Code:FCT (without integrator)	**Code:**420(Typical rated 2kA) **Code:**510(Typical rated 3kA) **Code:**620(Typical rated 6kA) **Code:**800(Typical rated 10kA)	**Code:120** 120mV/kA@50Hz±5%	**Code:-2m** **Code:-5m** **Code:-10m** **Code:-20m**
		Code:100 100mV/kA@50Hz±0.5%	
MRC	**Code:16**(Typical rated 100A) **Code:24**(Typical rated 300A) **Code:36**(Typical rated 600A)	**Code:50** 50mV/kA@50Hz±0.5%	**Code:-2m** **Code:-5m** **Code:-10m** **Code:-20m**
		Code:60 60mV/kA@50Hz±5%	
NRC	**Code:100**(Typical rated 1kA) **Code:150**(Typical rated 3kA) **Code:200**(Typical rated 6kA)	**Code:105** 105mV/kA@50Hz±5%	**Code:-2m** **Code:-5m** **Code:-10m** **Code:-20m**
		Code:100 100mV/kA@50Hz±0.5%	
Other requirement could be OEM			

Final Code=Coil model+Coil length+Output ratio tolerance+Signal cable length

For example:

Y-FCT-350-100-2m is Y shape connector,coil length 350mm,output 100mV/kA@50Hz 0.5% tolerance,signal cable length is 2meter.

Integrator:

Integrator	Output form	Output value	Rated current	Power supply
Code:D1 (DIN-RAIL integrator)	**Code: .1**(AC voltage output) **Code: .2**(DC voltage output)	**Code: -333**(333mV) **Code: -1**(1V) **Code: -3**(3V) **Code: -5**(5V)	**Code: -500A** **Code: -1kA** **Code: -3kA** **Code: -10kA**	**Code: -12(12V DC)** **Code: -24(24V DC)**
	Code: .3(4-20mA output)	**N/A**		
Code:S9 (mini integrator)	**Code: .1**(AC voltage output) **Code: .2**(DC voltage output)	**Code: -333**(333mV) **Code: -1**(1V) **Code: -3**(3V)	**Code: -500A** **Code: -1kA** **Code: -3kA** **Code: -10kA**	**Code: -12(6-12V DC)** **Code: -24(24V DC)**
Code:S1 (high accuracy integrator)	**Code: .1**(AC voltage output) **Code: .2**(DC voltage output) **Code: .3**(4-20mA output)	**Code: -333**(333mV) **Code: -1**(1V) **Code: -3**(3V) **Code: -10**(10V)	**Code: -500A** **Code: -1kA** **Code: -3kA** **Code: -10kA**	**Code: -12(4-12V DC)** **Code: -24(24V DC)**
Code:TP (three phase integrator)	**Code: .1**(AC voltage output) **Code: .2**(DC voltage output)	**Code: -333**(333mV) **Code: -1**(1V) **Code: -3**(3V) **Code: -10**(10V)	**Code: -500A** **Code: -1kA** **Code: -3kA** **Code: -10kA**	**Code: -12(4-12V DC)** **Code: -24(24V DC)**
Code:A01 (1A output integrator)	**N/A**(0-1A)	**N/A**	**Code: -500A** **Code: -1kA** **Code: -3kA** **Code: -10kA**	**N/A(85-265V AC DC)**
Code:A05 (5A output integrator)	**N/A**(0-5A)	**N/A**	**Code: -500A** **Code: -1kA** **Code: -3kA** **Code: -10kA**	**N/A(85-265V AC DC)**
Code:SW (welding integrator)	**N/A**(0-10VDC)	**N/A**	**Code: -10kA** **Code: -50kA** **Code: -100kA** **Code: -500kA**	**Code: -12(4-12V DC)** **Code: -24(24V DC)**
Code:HF (high frequency integrator)	**N/A**(0-10VAC peak)	**N/A**	**Code: -1kA(1kA/1V)** **Code:** **-10kA(10kA/1V)**	**N/A(4-12V DC)**
Code:M2 (Integrator module)	**N/A**(0-5VAC peak)	**Code: -333**(333mV) **Code: -1**(1V)	**Code: -100A** **Code: -500A** **Code: -1kA** **Code: -3kA**	**Code: -3.3(±3.3V DC)** **Code: -5(±5V DC)**
Other requirement could be OEM				

Final Code=Integrator+Output form+Output value+Rated current+Power supply

For example:

D1.1-1-500A-12 is D1 integrator,AC voltage output,500A rated,output 1V,power supply 12V DC

A01-1kA is A01 integrator,rated 1kA,output 1A,power supply 85-265V AC DC