VPLog-i-R

User manual

VPLog-i-R

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Publisher

Van Putten Instruments BV
Buitenwatersloot 335
2614 GS Delft
The Netherlands

Table of Contents

1 Introduction

This document describes the user manual and the functional specifications of the VPLog-i-R current sensor.

Glossary

AC	Alternating current
CF	Crest Factor = Peek_current/RMS_current
DC	Direct current
GND	Ground
Hz	Hertz
IDEP/CN8	Combined Nomenclature code
mA	milli Ampère
ppm	Parts pro million; 1ppm=0,0001%=1/1000000
PWR	power
true RMS	true Root Mean Square, Urms = sqrt(mean(U^2))

2 Safety Regulations

Warnings, cautions and notes within this manual will be used as follows:

WARNING: Used to denote a danger to personnel of serious injury and/or death. The warning will be preceded by the caption WARNING and the detail of any warning will be in bold and uppercase.

CAUTION: Used to denote a possibility of damage to material or equipment but not a danger to personnel. The caution will be preceded by the caption CAUTION and the detail of any caution will be in bold and lowercase.

NOTE: used to draw attention to information that is extraneous to the immediate subject of the text. A note will be preceded by the caption NOTE and the detail will be in italics.

All warnings, cautions and notes will precede the relevant sections of the text.

General safety regulations

WARNING: THIS DEVICE IS NOT DESIGNED FOR AND THEREFORE NOT INTENDED FOR USE IN ANY ENVIRONMENT WHERE HUMAN LIFE DEPENDS DIRECTLY ON THE USE OF PROVEN RELIABILITY AND FAILSAFE TECHNIQUES AND COMPONENTS.

WARNING: THIS DEVICE MUST ONLY BE OPERATED IN ENVIRONMENTS LIMITED TO THE SPECIFIED TEMPERATURE AND HUMIDITY CONDITIONS.

WARNING: THIS DEVICE IS NOT PROTECTED AGAINST ANY CORROSION FROM ANY TOXICAL VAST PARTICLE, FLUID OR GAS.

WARNING: THIS DEVICE MUST NOT BE USED IN NUCLEAR PLANTS OR IN ANY EXPLOSIVE ENVIRONMENT.

CAUTION: The maximum input voltages must not be exceeded.

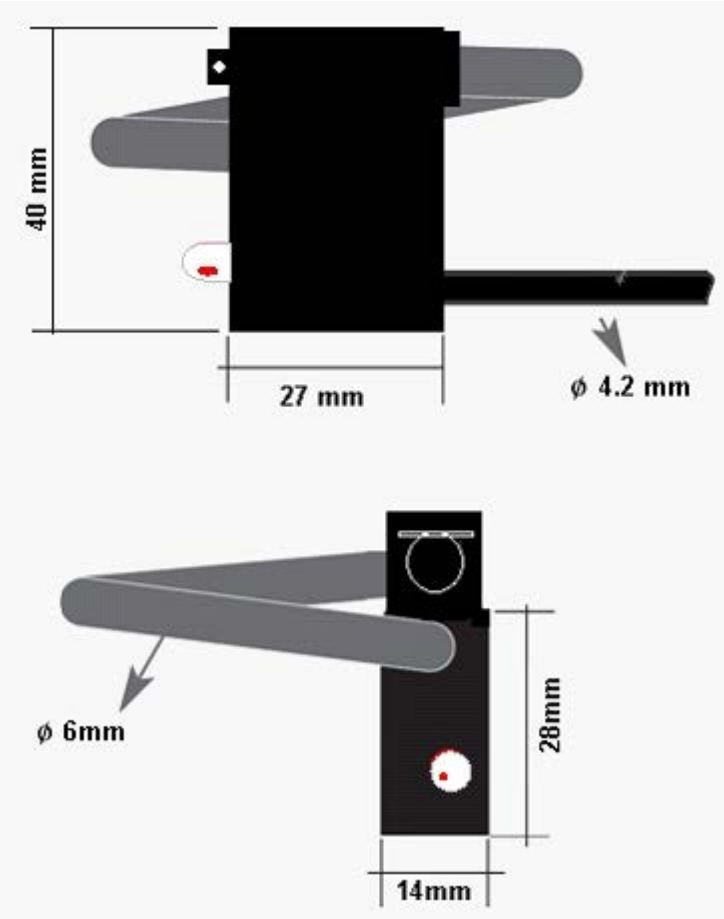
3 Instrument Description

The VPLog-i-R AC current sensor, based on a Rogowski coil, that measures AC currents up to 1600A true-rms on a single phase power cable.
The sensor has a modbus interface for communication.

The sensor has an indication LED. This blinks when modbus communication is ongoing.

Each sensor has a unique serial number and is delivered with a calibration certificate and report.

The following figure shows the module dimensions. The area/diameter of the loop formed by the measurement coil (light gray on the figure) is 65mm?.



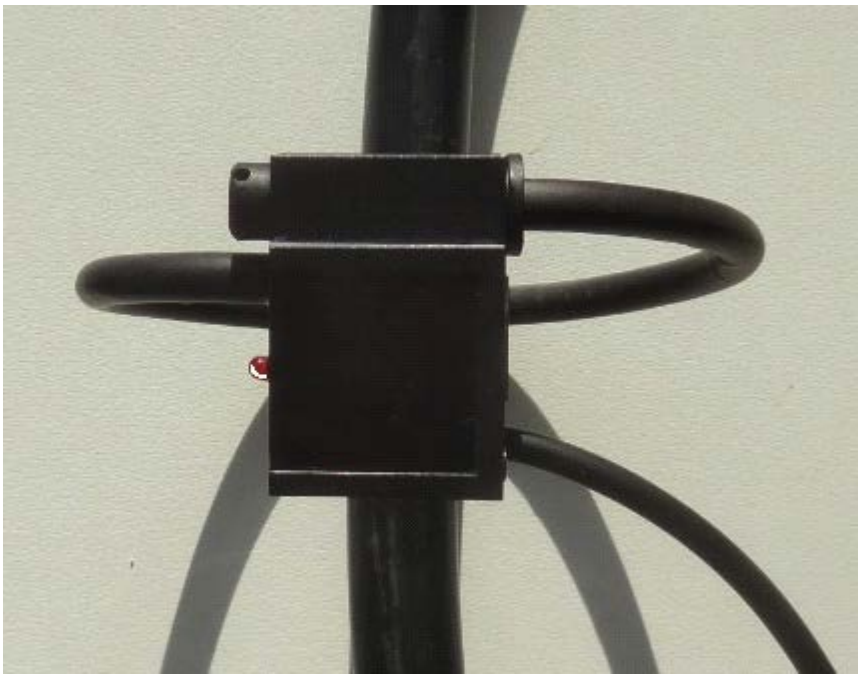
The hole (?1.5mm) in the plug can be used to seal the device.

The irregularity in the loop between the top and bottom coil end, is compensated by a unique circuit that compensates for this error. So there is no additional error due to the mounting of the coil in a plane perpendicular to the power cable or not.

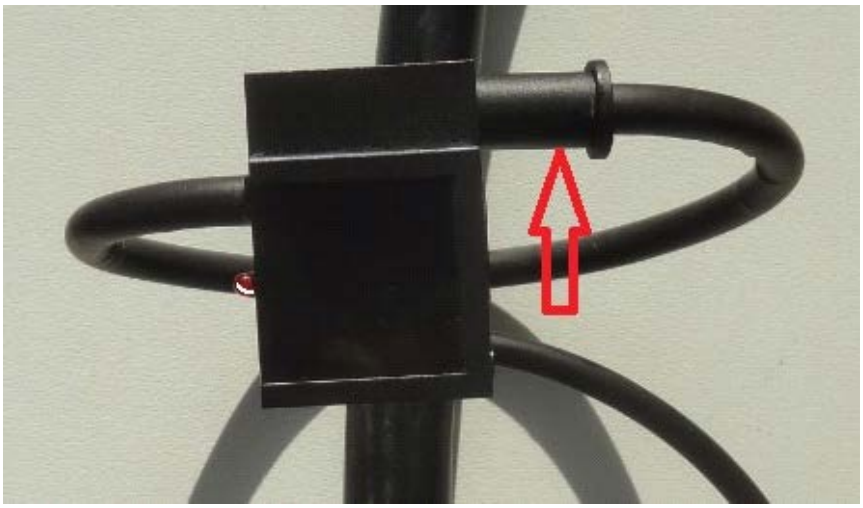
4 Installation

Connection to the cable

To install the VPLog-i-R sensor, wrap the measurement coil around the single phase power cable (L1, L2, L3 or N). Then click the plug into the clamp. The coil has to make a **closed** loop around the power cable.

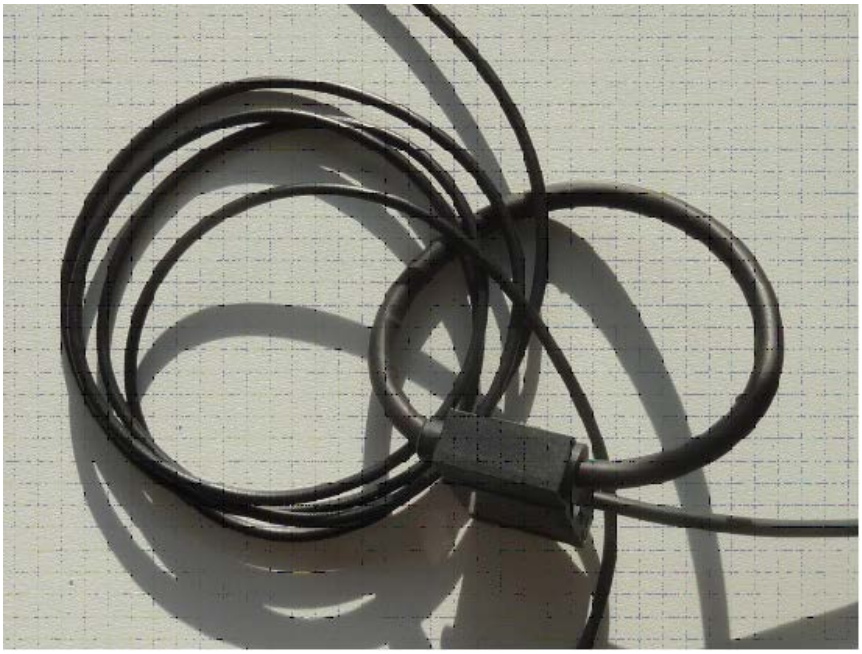


The following figure illustrates a faulty installation.



NOTE: *The sensor is not sensitive to power direction.*

NOTE: *Wrapping the power cable twice doubles the sensor's sensitivity. Use this feature to measure small currents.*



Sensitivity is 5 times higher if the power cable is wrapped around the coil 5 times

Note: The alignment of the sensor has no influence on the accuracy, due to the compensation circuit added in the VPLog-i-R.

WARNING: HIGH VOLTAGES ARE HAZARDOUS AND CAUSE AN IMMEDIATE RISK TO SERIOUS INJURY OR EVEN DEATH.

WARNING: BE VERY CAREFUL TO RESPECT ALL GENERAL AND LOCAL SAFETY PRECAUTIONS (E.G DISCONNECT POWER, WEAR SAFETY GLASSES, RUBBER GLOVES AND ADEQUATE CLOTHES, ETC)

Power-On/Off

The VPLog-i-R sensor has no power on/off switch. Applying power to the sensor starts its internal power-up sequence. Switch the sensor off by removing its power supply.

5 Connection

Terminals

Terminal	Color
PWR	Red
RS485A	Orange
RS485B	Brown
GND	Black

Modbus settings

The following table holds the default communication parameters for modbus.

Parameter	Description
Modbus Address	1
Baudrate	38400 baud
Parity	No parity bit is used.
Stop-bits	1 stop bit is used.

Modbus registers

The following is an overview of the available modbus registers.

Name	Register	Description	Units
I 50Hz	1	Current at base frequency	0.1 AAC
I RMS	2	True RMS current	0.1 AAC
Frequency	3	Frequency	0.01 Hz

Protocol functions

For reading the 16 bit values, modbus supports the commands “Read Holding Registers” (0x03). When addressing registers, the command contains the address minus 1, for instance registers 1..3 are addressed as 0..2.

The VPLog-i-R also supports the modbus scan protocol. This allows to change the modbus settings and to request extra information from the module.

Modbus example

Example 1
The following example contains a request and response for 2 registers starting at register 2 (RMS current + frequency).

Request : 01 03 00 01 00 02 95 CB
Response: 01 03 04 13 88 13 88 73 CB

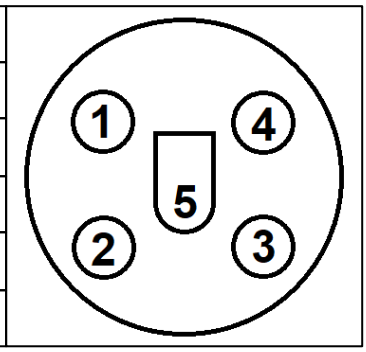
Data bytes	Description
Request	
01	modbus address VPLog-i-R
03	Function
00 01	Starting register
00 02	Register count
95 CB	CRC
Response	
01	VPLog-i-R modbus address
03	Function
04	Byte count

13 88	I RMS (5000 -> 500.0 AAC)
13 88	I RMS (5000 -> 50.00Hz)
73 CB	CRC

6 Configuration

In order to configure the modbus settings of the VPLog-i-R, connect it to the M12 5 Pin female connector (VPA.0000.300) and use the VPFlowScope JB5 interface KIT (VPA.5001.205) to connect it to your PC.

Pin	Wire color
1	Red
2	Black
3	-
4	Orange
5	Brown



M12 5 Pin female connections (internal, back side)

Use the VPLog-i-R configuration software (download at www.vpinstruments.com) to check and configure baudrate, address, stopbits and parity.
Enter the connected COM port number (JB5 RS458 to USB converter) and follow the instructions.

7 Specifications

Environmental

Specification	Value
Operational ambient temperature	-20 ºC to +70 ºC
Operational relative humidity	max 95%, non-condensing
Storage ambient temperature	-20 ºC to +70 ºC
Storage relative humidity	max 95%, non-condensing

Mechanical

Specification	Value
Coil Length	250 mm
Allowed Power Cable Diameter	65 mm
Coil Diameter	6 mm
Coil Bend Radius	30 mm
Coil Plug Diameter	12 mm
Housing W x H x D	27 mm x 40 mm x 14 mm
Output Cable	5 m UL-LiYY, double insulation
Weight (Housing + Coil)	150gr
IDEP/CN8	8504.3129

Electrical

Specification	Unit	Min.	Typ.	Max.	Conditions
Voltage (PWR to GND)	Vdc	7	-	28	
Power consumption	mA		11		Vdc=24V
Current range (CF=2)	Aac		1600		
Current range (CF=1.5)	Aac		2200		
Frequency range	Hz	48		62	
Measurement bandwidth	Hz		720		
Noise	% full scale		0.2	0.5	
Supply coefficient	ppm/V		160		(1)
Temperature coefficient	ppm/°C		100		(2)
Accuracy	% full scale	-1		1	(3)
Modbus start-up time	s	1		2	(4)
Measurement start-up time	s	2		3	(5)

(1) The change of the output current, if the sensor voltage changes one Volt.
(2) The change of the output current, if the sensor temperature changes one degree Celsius.
(3) When mounted as shown in chapter Installation.
(4) Power-on to modbus ready time
(5) Power-on to correct measurement read out. 0A is returned before.

Notes

Notes

easy insight into energy flows

VPInstruments
Buitenwatersloot 335
2614 GS Delft
The Netherlands
info@vpinstruments.com
www.vpinstruments.com

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