Arc Detection LiBo Sensor -8 und -16

Instruction Manual, Technical Data and Important Notice from the Manufacturer

Article No. 25630004-01 (for -8) and 25630005-01 (for -16)

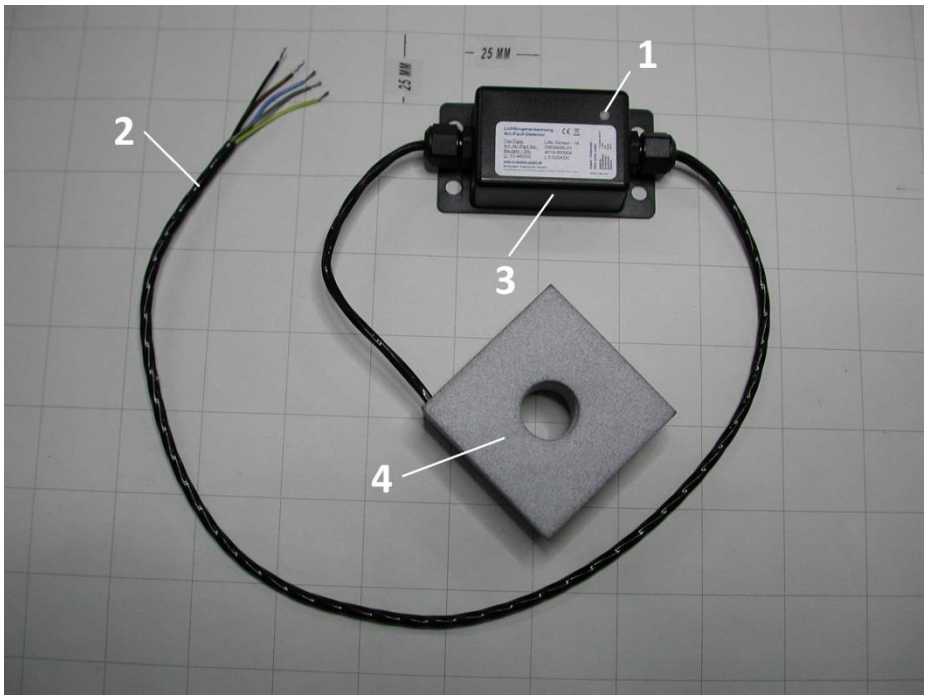

Image 1: LiBo Sensor with toroid coil, shows -16 (4), Electronic-Box (3), Connection cable (2) and Duo-LED Red/Green (1)

General remarks

The unit shown consists of a toroid coil sensor in two sizes, electronic system and a connection cable.
The customer himself is responsible for a DC supply conforming to standards and fused.
The unit can be used retrofitted or, on request, in parts of it or circuitry licensed. (see Image 3 on last page for an application proposal).
The cable to be monitored for arcs will be fed through the toroid coil with inner diameter of 8mm (-8) or 16mm (-16), independant of the feed through direction.

1. Connection cable (Image 1: Pos. 2)

   Color classification of the wires:

- yellow/green : Test
- brown : Reset
- blue : Alarm Output
- grey : + 12-48VDC Supply voltage
- black : GND/Minus (-)

End of wires are tinned.

2. Supply voltage applied, Getting started, Status memory

   After feeding the live DC cable to be monitored through the toroid coil (Image 1: Pos. 4) you connect the grey wire of the connecting cable (Image 1: Pos. 2) to the Plus terminal and the black wire to the Minus terminal of the DC source (12-48VDC) of the customer.
   At first use the red LED (Image 1: Pos. 1) will be on for a short period of time (self-test)and becomes green afterwards, the unit is now ready for use. If the red LED stays on, make a reset by connecting electrically the brown wire for 2 seconds to the black wire. If the LED stays red after the reset, you need to calibrate the unit following the procedures in chapter 9. from this manual.

   If calibration fails, you need to measure the DC voltage at the two test-pins (Image 2: Pos.1 and 2): if the reading shows a voltage between 1,80 and 2,00 VDC and the LED stays red, you need to return the unit to the manufacturer. Reading voltages below 1,80VDC or above 2,00VDC you need to adjust the voltage by the potentiometer (Image 2: Pos. 3) to 1,80VDC and recalibrate following chapter 9.
   If the power supply fails and the supply voltage finally comes up again, the LED shows the latest status (red or green) prior to the loss of power after a self- test has been performed successfully.

3. Duo-LED Red/Green (Image 1: Pos. 1)

   This LED is green during normal operation and faultless circuitry assuming a calibration was performed in a voltage range of 1,80 to 2,00VDC at the test-pins (Image 2: Pos. 1 and 2).
   This LED is red if an arc is detected or the circuitry has a fault (including the toroid coil sensor (Image 1: Pos. 4) or the calibration range of 1,80 to 2,00VDC has been exceeded or fallen below.

4. Test

   Components and circuitry are checked by a test feature. This test feature is initiated by connecting the yellow-green wire of the connection cable (Image 1: Pos.2) for 2 seconds electrically to the black wire. During this connection is made, the LED (Image 1: Pos. 1) shines red. If the connection is open again and if there is no fault in the circuitry the LED shines green again.
   If there is a fault during testing, the LED stays red.

5. Automatic test following E DIN EN 63027

   In the background an automatic test for the unit is performed about every 24h.
   A pseudo-arc is generated in the toroid coil and processed by the circuitry. If there is no fault in the circuitry, an alarm will not be generated (red LED) and the test remains undetected. In case of a fault, the LED (Image 1: Pos. 1) shines red and the blue Alarm Output-wire is deactivated, meaning in a high-impedance state. If a reset or calibration (see chapter 6. and 9.)is not successful, the unit needs to be returned to the manufacturer.

6. Reset

   Activating Reset after detection of an arc, the red LED (Image 1: Pos. 1) will change into green if there is no other fault. To perform a reset, the brown wire of the connection cable needs to be electrically connected to the black wire for 2 seconds. . If you perform the reset and test function at the same time for about 2-4 seconds, a calibration will take place (see chapter 9.).

7. Alarm Output

   The blue Alarm-Output wire of the connecting cable is connected to the (Open) Drain of a FET. In normal operation (no arc, LED shows green) the FET is active and the blue wire is on GND potential (Fail Safe). If an arc is detected or a fault occurs, the Alarm-Output becomes high impedance state (red LED on). Performing a reset (see chapter 6.) and assuming no other faults, the output will go back to GND potential.

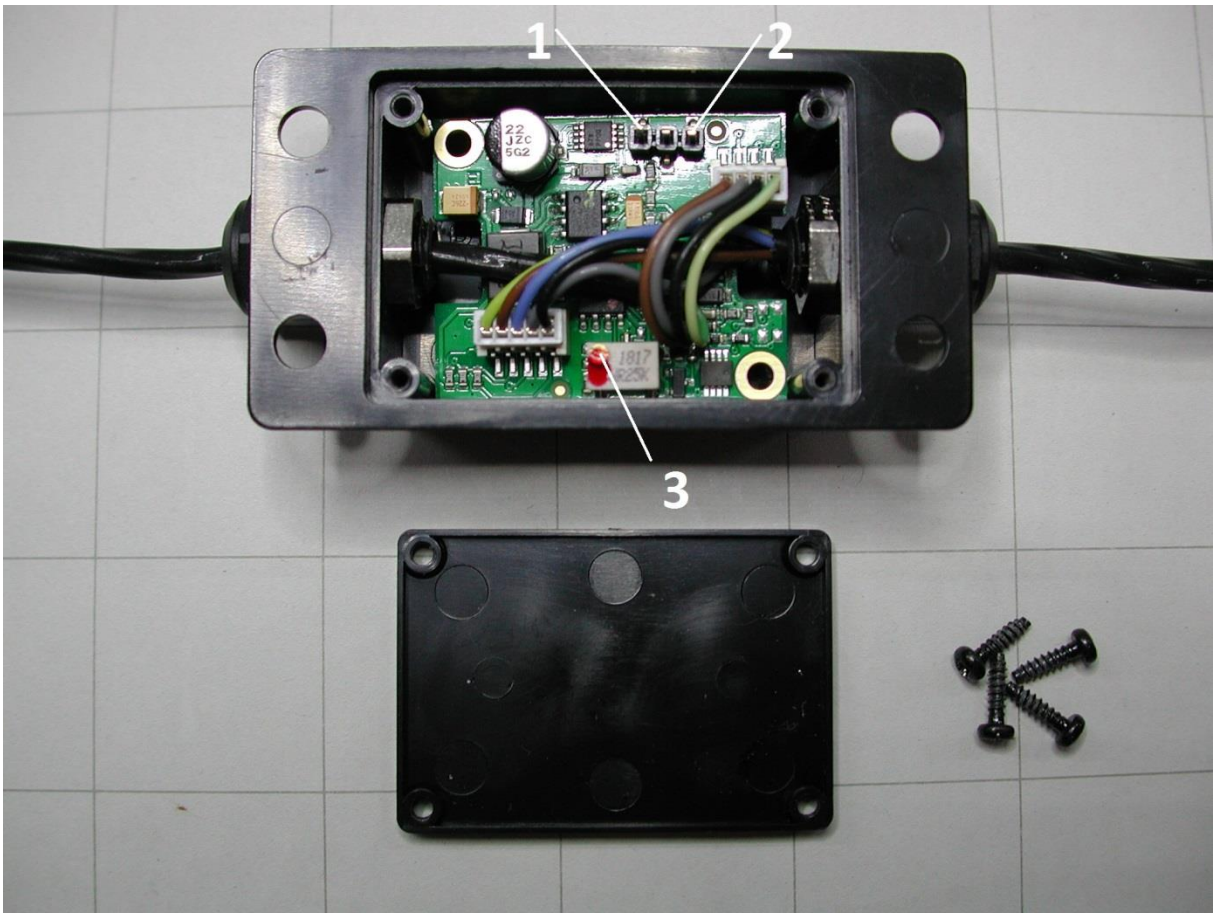

Image 2: View on PCB, showing 1: Test-Pin (+), 2: Test-Pin (-), 3: Potentiometer

8. 3-pin multi-pin connector and potentiometer inside the box

- After removing the cover plate (loosing 4 screws and taking off the cover plate) you see a 3-pin connector and a potentiometer (Image 2: Pos. 3) on the PCB. To the test-pin (+) (Image 2: Pos. 1) you connect the plus of a digital voltmeter (4-5 digits of resolution recommended), to the test-pin (-) (Image 2, Pos. 2) the minus of that digital voltmeter. Turning the potentiometer screw carefully with a small clockmaker screwdriver will set the DC voltage across the test-pins.
- **You need to calibrate the unit (see chapter 9.) after each setting of the potentiometer.**
- Factory-made voltage is **1,80VDC**

9. Calibration

If there is a disturbance on the cable to be monitored and the LED (Image 1: Pos. 1) goes red after power is supplied and cannot be resetted to green (see chapter 6.), there is a fault in the unit or the voltage on the test-pins exceeds the calibration range of 1,80 to 2,00 VDC. In this case, the wires Test (yellow-green) and Reset (brown) needs to be connected for 2-4 seconds both at the same time to the GND wire (black). The circuitry adjusts itself automatically to the actual voltage by adapting the alarm-threshold. After that, a self-test is performed. If this test is positive, the LED shows green again and the output is activated.

Technical Data:

- Supply voltage: 12-48VDC +/-10%, Supply current 7mA, up to 23mA when “Test” is activated

- Degree of protection: IP4x (DIN 40050), higher degree upon request

- Working- and Storage- Temperature range: -20 up to +80 degree C (different temperature ranges upon request)

- Box size including flange: 67 mm(L) x 34 mm(W)x21 mm(H), color: black

- Cable length of the toroid sensor cable: about 25 cm,
  length of the connection cable: about 50 cm

- Arc Detection starting at about 40 watts of arc power

- Direct current of the cable to be monitored:
  Toroid coil -8 : minimum of 50A
  Toroid coil -16: minimum of 100A (higher currents upon request)

- Alarm Output: 12-48VDC, up to 1A (Open Drain)

- Full galvanic isolation between DUT (Device under test) and sensor. Insulation strength due to the cable data of the cable being monitored for arcs

- All functions of the unit are in accordance with E DIN EN 63027

- Calibration range: 1,80- 2,00VDC, factory-made voltage: 1,80VDC

- Declaration of Conformity available

Important notice from the manufacturer

- **Before using the sensor you should carefully read the Instruction Manual and the Technical Data. These documents including the Declaration of Conformity you will find on the homepage**

  www.m-system-gmbh.de

  under „Produkte“.
- **An article- and series No. identifies the sensor.**
- **To make sure the sensor works normally over time, the manufacturer recommends a regular control of the sensitivity by means of a calibration by the technician who installed the sensor.**
- **The circuitry was developed following the generally recognised codes of practice, following also E DIN EN 63027 dated February 2018. Using the factory-made voltage of 1,80VDC at the test-pins, the circuitry works well on various PV-strings and DC-cables.**
- **Caused by a variety of disturbances on DC-cables, a calibration or setting of a certain voltage by the potentiometer might not be successful for a proper operation of the sensor.**
- **Before placing an order the manufacturer presumes the test of a sensor on loan and for a certain amount of time to make sure the sensor is working properly in the application of the customer.**
- **Warranty corresponding to the General Terms and Conditions of the manufacturer.**

If the customer cannot make sure that the sensor works properly in his application after setting the sensitivity or calibration, the manufacturer can help with different proposals. This would mean a change of hard- or software, but also a statement that the sensor from M-System never will work properly in a specific application.

Environmental notice

At the end of the product´s life, no depollution is allowed via domestic waste. The product needs to be given to a professional collection point for recycling of electric and electronic products.

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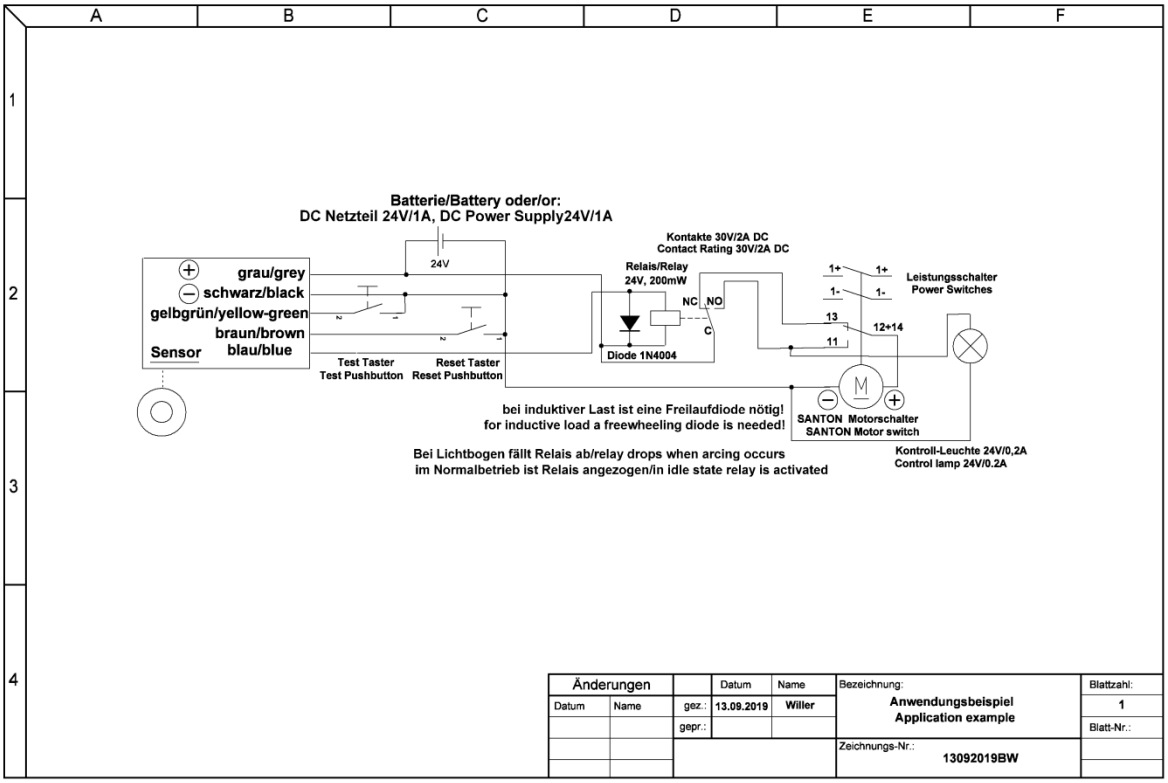

Image 3: Application Proposal

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