DEQC33011 MANUAL

Ver: PRELIMINARY

1 SAFETY INFORMATION

1.1 The DEQC33011 belongs to the Extra Low Voltage class of electrical equipment with no voltage levels above 75VDC present anywhere within the device. Currents passing through the DEQC33011 during normal operation are below 1A, except for short circuit probing pulse of 3A / 250µs. In operational setting, with the enclosure cover closed, DEQC33011 has no exposed conductive surfaces subjected to voltages in relation to each other, or the -48VDC or PE terminals.

1.2 During the installation of the DEQC33011 on the site, the Protective Earth (PE) terminals of the DEQC33011 controller must be connected to the PE circuit of the site, and the light units.

2 ENIROMENTAL CONDITION OF USE

The DEQC33011 is designed for application in field conditions as follows:

2.1 Ambient air temperature from -40°C to +63 °C
2.2 Relative humidity up to 98 % at temperature up to +35°C (IEC 60068-2-3);
2.3 Mechanical vibration 10 - 500Hz with acceleration up to 2.2 g (IEC 60068-2-6);
2.4 Salt mist conditions (IEC 60068-2-11);
2.5 Wind speeds up to 67 m/s (240 km/h).
2.6 Entrance protection class of the DEQC33011 is IP 66.

3 FUNCTIONAL AND BUILD DESCRIPTION

The main function of the DEQC33011 is to monitor its output circuits, and to provide alarm notification to connected monitoring equipment through a set of potential free switching relay terminals in case of the failure of any one of the three obstruction lights connected to DEQC33011.
Alarm mode is detected upon detecting a reduction of the supply current consumed by any of three lamps below a pre-set level, or a detecting a short circuit. DEQC33011 is capable of limiting the current drawn from power source in case of short circuit coming from an output while continuing to supply power to remaining light units. The printed board is covered by conformal coating.

3.1 Operable components

- three variable multi-turn resistors for adjusting the undercurrent alarm threshold individually for each output.
- a 4-position DIP switch (SW1) for:
  a) selection of output circuits to LED obstruction light for operation; allows to de-energize and exclude output circuits L2 and L3 from current monitoring;
  b) selecting the dual mode of operation with a primary and a secondary (spare) light unit;
  c) reset the microcontroller (blocked by paint)

3.2 Screw terminals belonging to three logical groups (power input, power output, and monitoring extend above the surface of the resin for connecting input and output cables.

3.3 The input and output cable ports are sealed IP67 by the use of suitable nickel plated brass cable glands. All three cable glands are located at the bottom side of the enclosure while the enclosure is foreseen for either horizontal and vertical installation.

3.4 Three two-color 3mm LED indicators extend through the lower left side of the DEQC33011 enclosure, signaling the status of output circuits L1, L2 and L3. The light signals emitted by the LEDs indicate the following conditions:
- green light: normal operation of the corresponding output circuit (current is within limits);
- red light: short circuit fault condition is detected in the corresponding output circuit;
- yellow light: undercurrent circuit fault condition is detected in the corresponding output circuit;
- No light (LED off) : the corresponding output circuit is not selected for output current monitoring or no power with proper polarity is supplied to the module

3.5 Electronic circuit is housed inside a commercially available IP66 cast aluminum enclosure.

4 ELECTRICAL SPECIFICATION

- Electrical strength of the insulation: 500 Vac, 1 minute (IEC 60598 – 1);
- Transient protection: 2 KV (8/20us) (IEC 61000-4-5);
- Insulation resistance (100 Vdc): 1 MOhm (IEC 60598-1);
- Electromagnetic compatibility (EMC): EN 50293, EN 55022;
- Nominal Power voltage: 48 Vdc ±10% ;
- Power consumption of the internal circuitry (DEQC33011 only):
  In normal operating (monitoring) mode: 10 mA typical
  In alarm mode due to undercurrent (with relay engaged): 20 mA typical
  In alarm mode due to overcurrent (with relay engaged): 20 mA typical with current pulses of up to 700mA/300us per output circuit once every second (short circuit probing).

4.1 Output current
- up to 300 mA ±10% typical total with all outputs driven (nominal current of 3 SEGS48B32 lamps)
- Usable maximum : 1800 mA ±10% (600 mA per channel, below fixed short circuit alarm threshold of 1000 mA per channel)
- Worst case: static load current of 2100 mA (below point of short circuit).

4.2 Alarm Mode
- Alarm mode engage undercurrent threshold setting per output: 75mA ±10% typical (below 25% of SEGS48B32 nominal current). The usable range for undercurrent threshold setting is 10 mA to 260 mA (adjustable for each output using variable resistors: P100-L1, P101-L2, P102-L3)
- alarm mode engaged short circuit: threshold set at 700 mA ±5%
- Alarm mode engage time delay: 30 sec typical

4.3 Electrical In and Out
- Voltage Input: 48 Vdc ±10% . Vout= Vin-1.4V. In case of application of a power supply voltage with reversed polarity to the input of DEQC33011, this voltage shall not propagate to the outputs.
- Rating of the current alarm relay terminals: 75 Vdc / 3 A max.
- Maximum capacitive load on terminals: 0.5 µF (not exceeded by a 1000m run of a typical power cable).

5 CONNECTIONS

Cable input and output ports (glands) and ranges of usable cable outside diameters:
Monitoring port (leftmost): M16 x 1.5, range of cable outside diameters 4mm to 8mm
Power output port (middle): M20 x 1.5, range of cable outside diameters 7mm to 12mm
Power input port (rightmost): M20 x 1.5, range of cable outside diameters 7mm to 12mm
Screw terminals are used for connecting of power and signal wires with conductor diameter between 0.26mm and 2.0mm.
Logically, terminals are grouped in three groups:
Terminal Group 1: Power interface (input) for connecting to 48VDC power supply at the site of application (Table 1);
Terminal Group 2: LED Light Power interface (outputs) for connecting three LED Obstruction Light units;
Terminal Group 3: Alarm Signal interface for connecting to external monitoring equipment.

Table 1. Terminal Group 1: connections to 48VDC power supply of the installation site

Terminal Nr.	Signal Name	Function	Description	Comment
1	-U	Input	Positive power supply wire; nominal voltage 48VDC	This voltage is further routed to operate the LED Obstruction Lights connected to circuits L1, L2, and L3, and used locally for powering the current monitoring circuitry
2	+U	Input	DC power supply return wire	The wire is directly routed to the output to 3 LED Obstruction Lights, terminal 8
3	PE	Input, output	Protective Earth; connected to enclosure directly, and to the ground plane through a varistor	This double terminal is marked as PE, not by a terminal number(3). It is directly connected to the PE terminal 4 foreseen for output cable connection.

Table 2. Terminal Group 3: connections to external remote monitoring equipment

Terminal Nr.	Signal Name	Function	Description	Comment
10	RLY	Output	Switching terminal of the current alarm relay	Potential free contacts; parallel monitoring of all 3 light units
9	RNO	Output	Normally Open terminal of the current alarm relay	When the current consumption of all monitored LED light units is normal, this terminal is floating. When the current consumption of any LED light is below the set threshold, or any individual output circuit is shorted, this terminal is connected to the RLY terminal.
11	RNC	Output	Normally Closed terminal of the current alarm relay	When the current consumption of all monitored LED light units is normal, this terminal is connected to the RLY terminal. When the current consumption of any LED light is below the threshold, or the output circuit is shorted, this terminal is floating.

Table 3: Terminal Group 2 connections to 3 LED Obstruction Lights

Terminal Nr.	Signal Name	Function	Description	Comment
7,6,5	L1, L2, L3	Output	Positive power supply wires to LED units; nominal voltage 48VDC in all modes, pulsed for 2.5ms every second in case of short circuit	The power supply voltage is routed to 3 LED Obstruction Lights through individual current shunts for current monitoring, protecting diodes, and current limiting elements
8	-48 VDC	Output	DC power supply return wire from the LED units	This terminal is directly routed to the input 2 from the power supply
4	PE	Output	Protective Earth	This terminal is marked as PE, not by terminal number (4). It is directly wired to the input PE terminal 3 in Group 1.

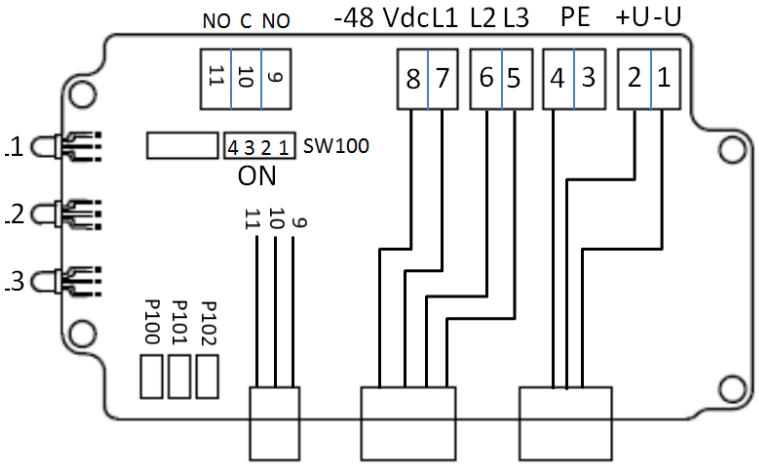

Figure 1: Current Monitoring Alarm Module DEQC3011 terminals

6 MECHANICAL SPECIFICATION

The DEQC33011 is intended for mounting on a flat surface prepared with two mounting holes, one in lower left corner of the module, and the other in upper right corner of the module, matching to the mounting hole arrangement of the module (Figure 2). Mounting hole cavities are covered by the lid and sealed from the inside compartment of the enclosure.

Use appropriate screws to fix the enclosure to the flat surface (e.g.: M4x10). The screws must be chosen accordingly to the type of wall on which the DEQC33011 is mounted.

The space required for DEQC33011 installation extends approximately to 0.0006 m^3 (125 X 80 x60 mm), depending on required bending radius of the power cables used.

Weight of DEQC33011 module is 0.620 ± 0.1 kg.

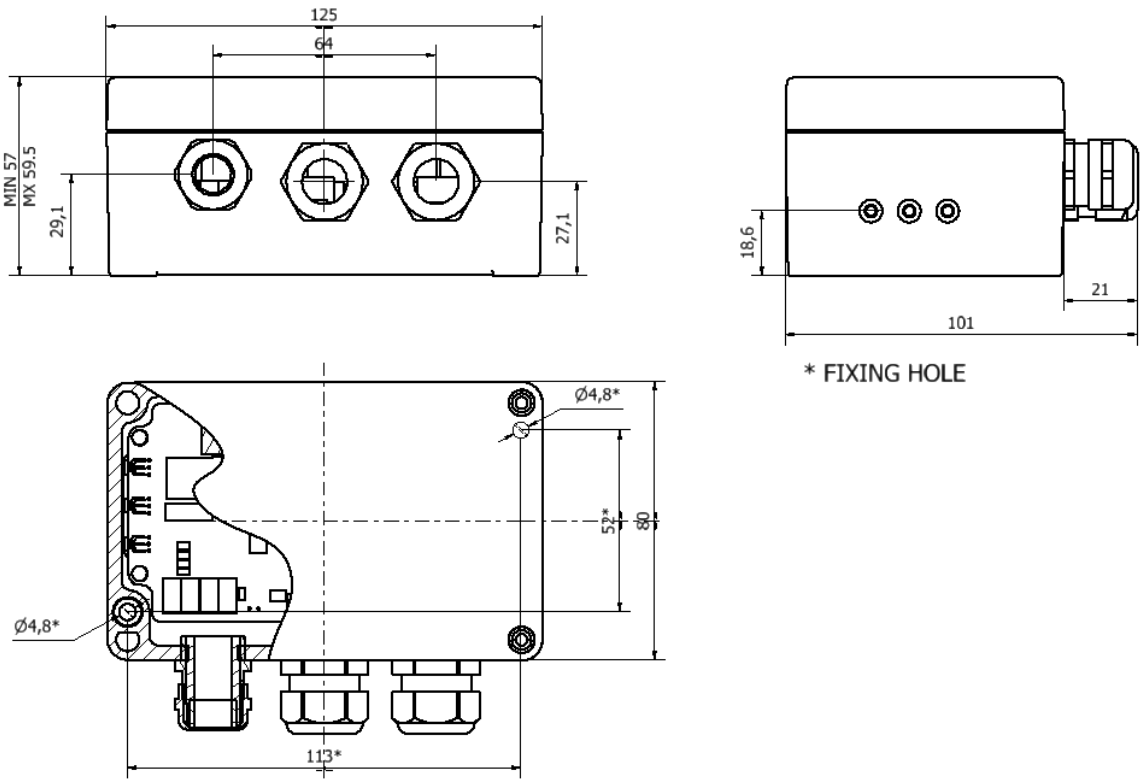

Figure 2: Mechanical dimensions of DEQC33011

7 LABELLING

The following labels and markings are placed on the enclosure of DEQC33011:

- Product name
- Name of the manufacturer and address;
- Country of origin;
- Trademark of the manufacturer;
- Power Supply Voltage (48 VDC);
- The serial number of the product
- LED indicator labels (L1, L2, L3);
- CE and RAEE symbol.

Moreover inside of the Lid there is a connection diagram (Figure 3).

8 STORAGE AND TRANSPORTATION

For long-term storage the DEQC33011 must be kept in packed state inside a warehouse at temperatures between +5 °C to + 50 °C, and at relative humidity of up to 80% at temperatures up to + 25 °C.

The air in the warehouse shall not contain any kind of aggressive substances or steam during the storage period.

The DEQC33011 (in packing) may be transported by any means of transport at temperatures from -40 °C to + 50 °C.

During transportation by the air the DEQC33011 (in packaging) must be kept within the hermetically isolated sections of the aircraft.

9 INSTALLATION INSTRUCTIONS

NOTE 1: Installation of the DEQC33011 may only be performed by a competent specialist in accordance with local rules and regulations. Avoid any activities around structures of significant height and obstruction light cable in expectation or presence of thunderstorms. The EMC conditions of electrical systems on the site of application must be compliant to industrial environment requirements, providing proper grounding and lightning protection.

9.1 Remove the lid from the DEQC33011, unscrewing the four screws with a flat blade SL6 or cross-tip PZ2 screwdriver, and carefully leave it hanging by the grounding wire connecting the lid to the module. Perform a visual inspection of the inside space of the module and make sure that there are no obvious signs pointing to failures due to electrical overstress, tampering, chemical substances, or humidity.

9.2 Mount the DEQC33011 in required position, making sure that there is enough space to route the power and signal cables to the module.

9.3 Make sure that it is safe to perform electrical connections to the module, that all relevant power circuits are de-energized with circuit breakers (switches) correspondingly marked to prevent activation, and that there are no voltages present on any wires of both cables.

9.4 Before making the connections to terminal output group, make sure that the wires supplying the light units are not energized by mistake, and not shorted at the other end - no short circuits on wire pairs "+48V" (terminals 5, 6, and 7) to "GND" (terminal 8). See figure 3.

9.5 Make sure that cable and wire diameters are suitable for use with the DEQC33011. Route all three cables through corresponding cable glands and make connections to screw terminals of all terminal groups using a 3mm flat blade screwdriver, avoiding applying excessive torque. Tighten the cable glands securely by appropriate wrench (M20 and M16), applying reasonable torque and making sure that the individual wires are not under stress after the cable glands are tightened.

9.6 The DEQC33011 is supplied in factory configuration for use with 3 LED Obstruction Lights SEGS48B32 connected to its outputs, therefore setting up operations are not required during regular installation of the module for use with 3 LED light units. To configure a specific mode of operation of DEQC33011, follow instructions suitable for your application (see next operations).

9.6.1 For application with 3 LED light units, make sure that SW100/switch 2&4, are set to "ON". It's recommended to leave SW100/switch3 in OFF position although it has no effect.

9.6.2 For application with 2 LED Obstruction lights connected to output circuits L1 and L2 monitored, set the SW100/switch 2 to "ON", and position 3&4 to "OFF". This configuration will exclude L3 from supply and monitoring and L2 from spare unit (SPA) mode. Output circuit L1 is always monitored, it is not possible to exclude it from triggering the alarm.

9.6.3 For application with a single LED Obstruction light connected to output circuit L1 monitored, set the DIP switch SW100/switch 2, 3 and 4 to "OFF" for excluding the unused output circuits L2 and L3 from current supply and monitoring. Output circuit L1 is always monitored, it is not possible to exclude it from triggering the alarm.

9.6.4 For application with two LED Obstruction lights in dual light configuration where one of the light units is operational as a primary signal light, and the secondary light unit is in standby mode as SPA, to be powered in case of undercurrent or overcurrent failure detected in primary light circuitry, configure the SW100/switch 3 in 'ON' position and SW100/switch 2 & 4 in 'OFF'. Connect the secondary light unit to output circuit L2.

9.7 Power up the module with 48VDC and observe it's behavior. After applying the power, depending on whether the output circuits L2 and L3 are excluded from current monitoring or not, one to three status LEDs will light up (see 4.5 above for explanation of indicator colors). In case that all three light units were not connected at the time of powering the module, the module stays in alarm mode until a load drawing current within the expected range is applied to all monitored outputs. Power supply voltage is always present on outputs L1 to L3, unless the circuits are connected to a load exceeding the overcurrent threshold.

9.8 If the startup of DEQC33011 was successful, obtain visual confirmation that all connected obstruction lights on the host structure are operational, and that corresponding LEDs indicate normal operation, then carefully seat the lid and tighten the four screws fixing the lid applying reasonable torque. In case of any doubt, perform testing of DEQC33011 according to instructions provided in paragraph 10.

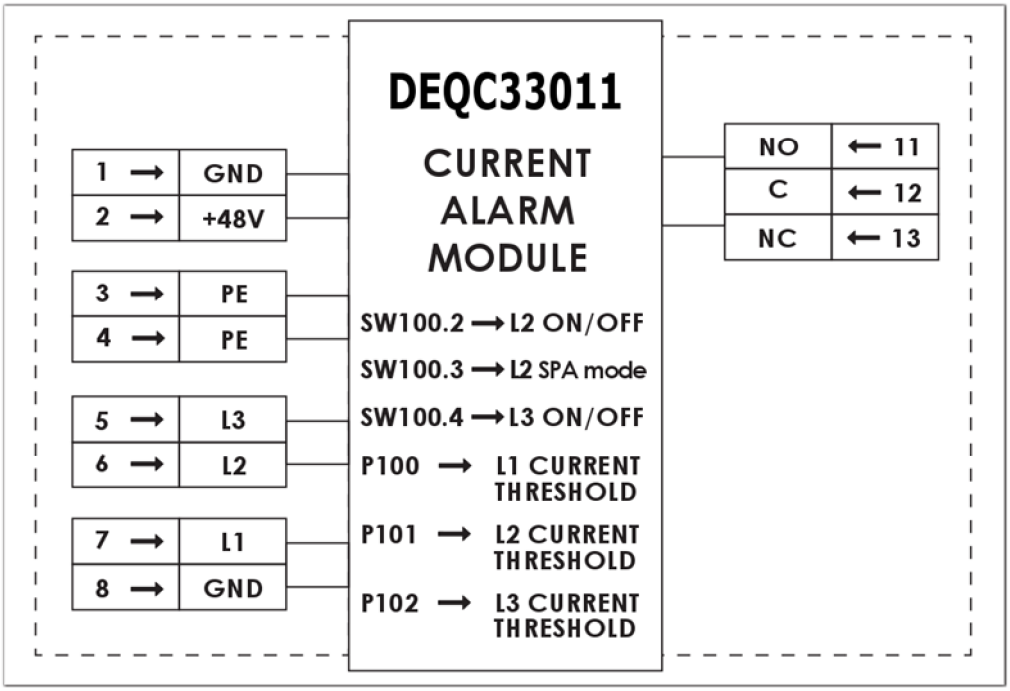

Figure 3: Connection and setting diagram

10 TESTING AND USE

10.1 The factory threshold settings to activate the alarm signal in case of reduction of any one of the connected LED Obstruction Light power supply currents below a preset level, or in case of detection of a short circuit on the obstruction light power feed (output) circuitry are provided in section 5. If these settings need to be changed for a specific application, it is recommended to make the changes in laboratory environment before installation on the site.

10.2 Control elements: multi-turn variable resistors P100, P101 and P102 operable by a flat blade screwdriver with 2 x 0.4mm tip, are provided for adjusting the threshold for switching to the undercurrent alarm mode of each output channel (see Figure 3 for location). Each full turn of these resistors changes the threshold of the corresponding output circuit by approximately 10mA, increasing the threshold when turned clockwise, and decreasing the threshold when turned counterclockwise. Refer to 4.2 for undercurrent threshold range and default settings. It is also possible connect a 3-digit display board (code…) to read the current set (in mA) for each enabled light. Connect and disconnect the display board only when the DEQC33011 is de-energized.