

This manual provides important safety and technical information

Installation Manual
OPW Engineered Systems

Rack Monitor 88xxE



Disclaimer

This manual provides important safety and technical information of the OPW Rack monitor 88XX-series. It is important that this manual is read and understood completely by the installing technician prior to installation.

88XX is a secondary overflow prevention monitor for protecting loading operations from overflowing. It performs two functions i.e. grounding and overflow monitoring and is compatible with 2 and 5 wire optic probes.

OPW Fluid Transfer Group Europe BV OPW guarantees the customary normal quality and soundness of the items delivered during the guarantee period and that this product is adequate for the stated use in chapter 1 and is in accordance with the Directive(s) stated in the declaration of conformity in this manual.

OPW Fluid Transfer Group Europe BV cannot be held responsible for incorrect use of the RACK MONITOR 88XX. The Rack Monitor 88XX is for the use of monitoring of loading of tank trucks with the application and parameters stated in chapter 1 of this manual.

In case this OPW Rack Monitor 88XX is used in another location then mentioned in the initial quotation or is abused, all guarantees will be declined.

This installation manual is an integral part of the supplied product and must at all times be supplied with the Rack Monitor 88XX when it is relocated or sold to a third party. All pages of this manual must be in accordance to the table of contents. If not, please contact **OPW Engineered Systems**.

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Warranty

All parts and products are thoroughly inspected and tested from the time raw material is received at our plant, until the product is completed. We guarantee that all products are free from defects in materials and workmanship for a period of one year from the date of shipment. Any product that may prove defective within said one-year period will, at our option, be promptly repaired, or replaced, or credit given for future orders. This warranty shall not apply to any product which has been altered in anyway, which has been repaired by any party other than an authorized service representative, or

when such a failure is due to misuse or conditions of use. We shall have no liability for labor costs, freight costs, or any other cost or charges in excess of the amount of invoice for the products.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, AND SPECIFICALLY, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Approvals

The 88XX OPW-ENGINEERED SYSTEMS Loading Rack Monitor is suitable for

Ex 2(1) G Ex db [ia Ga] IIB T4 Gb

Class I, Division 1, Groups C & D

hazardous locations with intrinsically safe outputs, and housed in an Explosion Proof Enclosure.

All monitors are ATEX / IECEx / QPS approved.

Please consult the factory for the availability of special models.

IECEX: Ex db [Ex ia] IIB T4 Gb

ATEX:  Ex db [Ex ia] IIB T4 Gb

Canada: Ex db [Ex ia] IIB T4 Gb; [Ex ia] Class I, Division 1, Groups CD, T4

US: Class 1, Zn 1, AEx db [Ex ia] IIB T4 Gb; [Ex ia] Class I, Division 1, Groups CD, T4

Technical assistance in the U.S.A.

If at any time during the installation a question arises that is not covered in this Installation Instruction, or with any other applicable documents referenced, feel free to call the

OPW-ENGINEERED SYSTEMS – ELECTRONICS TECHNICAL ASSISTANCE LINE:

In the U.S.A., Call: 513-932-9114 or 800-547-9393

OPW-ENGINEERED SYSTEMS – CUSTOMER SERVICE DEPARTMENT:

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IN ALL OTHER COUNTRIES: Contact your local **OPW-ENGINEERED SYSTEMS** agent.

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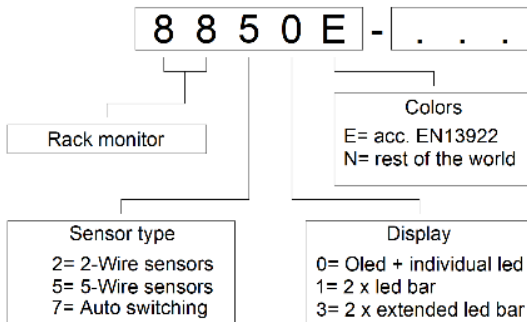
1 Specifications

The Rack Monitor 88XX is a loading rack monitoring system which detects and controls loading operations from overfilling and communicates a pending overfill condition to the loading rack control automation equipment by means of a normally open relay contact. In addition this non-permissive condition as well as diagnostic information is displayed. A typical system contains loading rack control monitor (88xxE Rack Monitor) and a API 10 wire screened coiled cable with a black 10 pins 4 J-slot plug (Model 7400E).

“Optic” signal inputs allow compatibility with the EN13922 and applicable industry standards. Signals come from the truck/trailer mounted on-board control monitor or sensors. Thermistor sensors are NOT supported in the 88xx versions. The 88xxE rack monitor supersedes the 84xx and 85xx type rack monitors and are suitable for hazardous locations with intrinsically safe outputs and are housed in a IP 65, Explosion Proof “d” Enclosure.

Available versions are shown in the matrix below and installation of all versions is basically the same.

There are different types of rack monitors.



Model 8820 E or N is a rack monitor for 2-wire sensors only. Model 8850 E or N are for 5-wire sensors and the 8870 E or N is able to detect 2 or 5-wire sensors.

Above mentioned rack monitors are equipped with an Oled display and individual indicators per compartment and separate indicators for grounding and bypass (indicated with a “0” at the end). The colored label is according the European color-code (“E”).

ATEX/IECEx Certification Detail

Entity parameters in reference to ground (See Fout! Verwijzingsbron niet gevonden. for details)

	J5										J7
	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH9	
U_{out} V	12,45	12,45	12,45	12,45	12,45	12,45	12,45	12,45	12,45	-1,99	12,45
I_{out} mA	40	40	40	42	40	40	40	133	170	17	37
P_{out} mW	116	116	116	121	116	116	116	407	530	13,3	115
C_{out} μ F	7,7	7,7	7,7	7,7	7,7	7,7	7,7	7,7	7,7	7,7	7,7
C_{in} μ F	0	0	0	0	0	0	0	0	0	0	0
L_{in} H	0	0	0	0	0	0	0	0	0	0	0
L_o/R_o mH/ Ω	1,1	1,1	1,1	1,1	1,1	1,1	1,1	0,3	0,27		3

Figure 1

Note : Grounded shield/screen shall be provided to CH-9 to maintain intrinsic safety.

1.1 Specific Conditions of use.

The flameproof joints are not intended to be repaired.
The cover fasteners are M8x1,25 property class A2-70.

1.2 Specifications inside Enclosure.

Free Volume : <1L (61ⁿ³) empty.
Internal Pressure : 80 kPa (0.8 bar / 11.6 PSIG) to 110 kPa (1.1 bar / 15.6 PSIG)
(atmospheric pressure)

1.2.1 Specifications Printed Circuit Board (PCB).

Mains:

Nominal min. input voltage : 85 Vac.
Nominal max. input voltage : 264 Vac.
Frequency : 47 / 63 Hz

Nominal power consumption : 4VA.

Nominal input current : at 110Vac -> 0.6A rms.
: at 230Vac -> 0.3A rms.

Inrush current cold start @25° : 20A at 115Vac
: 40A at 230Vac

Mains current limitation

internal fuses : 1AT
Discharge time : 90 Sec.

Relay contacts:

Input voltage : 250V ac/dc max.
Relay contacts current limitation:
Internal fuses : 2AT

- All rigid conduit (if used) must be installed with seal fittings within 18" (457.2 mm) of each used NPT opening into the Rack Monitor per Article 500 of NFPA 70, National Electrical Code / Canadian Electrical Code (CEC) Section 18.
- All cables (if used) must be guided into the Rack Monitor by use of Cable Glands (see Annex A of IEC 60079-0 and Annex C of IEC 60079-1)

Specifications external environment

Temperature Range (T _a)	: -45°C (-42.8°F) to +70°C (+158°F)
Max. surface temperature (T ₄)	: ≤135°C (275°F)
IP Class closed	: IP68 acc. to IEC 60529
Resistant to	: UV Light (within Sun light) : Corrosion : Ingress of Gasoline vapors (Aliphatic Hydrocarbons) and liquids : (Diesel) Exhaust fumes : Rain Water : All other weather conditions : Explosive Mixtures
External Pressure	: 80 kPa (0.8 bar / 11.6 PSIG) to 110 kPa (1.1 bar / 15.6 PSIG) (atmospheric pressure)
Air	: normal oxygen content, typically 21% v/v

1.2.2 Cable Glands Specifications

Pitch (P)	: $0.7 \geq P \leq 2$ mm
Thread tolerance	: Medium or fine tolerance quality acc. To ISO 965-1 and ISO 965-3
Threads engaged	: ≥ 5
Depth of engagement	: ≥ 8 mm
Execution (ATEX)	: M20x1,5 and M16x1,5
Safety class	: Explosion proof Ex d
½"NPT-14	
Threads engaged	: ≥ 5
Thread tolerance	: must be in accordance with ANSI/ASME B1.20.1
?	

1.3 General Specifications

Outline size 88XX	: Width = 270 mm (10.6") : Height = 230 mm (9.1") : Thickness = 60 mm (2.4")
Material	: Aluminum with <7.5% Mg (acc. to IEC 60079-0 Group II, zone 1) : EN AW 6082 T651
Surface Resistance	: ≤ 1 G Ω (at 23 \pm 2°C / 73.8 \pm 3.5°F) and relative humidity stated) (between parts)
Min. X sect. earth con. (S)	: at least 4 mm ² (0.16 in ²)
Earth continuity torque	: 10 Nm (\pm 10%) (7.4 FtLbs)
View angle display	: \sim 25°
Visibility display	: \sim 0.5 m (1.6 Ft)
View angle LED's	: 90°
Visibility LED's	: 20 mm (65.6 Ft) (no direct sunlight)
Seals	: NBR

- The gasket(s) shall be attached or secured to one of the mating faces to prevent loss, damage or incorrect assembly. The gasket material shall not itself adhere to the other joint face and has to be slightly greased.

1.3.1 Door mounting Bolts

Size	: 14 x M8 x 1.25
Material	: A2-70
Yield Stress Limit	: 450 N/mm ²
Tensile Stress Limit	: 700 N/mm ²
Thread engagement (h)	: > 15 mm
Mounting bolt torque	: 21.2 Nm (\pm 10%)
Tolerance	: 6g acc. to ISO 4762

1.3.2 Package Dimensions

Package outside dimensions 88XX (HxWxD):
Package weight 88XX:

1.3.3 Storage of the Rack Monitor 88XX

Keep the Rack Monitor 88XX into the initial box and store it into a dry warehouse. Make sure (before installation or storage) to check if the package and the Rack Monitor 88XX is free from damages.

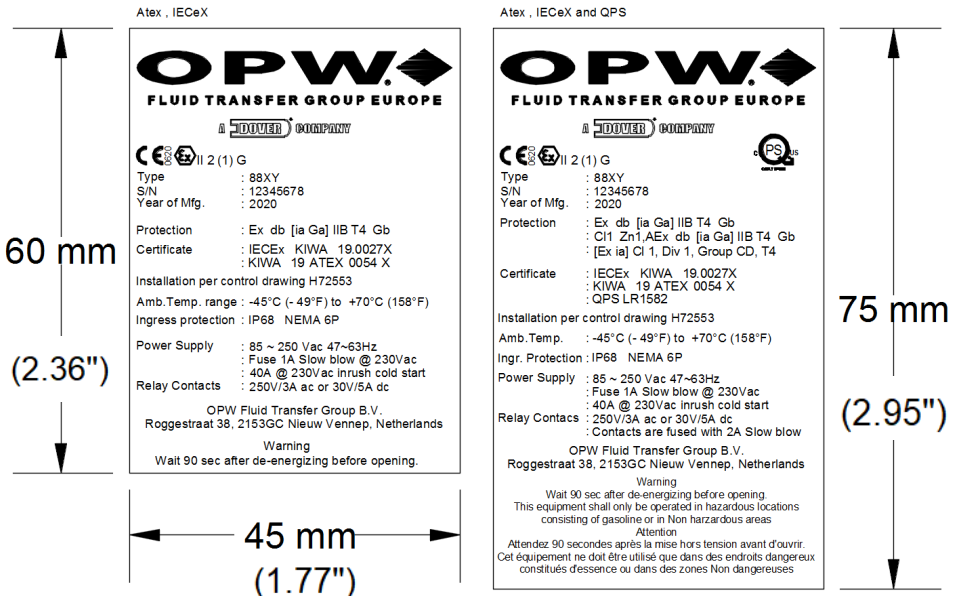
Storage Temperature (T_s) : -20°C (-4°F) to +70°C (158°F)

1.4 Nameplate

The nameplate of the Rack Monitor 88XX is laser engraved on the outside of the Enclosure at the left side. The nameplate contains manufacturer, brand, type, serial number, year of manufacturing, protection type, certificate number, temperature range and product category.

Please see below example of the used nameplate. On the left side a nameplate only used in NEC & IEC Zone System and on the right side the nameplate used in NEC Division System and IEC Zone System.

Figure 1



1.5 Compliance

See inserted Declaration of conformity H72651 for the latest standards and directives.
Please contact OPW when this document is missing

To get the Rack Monitor enclosure with a CE marking following directives are applicable

Used Standards:

IEC/EN 60079-0	2017/18	: <i>Electrical apparatus for explosive gas atmospheres – Part 0 General requirements</i>	:
IEC/EN 60079-11	2011/12	: <i>Electrical apparatus for explosive gas atmospheres – Part 11: Intrinsic safety "i"</i>	:
IEC/EN 60079-1	2014	: <i>Electrical apparatus for explosive gas atmospheres – Part 1 Flameproof enclosures "d"</i>	:
IEC 60529		: <i>Degrees of protection provided by enclosures (IP Code)</i>	
EN 13922		: <i>Tanks for transport of dangerous goods - Service equipment for tanks – Overfill prevention systems for liquid fuels</i> <i>Note : Thermistor sensors are not supported</i>	

With regard to the Electromagnetic Compatibility the following standards are applied:

EN 55016-2-1 (2014) + A1(2017)	: Conducted emission
EN 55016-2-3 (2017)	: Radiated emission
EN-IEC 61000-3-2 (2014) & EN-IEC 61000-3-2 (2019)	: Harmonics
EN-IEC 61000-3-3 (2013)	: Flicker
EN-IEC 61000-4-2 (2009)	: ESD
EN-IEC 61000-4-3 (2006) + A1 (2008) + A2 (2010)	: Radiated Immunity
EN-IEC 61000-4-4 (2012)	: EFT
EN-IEC 61000-4-5 (2014) + A1 (2017)	: Surge
EN-IEC 61000-4-6 (2014)	: Conducted Immunity
EN-IEC 61000-4-11 (2004) + A1 (2017)	: Voltage Dips and Interruptions

Initial installation

Attention: Installation must be performed by authorized and trained personnel only.

- General understanding of relevant electrical engineering
- Practical understanding of explosion protection principles and techniques
- Understanding of and ability to read and assess engineering drawings
- Working knowledge and understanding of relevant Standards in explosion protection
- Basic knowledge of quality assurance, including the principles of auditing, documentation, traceability of measurement, and instrument calibration

1.6 Safety precautions

Warning: Read & Understand this instruction before starting installation.

- Equipment to be used for its designated purpose only.
- Local regulations for installation have to be followed at any time.
- Product flow may result in static electricity, earthing of the equipment is required.
- OPW instructions must be followed for installation of any OPW Product at any time.
- **Make sure to use adequate personal protection at all time during the operation,**

Caution: **Switch OFF mains power before making any connections**

1.7 Installation Preparations

For safe and efficient transportation rack Monitor 88XX's is packed in a box. Each shipment contains one or more boxes with fastening materials for assembly of the Rack Monitor 88XX. Optional accessories are packed in boxes.

When on arrival the Rack Monitor 88XX is stored for later use please keep the Rack Monitor 88XX into the initial box and store it into a dry warehouse (for details see chapter 1.3.3). Make sure (before installation or storage) to check if the Rack Monitor 88XX is free from damages.

All Rack Monitor 88XX's will have a unique identification by means of a serial number.

Pay attention to the following.

1. Bolt material minimum Stainless Steel class A2-70
2. Torque setting as per bolt class.
3. The enclosure must be installed to a rigid surface.
4. The equipment must be de-energized before opening the cover.
5. The conditions of safe use relevant to the intrinsically safe electronics internal to the enclosure apply as follows:
 - The metallic enclosure shall be bonded to a protective earth conductor.
 - The input and output parameters shown in specifications shall be taken into account when connecting to external equipment.
6. Verify gap between lid and base after installation. Must be smaller than 0,15mm

No special tools or equipment for installation of the Rack Monitor 88XX are required. Make use of metric Allen Keys and metric wrenches to secure the nuts from rotating.

The rack monitor 88xx can only be operate in hazardous locations consisting gasoline or in Non-hazardous areas where NEC Division System classification system is applicable. This is not an restriction for ATEX and/or IECeX Zone classification.

6.1 Installation Rack Monitor 88XX

Installation & maintenance shall be carried out in accordance with the applicable code of practice by suitable trained personnel.

Steps to mount the Rack Monitor 88XX:

- Remove the Rack Monitor 88XX from the box and make sure it is free from damages,
- Check if the Rack Monitor 88XX corresponds to the drawing in Figure 2.

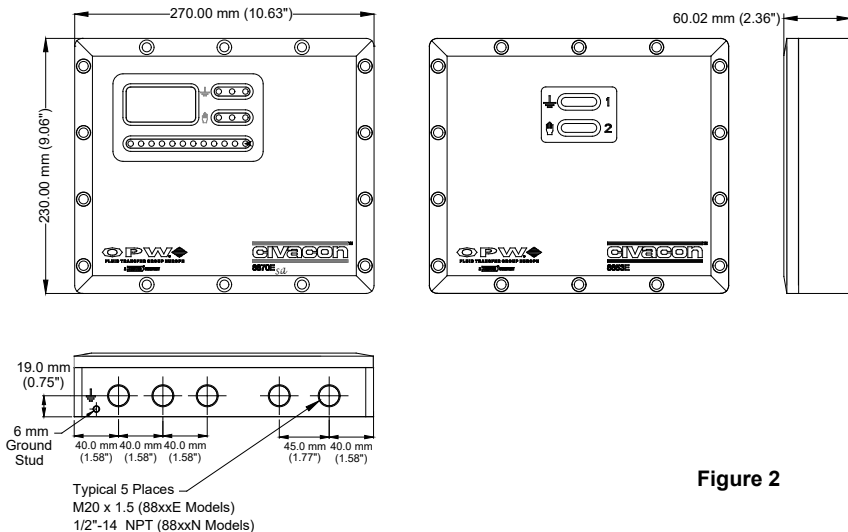


Figure 2

- Remove the 14 bolts mounted into the lid,

- Remove the lid and pay extra attention to the plastic screen mounted on the rear of the lid.
- The plastic screen is part of the flame-path of the housing,

Warning: Store the lid on a clean surface with.
Front faced downwards.

Mounting holes

Drawing Figure 3 at right shows the dimensions of the mounting holes

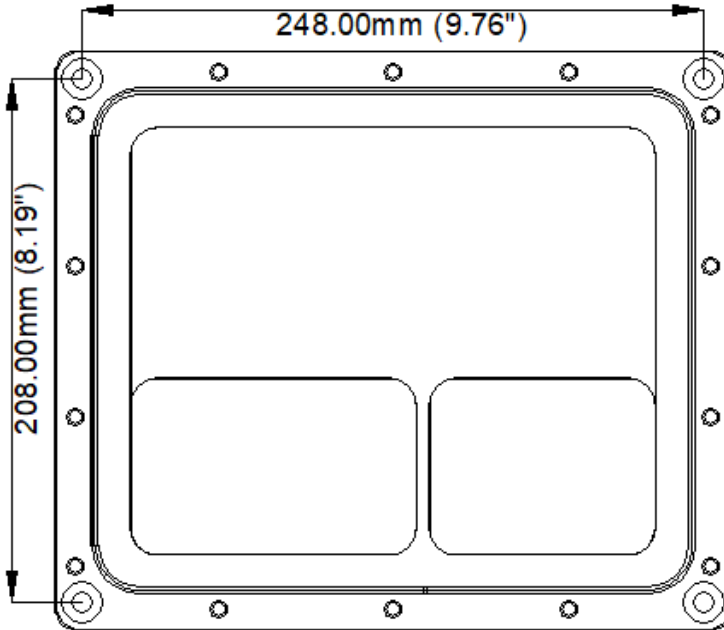


Figure 3

Prepare the designated position for installation,

- Make sure that the drilled holes are at least 8,4 mm or M8 threaded and that they correspond to the holes of the enclosure.
- Position the Rack Monitor 88XX in front of the drilled holes (see Figure 4),
- Attach the hexagon socket head bolts M8x65 [or 5/16" x 2.5" Lg] and fixate them with M8 nuts [or 5/16"] (see Figure 5),

Or

Use 4 x M10 bolts to mount the enclosure from the rear. Mounting holes are machined with 4 x M10 thread. (see Figure 5).

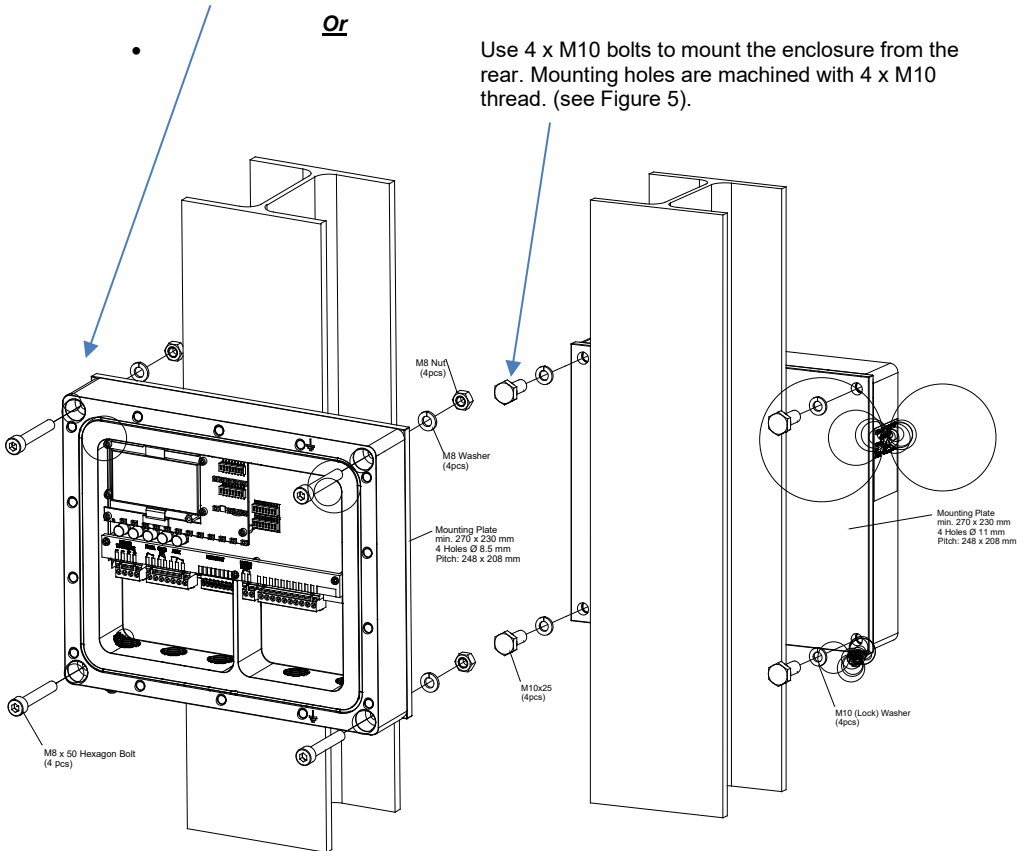


Figure 4

Figure 5

Mounting Points

- Tighten the housing mounting bolts and the nuts (shown in Figures 5 & 6 above) with a minimum of 14.5 Nm [10.3 FtLbs] and a maximum torque of 27.6 Nm [20.3 FtLbs],

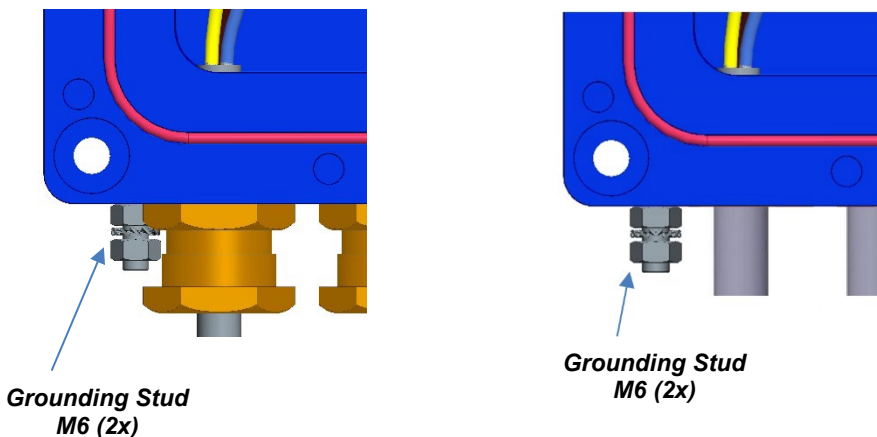
When Using Cable Glands (Housing with M20 Entry Holes)

- Select a suitable cable gland that meets the cable outer diameter.
- Install the (Ex “d” M20x1,5mm and/or M16x1,5mm Certified) cable glands into the desired location.
- Determine the conductor length required to connect to the designated terminal block and prepare the cable accordingly, removing part of the outer sheath where required to reveal the insulated conductors. (wires should be cut to length with no excessive wire coiled inside the enclosure).
- Strip the insulated wires to the desired length (OPW recommends the use of bootlaces or crimping pins to connect multi-stranded wires. This provides a secure connection to terminal blocks and captive terminals and stop wire strands short circuiting to adjacent connectors).
- Ensure that the cable gland seal is in a relaxed state by unscrewing the seal nut until there is no compression on the seal.
- Pass selected cable through the gland to desired position, then tighten seal nut by hand until heavy resistance is felt, then rotate one full turn with the appropriate wrench.
- Start connecting the wiring according to the following steps in Section 6.2.,

When Using Rigid Conduit (Housing with 1/2” NPT Entry Holes)

- A hazardous area approved Conduit Seal must be installed within 18” off each used conduit port.
- Any unused conduit ports must be plugged using hazardous area approved plugs.

Note : Use one of the two provided ground bolts (see Figure 7). to ensure a proper and reliable **grounding** (electrical bonding).



**Figure 6
with Cable Gland (left) & Rigid Conduit (right)**

Note : The connection of cables and conduits to the Rack Monitor should be made in accordance with requirements of the relevant type of protection. Cables and cable glands must be in accordance with the type of protection. Unused openings must be closed with blanking elements suitable for the relevant type of protection. The blanking elements must be certified for the type of protection and can be removed only with the aid of tools. The product connections must guarantee the degree of protection. Instruction Manual of the certified cable glands and blanking elements must be observed.

Used cable glands and cable shall be suitable for operation at of least 75°C.

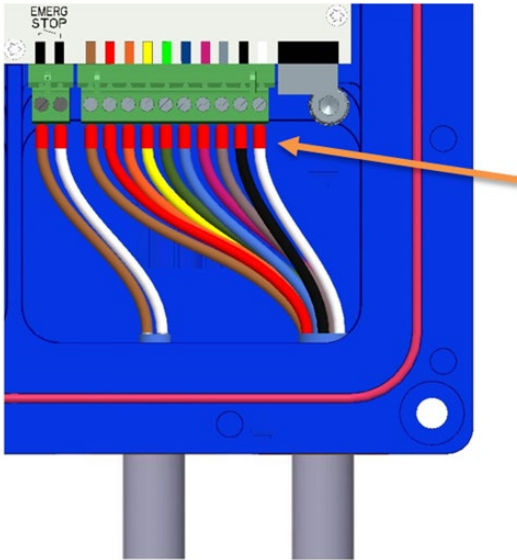
Note : Do not drill any additional (conduit) hole in the rack monitor enclosure. This will violate the enclosure's approvals and voids the warranty.

Note : The apparatus shall not be installed in an environment subject to acetic acid vapors.

Note : if the equipment is likely to come into contact with aggressive substances*, then it is the responsibility of the user to take suitable precautions** that prevent it from adversely affected, thus ensuring that the type of protection is not compromised.

- * Aggressive substances:
 - Acidic liquids or gases that may attack metals or solvents may affect polymeric materials.
- ** Suitable Precautions:
 - Regular checks as part of routine inspections or establishing from the material's datasheet that it is resistance to specific chemicals.

6.2 Electrical wiring / installation



Sensor

To connect the monitor to the sensors mounted on a tank-truck a plug and cable set is being used.

If the monitor is set to EN13922 specifications a

10 wire cable with a Black plug **MUST** be used.

However, if needed and used outside the European Union, a cable and Blue 3-J plug can be provided (Civacon Model 7100 Series), or a cable and Green

4-J-plug can be provided (Civacon Model 7300 Series), dependent on geographic area of install or local standards.

Although a plug and cable set can be directly connected to the monitor it is recommended to use a junction box or extra plug-socket breakaway to prevent or limit the damage caused by tank-trucks driving away while the plug still connected to the socket.

Figure 7 (Rigid Conduit Shown)

The connections of the cable to the plug according to EN13922 are shown in Figure 8. Table 1 is showing the alternative color-code and functional descriptions of all 10 wires.

The wire at pin 9 must be screened ensuring that the maximum connected combined capacity of $7,7\mu\text{F}$ is used. This is not needed if the total connected combined capacity C_o to all channels (CH 1 to 9 of J5) and J7 is less than $4\mu\text{F}$.

Note : *Grounded shield/screen shall be provided to CH-9 to maintain intrinsic safety (if required by the geographic installation location's safety approval regulations).*

Only Ex certified sensors within entity parameters mentioned in Figure 8 may be connected to the 88XX when the geographic area of installation requires compliance to EN13922.

OPW also recommends using only EN13922 sensors to ensure compatibility in these geographic installation locations.

Note : Read cable specifications mentioned under entity parameters.

**Five-wire
pin usage**

EN13922 Color	Current Color	US Color	US Color
7400E	7110	7300	7100
Black	Blue	Green	Blue
4J Plug	3J Plug	4J Plug	3J Plug

Plug & terminal Pin No.	10 Pins	6 Pins	10 Pins	6 Pins	
1	Brown		Brown		nc
2	Red		Green		nc
3	Orange		Red		nc
4	Yellow	Yellow	Yellow	Yellow	Pulse to sensors
5	Green	Green	Black	Green	Diagnostic
6	Blue	Blue	Blue	Orange	Pulse Return
7	Violet		Violet		nc
8	Grey	Grey	Orange	Red	Power
9	Black	Black	Grey	White	Ground verification
10	White	White	White	Black	Ground return

**Two-wire
pin usage**

EN13922 Color	US Color
7400E	7300
Black	Green
4J Plug	4J Plug

Plug & terminal Pin No.	10 Pins	10 Pins	
1	Brown	Brown	Input compartment 1
2	Red	Green	Input compartment 2
3	Orange	Red	Input compartment 3
4	Yellow	Yellow	Input compartment 4
5	Green	Black	Input compartment 5
6	Blue	Blue	Input compartment 6
7	Violet	Violet	Input compartment 7
8	Grey	Orange	Input compartment 8
9	Black	Grey	Ground verification
10	White	White	Ground return

Table 1

Note:

In all above cases plug-pin number must connected to the same terminal pin number.
e.g. plug-pin 1 must be connected to terminal pin 1 of rack monitor, etc.

Emergency-switch

An emergency switch or dead man switch can be connected at the terminal shown in Figure 9 (Rigid Conduit Shown)

On the left side of the (10) tank truck sensors terminal strip a 2 pin terminal strip is placed.

This is an intrinsically safe normally open input that **MUST** be closed (latched or un-latched) to gain a "permissive" condition.

As soon as this switched input is opened (or broken wire) the Rack monitor 88XX will switch to NON permissive.

If this input is NOT used a connection **MUST** be made between the two pins. See Figure 9 (Rigid Conduit Shown)

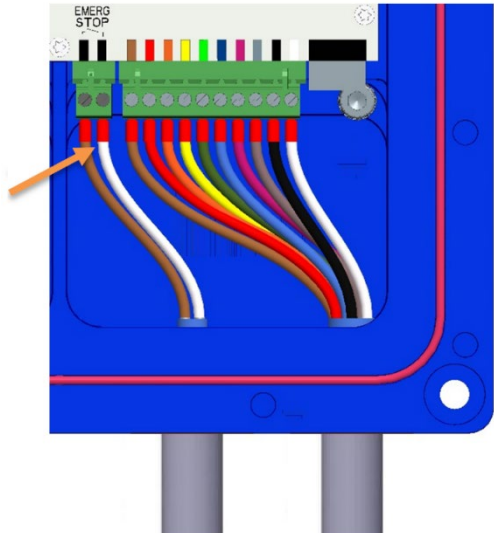


Figure 8 (Rigid Conduit Shown)

Truck data communication.

The 87xx Series Rack Monitors can be used to read a Vehicle ID if installed on the truck (See Figure 10 **Fout! Verwijzingsbron niet gevonden.**).

Contact OPW / Civacon for software upgrade

Dip switch "0" (outmost right) must be set to activate the software.

This feature, reading a Vehicle ID if installed on the truck, requires communications with the rack monitor via the unit's optional RS485 communications port. Communications follows MODBUS RTU data communication protocol.

See operating manual for used RS485 Data protocol.

OPW / Civacon advise to use our Model CID-2000 Electronic ID Module (See **Fout! Verwijzingsbron niet gevonden.**)

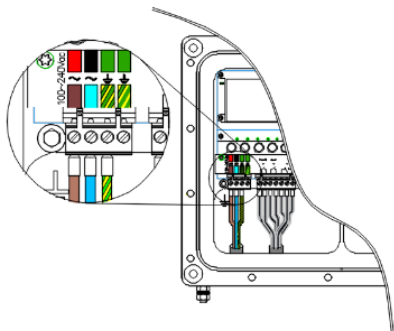
See H53171PA (MODEL CID-2000 INSTALLATION INSTRUCTIONS) for details.



Figure 9

Mains wiring

CAUTION: Switch OFF mains power before making any connection.



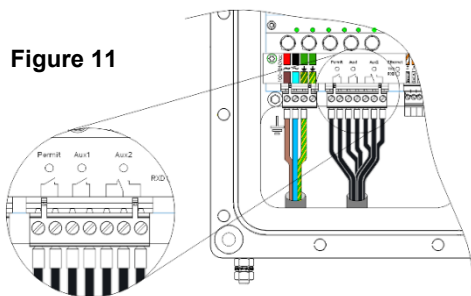
The mains terminal block is situated at the lower left corner of the metallic enclosure. Since the 88XX rack monitor is equipped with a high efficient switching regulator with a wide operating range. No settings have to be made and all voltages between 110 and 240 Vac are accepted. The two right entries of the main terminals are used to connect the earth wire and is internally connected to the chassis. The two left entries are the power terminals and the neutral conductor and the line conductor. Two internal (2AT) fuses are placed for mains current limitation.

Figure 10

Warning: The electrical installation must be done according local regulations and code of practice.

Relay outputs

Figure 11



Three relays are provided.

All relays are voltage free relays and must be used within their specifications.

Function of the relays depends on the dipswitch settings or Sd-card file.

The relay on the outer left side (normally open) is used for permissive / Non-permissive.

Permissive/ Non-permissive is an combination of dry sensors and good ground verification.

The permissive / Non-permissive relay has an feedback contact that can be used to switch the second relay.

The second relay AUX1 is an multipurpose relay and can be configured to for fill different functions. AUX1 relay is also used for the secondary detection circuit.

The last relay AUX2 is added for other functions.

Ask OPW Engineered Systems for other available functionalities.

Data communication

The 88XX series rack monitors are equipped with a communication socket designed to support different kind of protocols due to the versatile world of communications.

Consult OPW for possible communication add-ons.

Finishing installation

- Remove the corrosion protector from the seal and attach it to the door,

Caution: - Make sure, before closing the enclosure that the cables do not get stuck between the door and the bottom side of the enclosure.

- Close the door, make sure to press the hinges completely into the enclosure,
- Connect all 12 bolts M8x25,

Warning: Do **not** leave any bolts out for a safe use.

- Tighten the bolts with a minimum of 21 Nm and a maximum torque of 22 Nm (16.2 FtLbs),
- Make sure that all earth cables are connected,
- Energize the system,

Warning: Do not make modifications to the Rack Monitor 88XX for alternative mounting (with exception of the mentioned method in Figure 5 or Figure 6) when not making use of the initial mounting holes in the Rack Monitor 88XX any guarantees will be declined.

7. System configuration

A typical system consist of two parts.

- The Loading Rack Side
- The Tank Truck Side

The 88XX Rack monitor is mounted as a stationary system on a loading rack.

Although the 88XX rack monitor is equipped with all basic functionalities some extra parts can be added.

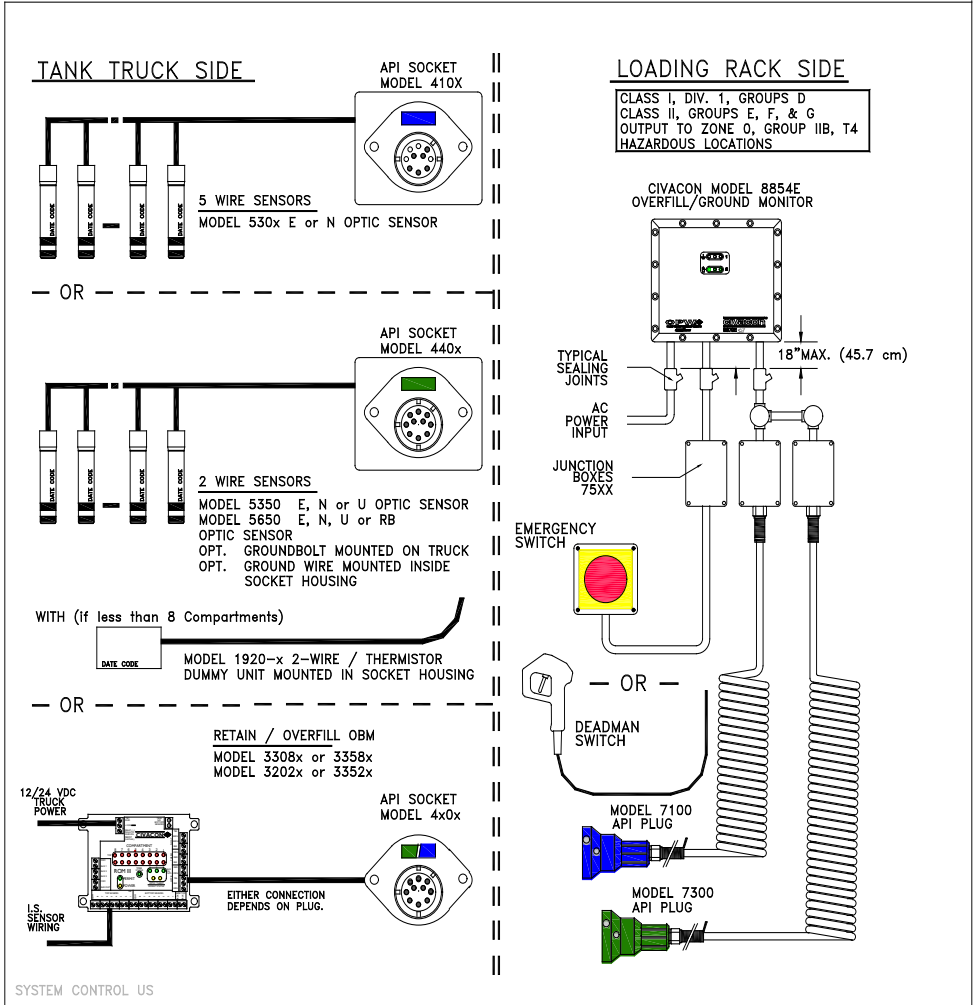
The minimum configuration (Figure 3.1) for a standard overfill prevention system for liquid fuels conform the

NEN-EN13922 consist of:

- A 88XX Rack Monitor.
- A flexible 10 conductor coiled cable, with screened #9 data conductor (for installations to EN13922).
- A Black 10 pins 4J plug. (for installations to EN13922), / Green 8 or 10 pins, 4J plug or Blue 6 pins, 3J plug for “Rest of World” installations as local industry standards dictate.

Contact OPW Engineered Systems or local distributor for available optional system accessories.

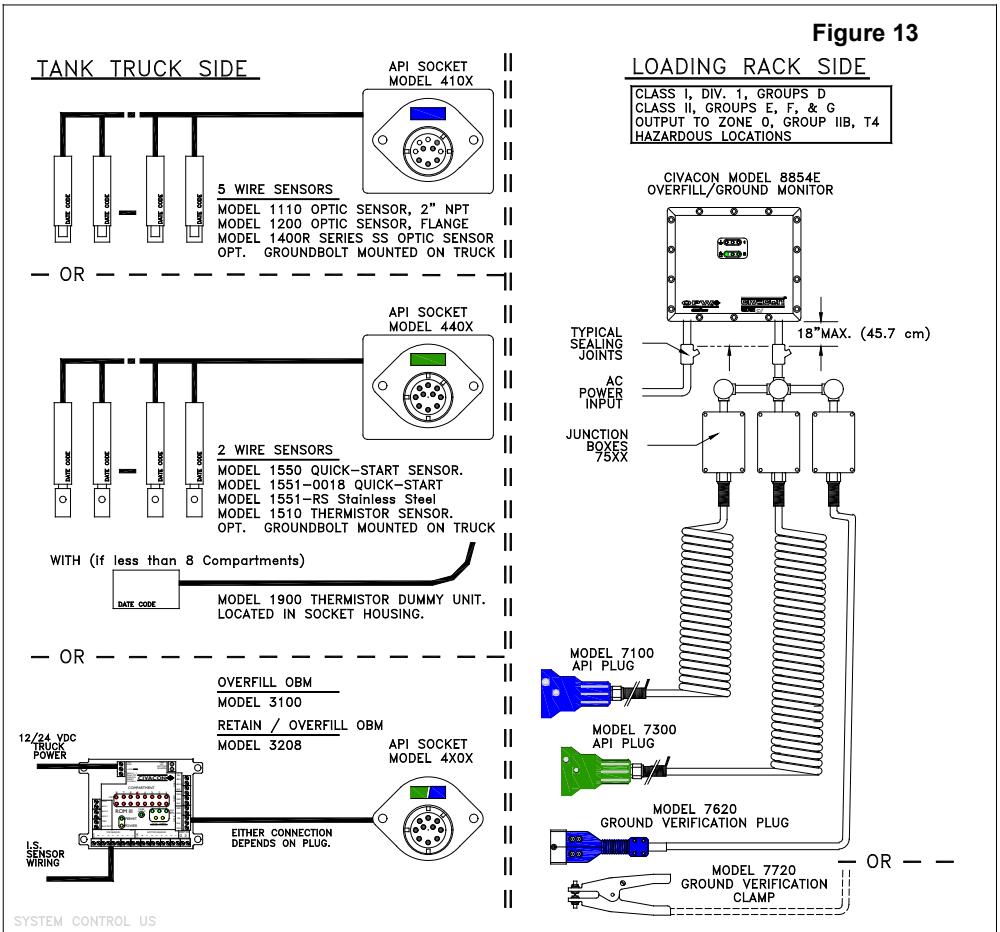
Figure 12



Another typical configuration is shown below.

Instead of flameproof cable glands explosion proof seals are used.

Read the installation manual of the explosion proof seals carefully to avoid dangerous situations.



Notes:

1. Control Equipment and Electrical Apparatus connected to the 88XX Rack monitor should NOT use or generate more than 250 Volts AC.
2. Installation should be in accordance with Electrical installations in hazardous areas EN/IEC60079-14, EN50281 VDE-0165, NEC ANSI/NFPA 70 and ANSI/ISA RP12.6. In Canada, the system must be installed in accordance with the Canadian Electrical Code, CEC Part 1 and/or in accordance with all national and local regulations (codes) for installation of electrical equipment.
3. Seal must be placed within XX" when used in a Division 1 environment.
4. Seal must be placed directly at the entry when used in an ATEX/IECEx environment.
5. Only certified cable-glands and blind stops (M20x1,5 or M16x1,5) for flameproof enclosure may be used.
6. Consult API Socket and Sensor drawings for detailed information.

8. Maintenance

Please take the following precautions before when servicing the Rack Monitor 88XX:

- Before maintenance entire installation must be shut down/off before proceeding,
- Maintenance must be performed by authorized personnel only,
- All fasteners must be inspected periodically,
- After maintenance is performed, the Rack Monitor 88XX must be tested before the next use,
- Periodical inspection (interval every 6 months) for leakages (especially with heavy rainfall or wind),
- Periodically maintenance is not required but we recommend to check the internals at least once a year, by tucking all the cables and if there is no corrosion,
- Depending upon the condition of the inside the enclosure after inspection it may be necessary to apply a coating of corrosion inhibiting spray to the interior components,
- **Open and Replace the corrosion inhibitor located on the inside of the door on a regular base.**
(part nr: H71307)
- During servicing loading and unloading of tank trucks is not allowed,
- During maintenance (partial) disassembling could be necessary and the procedures apply as during installation.
- **Repairing of flame-paths is not allowed.**

8.1 Check Points

During maintenance the following items should be checked:

- All earth cables should be rigidly connected and free from corrosion,
- If there is no moisture inside of the enclosure,
- If the main seal is still intact and still soft and smooth,
- If there is no corrosion on any part inside the enclosure,
- Visual inspect all electronic components with special attention for the voltage suppressors (also see chapter Trouble shooting),
- Check cable more periodically if the rack monitor is exposed to very cold weather conditions.

When maintenance has been performed the following should be done before closing the Rack Monitor 88XX:

- Replace the corrosion protector (should be done every 6 months),
- Put grease on the main seal,
- Make sure that all earth cables are connected,
- Apply coating (if necessary) to the interior components,

Caution: - Make sure, before closing the enclosure, that the cables do not get stuck between the door and the bottom side of the enclosure.
- When tightening the bolts, apply the previously mentioned torque.

9. Operational Use

For a correct use of the Rack Monitor 88XX it is important to follow the instructions in the user manual supplied with the product and this installation manual.

The following applies:

- All incidents need to be reported to **OPW Engineered Systems**. In case of injudicious use or if a calamity has occurred, the complete installation / construction needs to be inspected according to the maintenance instructions.
- It is prohibited for unauthorized people to be in the near proximity of the Rack Monitor 88XX. Especially when the Rack Monitor 88XX is in use, only the operator is authorized to be in the working area of the Rack Monitor 88XX.

10. Dismantling Rack Monitor

Attention: Dismantling must be performed by authorized and trained personnel only.

At the end of its lifetime and/or when changing the infrastructure of the working environment the rack Monitor 88XX must be moved to a new location the rack monitor should be dismantled.

Attention: The same precautions and procedures of initial installation should be followed.

Warning: Ensure a safe working environment prior to installing or dismantling. In case of a hazardous environment such please ensure cleaning the parts. When in doubt consult specialized personnel, companies or governments.

Before dismantling the rack monitor, please take following precautions;

- **Make sure to use adequate PPE (personal protection equipment) at all times during the operation.**
- Arrange necessary permits and/or approval with the responsible company representatives prior to starting.

If rack monitor is cleaned and dried and the required precautions are taken it can be dismantled.

- Dismount the bolts from the door of the Rack Monitor 88XX.
- Remove lid.
- Disconnect all cables.
- Dismount the bolts from the connecting plate between the rack monitor and the Stand Post.
- Remove the rack monitor.

Warning: When removing the last bolt, make sure that it doesn't fall onto the ground, if necessary, put straps around it and use a hoisting device to lift the Rack Monitor 88XX.

- Secure the parts from moving by securing them with the bolts from the door (use at least 2 bolts and send the remaining back separately),

Or

- Take the rack monitor apart by disconnecting all the parts,
- Remove all the parts,
- Dispose the parts separately, so the parts can be recycled,

Or

- Send the Rack Monitor 88XX back to **OPW Engineered Systems**

Please make yourself aware of potential risks when disassembling the rack monitor. Please consult qualified personnel or contact local reseller / companies, local governments or **OPW Engineered Systems**.

11. Trouble shooting

Not all events can be displayed and please consult the operational manual for operational related problems.

On all relay contacts and power inlet voltage terminal suppressors are placed to limit the surge voltage and current as well absorbing energy. The surge protecting devices protect the rack input voltage and relay contacts against surges generated by electromagnetic effects such as lightning or electrostatic discharge, over-voltages and high inductive loads. If a device is overloaded it can explode during the protection process. Consult OPW if this has happened. Do **NOT** replace fuses if the reason of a blown fuse is unknown.

Caution : When replacing the fuses, always make sure that you replace the fuse with original ones with an equal stated value.

12. Procedure in case of an Error or Emergencies

Many events could happen when working or installing a Rack Monitor, please see below summary showing a selection of potential events and errors and the proposed solutions.

Important: in case of personal injury the local medical services are contacted immediately. **OPW Engineered Systems** cannot be held responsible for none, late or erroneously medical care. When there is no personal injury but there is a high risk of explosions, fire or environmental disorders the local authorities should and must be contacted before contacting the **OPW Engineered Systems**.

Condition	Possible Cause	Solution
Not all bolts can be applied to mount the enclosure to its designated position.	Check whether the drill pattern is right.	-Correct the hole pattern -Check if the bolts are M8x65
The Rack Monitor 88XX doesn't turn ON	The mains connector isn't connected.	Connect the mains connector.
		Check if the main wiring is connected according to the installation instruction.
		Check if there is any power available at the terminal of the Rack Monitor 88XX.
	The fuses are broken.	Replace the fuses for new ones.
The door cannot being closed	There is a cable between the door and the back of the enclosure	Remove the cable (bend it the other way) and try to close the door again.
System goes directly into 'NON PERMISSIVE'	The deadman switch is not connected.	Connect the cable according to the installation manual. Connect a bypass cable between pin 1 & 2 according to the installation manual.

For all other possible inflictions/damages to the Rack Monitor 88XX, contact **OPW Engineered Systems** and ask for assistance.

Sensor cable specifications:

OPW recommends to use plug / cord set with an individually screened blue cable / part number 7400E. If another equivalent cable is used the inductance L_i must be less or equal to 0,8 mH/km for a maximum length of 40 meters. In case of using cable with a higher inductance the cable length must be reduced accordingly.

Annex A - Available detail wiring drawings of the Rack Monitor 88XX and associated parts

- *Drawing(s)*

DS00258
DS00259

BLACK PLUG WIRING
7511E DUAL BREAK AWAY

Annex B - Recommended Spare Parts

With the purchase of the Rack Monitor the **OPW Engineered Systems** recommends some spare parts to be purchased. Although this Rack Monitor 88XX is designed with solid state lamps and minimum maintenance components spare parts are available. When parts are replaced it is recommended to replace them with the original parts.

The recommended spare parts are:

Part number	Description	Quantity
EL04208	Mains power input fuse (TR5 1A Slow Blow 250V), Qty. 2 per unit)	1
EL04141	Relay contact output fuse (TR5 2A Slow Blow 250V), Qty. 3 per unit)	1
008-FABSS1038	Bolt M8X25-DIN 912 A2 70	1
H72936	Corrosion protector silica gel 8800XX	1

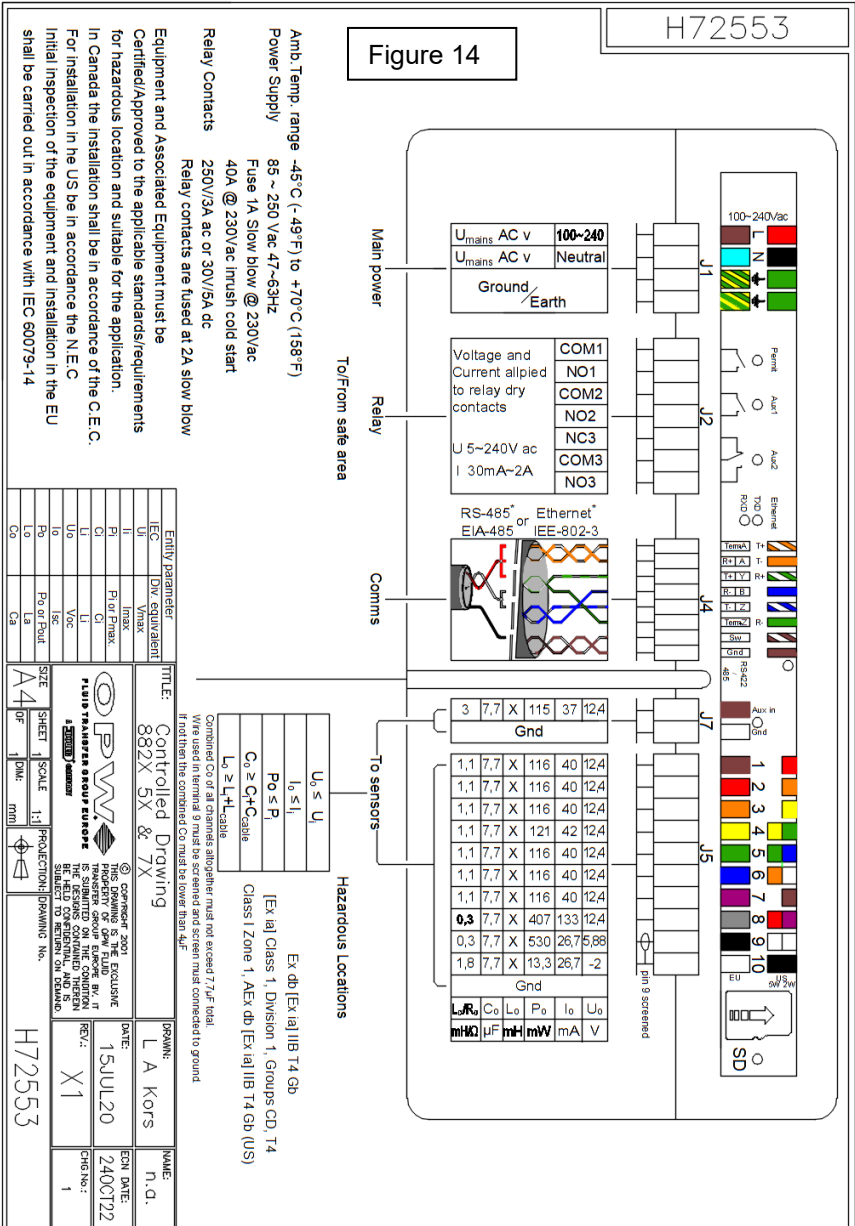
The following parts are also available:

Part number	Description	Quantity
EL04209	Internally used connector kit	1
BCU-BLUE	Blue Function key (low level)	1
BCU-RED	Red Function key (high level)	1
88XX-BRK	Fastener kit 14x Door Bolts	1
H72612NA_PA	Operation manual, OPW Engineered Systems	1
EL05104	Cable gland M20x1,5 Ø cable diameter 10-14mm ATEX-Ex/d (not armed)	1
EL05134	Cable gland M20x1,5 Ø cable diameter 3.1-8.6mm ATEX-Ex/d (not armed)	1
7400E	Black Plug and 10-conductor individual screened coiled cable.	1

Rack Monitor Test equipment.

An Automatic Rack Tester 1386E can be used to test the rack monitor and cable. Rack Monitor tester 1386-1386 is also available and may be used as well for testing / commissioning. Ask OPW Engineered Systems for availability.

Control Drawing H72553.



EU Declaration of Conformity

In accordance with ISO/IEC 17050:2004

OPW Fluid Transfer Group Europe BV

Roggestraat 38
 2153 GC Nieuw Vennepe
 The Netherlands
 T: +31 (0)252 660 300

declare that:

Product type:
 Product description:
 Brand name:
 Serial nbr.:
 Date of production:

Place label here

1
2
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4
5
6
7
8
9
0

Protection Type : Ex db ia [ja Ga] IIB T4 Gb.
 Certificate number : KIWA19ATEX0054X / IECEx KIWA 19.0027X
 Product category : II 2 (1) G

is/are in accordance with the following Directives:

2014-34-EU

ATEX 114 – Explosion Safety Directive
 and its amending directives

2004/108/EC

EMC – Electro Magnetic Compatibility Directive
 and its amending directives

has been designed and manufactured to the following specifications:

(IEC)/EN 60079-0	(ed7.0)07/2018	<i>Electrical apparatus for explosive gas atmospheres – Part 0: General requirements</i>
(IEC)/EN 60079-1	(ed7.0)07/2014	<i>Electrical apparatus for explosive gas atmospheres – Part 1: Flameproof enclosures "d"</i>
(IEC)/EN 60079-11	(ed6.0)01/2012	<i>Electrical apparatus for explosive gas atmospheres – Part 11: Intrinsic safety "I"</i>
(IEC)/EN 61000-6-2	(ed2.0)10/2006	<i>Generic standards, Immunity for industrial environments</i>
(IEC)/EN 61000-6-4	(ed)2.1/2011	<i>Generic standards, Emission for industrial environments</i>
EN 13922	09/2011	<i>Tanks for transport of dangerous goods- Service equipment for tanks – Overfill prevention systems for liquid fuels</i>

The revised (harmonized) standards have been compared to the standards used for certification purposes and that no changes in the "state of the art" apply to the equipment.

Has satisfactorily passed a manufacturing quality check, containing a functionality test, a dimensional check and a visual inspection. All tests are in accordance with the **OPW Fluid Transfer Group Europe BV**, 'General Test and Inspection Plan'.

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all essential requirements of the Directives.

The commitments are fulfilled towards: **Kiwa Nederland B.V.**
Wilmersdorf 50 7300 AC Apeldoorn Netherlands

Mr Edwin Smit
Managing Director

(Leo Kors Authorized signatory on behalf of OPW Fluid Transfer Group Europe B.V.)

Place : Nieuw Vennepe



EU Declaration of Conformity

In accordance with ISO/IEC 17050:2004

OPW Fluid Transfer Group Europe BV

Roggestraat 38
2153 GC Nieuw Vennep
The Netherlands
T: +31 (0)252 660 300

declare that:

Product description : Function Key
Item number : BCU-BLUE, BCU-YEL, GRN & BCU-RED
Brand name : Civacon
Protection Type : Ex ia IIC T4
Certificate number : ZELM 08 ATEX 0360 X
Product category : II 2 G

is/are in accordance with the following Directives:

2014-34-EU

ATEX 114 – Explosion Safety Directive
and its amending directives

has been designed and manufactured to the following specifications:

IEC/EN 60079-0
IEC/EN 60079-11

07/2018
01/2012

Electrical apparatus for explosive gas atmospheres – Part 0: General requirements
Electrical apparatus for explosive gas atmospheres – Part 11: Intrinsic safety "I"

The revised (harmonized) standards have been compared to the standards used for certification purposes and that no changes in the "state of the art" apply to the equipment.

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all essential requirements of the Directives.

The commitments are fulfilled towards:

Zelm Ex
Siekgraben 56, 38124 Braunschweig, Deutschland
Identification number: **CE 0820**

Mr. Edwin Smit
Managing Director

(Leo Kors Authorized signatory on behalf of OPW Fluid Transfer Group Europe B.V.)

Place : Nieuw Vennep

