

OVERFILL PREVENTION CONTROLLER EUS-2

Technical Description | Version 1.82 | English

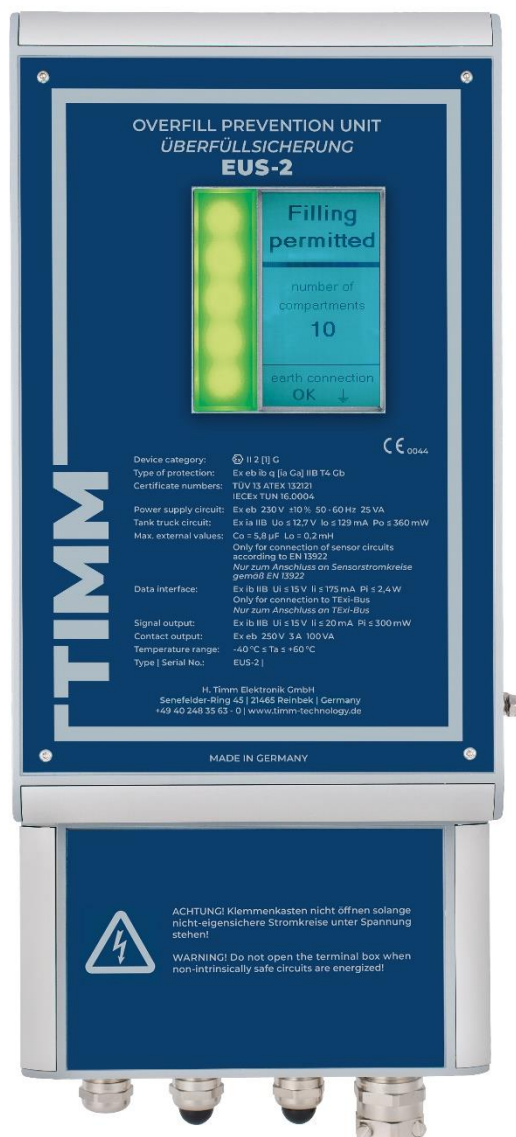


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1. General Information

As stationary part of the Overfill Prevention System for liquid fuels, the explosion-proof control unit type EUS-2 complies with the requirements on overfill prevention systems for bottom-loading tank trucks according to Annex IV of VOC-Directive 94/63/EC as well as with European standard EN 13922 and American API RP 1004 recommendations. Timm has combined its longterm competencies in explosion protection and experiences in overfill prevention in this control unit. EUS-2 is characterised by ease of installation, convenient operation, functional safety and a user-friendly state-of-the-art explosion protection concept (IEPC) designed by Timm.

compartment) are connected to the control unit at the filling gantry by a standard plug and socket connection. The level sensors are positioned in the top of each tank compartment deep enough to assure that once a sensor gets activated, product flow stops before the compartment is completely full. In case a sensor senses liquid, the control unit triggers to shut-off the product flow for all compartments to prevent leakage of fuel or the compartment's bursting.

When being connected to a tank truck, the control unit EUS-2 detects the type of level sensors (optic/thermistor), the sensor installation (five-wire/two-wire) as well as the way of ground verification (resistance/ ground bolt) and activates auto-

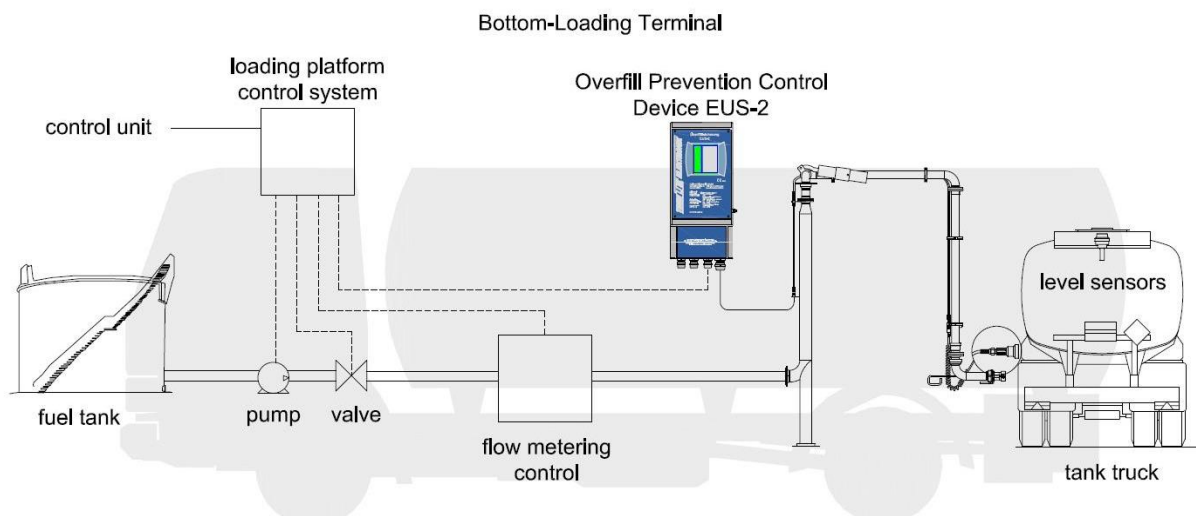


Figure 1: Bottom loading with overfill prevention control by Timm`s control unit type EUS-2

2. Functional Principle

To ensure a safe filling process, the overfill prevention controller EUS-2 provides three main functions:

- Overfill prevention
- Grounding verification
- Vapour recovery monitoring

During loading of tank trucks, the level sensors at the truck (one sensor per tank

compartment) are connected to the control unit at the filling gantry by a standard plug and socket connection. The level sensors are positioned in the top of each tank compartment deep enough to assure that once a sensor gets activated, product flow stops before the compartment is completely full. In case a sensor senses liquid, the control unit triggers to shut-off the product flow for all compartments to prevent leakage of fuel or the compartment's bursting.

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The vapour recovery hose connection is monitored on the tank truck via an electro-pneumatic interlock switch, which is looped into the grounding verification line. The control unit EUS-2 ensures that filling is only possible if the vapour recovery system and the grounding line are connected properly.

3. Special Features

3.1. Compliance to latest European and American Standards

The EUS-2 control unit is designed in full compliance to the newest editions of European ATEX and EMC Standards, European Standard on Overfill Prevention EN 13922 as well as to American Guideline API RP 1004. With Timm Elektronik being an independent manufacturer, full compatibility to corresponding truck equipment and level sensors of other manufacturers is ensured for operation worldwide. The control unit EUS-2 is capable to detect automatically the type of counterpart truck equipment and activates the required operating mode. With the offered disconnecter sockets, cables with plugs for the different receptacles can easily be exchanged or even connected to the controller at once.

3.2. Intelligent Explosion Protection

TIMM's intelligent explosion protection concept (IEPC) combines protection by intrinsic safety, increased safety, powder filling and protection by enclosure. With this unique combination of the types of protection, the main housing can be opened in gas hazardous areas when power is switched on for configuration and service (e.g. for setting the additional control outputs or the display language).

3.3. High Functional Safety | Fail Behavior

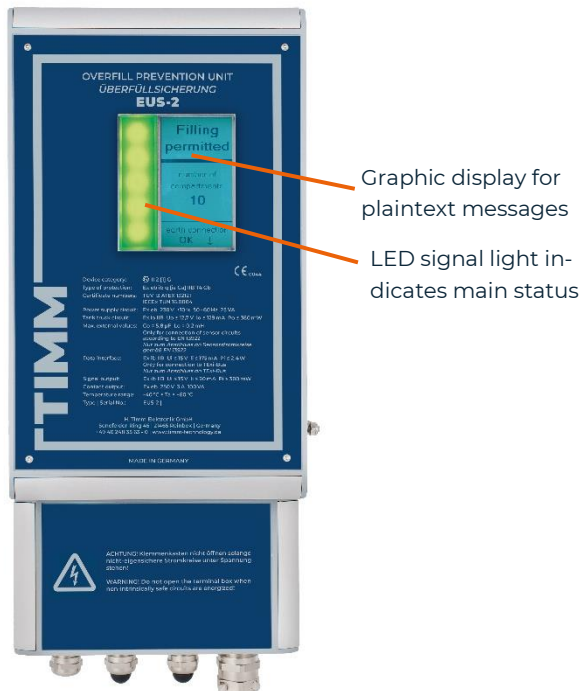
All safety related functions, internal components and the external wiring are monitored continuously by the device itself. Filling release is permitted only if periodic self-testing operates properly.



Figure 2: Opening of enclosure in hazardous areas for easy configuration

3.4. Bright Signal Light

The EUS-2 unit is equipped with a clearly visible bright multi-colour LED signal light. With its bevelled edges, the light is visible in a wide angle. This leads to unambiguous indication of operational status and time efficient utilisation at filling station.



3.5. Graphic Display

The large graphic display indicates clearly visible the actual operating status and auto-diagnosis information as plaintext messages. In combination with the joystick control, a simple, menu-driven and self-explaining configuration of the control unit and easy failure analysis is provided. Several character-sets are available for different languages.

3.6. Easy Configuration by Joystick

For easy configuration at the installation site (e.g. of the configurable control outputs K3, K4 and E2), the EUS-2 unit features a unique joystick control. It is situated well accessible on the backside of the front cover inside the units housing and allows an intuitively configuration with concurrent view to the graphic display.



Figure 3: Joystick for menu-driven device configuration

3.7. Reliable Ground Verification

The EUS-2 unit features continuously grounding verification and the ability for setting the grounding limit value exceeding EN 13922 requirements. Grounding is monitored reliable independent from truck configuration:

- Trucks with grounding lines directly connected to the chassis (EN 13922)
- Trucks with grounding verification via recognition device ('ground bolt')

With a strict grounding limit value, wearing off or dirt at the plug and socket connection will be noticed in time for preventive measures.

3.8. Control Outputs | Data Interface

Six control outputs enable advanced options for connecting the control unit according to individual customer needs:

- 2 Contact Release Outputs (redundant, potential-free, intern monitored)
- 1 Electronic Release Output
- 2 Configurable Contact Outputs

- 1 Configurable Electronic Output

The serial data communication interface eases process integration. Operational state commands can be transmitted to external process control systems. This allows remote diagnosis and process visualisation.

The analysis of the different control signals enables to distinguish, whether a filling process got interrupted by a correctable error (e.g. missing vapour recovery hose connection) or an actual overfilling.

3.9. Extended Area of Application

The type of explosion protection makes the control unit applicable to Gas Group IIB for filling even pure Ethanol. Furthermore, with its extended temperature range from -40 °C up to +60 °C, the device provides reliable operation under extreme climate conditions.

4. Accessories

TIMM provides a variety of accessories for its Overfill Prevention Controller.

4.1. Coiled Cable

The coiled cables come in two lengths, with truck connector plugs according to EN 13922 or API RP 1004 as well as with or without disconnecter plug.

- **EUS-1-SK7:** blue PUR coiled cable with truck connector plug, cable length about 2.6 m, expandable to about 7.5 m for direct connection to the control unit.
- **EUS-1-SSK7:** as type above-mentioned, but with additional disconnecter plug for detachable connection to disconnecter socket junction box EUS-1-ST or EUS-1-STP.

- **EUS-1-SSK3:** as type above-mentioned, but in short length of about 1.5 m, expandable to about 3.5 m; particularly intended for use with disconnecter socket junction box type EUS-1-STG11/11P at loading arm

Available truck connector plugs mounted to the coiled cables:

- **Black 10-pole plug with four locking pins and ten electrical contacts**, according to EN 13922 (for thermistor type and optic type vehicle sensor systems).
- **Blue marked plug with three locking pins and seven electrical contacts** (fitting onto 6-pin truck sockets for optic vehicle sensor systems acc. to API RP 1004 standard). The additional 7th pin is intended for identifying the parking socket.

Electrical contacts of the plug are used as well for detecting the park position in combination with suitable parking sockets.

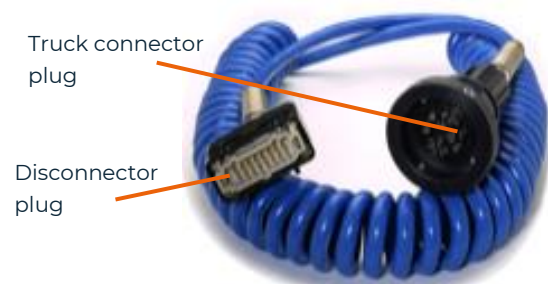


Figure 4: Coiled cable with disconnecter plug

4.2. Disconnecter Socket

The following intrinsically safe disconnecter socket junction boxes are available:

For installation at **filling gantry**:

- **EUS-1-ST:** junction box with disconnecter socket to connect a plug-in coiled cable type EUS-1-SSK7 or EUS-1-SSK3; complete with

1 m uncoiled cable for connection to the control unit.

- **EUS-1-STP:** as type above-mentioned, but with additional code-generating truck socket for detecting the 'truck connector in park position' status.
- **EUS-1-ST2P2:** dual junction box with two disconnecter sockets for the detachable connection of two coiled cables with different truck connector plugs to the controller; including two park position sockets.

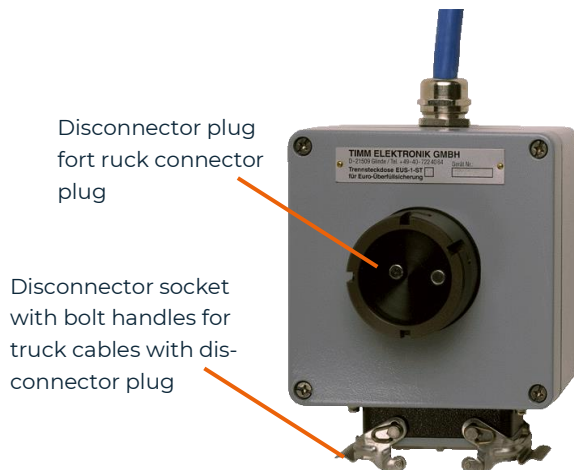


Figure 5: Disconnector socket junction box EUS-1-STP

For installation at the **vapour recovery arm** (close to coupling):

- **EUS-1-STG11:** disconnecter socket unit to connect a plug-in coiled cable type EUS-1-SSK3. With 11 m straight cable to the control unit and a cable mounting set for cable installation at the vapour recovery arm.
- **EUS-1-STG11P:** same as type above-mentioned, but with additional truck socket for detecting the 'truck connector in park position' status by integrated socket code generator.

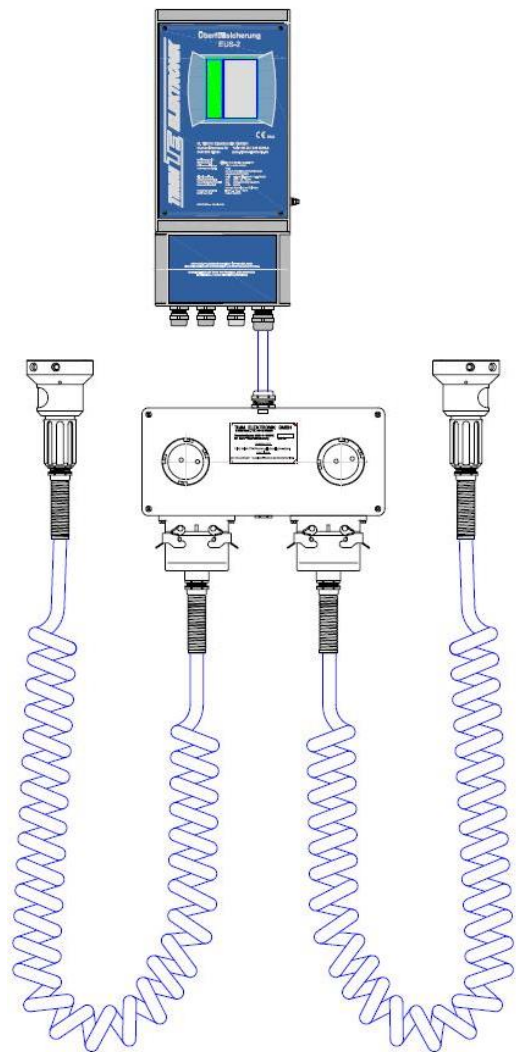


Figure 6: Dual disconnecter junction box EUS-1-ST2P2

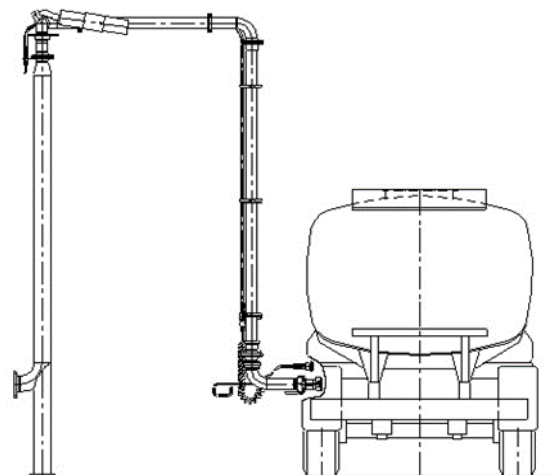


Figure 7: Disconnecter socket unit

4.3. Testing Equipment

The functioning of the control unit can easily get checked by using the special testing equipment. It is equipped with a socket for connecting to the truck connector cable as well as with different testing switches to simulate the criteria 'grounding', 'vapour recovery hose connection' and individual 'sensor status'.


The testing equipment is available with sockets according to EN 13922 or API RP 1004.



Figure 5: Testing Equipment EUS-TST3

5. Technical Specifications

5.1. Operating Data

- Device category according to ATEX (directive 2014/34/EU)
 II 2 [I] G
- Type of protection
 Ex eb ib q [ia Ga] IIB T4 Gb
- Protection of enclosure
 IP66
- Shut down response time
 ≤ 450 ms
- Power Supply
 - Type of protection 'increased safety'
 Ex eb
 - 230 V AC ± 10 %, 50-60 Hz, about. 25 VA
- Ambient temperature range
 -40 °C to +60 °C
- Dimensions
 475 mm, 215 mm, 120 mm (H, W, D)
- Weight
 about 10 kg

5.2. Sensor and Grounding Circuits

- Type of Protection
 "intrinsic safety" Ex ia
- For connection to apposite level sensors
 Maximum 8 two-wire-sensors or
 Maximum 12 five-wire-sensors
- Cable length
 Maximum 50 m (Ex specification, functional limitations must be observed)

- Maximum values

$U_o = 12,7$ V, $I_o = 129$ mA,
 $P_o = 360$ mW

5.3. Control Output Circuits

Contact Outputs

- Type of protection "Increased safety"
 Ex eb
- Maximum values: 250 V AC, 3 A, 100 VA
 - **2 Filling release Contacts**
 redundant, potential-free, intern monitored, closing contacts
 - **2 Additional Contacts**
 Potential-free changeover contacts, configurable for detailed signalling 'grounding', 'overfilling', 'filling process', 'parking position'

Electronic Output (E1, E2)

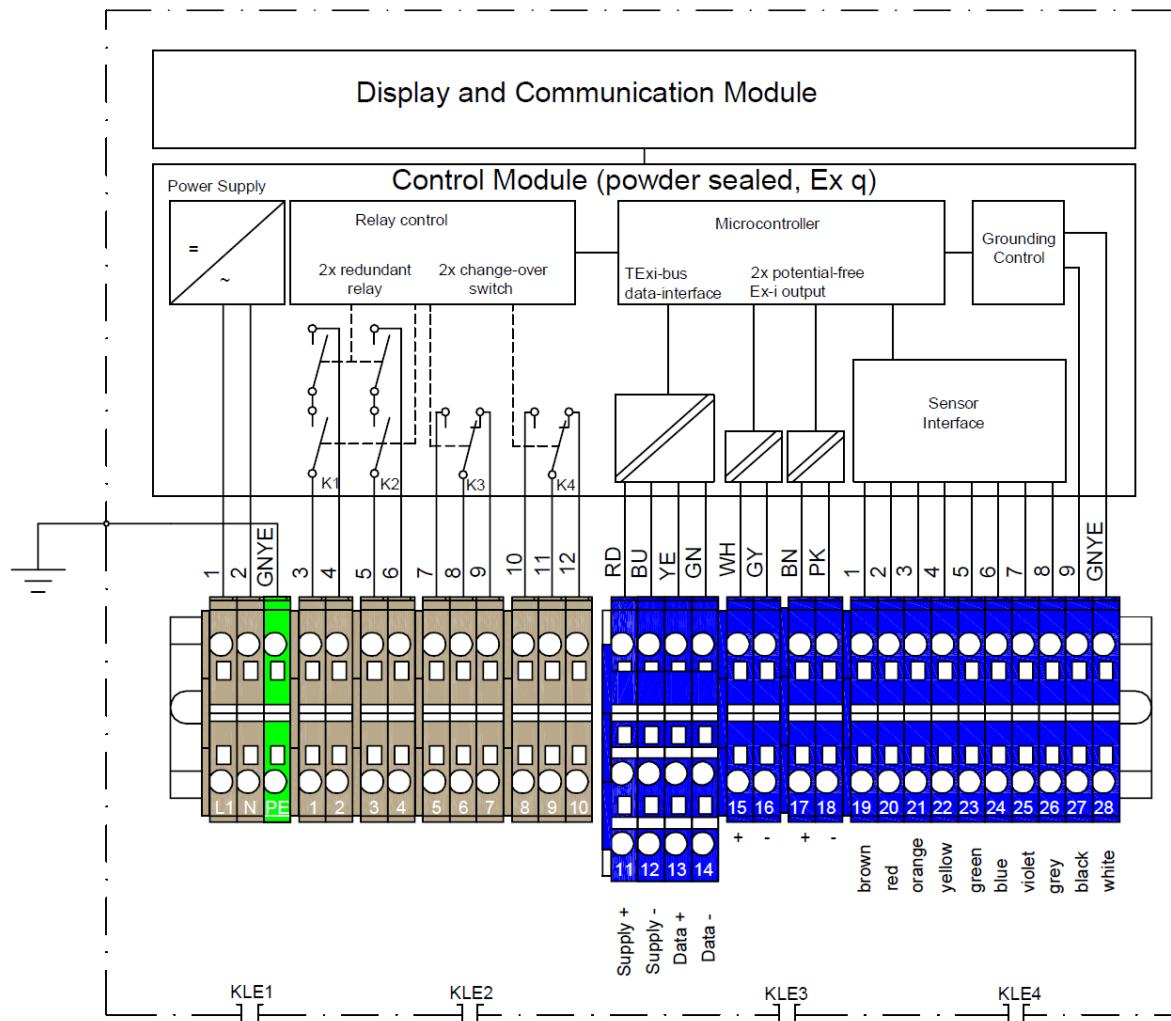
- Type of protection "Intrinsic safety"
 Ex ib
- NAMUR-compatible
- For connection to certified intrinsically safe circuits
- Maximum values
 $U_i \leq 15$ V, $I_i = 20$ mA, $P_i = 300$ mW
 - Electronic Filling Release Output
 potential-free, oscillating (fail-safe)
 - Additional Electronic Output
 potential-free, optionally switchable static or oscillating

Serial Data Interface

- Type of protection: 'Intrinsic Safety'
 Ex ib
- For connection to TExi-Bus (Timm intrinsic safety databus)
- Maximum values: $U_i \leq 15$ V, $I_i \leq 175$ mA, $P_i \leq 2,4$ W



6. Connection Diagram



L1, N, PE: **Power supply**

1 - 2:	Closing contact output K1	-	Filling release
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3 - 4: Closing contact output K2 - Filling release

5 - 7: **Switching contact output K3** - **Configurable**

8 - 10:	Switching contact output K4	-	Configurable
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15 - 16: Ex i Electronic output E1 - Filling release

17 - 18: Ex i Electronic output E2 - Configurable

11 - 14: Ex i Data-interface (TExi-Bus)

19 - 28: Tank truck cable connection

8. International Approvals

In addition to the **ATEX** certificate, we also have Ex-approvals for the EUS-2 according to **IECEX** and **EAC Ex** (according to TR-CU 012/2011) for Australia, Oceania and the Eurasian customs union.



Europe (EU + EFTA)
EC-Type-Examination Certificate
TÜV 13 ATEX 13121



Australia | Oceania
IECEX Certificate



Russia / EAEU
EAC Ex Certificate according to TR CU 012/2011

9. Contact us

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