# Limit indicator GWG type GWD

**only valid in connection with issue 2: assembly and operating instructions**

CE 0045

with / without loose wall fitting type 905

with assembled wall fitting type 905

tank panel with GWD/FSS insert

with type FSA level gauge

BIO

Safety level Fuel+

## CONTENTS



## ABOUT THIS PRODUCT

The type GWD limit indicator is a safety device against overfilling the tank during filling in combination with the overfill prevention mechanism of the road tanker.

## CE MARKING

The product meets the applicable requirements defined in the legal harmonisation provisions of the European Union.
As the manufacturer, we certify this with the following declaration:

- Declaration of performance according to EU-BauPVO pursuant to EN 13616
- EC declaration of conformity pursuant to EMC and RoHS
- National approvals: Belgium, AIB-Vinçotte, prototype no.: 99/H031/03060502

## DECLARATION OF CONFORMITY

You will find the manufacturer's **declaration of conformity** for this product on the website: **https://www.gok.de/konformitaetserklaerungen**

## DECLARATION OF PERFORMANCE

You will find the manufacturer's **declaration of performance** for this product on the website**: www.gok.de/leistungserklaerungen**

## SUITABLE TANKS

The limit indicator may only be installed and used in combination with an overfill prevention mechanism of the road tanker in the following tanks:

- to be used in/with above ground, non-pressurized, static tanks
- operate indoors

**Table 1: Type GWD limit indicator for tanks**

| Tanks | pursuant to standard |
|---|---|
| above-ground battery tanks | DIN 6620 |
| locally manufactured tanks made of steel for above-ground storage | DIN 6625-1, DIN 6625-2, ÖNORM C 2117 |
| Tanks | NBN I 03-002 |
| stationary pressure-free tanks made of thermoplastics | EN 13341, EN 12573 parts 1 to 3 |
| above-ground GRP tanks | EN 13121 parts 1 to 4 |
| other tanks | including certificate of suitability for intended use issued by building inspectorate |
| The certificates of suitability for intended use of the tanks, e.g. regarding admissible operating media, must be observed. | |

## FUNCTION DESCRIPTION

**Limit indicator type GWG**

In accordance with the regulations for protecting waterways against pollution, overfilling of tanks used to store liquid fuels must be prevented. This basic requirement is met if road tankers are equipped with an overfill prevention mechanism automatically preventing the tanks from being overfilled in cooperation with a limit indicator specified according to worksheet DWA-A 779, DWA-A 791, DIN 4755 and VdTÜV leaflet Tank systems 964, respectively.

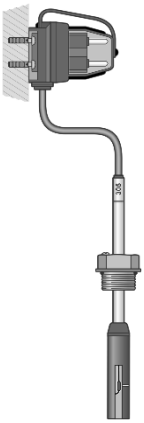
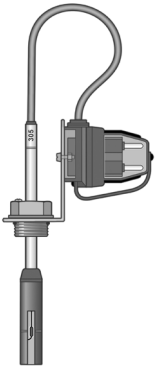
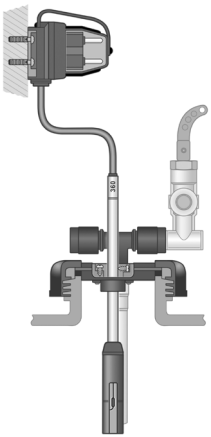
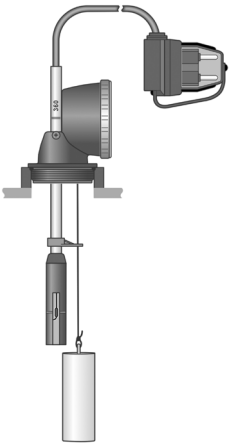
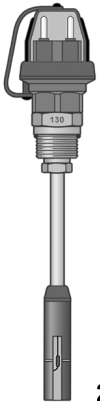
The GWG series limit indicators meet the requirement according to:

- EN 13616: Sensor as part of an overfill prevention type B1 (Current interface)
- EN 13616-2: Overfill prevention sensor as part of an overfill prevention without closure device
- TRbF 511: limit indicator (withdrawn)

The function of the limit indicator is only guaranteed in combination with the overfill prevention mechanism (overfill prevention controller according to EN 13616 or EN 16657) of the road tanker. The certificates of suitability for intended use of the overfill prevention mechanism must be observed and adhered to as well.

## GENERAL PRODUCT INFORMATION

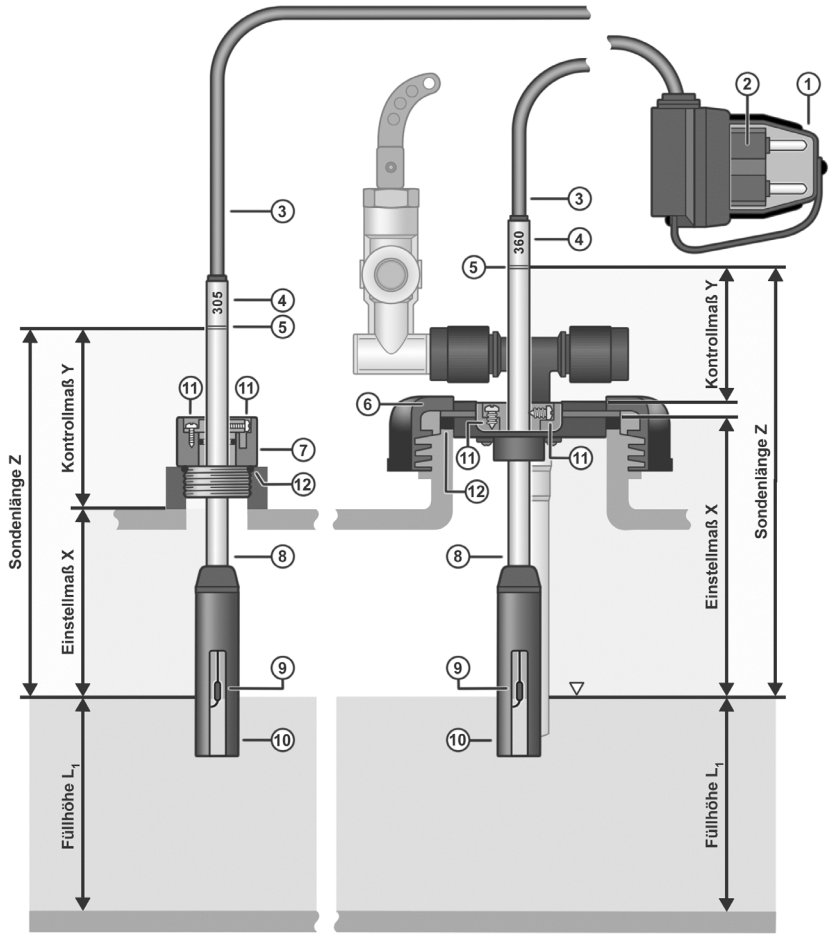
**Table 2: Type GWD** designs (exemplary probe length **Z**)

| | | | |
|---|---|---|---|
|  with loose type 905 wall fitting and insert G 1, Z = 305 mm |  with mounted, wired type 905 wall fitting and insert G 1, Z = 305 mm |  with loose type 905 wall fitting and tank panel, Z = 360 mm |  with type FSA level gauge Tank connector AG G 1 1/2 and/or AG G 2 |
|  **1)** with insert G 1/2, Z = 305 mm |  with mounted type 905 wall fitting and insert G 1, Z = 200 mm |  **2)** with mounted type 905 wall fitting and insert G 3/4 with fix adjusting dimension, Z = X |  replacement limit indicator without insert Z = 360 mm |

Special designs possible, possible probe length Z = 100 ÷ 1000mm
Deviating from the aforementioned: **1)** version 65 ÷ 1000mm, **2)** version 80 ÷ 1000mm

## DESIGN

**Table 3: Type GWD limit indicator basic design and terms**




① Connector, cap
② Connector, joint
③ Cable
④ Probe length in mm, permanently impressed
⑤ Notch marking the probe length
⑥ Tank panel connection
⑦ Insert G1
⑧ Probe tube
⑨ Sensor
⑩ Sensor cover
⑪ Locking screw
⑫ Gasket

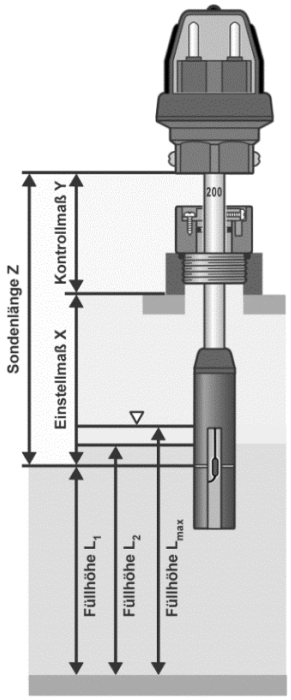
**NOTICE** **To the system operator**

**Have your specialised company confirm the proper installation of the limit indicator (template installation certificate see issue 2).**

All instructions included in the issues 1 and 2 must be observed, adhered to, and understood by the specialised company and the operator.

## LEVELS ACCORDING TO EN 13616

**Table 4: Levels**




The limit indicator consists of a height-adjustable probe tube. The GWG is installed vertically into the tank with an insert. The connection line of the overfill protection device is connected to the road tanker using a connector.

**Level $L_1$**
At this level, the process of filling is interrupted or reduced significantly. The level is set in such a way that the level $L_2$ is not exceeded when draining the road tanker and the filler line. Level $L_1$ is the reference dimension for the **adjusting dimension X**.

**Level $L_2$**
Regarding this level, any further addition of operating medium is prevented when filling the tank prior to or when reaching the maximum level $L_{max}$ of the limit indicator.

**Admissible level $L_{max}$**
Level at admissible level according to **table 5**.

**Marks on the limit indicator**
The limit indicator has two marks:
- Probe length **Z** in mm, impressed permanently, with notch, must be visible upon installation
- Switching point of the sensor for $L_1$.

**NOTICE** If required, the probe tube protruding from the tank must be protected against mechanical loads, e.g. pressure, impact, or vibrations.

**CONTROL DIMENSION Y = Z - X**
Clearance between upper mark for **Z** and upper reference edge tank.

**Mode of operation of a limit indicator**

Regarding the function of the limit indicator, the principle of a temperature-dependent electrical PTC resistor is used - also referred to as PTC thermistor or sensor. The resistance of the PTC thermistor creates a current.

If, during filling, the GWG is connected to the controller of the overfill prevention mechanism on the road tanker with the help of a line, the GWG is supplied with voltage. The PTC thermistor heats. The change in temperature causes the approval signal and the controller opens the cut-off valve on the road tanker. Once the escaping liquid makes contact with the PTC thermistor at level $L_1$ in the tank, the PTC thermistor cools down and the electrical resistance changes. This change in resistance causes a change in current in the GWG circuit. As a consequence, the controller immediately stops filling by closing the cut-off valve on the road tanker.

**NOTICE** **The process of filling shall be terminated at the latest when reaching the maximum admissible discharge volume previously determined by the road tanker driver.**
It shall be inadmissible to deliberately fill until shutdown by the limit indicator when the admissible level is reached.

**NOTICE** **Filling and water control in Germany**

According to § 23 "Requirements for filling and draining" of the Ordinance on Installations for Handling Substances Hazardous to Water (AwSV), this applies to Germany:

"(1) The person filling or draining an installation shall be obliged to monitor this process and to make sure, prior to starting any work, that the required safety equipment is in a proper condition. The admissible exposure limits of the installations and safety equipment must be adhered to when filling or draining."
(2) Tanks in installations for handling liquid substances hazardous to water may only be filled with fixed pipe connections using an overfill protection.
(3) Tanks in fuel storage installations may only be filled from road tankers, demountable tanks and portable tanks using an automatically closing filling safety device. Fuel oil consumer systems with a volume of up to 1.25 $m^3$ may also be filled using self-closing nozzles, notwithstanding sentence 1."

## ADJUSTING DIMENSION X

The tables of the manual issue 2 regarding the adjusting dimension **X** are based on a level $L_1$ for the length of the filler line **to 20m**. Level $L_1$ is the reference dimension for **X**.
If, for storing, filling, and handling water-hazardous substances, the filler line on the installation is **longer than 20m**, the level $L_1$ must be reduced:
Criterion:

- Overrun volume in the filler line
- the adjusting dimension **X** must be re-determined according to the special conditions
- the admissible level with $L_{max}$ of tanks according to table 5 must not be exceeded, e.g. level indicator maximum on the tank and on the level gauge, respectively

**Table 5: Admissible level at $L_{max}$ of tanks for fuels**

| Admissible level 6) | Tank | | Fuel oil | Fuel | Depth |
|---|---|---|---|---|---|
| | Above-ground | Underground 5) | | | |
| 90% (*V/V*) 7) | **X** | | **X** | **X** | **---** |
| 95% (*V/V*) | **X** | | **X** | **X** | **---** |
| | | **X** | **X** | **X** | **< 0.3m** 1) 2) 4) |
| | | **X** | **X** | **X** | **< 0.8m** 3) 10) |
| | | **X** | **X** | **X** | **(AT) ns** 8) |
| 97% (*V/V*) | | **X** | **X** | **X** | **≥ 0.3m** 1) 2) 4) |
| | | **X** | **X** | **X** | **≥ 0.8m** 3) 10) |
| | | **X** | | **X** | **≥ 1,0 m** 11) |
| 98% (*V/V*) | | **X** | **X** | **X** | **(BE)** 9) |

1) Only for fuels with a spatial thermal expansion coefficient ß ≤ 85 • $10^{-5}$/K, e.g. fuel oil EL
2) Only for fuels with a spatial thermal expansion coefficient ß ≤ 85 • $10^{-5}$/K, e.g. diesel fuel
3) Acc. DIN 4755
4) Acc. to TRÖl edition 2.1 and DWA-A 791 (TRwS)
3) Type GWS only
6) Maximum admissible storage volume < actual tank volume
7) Tanks in rail vehicles according to EN 45545-7
11) Acc. TRBS 3151 / TRGS 751
8) Applicable in Austria for tanks, pursuant to TRÖL 3rd edition
9) Applicable in Belgium
10) Acc. to VdTÜV leaflet Tank systems 967

**NOTICE** In Germany, the following is/was applicable: pursuant to TRbF 20:
For tanks for storing combustible liquids with toxic or etching properties, a level of at least 3% less must be complied with.

## ADJUSTING DIMENSION X AND SUBSEQUENT LEAK PROTECTION LINING

The subsequent installation of a leak protection lining in a tank reduces the actual tank volume and therefore the level $L_1$ and $L_{max}$. Within the framework of the certificates of suitability for intended use of leak protection lining issued by the building inspection of the DIBt, it is stated that, upon installation, the adjusting dimension $X_{m.LSA}$ must be re-determined by the executing specialised company or by an expert according to water law and that the limit indicator must be adjusted accordingly.

TÜV Nord recommends increasing the specified adjusting dimension **X** of the limit indicator by 30mm for installation in a tank without leak protection lining.
In this case, the following is applicable to the corrected minimum adjusting dimension:
$X_{m.LSA} = X + 30$ mm with **X** in [mm]

## ADJUSTING DIMENSION X FOR TANKS NOT CORRESPONDING TO ANY STANDARD FOR BUILDING INDUSTRY

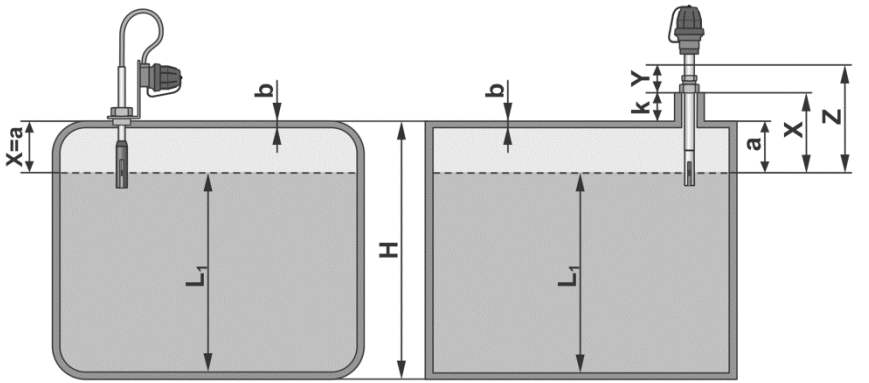
These cases require individual acceptance. The approach shall be coordinated with the competent authority (e.g. in Germany, the lower water authority) or an expert / competent person (in Germany, according to AwSV).

**Option** 1
Use of a limit indicator corresponding to the one installed up to date. Ask the tank manufacturer, stating the attached number of the certificate of suitability for intended use of the building inspectorate, for the successor model.
The certificate of suitability for intended use of the building inspectorate of the limit indicator for the respective tank shape, the adjusting dimension **X**, and the connecting thread of the insert must be observed. The adjusting dimension **X** for the new limit indicator can be adopted.

**Option** 2
Regarding a completely empty tank, the adjusting dimension can be determined by so-called “volumetric measurement”. “Volumetric measurement” is an experimental process conducted in order to create a calibration chart. For this, the completely empty tank is filled gradually and the volume and the related level are determined (e.g. by a folding metre stick).

**Option** 3
The determined overrun volume is subtracted from the admissible level $L_1$. The difference is used, together with a calibration chart or by calculating the volume for the tank, to determine the level $L_1$.
The following calculation according to **table 6** is based on TRbF 510, ZG-ÜS of DIBt, VdTÜV leaflet Tank systems 967 and EN 13612-2:2016.

**Table 6: Calculation option for the adjusting dimension X**




| | |
|---|---|
| a = dimension a= H - $L_1$ - b<br>b = tank wall thickness | H = height or diameter of the tank<br>k = height bushing or threaded flange |

| | | | |
|---|---|---|---|
| 1. | maximum volumetric flow rate of the booster pump of the road tanker | **$Q_{max}$** | L/min |
| 2. | switching and closing delays of the booster pump of the road tanker | Time | |
| | Level sensor according to measurement / datasheet | **$t_1$** | s |
| | Switch / relay / or such like | **$t_2$** | s |
| | Booster pump, flow time | **$t_3$** | s |
| | Shut-off fitting:<br>• mechanical, manually operated time alarm to closing start, closing time:<br>• electrically, pneumatically, or hydraulically operated, closing time: | **$t_4$** | s<br>s |
| | Total time ($t_{total} = t_1 + t_2 + t_3 + t_4$): | **$T_{total}$** | s |
| 3. | Overrun volume**$V_4$** | | |
| | Overrun volume from delays:<br>**$V_1$** = **$Q_{max}$** • (**$t_{total}$** / 60) | **$V_1$** | L |
| | Overrun volume from filler line:<br>**$V_2$** = ($\pi$ / 4) • **$D_i^2$** • **$L_{FL}$** / 1000<br>**$D_i$** = internal pipe diameter in mm<br>**$L_{FL}$** = length of the filler line in m | **$V_2$** | L |
| | **$V_4$** = **$V_1$** + **$V_2$** | **$V_4$** | L |
| 4. | Level**$L_1$** | | |
| | Volume at admissible level according to table 1 issue 1. | **$V_3$** | L |
| | Overrun volume | **$V_4$** | L |
| | Volume at level **$L_1$** **$V_5$** = **$V_3$** - **$V_4$** | **$V_5$** | L |

Then, the volume at level **$V_5$** value results, in combination with the calibration chart or by calculation, in the level **$L_1$**.
The adjusting dimension **X** for the GWG must be determined taking into account* the tank shape:

Installation on tank ceiling: **X = H - $L_1$ - b** = mm

***** if applicable Take into account ADJUSTING DIMENSION **X** AND SUBSEQUENT LEAK PROTECTION LINING.

**Table 7: Example for calculating the adjusting dimension X**
Length = 1010mm Width = 1010mm Height H = 1010mm b = 5mm,
Rated volume of the tank = 1000L Bushing with k = 30mm GWG with Z = 305mm

| | |
|---|---|
| 1. $\mathbf{Q_{max}}$ pursuant to DIN 4755 and DWA-A 791 | 1200L/min |
| 2. Total time $\mathbf{t_{ges}}$ pursuant to EN 13616 | 5.5s |
| 3. Overrun volume $\mathbf{V_3}$ | |
| $\mathbf{V_1}$ = 1200L/min; (5.5s • min / 60s) | 110L |
| $\mathbf{V_2}$ for $D_i$ = 55mm and $L_{FL}$ = 15m | 35L |
| $\mathbf{V_4 = V_1 + V_2}$ = 110L + 35L | 145L |
| 4. Response height $\mathbf{L_1}$ and adjusting dimension X | |
| $\mathbf{V_3}$ = 95% (*V/V*) of 1000L | 950L |
| $\mathbf{V_5 = V_3 - V_4}$ = 950 - 145 | 805L |
| a) Look up volume $V_5$ in calibration chart and find the level $L_1$ | _ _ _ _ mm |
| b) Approach: $\mathbf{L_1 + a - b = H - (2 \bullet b)}$ = 1000mm<br>1000L ≡ 1000mm at 100% (V/V), 805L ≡ $\mathbf{L_1}$ [mm] | |
| c) from a) or b): $\mathbf{L_1}$ = 805mm | |
| d) Adjusting dimension GWG<br>$\mathbf{X = H - L_1 - b + k}$ = 1010 - 805 - 5 + 30 | 230mm |
| e) Control dimension GWG $\mathbf{Y = Z - X}$ = 305 - 230 | 75mm |

## LIMIT INDICATOR REPLACEMENT (OLDER TANKS)

From DIBt information issue 1/2008
When replacing limit indicators on tanks with test certificates or general approvals of the building inspectorate, the following limit indicator with the certificate of suitability for intended use of the building inspectorate may be installed:

- limit indicators fitting into the designated connection on the tank,
- limit indicators having such a length allowing for the hitherto adjusting dimension to be re-configurable and for reading off the related control dimension.

# Limit indicator

## Type: GWD Series: GWG

**10**

## EN 13616:2004/AC:2006

## No. GWD–EU-BauPVO–DE–2018-12-10

Overfill prevention type B – subtype B1 (Current interface)
Overfill prevention devices without closure device
– overfill prevention sensor–
are intended to be used in/with above ground, non-pressurized, static tanks designed for liquid fuels

Performance according declaration of performance

CE 0045

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