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# EVALUATION CERTIFICATE

## No. DK0199-R76-16.01

| | |
|---|---|
| **Object name** | **KFS-TM** |
| **Object type** | **A weighing indicator for non-automatic weighing instruments** |
| **Issued by** | **DELTA Danish Electronics, Light & Acoustics** |

Issued in accordance with the requirements in WELMEC Guide 8.8:2011" Guide on General and Administrative Aspects of the Voluntary System of Modular Evaluation of Measuring instruments".

| | |
|---|---|
| **In accordance with** | OIML R76:2006,<br>EN 45501:2015<br>WELMEC Guide 2.1:2001<br>WELMEC Guide 8.8:2008. |
| **Issued to** | **Kern & Sohn GmbH**<br>Ziegelei 1<br>D-72336 Balingen<br>GERMANY |
| **Manufacturer** | **Kern & Sohn GmbH** |
| **Characteristics** | A weighing indicator for non-automatic weighing instruments. |
| **Description and documentation** | The weighing indicator is described and documented in the annex to this certificate. |
| **Remarks** | Summary of tests involved: see annex.<br>This evaluation certificate cannot be quoted in a NAWI EC type approval certificate without permission of the holder of the certificate mentioned above. |

The annex comprises 8 pages.

**Issued on** **2016-01-27** **Signatory: J. Hovgård**

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# Descriptive annex

## Contents

# 1. Name and type of instrument

The weighing indicator is designated KFS-TM. It is an electronic non-automatic weighing indicator to be connected to a separate load receptor and capable of transmitting the instant weight to an external display unit or to a digital indicator.

The indicators consist of analogue to digital conversion circuitry, microprocessor control circuitry, power supply, keyboard, non-volatile memory for storage of calibration and setup data, and a weight display contained within a single enclosure.

# 2. Description of the construction and function

## 2.1 Construction

### 2.1.1 KFS-TM series of weighing indicators/transmitters

The KFS-TM indicator is supplied in an ABS plastic enclosure.

The KFS-TM indicator is specified in Section 3.1.

### 2.1.2 Load cells

Requirements to connected load cell(s) are set out in Section 3.2.

### 2.1.3 Load receptor

Requirements to connected load receptor are set out in Section 3.3.

### 2.1.4 Interfaces and peripheral equipment

Set out in Section 4.

## 2.2 Functions

The instrument is a microcontroller based electronic weight indicator that requires the external connection of strain gauge load cell(s).

The primary functions provided are,

- Self-test function
- Initial zero-setting – ≤ ±10 % of Max
- Semi-automatic zero-setting – ±2 % of Max
- Zero-tracking – ±2 % of Max
- Semi-automatic tare device
- Preset tare device
- Counting device
- Totalization device
- Manuel check weighing device
- Printing device
- Extended indication device
- Real-time clock
- Gravity compensation

**Software version**

The software is separated in a weighing system and an application. The weighing system version is displayed during power up. The application version can be displayed during power up by pressing the TARE/ZERO key.

The approved weighing system software version is 1.10
The approved application software version is A1.xx, where xx can be 00 to 99.

# 3. Technical data

## 3.1 Weight indicator

The KFS-TM has the following characteristics:

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|---|---|
| Type: | KFS-TM |
| Accuracy class: | III |
| Weighing range: | Single-interval, multi-range, multi-interval |
| Maximum number of verification scale intervals (n): | ≤ 6000 for single interval or<br>≤ 2×3000 for multi-range and multi-interval |
| Minimum input voltage per VSI: | 1.0 µV |
| Maximum capacity ($Max_i$): | $n_i \times e_i$ |
| Verification scale interval, $e_i$ = : | $Max_i / n_i$ |
| Maximum tare effect: | -Max |
| Fractional factor (pi): | 0.5 |
| Excitation voltage: | 5 VDC |
| Minimum input impedance: | 87 ohm |
| Maximum input impedance per channel: | 1200 ohm |
| Circuit for remote sense: | present |
| Supply voltage: | 12 VDC / 100-240 VAC, 50/60 Hz using external adapter<br>6 V battery (optional) |
| Operating temperature range: | -10 °C / +40 °C |
| Maximum cable length between KFS-TM and junction box for load cells: | 282 m/mm$^2$ |
| Peripheral interface(s): | See Section 4 |

### 3.1.1 Connecting cable between the indicator and the junction box for load cell(s), if any

#### 3.1.1.1 4-wire system

| | |
|---|---|
| Line: | 4 wires, shielded |
| Maximum length: | The certified length of the load cell cable, which shall be connected directly to the indicator. |

#### 3.1.1.2 6-wire system

Line: 6 wires, screened

**Option 1:**

Maximum length: 282 m/mm$^2$ (for n = 6000)
Maximum resistance per wire: 4.8 Ω

In case the (n) for the weighing instrument is less than (n) mentioned above, the following apply:

**Option 2:**

Coefficient of temperature of the span error of the indicator: Es = 0.0034 [%/25K]
Coefficient of resistance for the wires in the J-box cable: Sx = 0.0096 [%/ohm]

$L/A_{max}$ = 295.86 / Sx * (emp/n - Es) [m/mm²] in which emp = p'i * mpe * 100/e

From this, the maximum cable length for the weighing instrument may be calculated with regard to (n) for the actual configuration of the instrument.

## 3.2 Load cells

The KFS-TM weighing indicator may only be used with load cell(s) that fulfils the following general acceptance of load cells.

### 3.2.1 General acceptance of load cells

Any load cell(s) may be used for instruments under this certificate of type approval provided the following conditions are met:

1) A test certificate (EN 45501) or a respective OIML Certificate of Conformity (R60) is issued for the load cell by a Notified Body responsible for type examination under the Directive 2009/23/EC.

2) The certificate contains the load cell types and the necessary load cell data required for the manufacturer's declaration of compatibility of modules (WELMEC 2, Issue 6, 2014), and any particular installation requirements. A load cell marked NH is allowed only if humidity testing to EN 45501 has been conducted on this load cell.

3) The compatibility of load cells and weight indicator is established by the manufacturer by means of the compatibility of modules form, contained in the above WELMEC 2 document, or the like, at the time of EC verification or declaration of EC conformity of type.

4) The load transmission must conform to one of the examples shown in the WELMEC 2.4 Guide for load cells.

## 3.3 Load receptors

The KFS-TM weighing indicator may only be used with a load receptor that has a load transmission device in accordance with the standard solutions shown in WELMEC Guide 2.4:2001.

## 3.4 Composition of modules

Composition of modules to a non-automatic weighing instrument using KFS-TM shall satisfy EN45501:2015 annex F.

# 4. Interfaces and peripheral equipment

## 4.1 Interfaces

### 4.1.1 Load cell input

A 7-terminal connector for the load cell is positioned on the back of the enclosure.

### 4.1.2 Other interfaces

The indicator may be equipped with the following protective interface,

- Serial interface RS 232C

The interface is characterised “Protective interface” according to paragraph 8.4 in the Directive and do not have to be secured.

# 5. Approval conditions

## 5.1 Compatibility of modules

In case of composition of modules EN45501:2015 annex F shall be satisfied.

# 6. Special conditions for verification

## 6.1 Composition of modules

The environmental conditions should be taken into consideration by the composition of modules for a complete weighing instrument, for example instruments with load receptors placed outdoors and having no special protection against the weather.

The composition of modules shall agree with Section 5.1.

# 7. Securing and sealing of KFS-TM indicator

## 7.1 Securing and sealing

Seals shall bear the verification mark of a notified body or alternative mark of the manufacturer according to ANNEX II section 2 or 3 of the Directive 2009/23/EC.

### 7.1.1 KFS-TM indicator

Access to the configuration and calibration facility requires that the calibration switch is depressed.

The calibration switch is accessed through a hole in the rear of the enclosure. Sealing the cover plate for this hole and the access to one of the screws of the enclosure with brittle plastic stickers prevent access to the calibration jumper and secure the electronics against dismantling/adjustment.

### 7.1.2 Indicator - load cell connector - load receptor

Sealing of the connection between the KFS-TM weighing indicator and the load receptor and load cell(s) is accomplished by sealing the connector(s) with brittle plastic sticker(s) or with wire and seal.

In the rare cases where this is not possible, the connection can be secured in one of the following ways:

- Inserting the serial number of the load receptor as part of the principal inscriptions contained on identification plate of the indicator, and insertion of the serial number of the indicator on the data plate of the load receptor. If the load receptor does not have a sealed junction box, one of the screws fastening the load cell shall be sealed with a sticker or with wire and seal, so the load cell cannot be exchanged.

### 7.1.3 Junction box for load cells

A junction box for load cells shall be sealed against opening with wire and seal or brittle plastic sticker(s).

## 8. Tests performed

Tests carried out by DELTA for this evaluation certificate on Scanvaegt System's SV01 weighing indicator.

| **Test** |
|---|
| Temperature effect on sensitivity with minimum weighing range and input impedance of 87 / 350 Ohm (20, 40, -10, 5 and 20 °C) |
| Temperature effect on no-load indication with minimum weighing range and input impedance of 87 Ohm (20, 40, -10, 5 and 20 °C) |
| Damp heat, steady state |
| Repeatability |
| Warm-up time |
| Voltage variations |
| Span stability |
| Cable length between KFS-TM and a junction box for load cells |
| EMC immunity tests are performed with a load cell of 350 Ohm |
| Voltage dips and interruption |
| Electrical bursts |
| Surge |
| Electrostatic discharge |
| Radiated electromagnetic fields |
| Conducted electromagnetic fields |

**The test item fulfilled the maximum permissible errors at all tests.**

Surge was tested on the AC side of the external AC/DC adapter. KFS-TM is not to be supplied from DC Mains.

## 9. Documentation

**Test** report
DANAK-1913578 dated 18 November 2013, 71 pages.

**Technical file**
Contents of the technical documentation held by the notified body in technical file T206507.

## 10. Pictures

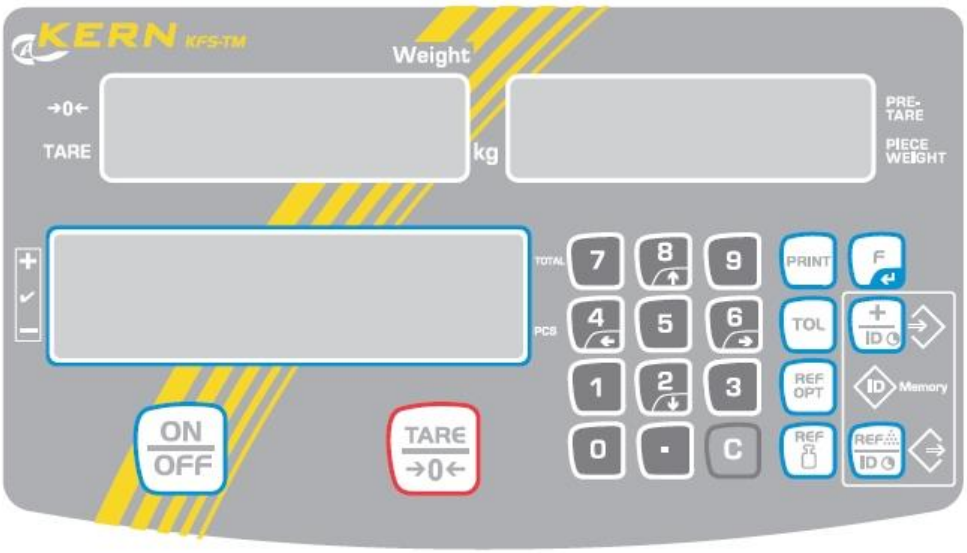


**Figure 1** KFS-TM indicator.

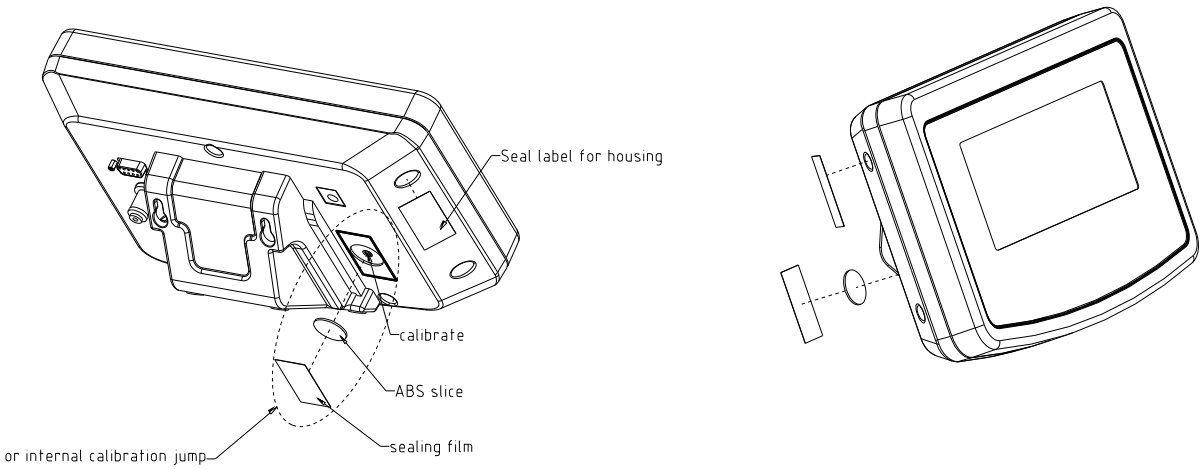


**Figure 2** Sealing of KFS-TM indicator.