CERTIFICATE
of
EU TYPE-EXAMINATION
No. DK 0199.170

BS-n / WF..

CONTINUOUS TOTALISER

Issued by **DELTA Danish Electronics, Light & Acoustics**
EU - Notified Body No. 0199

In accordance with the requirements for the automatic weighing instruments in Directive 2004/22/EC of the European Parliament and Council of March 31, 2004 on Measuring Instruments (MID).

Issued to **Esit Elektronik Ltd. Şti.**
Nişantepe Mah. Alemdağ
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TURKEY

In respect of Continuous totaliser designated BS -n / WF.. with variants of modules of load receptors, load cells and peripheral equipment.
Accuracy class 0.5, 1 and 2
Maximum capacity, Max: $\geq$ 1 kg.
Maximum flow rate, Q_{max} from 1 t/h to 6000 t/h
Totalisation scale interval, $d \geq 1$ kg
Variants of modules and conditions for the composition of the modules are set out in the annex.

The conformity with the essential requirements in Annex 1 and the specific requirements in Annex MI-006, chapter I & V of the Directive 2004/22/EC is met by the application of OIML R50-1:1997, WELMEC Guide 8.16-4:2006, WELMEC Guide7.2:2009, and OIML D11:2004 section 12 & 13 level 3.

The principal characteristics and approval conditions are set out in the descriptive annex to this certificate.

The annex comprises 13 pages.

Issued on   **2009-11-06**
Valid until   **2019-11-06**   Signatory: J. Hovgård

Descriptive annex

Contents   Page

1. Name and type of instrument and modules

The continuous totaliser is designated "BS-n" and "WF.." respectively. It consists of a LCA-B electronic controller and display unit and a belt conveyor with built-in load receptor.

The instrument is Type P and Risk Class C according to WELMEC Guide 7.2 (2009).

The modules appear from the sections 3.4, 3.5 and 3.6, the principle of the composition of the modules is set out in the sections 6.1 and 10.

2. Description of the construction and function

2.1 Construction

The continuous totaliser consists of,

- A conveyor belt having a tensioner, which may use a spring or a dead load for tensioning
- A load receptor with roller(s)
- Strain gauge load cells
- A displacement transducer
- An electronic measuring, processing and display unit
- Peripheral devices.

2.1.1 Weighing controller unit

The electronic measuring, processing and display unit designated LCA-B supplies the strain gauge load cells with excitation voltage and amplifies, digitises and converts the output signal of the load cells into a weight value. Simultaneously the pulses from the displacement transducer are processed to determine the belt length that has passed over the load receptor. Based on this, the mass of the material passing over the load receptor is determined.

The man-machine interface of the weighing controller is placed on the front panel of the LCA-B and comprises:

- An alphanumeric dot matrix LCD display with 2 lines of each 16 characters.
- Three keys keypad ("Zero", "Tare" and "Function").

The software of the LCA-B can only be modified by exchanging the memory chip that contains the programme. Exchange can not take place, when the unit is sealed.

The software performs a self test at start up.

2.1.2 Load cells

Set out in section 3.4.

2.1.3 Load receptor

Set out in section 3.5.

2.1.4 Displacement transducer

Set out in section 3.6.

2.1.5 Interfaces and peripheral equipment

Set out in section 4.

2.2 Function

2.2.1 Functions and devices

The automatic weighing instrument has the following permitted functions and devices that are subject to the Measuring Instrument Directive:

- Power up test
- Semi-automatic zero setting device
- General totalising device
- Partial totalisation indicating devices (T1 and T2)
- Optional supplementary totalisation indicating device (mechanic counter)
- Detection of significant fault
- Alibi function (internal data storage device)

2.2.2 Software identification

The approved firmware version is 3.0d.

3. Technical data

The automatic weighing instruments and its modules are set out as follows:

3.1 Continuous totaliser

Type:	BS-n / WF..
Accuracy class:	0.5 or 1 or 2
Maximum capacity (Max):	$\geq$ 1 kg
Minimum capacity (Min):	$\geq$ 20 % of Max
Maximum flow rate (Q_{max}):	1 t/h to 6000 t/h
Minimum flow rate (Q_{min}):	$\geq$ 20 % of Q_{max} for single speed Min $\geq$ 20 % of Max shall be fulfilled at all speeds for multi-speed and variable-speed
Totalisation scale interval (d):	$\geq$ 1 kg
Scale interval for test:	d / 100
Belt velocity type:	single-speed, multi-speed, or variable-speed
Maximum belt speed, v_{max}:	0.025 m/s to 3 m/s
Minimum belt speed, v_{min}:	$\geq$ 20 % of v_{max}
Weigh length, L:	0.5 m to 1.5 m
Temperature range:	-10 °C to 40 °C
Electromagnetic class:	E2
Humidity:	Non-condensing

3.2   Weighing controller

The LCA-B weighing controller has the following characteristics:

Type:	LCA-B
Accuracy class:	0.5
Fractional factor:	$p'i = 0.7$
Excitation voltage:	10 VDC
Minimum span range:	10 mV
Minimum input voltage per totalisation scaleinterval	2.5 µV
Circuit for remote sense:	Remote sensing using 6-wires in the load cell cable
Minimum load cell input impedance:	43 Ohm
Maximum load cell input impedance:	1100 Ohm
Maximum cable length to junction box:	477 m/mm^2 in a 6-wire system
Maximum pulse frequency:	1000 Hz
Minimum pulse frequency:	20 Hz
Operating temperature range:	-10 °C to +40 °C
Power requirements:	Mains adapter 230 VAC (50/60 Hz) Optional DC supply from 12 to 24 VDC
Peripheral interface:	Set out in section 4

3.3   Connecting cable between the electronic controller and the junction box for load cells

3.3.1   6-wire system

Maximum length: 477 m / mm²

Line: 6 wires, shielded

3.4   Load cells

3.4.1   General acceptance of modules

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

1)   There is a respective test certificate (EN 45501) or an OIML Certificate of Conformity (R60) 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 5, 2009), 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 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.

3.5   Load receptor

The following types of load receptors are approved for the continuous totaliser:

- A weighing roller for belt transportation over the load receptor, suspended in two load cells.

- A weighing frame suspended in two load cells, mounted with one set of weighing rollers for belt transportation over the weigh table.

- Made by one or more identical weighing modules placed immediately after each other in a distance of 0.5 - 2 times the width of the belt. Each weighing module consists of one set of weighing rollers suspended in two load cells.

3.6   Displacement transducer

The displacement transducer is either an inductive switch placed on a trailing arm or a rotary encoder mounted on the tension roller.

The wheel of a trailing arm may only be driven by the inner side of the belt that is not getting in contact with the material to be weighed.

4.   Interfaces and peripheral equipment

4.1   Interfaces

The weight control unit has the following interfaces, which all interfaces are characterised "Protective interfaces" according to paragraph 8.1 in annex I of the Directive.

- RS232 / RS485 serial communication

- Relay outputs

- Analogue output, 0/4 - 20 mA

4.2   Peripheral equipment

Connection between the indicator and peripheral equipment is allowed by screened cable.

The instrument may be connected to any simple peripheral device (e.g. a printer) with a CE mark of conformity.

5.   Approval conditions

5.1   Connection of cables

All cables shall be shielded, and the shield shall be properly EMC wise connected to the housing / connector in both ends.

5.2   Conveyor belt

Exchange of the conveyor belt will require a new legal metrological test of the instrument.

5.3   Constant feeding rate

Although the WF.. is intended for constant feeding rate obtained by varying the belt speed only the totalized amount and not the feeding rate is the be regarded as a legale value.

5.4 Compatibility of modules

Compatibility of modules for continuous totalisers - an Excel worksheet developed by DELTA based on the principles in WELMEC 2, Issue 5, July 2009, paragraph 11 shall be satisfied.

An Excel file for calculation of "Compatibility of Modules" can be obtained from DELTA upon email request to legal@delta.dk.

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 5.3.

An example of a declaration of conformity document is shown in chapter 10.

7. Securing and location of seals and verification marks

7.1 Securing and sealing

Seals shall bear the verification mark of a notified body according to ANNEX F of the Directive 2004/22/EC or alternative mark of the manufacturer according to ANNEX D of the Directive 2004/22/EC.

7.1.1 Mechanical sealing

The identification plate shall be secured against removal with a brittle plastic sticker.

The position of the set of rollers next to the weighing frame(s) - on both sides - shall be secured against repositioning.

7.1.2 Electronic Controller sealing

The enclosure of the electronic controller shall be sealed against opening with brittle plastic stickers.

The connector of the load cell cable and the cable from the displacement sensor shall be sealed against disconnection of them.

7.1.3 Junction box for load cells

Access to the junction box, if any, is prevented by means of sealing by plastic stickers or lead seals.

7.1.4 Displacement transducer

If the displacement transducer has adjustable parts, these shall be sealed.

7.2 Verification marks

A sticker with verification marks is to be placed on or partly on the identification plate of the instrument.

8. Location of CE mark of conformity and inscriptions

8.1 Identification plate

All inscriptions for the instrument shall be placed on the identification plate, which is to be located on a visible place on the measuring instrument.

8.1.1 CE mark

A sticker with the CE mark of conformity and the supplementary metrology marking consisting of the capital letter "M", surrounded by a rectangle, and the last two digits of the year of its affixing shall be located on the identification plate.

8.1.2 Inscriptions

The identification plate shall bear the following inscriptions:

- Manufacturer's trademark and / or name

- Type designation

- Serial number

- Accuracy class

- Maximum capacity Max

- Maximum flow rate Q_{max}

- Minimum flow rate Q_{min}

- Minimum totalised load Σ_{min}

- Scale interval for totalisation d

- Belt speed   v for fixed speed,
                 v_1, v_2, … for multi-speed, and
                 v_{max}, v_{min} for variable-speed

- Temperature range: -10 °C to +40 °C

- Electromagnetic class: E2

- Humidity: Non-condensing

- Type examination certificate number

9. Pictures

Figure 1 BS Belt Scale controller
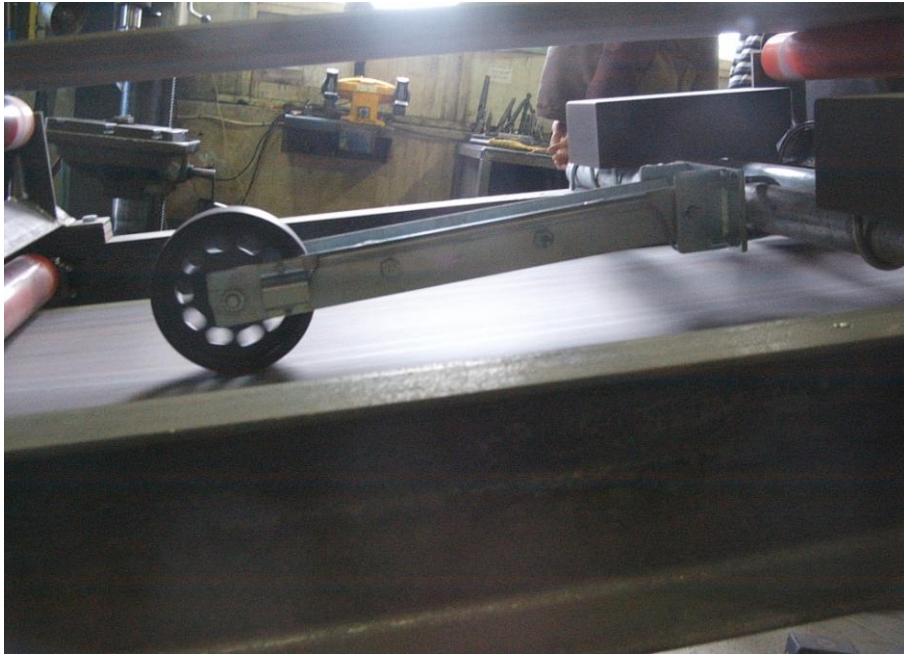

Figure 2 LCA-B

Figure 3 Trailing arm with wheel and inductive switch
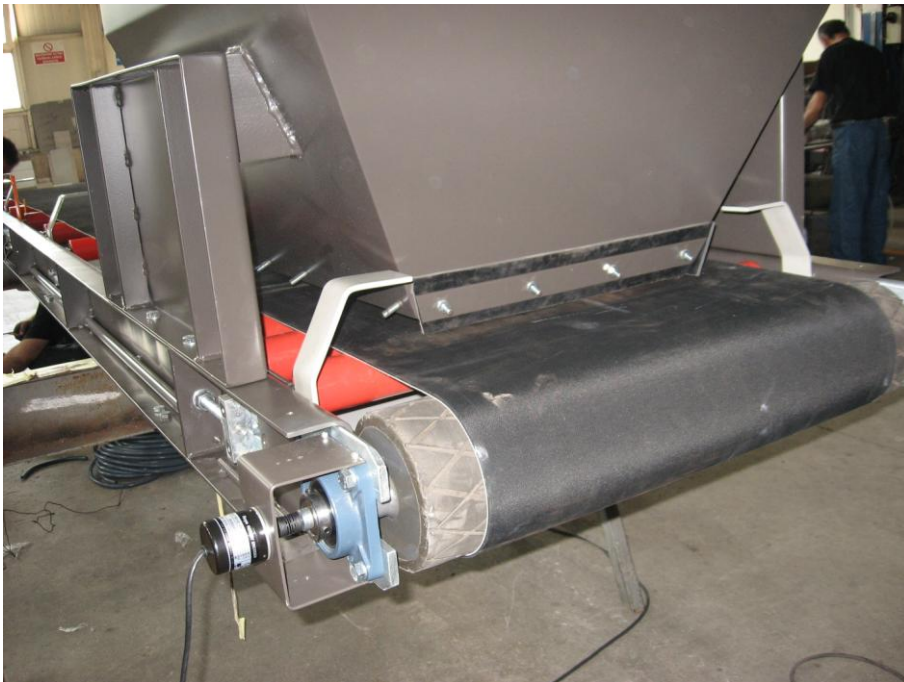

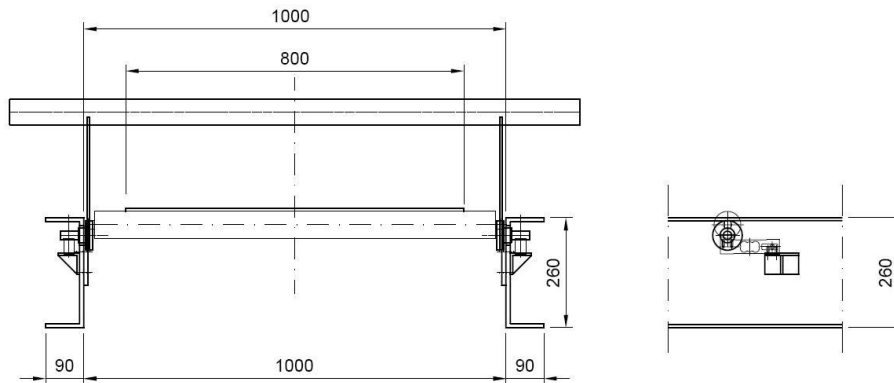**Figure 4** Rotary encoder mounted on tension roller

Figure 5 Weighing roller suspended in two load cells

Figure 6 Weighing frame

SPECIAL STRETCHER MECHANISM
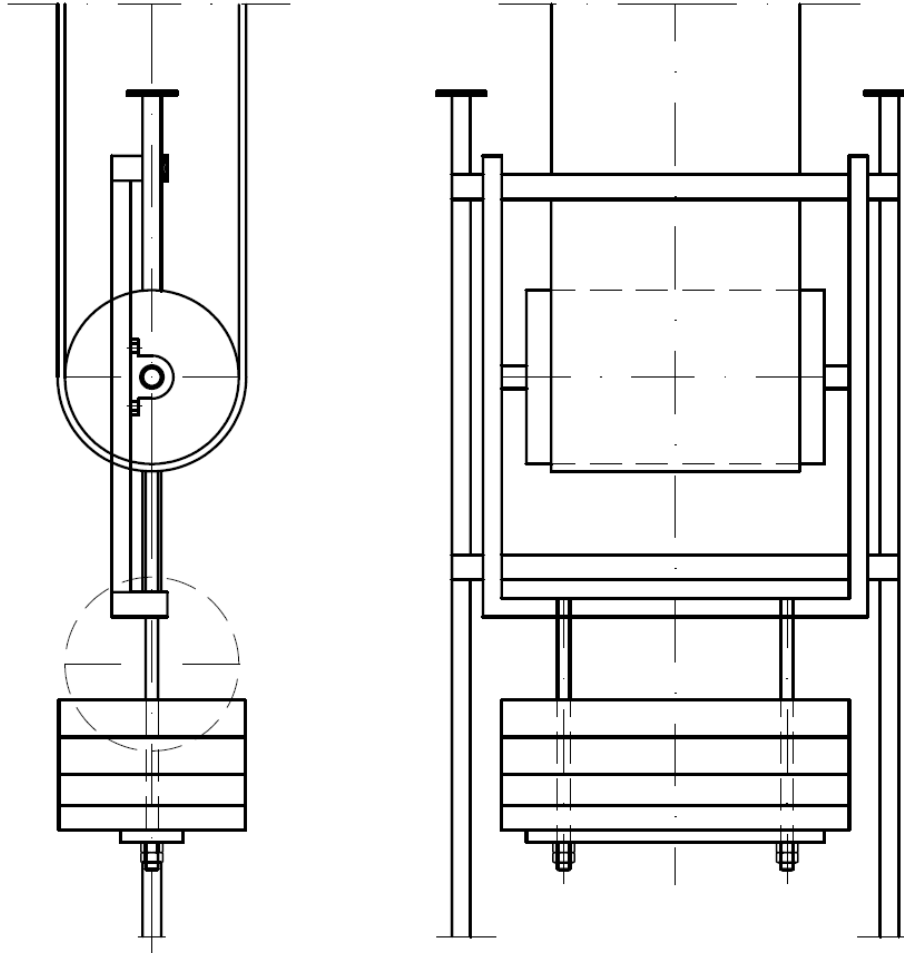## (For belt over 60m)

Figure 7 Arrangement for gravimetric tightening of the belt

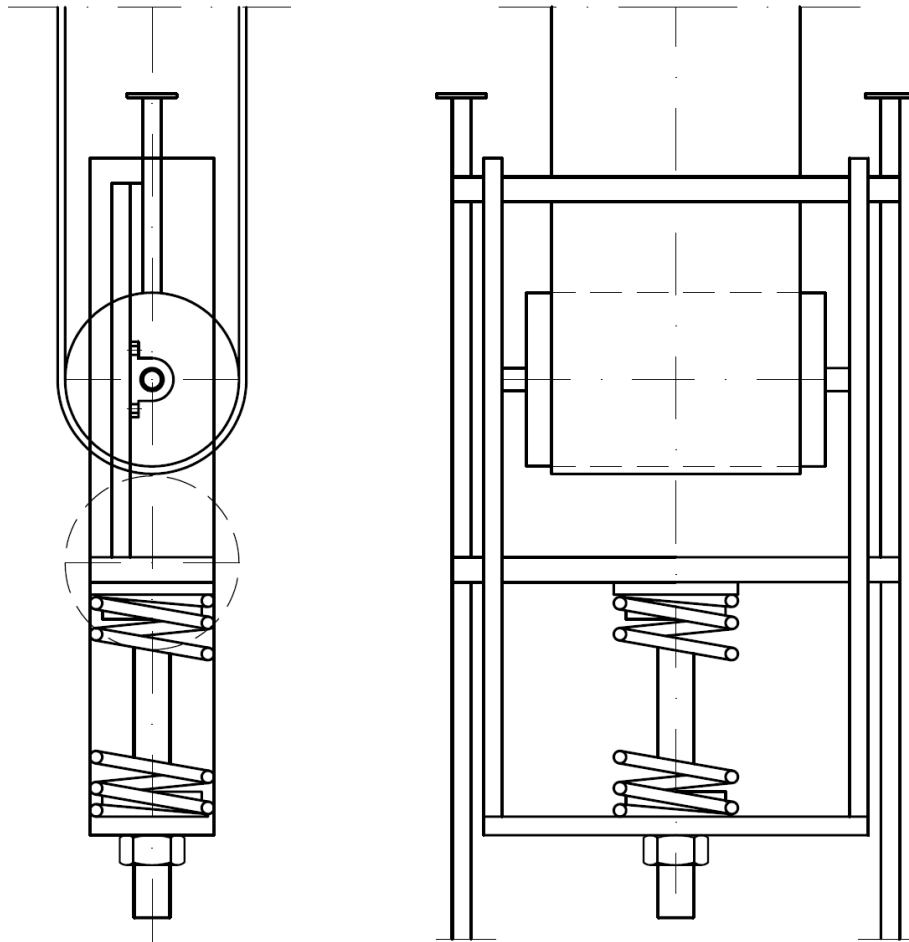# OUTOMATIC STRETCHER MECHANISM
(For belt lengths 8-60m)

Figure 8 Spring arrangement for tightening of the belt

10. Composition of modules – illustrated

COMPOSITION OF MODULES

Ref.: WELMEC 2 (Issue 5), July 2009, paragraph 11.

Belt weigher.

EC Type-Examination Certificate No.: (In conformity with OIML R50, 1997:) DK0199.170

ELECTRONIC DEVICE (Module 1) Type: LCA-B . . . . .

Accuracy class according to OIML R50:			0,5
Number of totalization scale intervals for Σmin:	n_i		800
Fraction of maximum permissible error (mpe):	p_1		0,7
Excitation voltage:	E_{ex}	[VDC]	10
Minimum span range for Max:	sp_{min}	[mV]	10
Minimum input-voltage per totalization scale interval:	$E_{in} = sp_{min} / n_i$	[µV]	12,5
Load cell interface:			6-wire (remote sense)
Minimum load cell impedance:	R_{LCmin}	[Ω]	43
Maximum load cell impedance:	R_{LCmax}	[Ω]	1100
Maximum permissible length of the cable:	$(L/A)_{max}$	[m / mm²]	477
Data communication interface:			Protective interface
Temperature range:	T_{min} / T_{max}	[°C]	-10 / 40
Test report or Test Certificate as appropriate:			

LOAD RECEPTOR (Module 2) Type: BS-2 . . . .

Weigh length:		[mm]	1000
Fraction of mpe:	p_2		0,14
Number of load cells:	N		2
Dead load:	DL	[kg]	13
Reduction ratio of the load transmitting device:	$R = F_M / F_L$		1
Correction factor:	Q		1

LOAD CELLs (Module 3) Type: Esit SSP

Accuracy class according to OIML R60:			C
Maximum accuracy class certified:			C3
Maximum number of load cell intervals:	n_{LC}		3000
Fraction of mpe:	p_3		0,7
Sensitivity:	S	[mV / V]	2
Impedance:	R_{LC}	[Ω]	350
Minimum load cell verification interval:	v_{min}	[% of Emax]	0,0095
Rated capacity:	E_{max}	[kg]	20
Minimum measuring range for Qmin:	$v_{min} * n$	[% of Emax]	7,6
Temperature range:	T_{min} / T_{max}	[°C]	-10 / 40
Test report or Test Certificate as appropriate:			

COMPLETE BELT WEIGHER

Manufacturer: Esit			. . . .
Type: BS-2			. . . .
Serial no.:			. . . . . .
Accuracy class according to OIML R50:			0,5
Fractions: pi = $p_1^2 + p_2^2 + p_3^2$ = (R76 clause 3.5.4.1)			
Maximum capacity:	Max	[kg]	26
Maximum flowrate:	Q_{max}	[kg /h]	39500
Minimum flowrate:	Q_{min}	[kg /h]	7900
Number of totalization scale intervals for Σmin:	n		800
Totalization interval for Qmin:	$(Q_{min}/Q_{max}) * Max / n = x$	[kg]	0,007
Utilisation of the load cells:	$\alpha = (Max * R)/[(Emax * N)]$		0,65
Output-voltage of the load cells:	$E_{out} = S * E_{ex} * \alpha$	[mV]	13,00
Max resistance of each wire in the cable to the junction box for load cells:		[Ω]	1
Specific cable-length to the junction box for load cells, if any:	L_a	[m]	10
Sectional area of each wire in the cable:	A_a	[mm²]	0,22
Temperature range allowed:	T_{min} / T_{max}	[°C]	-10 / 40
Peripheral Equipment subject to legal control:	. . . . .		

Requirements for compatibility			Satisfied, provided that all calculations below are >= 0	
pi	≤	1	1 - pi =	**0**
n	≤	n_i	n_i - n =	**0**
$(V_{min} / R) * \sqrt{N}$	≤	x	x - $(V_{min} / R) * \sqrt{N}$ =	**0,004**
sp_{min}	≤	E_{out}	E_{out} - sp_{min} =	**3,00**
R_{LCmin}	≤	R_{LC} / N	R_{LC} / N - RLCmin =	**132**
R_{LC} / N	≤	R_{LCmax}	R_{LCmax} - RLC / N =	**925**
L_a / A_a	≤	$(L/A)_{max}$	$(L/A)_{max}$ - L_a / A_a =	**432**
Q*(Max+DL)*R/N	≤	E_{max}	E_{max} - Q*(Max+DL)*R/N =	**0,50**

Signature and date: **COMPATIBILITY:** **SATISFIED**

DELTA