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EC Type Examination Certificate

No. DK 0199.580

ECI

CONTINUOUS TOTALIZING AUTOMATIC WEIGHING INSTRUMENT

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 Sistemler Imalat ve Ticaret Ltd. Sti.
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In respect of Continuous totalizer designated ECI with variants of modules of load receptors, load cells and peripheral equipment.
Accuracy class 0.5, 1 and 2
Maximum capacity, Max: ≥ 1 kg.
Maximum flow rate, Q_{max} from 1 t/h to 6000 t/h
Totalization 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 8.16-4:2014, WELMEC Guide 7.2:2011, 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 16 pages.

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Descriptive annex

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1. Name and type of instrument and modules

The continuous totalizer is designated ECI. It consists of an ECI electronic weighing 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 7.2:2011.

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

2. Description of the construction and function

2.1 Construction

The continuous totalizer 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 weighing controller of the ECI continuous totalizer is Esit's weighing controller type ECI.

Enclosures and keyboard

The enclosure of ECI is made of plastic. It is 149 mm wide x 84 mm high x 73 mm deep and is designed to mount in a flat panel.

ECI has 5 keys and the symbols of these are shown in the lower part of the display.

The rear panel of ECI contains all cable connectors.

Display

ECI has a 4.5 inch graphic LCD display (101×33 pixels) used for display of weight, indicators, key symbols, error messages, and setup information.

Electronics

The weighing controller consists of a mainboard and 2 to 6 insertion modules.

The mainboard contains microprocessor control circuitry, keyboard, display and non-volatile memory for program, alibi, setup and calibration parameters.

The module in slot 1 contains power supply, RS232 communication and isolated remote display communication.

The module in slot 2 contains the analogue to digital load cell interface and an USB connection.

The module in slot 4 contains displacement transducer interface and I/O interface.

Slot 3, 5 and 6 may contain optional I/O interfaces.

The module is specified in Section 3.2.

The electronic measuring, processing and display unit designated ECI supplies the strain gauge load cells with excitation voltage and amplifies, digitizes, 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.

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

2.2.2 Software identification

The approved firmware version is 1.4.

3. Technical data

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

3.1 Continuous totalizer

Type:	ECI
Accuracy class:	0.5 or 1 or 2
Maximum capacity (Max):	≥ 1 kg
Minimum capacity (Min):	≥ 20 % of Max
Maximum flow rate (Q_{\max}):	1 t/h to 6000 t/h
Minimum flow rate (Q_{\min}):	≥ 20 % of Q_{\max}
Totalization scale interval (d_t):	≥ 1 kg
Scale interval for test:	$d_t / 10$
Belt velocity type:	fixed speed
Belt speed, v:	0.025 m/s to 3 m/s
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 ECI weighing controller has the following characteristics:

Type:	ECI
Accuracy class:	0.5
Fractional factor:	$p'i = 0.7$
Excitation voltage:	10 VDC
Minimum span range:	2.5 mV
Circuit for remote sense:	Remote sensing using 6-wires
Minimum load cell input impedance:	43 Ohm
Maximum load cell input impedance:	1100 Ohm
Maximum cable length to junction box:	420 m/mm ² in a 6-wire system
Maximum pulse frequency:	200 Hz
Minimum pulse frequency:	2 Hz
Operating temperature range:	-10 °C to +40 °C
Power requirements:	12 – 24 V DC
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:	420 m / mm ²
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 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 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 totalizer:

- 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.

3.7 Documents

The documents filed at DELTA (reference No. T209553) are valid for the weighing instruments described here.

4. Interfaces and peripheral equipment

4.1 Interfaces

The weighing controller may be equipped with one or more of the following interfaces located on the main board or on separate interface boards. The interfaces are protective interfaces within the meaning of 2004/22/EC annex I, sect. 8.1 and need not to be secured.

- RS-232C
- RS-485 / RS-422
- USB
- Modbus (optional)
- Profibus (optional)
- Ethernet IP (optional)
- Analogue Output (optional)
- Digital I/O (optional)

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 Compatibility of modules

Compatibility of modules for continuous totalizers - an Excel worksheet developed by DELTA based on the principles in EN 45501:2015 annex F 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 wire and seal.

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 CE mark of conformity grouped together with space for the metrological M and year of production 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 totalized load Σ_{\min}
- Scale interval for totalization d_t
- Belt speed v
- Temperature range: -10 °C to +40 °C (optional)
- Electromagnetic class: E2
- Humidity: Non-condensing
- Type examination certificate number

9. Pictures



Figure 1 ECI Belt Scale controller



Figure 2 ECI screen dump

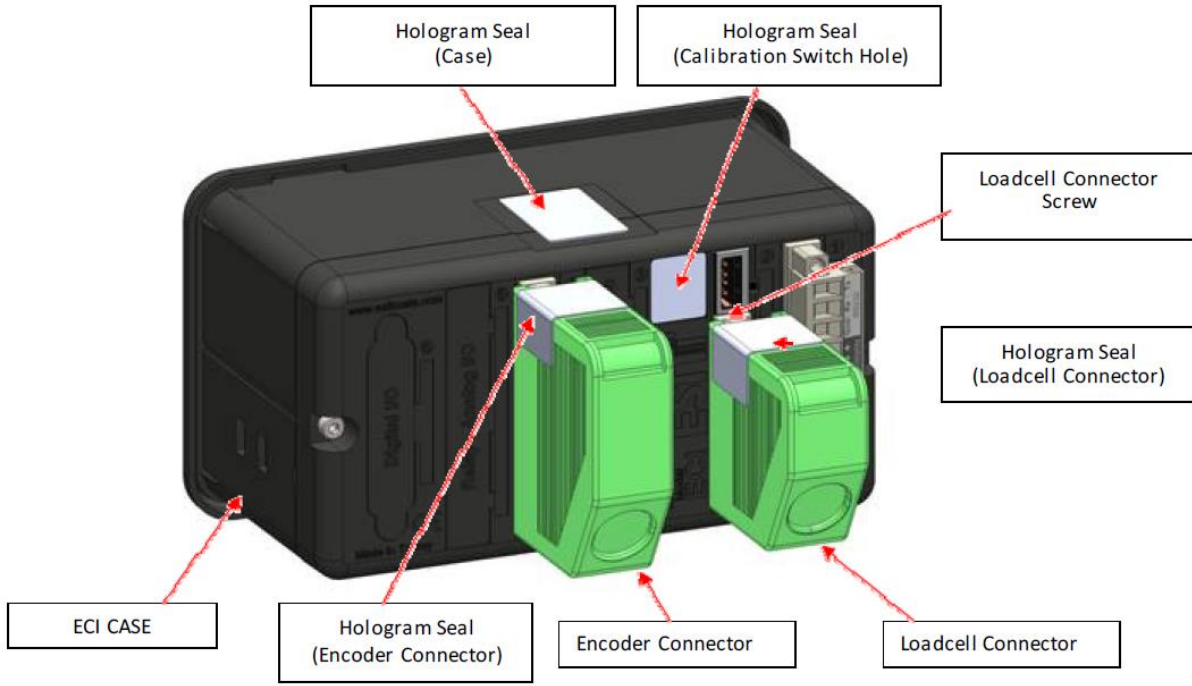


Figure 2 Sealing of ECI.

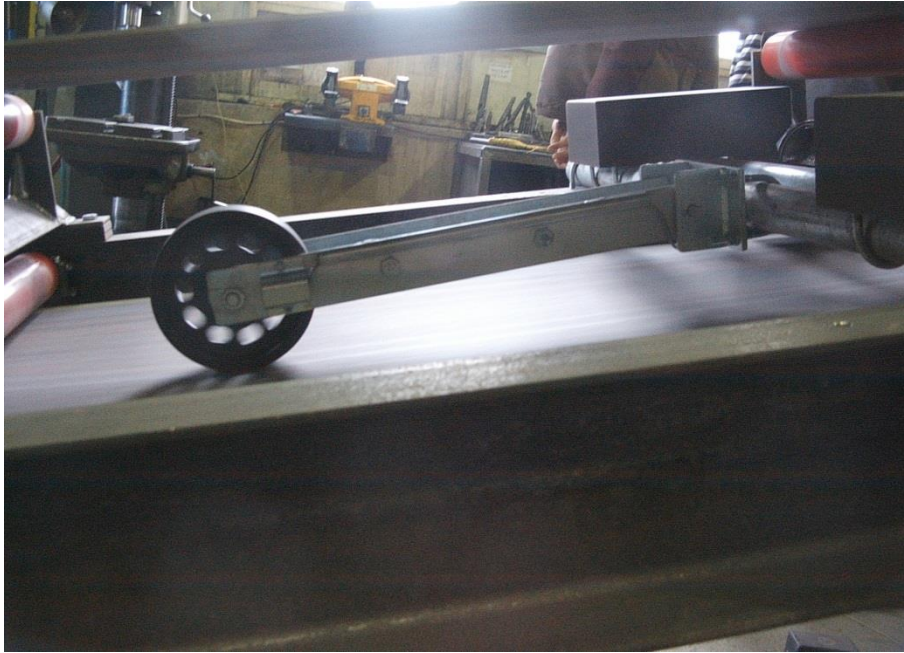


Figure 3 Trailing arm with wheel and inductive switch

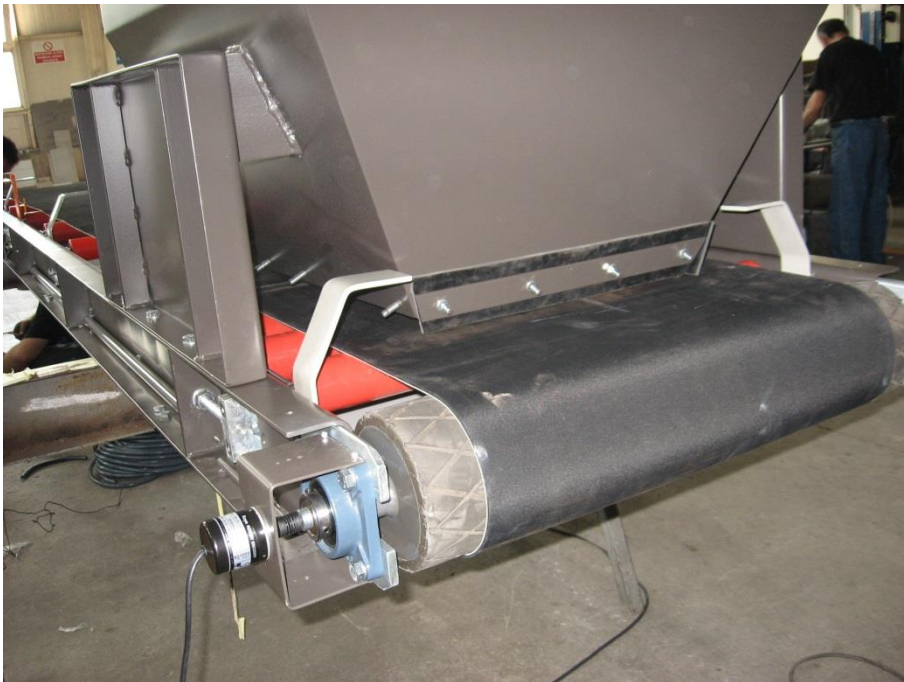


Figure 4 Rotary encoder mounted on tension roller

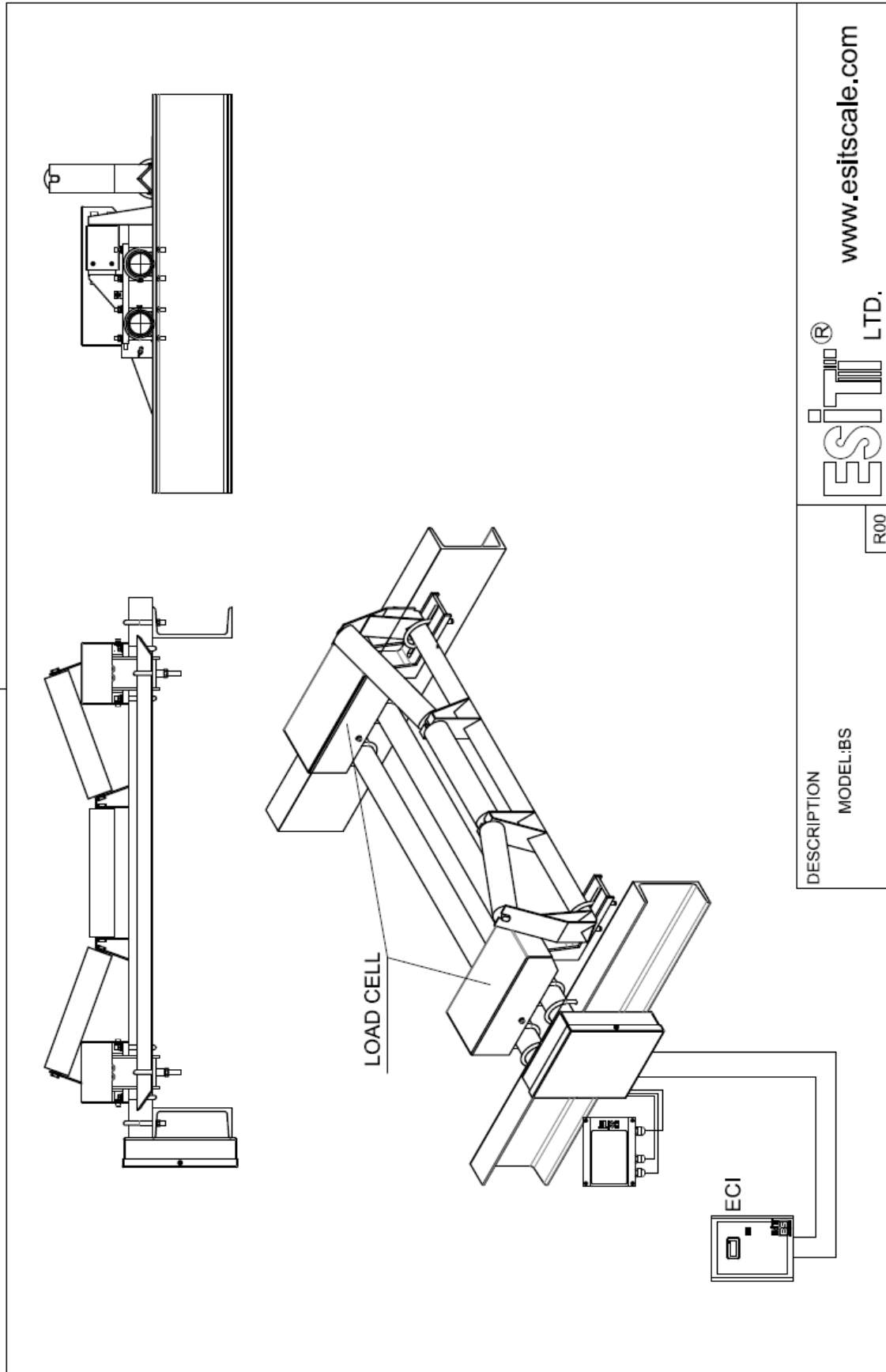


Figure 5 ECI-BS Weighing roller suspended in two load cells

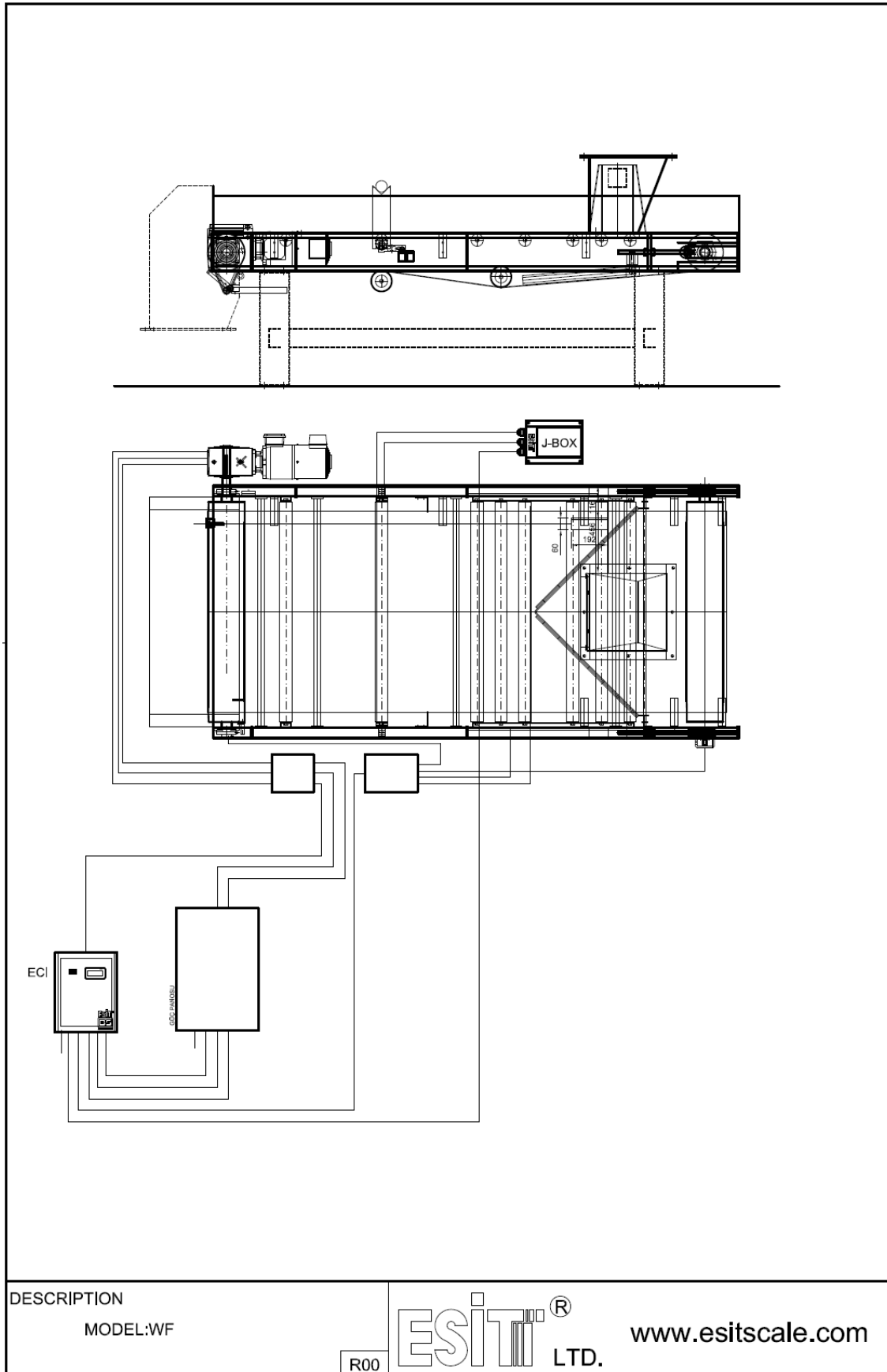


Figure 6 ECI-WF Weighing frame

SPECIAL STRETCHER MECHANISM (For belt over 60m)

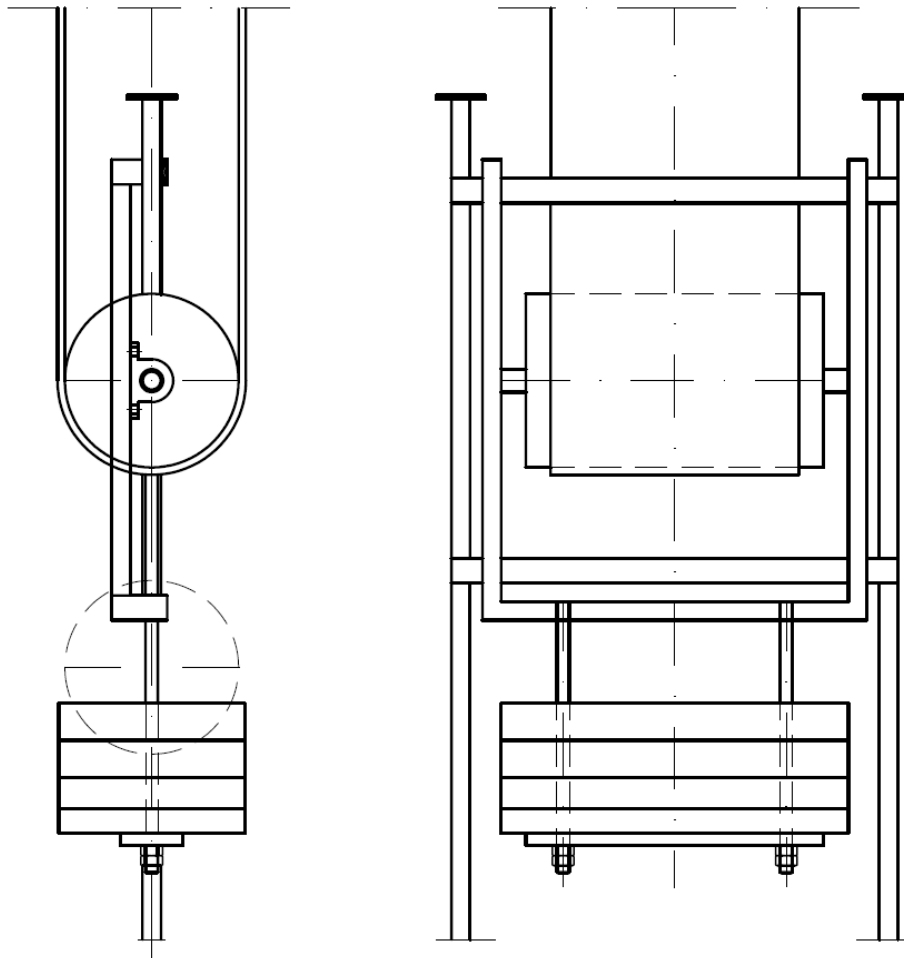


Figure 7 Arrangement for gravimetric tightening of the belt

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

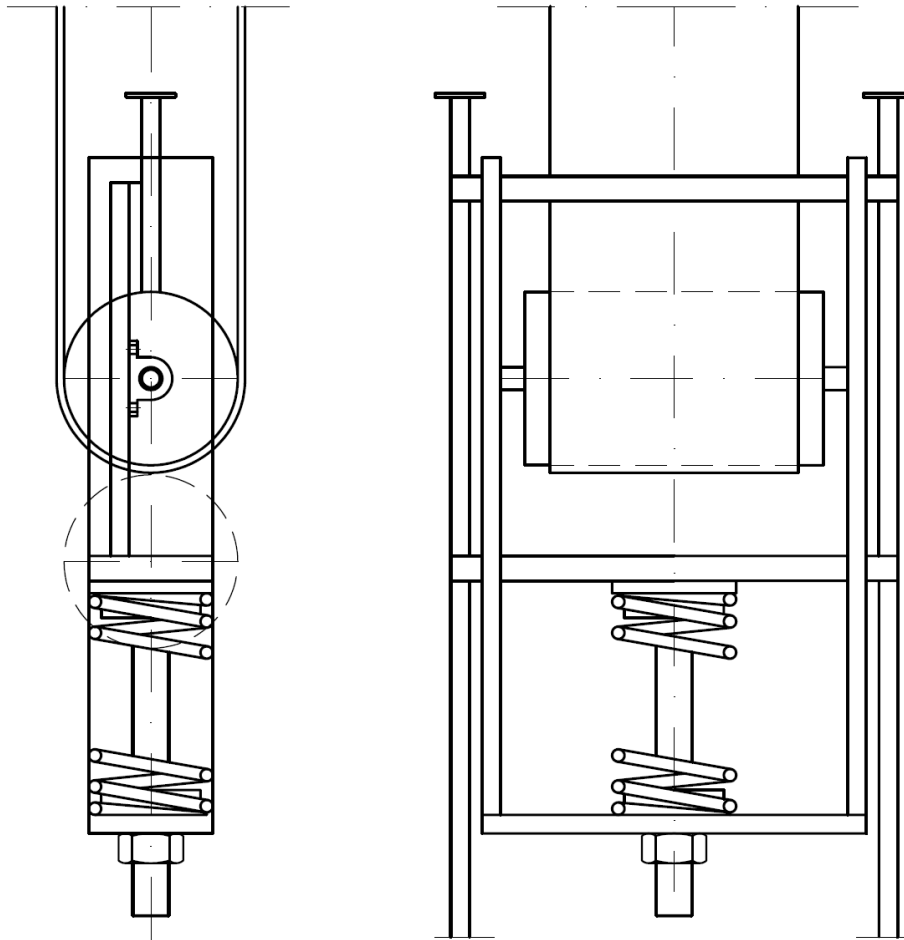


Figure 8 Spring arrangement for tightening of the belt

10. Composition of modules – an example

COMPOSITION OF MODULES

Based on: EN45501:2015 annex F.

Belt weigher.

EC Type-Examination Certificate No.: (In conformity with OIML R50, 1997:) **DK0199.580**

ELECTRONIC DEVICE (Module 1)	Type:	ECI
Accuracy class according to OIML R50:			0,5
Number of totalization scale intervals for Σ min:	n_1		800
Fraction of maximum permissible error (mpe):	p_1		0,7
Excitation voltage:	E_{ex}	[VDC]:	10
Minimum span range (for Q_{max}):	sp_{max}	[mV]:	2,5
Minimum span range for Q_{min} :	sp_{min}	[mV]:	0,5
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 / mm ²]:	420
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:	W_L	[mm]:	1000
Belt length:	B_L	[m]:	22
Maximum belt speed:	BV_{max}	[m/s]:	0,4
Minimum belt speed:	BV_{min}	[m/s]:	0,4
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	C
Accuracy class according to OIML R60:			C3
Maximum accuracy class certified:			3000
Maximum number of load cell intervals:	n_{LC}		0,7
Fraction of mpe:	p_3		2
Sensitivity:	S	[mV / V]:	350
Impedance:	R_{LC}	[Ω]:	0,0095
Minimum load cell verification interval:	v_{min}	[% of E_{max}]:	20
Rated capacity:	E_{max}	[kg]:	7,6
Minimum measuring range for Q_{min} :	$v_{min} * n$	[% of E_{max}]:	-10 / 40
Temperature range:	T_{min} / T_{max}	[°C]:	
Test report or Test Certificate as appropriate:			
COMPLETE BELT WEIGHER	Manufacturer:	ESIT	
	Type:	ECI BS-2	
	Serial no.:		0,5
Accuracy class according to OIML R50:			
Fractions: $p_i = p_1^2 + p_2^2 + p_3^2 = (R76 \text{ clause } 3.5.4.1)$			
Mass unit:		t / kg / g:	kg
Maximum capacity:	Max	[kg]:	26
Minimum capacity:	Min	[kg]:	5,2
Scale interval:	d	[kg]:	1
Maximum flowrate:	Q_{max}	[kg / h]:	37440
Minimum flowrate:	Q_{min}	[kg / h]:	7488
Number of totalization scale intervals for Σ min:	n		800
Required Totalization load:	Σ_{min}	[kg]:	800
Required v_{min} :	$rv = Max * R / \sqrt{N} / (3000 * \text{class})$	[kg]:	0,003
Utilisation of the load cells:	$\alpha = (Max * R) / [(E_{max} * N)]$		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]:	0,8
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	[mm ²]:	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
$p_i \leq 1$	$1 - p_i = 0$
$n \leq n_1$	$n_1 - n = 0$
$v_{min} \leq rv$	$rv - v_{min} = 0,0012$
$sp_{max} \leq E_{out}$	$E_{out} - sp_{max} = 10,50$
$R_{LCmin} \leq R_{LC} / N$	$R_{LC} / N - R_{LCmin} = 132$
$R_{LC} / N \leq R_{LCmax}$	$R_{LCmax} - R_{LC} / N = 925$
$L_a / A_a \leq (L/A)_{max}$	$(L/A)_{max} - L_a / A_a = 375$
$Q * (Max+DL) * R / N \leq E_{max}$	$E_{max} - Q * (Max+DL) * R / N = 0,50$

Signature and date:

COMPATIBILITY: SATISFIED