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EC Type-Approval Certificate

No. DK 0199.519

TLB4…

NON-AUTOMATIC WEIGHING INSTRUMENT

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

In accordance with the requirements for the non-automatic weighing instrument of EC Council Directive 2009/23/EC.

Issued to **Laumas Elettronica SRL.**
Via Primo Maggio 6
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ITALY

In respect of Non-automatic weighing instrument designated TLB4… with variants of modules of load receptors, load cells and peripheral equipment.
Accuracy class III and IIII
Maximum capacity, Max: From 0.3 kg up to 999 999 kg
Verification scale interval: e = Max / n
Maximum number of verification scale intervals: $n \leq 10000$ for single-interval and $n \leq 3 \times 10000$ for multi-interval (however, dependent on environment and the composition of the modules).
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 of the Directive is met by the application of the European Standard EN 45501:2015, OIML R76:2006 and WELMEC 2.1:2001.

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

The annex comprises 17 pages.

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Descriptive annex

Contents

1. Name and type of instrument and modules

The weighing instrument is designated TLB4. It is a system of modules consisting of an electronic indicator with 4 identical analogue input channels, connected to a separate load receptor and peripheral equipment such as printers or other devices, as appropriate. The instrument is a Class III or IIII, self-indicating weighing instrument with single-interval or multi-interval.

The name of the instrument may have the designation "JOLLY" put in front and may be followed by alphanumeric characters for technical, legal or commercial characterization of the instrument.

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.

The modules appear from Sections 3.1 and 3.2; 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

2.1.1 Indicator

The electronic indicator consists of a mainboard bearing the microcontroller, the ADC with 4 channels, a 6 digits 7-segment LED display, LED indicators for NET, zero, stable, weight unit (kg, g), 4 keys, connectors and all other components.
The mainboard's microcontroller and analog section are identical for all models.

The indicator has an enclosure made of ABS plastics intended for mounting in a DIN rail (see Figure 1).
The indicator has screw terminals for connection of power, load cell, and interface cables.

The indicator has 4 separate channels for connection of load cell(s).

All instrument calibration and metrological setup data are stored in the non-volatile memory.

The indicator is power supplied with 12 - 24 VDC.

2.1.2 Load receptors, load cells and load receptor supports

Set out in Section 3.3.

2.1.3 Interfaces and peripheral equipment

Set out in Section 4.

2.2 Functions

The weight indicating instruments are microcontroller based electronic weight indicators that require the external connection of strain gauge load cell(s) to one or more of the 4 load cell channels.
The weight information appears in the digital display located on the front panel and may be transmitted to peripheral equipment for recording, processing or display.

The primary functions provided are detailed below.

2.2.1 Display range

The weight indicators will display weight from –Max to Max (gross weight) within the limits of the display capacity.

2.2.2 Display test

A self-test routine is initiated at power up. The test routine turns on and off all of the display segments and indicators to verify that the display is fully functional.

2.2.3 Zero-setting

Pressing the "ZERO" key causes a new zero reference to be established and ZERO annunciator to turn on indicating the display is at the centre of zero.

Semi-automatic zero-setting range: 4 % of Max.
Automatic zero-tracking range: 4 % of Max.
Initial zero-setting range: 20 % of Max.

Zero-setting is only possible when the load receptor is not in motion.

2.2.4 Zero-tracking

The indicators are equipped with a zero-tracking feature, which operates over a range of 4 % of Max and only when the indicator is at zero (gross or net) and there is no motion in the weight display.

2.2.5 Tare

2.2.5.1 Semi-automatic tare

The instrument models are provided with a semi-automatic subtractive tare feature activated using the "TARE" key.

2.2.5.2 Preset tare

The indicators have a preset tare function for manually insertion of a tare value. The function can operate simultaneously with a semi-automatic tare, if the preset tare is activated first.
The value of the preset tare can be displayed temporarily upon operator's request.

2.2.6 Printing

A printer may be connected to the optional serial data port. The weight indicator will transmit the current to the printer when the "PRINT" key is pressed.

The printing will not take place if the load receptor is not stable, if the gross weight is less than zero, or if the weight exceeds Max.

2.2.7 Alibi memory (optional)

The indicators are equipped with an alibi memory; however, the alibi memory must be enabled in the configuration of the indicator in order to be used.
When enabled pressing the "Print" key will store the displayed weight in alibi memory, if it is a stable legal weight not already stored.

The Alibi memory can be read from an external unit connected via one of the serial interfaces.

The alibi memory is a circularly used buffer, but an alarm message is displayed each time the first record is overwritten.

2.2.8 Gravity compensation

The gravity adjustment parameters can be used to compensate the weight difference between the place in which the instrument is calibrated and the place of usage.

2.2.9 Extended resolution

The indicator can display the weight with extended resolution (d = 0.1e) for 5 seconds.

2.2.10 Event counter

The indicator has a non-resettable event counter, which increments each time the configuration is changed or the indicator is calibrated.

The value of the event counter can be viewed in the Info menu.

2.2.11 Operator information messages

The weight indicator has a number of general and diagnostic messages, which are described in detail in the user's guide.

2.2.12 Software version

The software version is displayed during the start-up of the indicator.
The version format is rx.yy.zz, where x is the legal version no., while yy and zz are major and minor version numbers for changes and corrections not influencing the legal function of the software.
The tested software version is r1.00.01.

3. Technical data

The TLB4 weighing instrument is composed of separate modules, which are set out as follows:

3.1 Indicator

The indicators have the following characteristics:

Type:	TLB4…
Accuracy class:	III or IIII
Weighing range:	Single-interval or multi-interval (≤ 3 intervals)
Maximum number of verification scale intervals (n):	10000 for Class III 1000 for Class IIII
Minimum input voltage per VSI:	0.25 µV
Maximum capacity of interval or range (Max_i):	$n_i \times e_i$
Verification scale interval, e_i = :	Max_i / n_i
Initial zero-setting range:	± 10 % of Max
Maximum tare effect:	100 % of Max
Fractional factor (pi):	0.5
Excitation voltage:	5 VDC
Number of load cell input channels:	4
Minimum input impedance per channel:	175 ohm, when all channels are in use
Minimum input impedance of all connected: load cells collectively for all channels:	21.9 ohm
Maximum input impedance per channel:	1100 ohm
Connecting cable to load cell(s):	6-wire
Supply voltage:	12 - 24 VDC (not to be supplied from DC Mains)
Operating temperature range:	-10 °C / +40 °C
Maximum cable length between TLB4 and junction box for load cells:	1926 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:	10 m/mm^2.

3.1.1.2 6-wire system

Line:	6 wires, screened

Option 1:

Maximum length:	1926 m/mm^2 (for n = 10,000)
Maximum resistance per wire:	32.6 ohm

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 = 0.0016 [%/25K]
Coefficient of resistance for the wires in the J-box cable: Sx = 0.0009 [%/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.

Reference: See Section 10.

The calculation program is obtainable by downloading at www.delta.dk/weighing.

3.2 Load receptors, load cells and load receptor supports

Removable platforms shall be equipped with level indicators.

3.2.1 General acceptance of modules

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 OIML Certificate of Conformity (R60) respectively 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.

3.2.2 Platforms, weigh bridge platforms

Construction in brief:	All-steel or steel-reinforced concrete construction, surface or pit mounted
Reduction ratio:	1
Junction box:	Mounted in or on the platform
Load cells:	Load cell according to Section 3.2.1
Drawings:	Various

3.2.3 Bin, tank, and hopper

Construction in brief:	Load cell assemblies each consisting of a load cell stand assembly to support one of the mounting feet bin, tank or hopper
Reduction ratio:	1
Junction box:	Mounted on dead structure
Load cell:	Load cell according to Section 3.2.1
Drawings:	Various

3.3 Composition of modules

In case of composition of modules, EN 45501:2015 annex F shall be satisfied.

3.4 Documents

The documents filed at DELTA (reference No. T207885) are valid for the weighing instruments described here.

4. Interfaces and peripheral equipment

4.1 Interfaces

4.1.1 Load cell input

The connectors for the four channels of load cell connection are located on the bottom and top of the enclosure.

4.1.2 Other interfaces

The indicator may be equipped with one or more of the following protective interfaces,

- RS485
- Digital input/output
- Analog output (optional)
- CANopen (optional)
- CC-Link (optional)
- DeviceNet (optional)
- EherCAT (optional)
- Ethernet TCP/IP (optional)
- Ethernet IP (optional)
- MODBUS/TCP (optional)
- PowerLink (optional)
- Profibus (optional)
- Profinet I/O (optional)
- SERCOS III (optional)

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

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 with a CE mark of conformity.

5. Approval conditions

5.1 Measurement functions other than non-automatic functions

Measurement functions that will enable the use of the instrument as an automatic weighing instrument are not covered by this type approval.

5.2 Scaling operation is not approved for NAWI

Display of a weight scaled by a coefficient (COEFF) is not allowed under this NAWI approval.

5.3 Compatibility of modules

In case of composition of modules EN 45501:2015 shall be satisfied.

A calculation program for composition of modules is obtainable by downloading at www.delta.dk/weighing.

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 Section 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 or alternative mark of the manufacturer according to ANNEX II, section 2.3 of the Directive 2009/23/EC.

7.1.1 Indicator

Access to the configuration and calibration facility requires either that a calibration jumper is installed on the underside of the main board, or that the operator types first a password and the key looked up on a special key card delivered by the manufacturer or via the Modbus interface.

The indicators have also a non-resettable event counter, which increment each time the configuration is changed.

Sealing of the cover of the indicator - to prevent access to the calibration jumper and to secure the electronics against dismantling/adjustment - is accomplished by a sticker across the enclosure assembly (see Figure 14).

7.1.2 Indicator - load cell connector - load receptor

Securing of the indicator, load receptor, and load cell combined is done the following way:

- Sealing of the load cell connector with the indicator using brittle stickers.

In special cases where the place of installation makes it impossible to use the above sealing:

- Inserting the serial number of the load receptor as part of the principal inscriptions contained on the indicator identification label.
- The load receptor bears the serial number of the indicator on its data plate.

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).

7.1.4 Peripheral interfaces

All peripheral interfaces are “protective”. Via the serial interface zero and span adjust can be performed, similar to what the operator can, but it will increment the event counter as evidence for the infringement of the sealing. Apart from this the interfaces neither allow manipulation with weighing data or legal setup, nor change of the performance of the weighing instrument in any way that would alter the legality of the weighing.

7.2 Verification marks

7.2.1 Indicator

A green M-sticker shall be placed next to the CE mark on the inscription plate.

The sticker with verification marks may be placed on or next to the inscription plate or on the front of the indicator.

7.2.2 Printers used for legal transactions

Printers covered by this type approval and other printers according to Section 4.2, which have been subject to the conformity assessment procedure, shall not bear a separate green M-sticker in order to be used for legal transactions.

8. Location of CE mark of conformity and inscriptions

8.1 Indicator

8.1.1 CE mark

A sticker with the CE mark of conformity and year of production is located on the identification plate which is located on the enclosure of the weight indicator.

8.1.2 Inscriptions

Manufacturer’s trademark and/or name and the type designation is located on the front panel overlay.

Indelibly printed on a brittle plastic sticker located on a visible place near the front panel:

- Max, Min, e =

On the inscription plate:

- Manufacturer’s name and/or logo, model no., serial no., type-approval certificate no., accuracy class, value of event counter, electrical data and other inscriptions.

In special cases as provided in Section 7.1.2:

- Serial no. of the load receptor

8.1.2.1 Load receptors

On a data plate:

- Manufacturer's name, type, serial number, capacity

In special cases as provided in Section 7.1.2:

- Serial no. of the indicator

9. Pictures

Figure 1 TLB4 indicator

Figure 2 TLB4 indicator – sub model TLB4 CANopen

Figure 3 TLB4 indicator – sub model TLB4 CC-Link.

Figure 4 TLB4 indicator – sub model TLB4 DeviceNet.

Figure 5 TLB4 indicator – sub model TLB4 EtherCAT.

Figure 6 TLB4 indicator – sub model TLB4 EthernetTCP/IP

Figure 7 TLB4 indicator – sub model TLB4 EtherNet/IP

Figure 8 TLB4 indicator – sub model TLB4 MODBUS/TCP

Figure 9 TLB4 indicator – sub model TLB4 POWERLINK

Figure 10 TLB4 indicator – sub model TLB4 PROFIBUS

Figure 11 TLB4 indicator – sub model TLB4 PROFINET IO

Figure 12 TLB4 indicator – sub model TLB4 RS485

Figure 13 TLB4 indicator – sub model TLB4SERCOS III

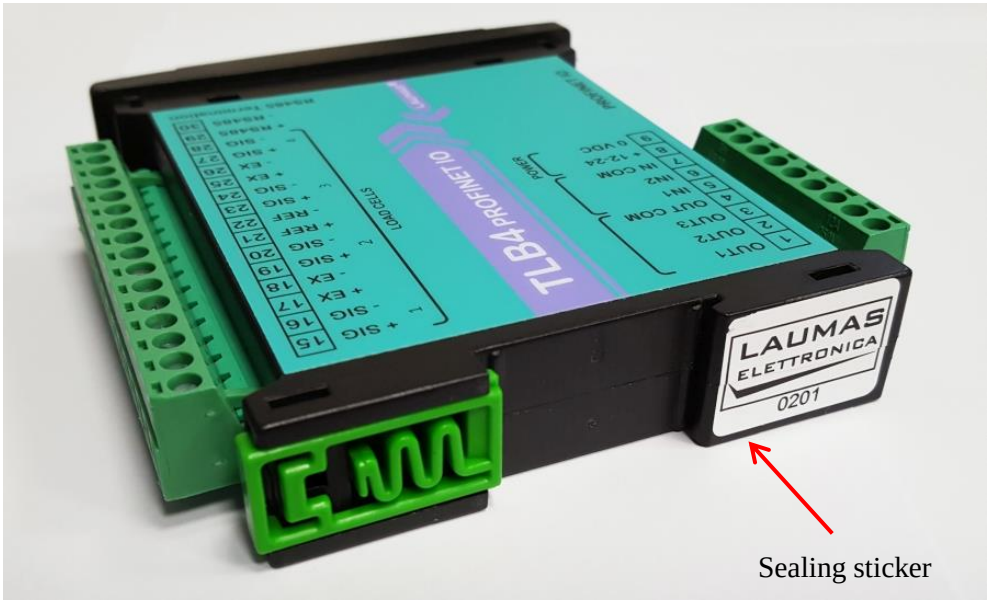

Figure 14 Sealing of TLB4 indicator.

10. Composition of modules – an example

COMPATIBILITY OF MODULES

Ref.: OIML R76-1:2006

Non-Automatic Weighing Instrument, single-interva

Certificate of EU Type-Approval N°: TAC: DK0199.519

INDICATOR A/D (Module 1)	Type:		TLB4		
Accuracy class according to EN 45501 and OIML R76:		$Class_{ind}$ (I, II, III or IIII)		III	
Maximum number of verification scale intervals (n_{max}):		n_{ind}		10000	
Fraction of maximum permissible error (mpe):		p_1		0,5	
Load cell excitation voltage:		U_{exc}	[Vdc]	5	
Minimum input-voltage per verification scale interval:		Δu_{min}	[µV]	0,2	
Minimum load cell impedance:		R_{Lmin}	[Ω]	175	
Maximum load cell impedance:		R_{Lmax}	[Ω]	1100	
Number of A/D-channels used:		K		4	
Coefficient of temperature of the span error:		Es	[% / 25°C]		
Coefficient of resistance for the wires in the J-box cable:		Sx	[% / Ω]		
Specific J-box cable-Length to the junction box for load cells:		$(L/A)_{max}$	[m / mm²]	1926	
Load cell interface:				6-wire (remote sense)	
Additive tare, if available:		T^+	[% of Max]	0	
Initial zero setting range:		IZSR	[% of Max]	-10 / 10	
Temperature range:		T_{min} / T_{max}	[°C]	-10 / 40	
Test report (TR), Test Certificate (TC) or OIML Certificate of Conformity:					
LOAD RECEPTOR (Module 2)	Type:				
Construction:				Platform	
Fraction of mpe:		p_2		0,5	
Number of load cells:		N		4	
Number of load cells per A/D-channel:		N_{ch}		1	
Reduction ratio of the load transmitting device:		$R=F_M / F_L$		1	
Dead load of load receptor:		DL	[% of Max]	20	
Non uniform distribution of the load:		NUD	[% of Max]	50	
Correction factor:	$Q = 1 + (DL + T^+ + IZSR^+ + NUD) / 100$			1,8	
LOAD CELL ANALOG (Module 3)	Type:		COK		
Accuracy class according to OIML R60:		$Class_{LC}$ (A, B, C or D)		C	
Maximum number of load cell intervals:		n_{LC}		3000	
Fraction of mpe:		p_3		0,7	
Rated output (sensitivity):		C	[mV / V]	2	
Input resistance of single load cell:		R_{LC}	[Ω]	700	
Minimum load cell verification interval:	($v_{min\%}$ = 100 / Y)	$v_{min\%}$	[% of Emax]	0,01	
Rated capacity:		E_{max}	[kg]	10000	
Minimum dead load, relative:		$(E_{min} / E_{max}) * 100$	[%]	0	
Temperature range:		T_{min} / T_{max}	[°C]	-10 / 40	
Test report (TR) or Test Certificate (TC/OIML) as appropriate:			TC7170		
COMPLETE WEIGHING INSTRUMENT			Single-interval		
Manufacturer: Laumas Elettronica	Type:		TLB4 platform scale		
Accuracy class according to EN 45501 and OIML R76:		$Class_{WI}$ (I, II, III or IIII)		III	
Fractions: $p_i = p_1^2 + p_2^2 + p_3^2$:		p_i		1,0	
Maximum capacity:		Max	[kg]	6000	
Number of verification scale intervals:		n		3000	
Verification scale interval:		e	[kg]	2	
Utilisation ratio of the load cell:	$\alpha = (Max / E_{max}) * (R / N)$			0,15	
Input voltage (from the load cells):	$\Delta_u = C * U_{exc} * \alpha * 1000 / n$		[µV/e]	0,50	
Cross-section of each wire in the J-box cable:		A	[mm²]	0,5	
J-box cable-Length:		L	[m]	100	
Temperature range to be marked on the instrument:	Not required	T_{min} / T_{max}	[°C]		
Peripheral Equipment subject to legal control:					

Acceptance criteria for compatibility				Passed, provided no result below is < 0	
$Class_{WI}$	<=	$Class_{ind}$ & $Class_{LC}$	(R76: F.4 (1))	$Class_{WI}$:	PASSED
pi	<=	1	(R76: 3.10.2.1)	1 - pi =	0,0
n	<=	n_{max} for the class	(R76: 3.2)	n_{max} for the class - n =	7000
n	<=	n_{ind}	(R76: F.4 (4))	n_{ind} - n =	7000
n	<=	n_{LC}	(R76: F.2.6)	n_{LC} - n =	0
E_{min}	<=	DL * R / N	(R76: F.2.5)	(DL * R / N) - E_{min} =	300
$v_{min} * \sqrt{N} / R$	<=	e	(R76: F.2.7)	e - (v_{min} * √N / R) =	0,000
or (if v_{min} is not given)				Alternative solutions: ↑ ↓	
$(E_{max} / n_{LC}) * (\sqrt{N} / R)$	<=	e	(R76: F.4 (7))	e - ((E_{max}/ n_{LC}) * (√N / R)) =	
Δu_{min}	<=	Δu	(R76: F.4 (8))	Δu – Δu_{min} =	0,30
R_{Lmin}	<=	R_{LC} / N	(R76: F.4 (9))	(R_{LC} / N_{ch}) - R_{Lmin} =	525
R_{lmax}	>=	R_{LC} / N	(R76: F.4 (9))	R_{Lmax} - (R_{LC} / N_{ch}) =	400
L / A	<=	$(L / A)_{max}^{WI}$	(R76: F.4 (10))	$(L / A)_{max}^{WI}$ - (L / A) =	1726
T_{range}	<=	$T_{max} - T_{min}$	(R76: 3.9.2.2)	(T_{max} - T_{min}) - T_{range} =	20
Q * Max * R / N	<=	E_{max}	(R76: F.2.4)	E_{max} - (Q * Max * R / N) =	7300,0

Signature and date:

Conclusion . . . . . ***PASSED***

This is an authentic document made from the program:
"Compatibility of NAWI-modules version 4.0".