DANAK
PROD Reg. nr 7026

FORCE Certification

EU Type Examination Certificate

No. 0200-NAWI-08892

TW20 / NS20 / EW20

NON-AUTOMATIC WEIGHING INSTRUMENT

Issued by **FORCE Certification**
EU - Notified Body No. 0200

In accordance with the requirements in Directive 2014/31/EU of the European Parliament and Council.

Issued to **Tscale Electronics Mfg. (Kunshan) Co., Ltd.**
No. 99 Jingwei Road,
Zhoushi, Kunshan, Jiangsu
CHINA

In respect of Non-automatic weighing instrument designated TW20 / NS20 / EW20 with variants of modules of load receptors, load cells and peripheral equipment.
Accuracy class III and IIII
Maximum capacity, Max: From 1 kg up to 750 000 kg
Verification scale interval: e = Max / n
Maximum number of verification scale intervals: $n \leq 7500$ for single-interval and $n \leq 2 \times 7500$ for multi-range and 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.

Issued on **2020-09-21**
Valid until **2030-09-21**

Jens Hovgård Jensen
2020-09-21

Digitally signed by Jens Hovgård Jensen
jhje@force.dk
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FORCE Certification references:
Task no.: 120-22986.90.10 and ID no.: 0200-NAWI-08892

Signatory: J. Hovgård Jensen

Descriptive annex

Contents

1. Name and type of instrument and modules

The weighing instrument is designated TW20 / NS20 / EW20. It is a system of modules consisting of an electronic indicator 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, multi-range or multi-interval, an external AC mains adapter and an internal rechargeable battery (optional).

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, 3.2.1, and 3.2.2; 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 indicator is specified in Section 3.1.

Enclosures and keyboard

The indicators are housed in an enclosure made of either ABS plastic (model TW20 / EW20) or stainless steel (model NS20).

The front panels of the indicator comprise:

- A 4.3” graphic display
- A keyboard containing 33 or 36 keys including keys for turning the indicator on/off, zero-setting and taring. Each key is identified with a name and/or pictograph.

Electronics

The instruments use a single printed circuit board, which contains all the instrument circuitry. The metrological circuitry for the models of weight indicators is identical. In addition to this there are a number of small PCB’s for different interfaces and one with the calibration switch so the small switch is accessible from outside.

All instrument calibration and metrological setup data are contained in non-volatile memory. The power supply accepts an input voltage of 12 VDC from the external power adapter with input from 100-240 VAC 50 Hz and with an optional internal Li battery of 7.4V. The indicator produces a load cell excitation voltage of 5 VDC.

2.1.2 Load receptors, load cells, and load receptor supports

Set out in Section 3.2.

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). 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 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: ±2% of Max.
Automatic zero-tracking range: ±2% of Max.
Initial zero-setting range: ±10% of Max.

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

2.2.3 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 gross zero and there is no motion in the weight display.

2.2.4 Tare

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

When the tare function is active both the Tare, Net and Gross value is shown in the graphic display.

2.2.5 Preset Tare

The instrument has the possibility for a preset Tare. The preset Tare value can either be entered with some short keys or associated to the PLU value.

2.2.6 PLU

The instrument can store up to 999 unit values that holds information of product name, unit weight hi/low limit. These are accessed using the direct keys or the PLU key and the numeric keyboard.

Access to editing them can be obtained using the menu key and selecting products.

2.2.7 Counting

The instruments have a counting function. The number of samples on the load receptor can be keyed in using the "SAMPLES" key, or the unit weight of one piece can be keyed in using the "U.W." key.

The count shown in counting mode and the unit weight, however, are not to be regarded as approved weighing results.

2.2.8 Percentage Weighing

The instrument can perform percentage weighing in relation to a known sample.

2.2.9 Printing

The EW20 models has a build-in printer, On the other models can a printer be connected to the optional serial data port. The weight indicator will transmit the current weight 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.

2.2.10 Check weighing

The instruments can be set to check the actual weight against a high and/or a low limit set by the user.

2.2.11 Display test

A self-test routine is initiated by pressing the on/off key to turn the instrument off, then pressing it again to turn the instrument on. The test routine turns on and off all of the display segments and light indicators to verify that the display is fully functional.

2.2.12 Real time clock

If it is available in the instrument, the real time clock can be activated to get printout with day and time information.

2.2.13 Operator information messages

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

2.2.14 Software version

The software is separated in weighing software, application software and screen keyboard software.

The software version of the different softwares are shown under system settings in the menu.

The approved software versions are,
weighing software *): V1.10
application software *): A1.xx.yy(z)
screen keyboard: K1.xx
*) part of legal relevant software.
Where xx and yy can be 00 to 99, while z can be not present or a to z.

2.2.15 Totalisation

The indicator can be configured with a totalisation function, adding actual weight display values to the memory when pressing "M+" key if the equilibrium is stable.
The total accumulated weight is shown constantly in the graphic display.

2.2.16 Battery operation

The indicator can be operated from an internal rechargeable battery, if this option is installed.

2.2.17 Gravity compensation

The gravity adjustment parameter can be used to compensate the weight difference between the place in which the instrument is calibrated and the place of usage. The parameter is before the verification set to the gravity for the place of verification, and after the verification it is set to the gravity for the place of usage. After entering the new value, the calibration is automatically adjusted for the place of usage. This adjustment is sealed.

3. Technical data

The TW20 / NS20 / EW20 weighing instruments are composed of separate modules, which are set out as follows:

3.1 Indicator

The indicators have the following characteristics:

Type:	TW20 / NS20 / EW20
Accuracy class:	III and IIII
Weighing range:	Single-interval, multi-range (2 ranges) or multi-interval (2 partial intervals)
Maximum capacity (Max):	≤ 750 000 kg
Maximum number of Verification Scale Intervals:	≤ 7500 for single-interval ≤ 2x7500 for multi-range and multi-interval
Maximum tare effect:	-Max within display limits
Fractional factor:	p'i = 0.5
Minimum input voltage per VSI:	≥0.5 µV
Excitation voltage:	5 VDC
Circuit for remote sense:	present on the model with 7-terminal connector
Minimum input impedance:	43 ohm
Maximum input impedance:	1600 ohm
Mains power supply:	12 VDC, or 100-240 VAC, 50/60 Hz using external adapter Internal rechargeable battery (optional)
Operational temperature:	-10 °C to +40 °C
Peripheral interface:	Set out in Section 4

3.1.1 Connecting cable between the indicator and load cell / junction box for load cell(s)

3.1.1.1 4-wire system

Cable between indicator and load cell(s):	4 wires (no sense), 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

Only to be used for indicator model with a 7-terminal connector for load cell.

Cable between indicator and junction box:	6 wires, shielded
Maximum length:	461 m / mm²

3.2 Load receptors, load cells and load receptor supports

Movable platforms shall be equipped with level indicators.

3.2.1 General acceptance of modules

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

1) There is a respective Part / Evaluation / Test Certificate (EN 45501:2015) or an OIML Certificate of Conformity (R60:2000 or R60:2017) issued for the load cell by a Notified Body responsible for type examination under Directive 2014/31/EU

2) The certificate contains the load cell types and the necessary load cell data required for the manufacturer's declaration of compatibility of modules ((EN 45501:2015 annex F), 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 EN 545501 document, or the like, at the time of EU verification or declaration of EU 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, hopper and non-standard systems

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 Annex F shall be satisfied.

3.4 Documents

The documents filed at FORCE (reference No. 120-29986) are valid for the weighing instruments described here.

4. Interfaces and peripheral equipment

4.1 Interfaces

The interfaces are characterised “Protective interfaces” according to paragraph 8.4 in the Directive.

4.1.1 Load cell input

1 or 2 5-terminal connector or 7-terminal connector for the load cell is positioned on the back of the enclosure or cables with these connectors are coming out of cable glands.

4.1.2 Other interfaces

The indicator may be equipped with one or more of the following protective interfaces located on the main board or on separate interface boards.

- RS-232C
- RS-485 (Optional)
- Ethernet
- USB
- Analog output (optional)
- Bluetooth
- WiFi (optional)
- Digital output for check-weighing signal

The interface does 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 Counting operation is not approved for NAWI

The count shown as result of the counting function is not covered by this NAWI approval.

5.3 Totalised weight is not a legal value.

When using the totalisation function creating a sum of several weighing results, this sum is only informative, as it is not a legal value.

5.4 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 5.4.

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 or 4 of the Directive 2014/31/EU.

7.1.1 Indicator

Access to the configuration and calibration facility requires that a calibration switch is pressed, before the menu can be entered.
On some models can the calibration switch be accessed through a hole in the enclosure,.

On models with a hole for access to the calibration switch this hole shall be sealed by means of a brittle plastic sticker or a screw secured with wire and seal.

Sealing of the cover of the enclosure - to prevent access to the calibration switch and to secure the electronics against dismantling/adjustment - is accomplished with either by a brittle plastic sticker placed so access to one of the screws of the enclosure is prohibited, or by sealing of the enclose with wire and seal.

7.1.2 Indicator - load cell connector - load receptor

Securing of the indicator, load receptor, and load cell combined is done in one of the following ways:

- Sealing of the load cell connector with the indicator by a wire seal

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 Peripheral interfaces

All peripheral interfaces are “protective”; they 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.

8. Location of CE mark of conformity and inscriptions

8.1 Indicator

8.1.1 CE mark

CE mark and supplementary metrological marking shall be applied to the indicator according to article 16 of Directive 2014/31/EU.

8.1.2 Inscriptions

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

Either In the top line of the display or indelibly printed on a brittle plastic sticker located on the front panel overlay:

- Max, Min, e =

On the inscription plate:

- Manufacturer's name and/or logo
- Manufacturers postal address
- Model no./Type designation
- Serial no.
- Type examination certificate no.
- Max, Min. e=
- Accuracy class
- Temperature range
- Electrical data and other inscriptions.

8.1.2.1 Load receptors

On a data plate:

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

Left to the manufacturer choice as provided in Section 7.1.2:

- Serial no. of the indicator

9. Pictures

Figure 1 TW20 indicator.

Figure 2 EW20 indicator.

Figure 3 NS20 indicator.

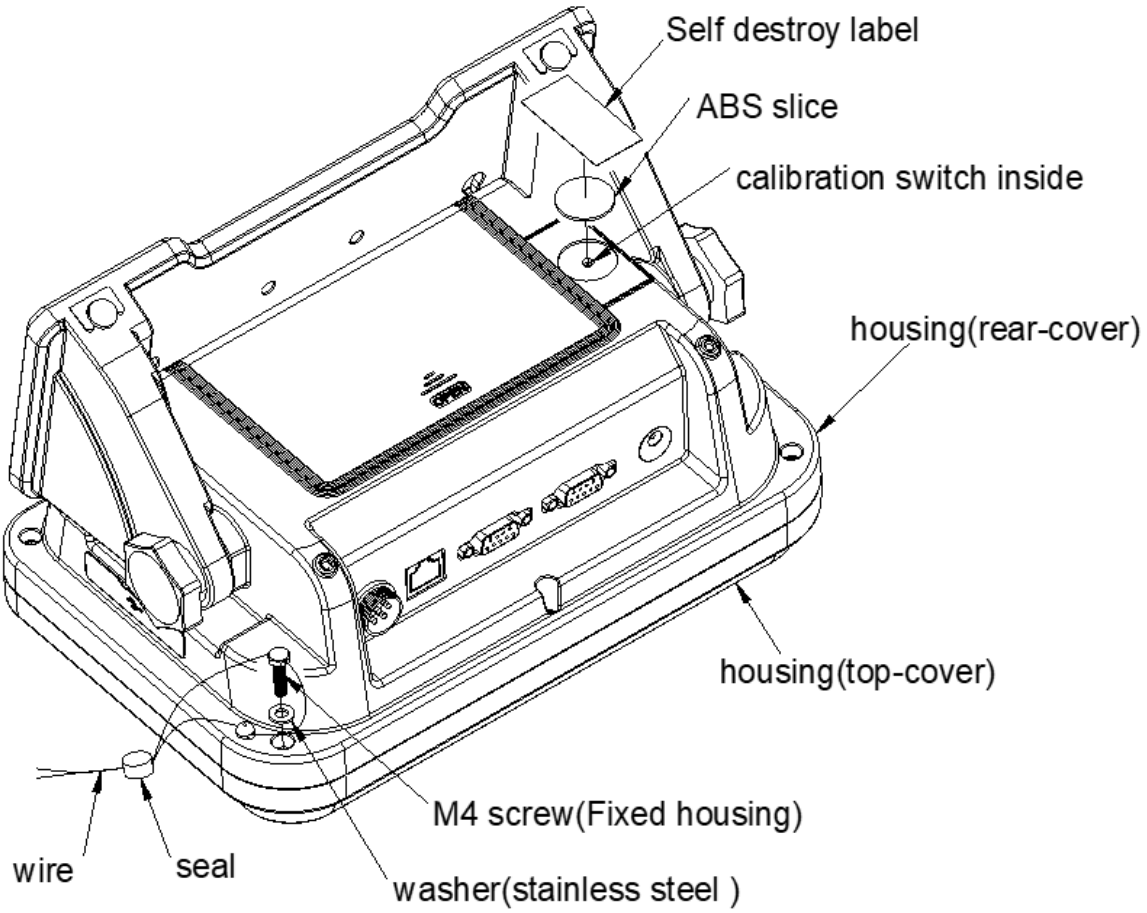

Figure 4 Sealing of TW20.

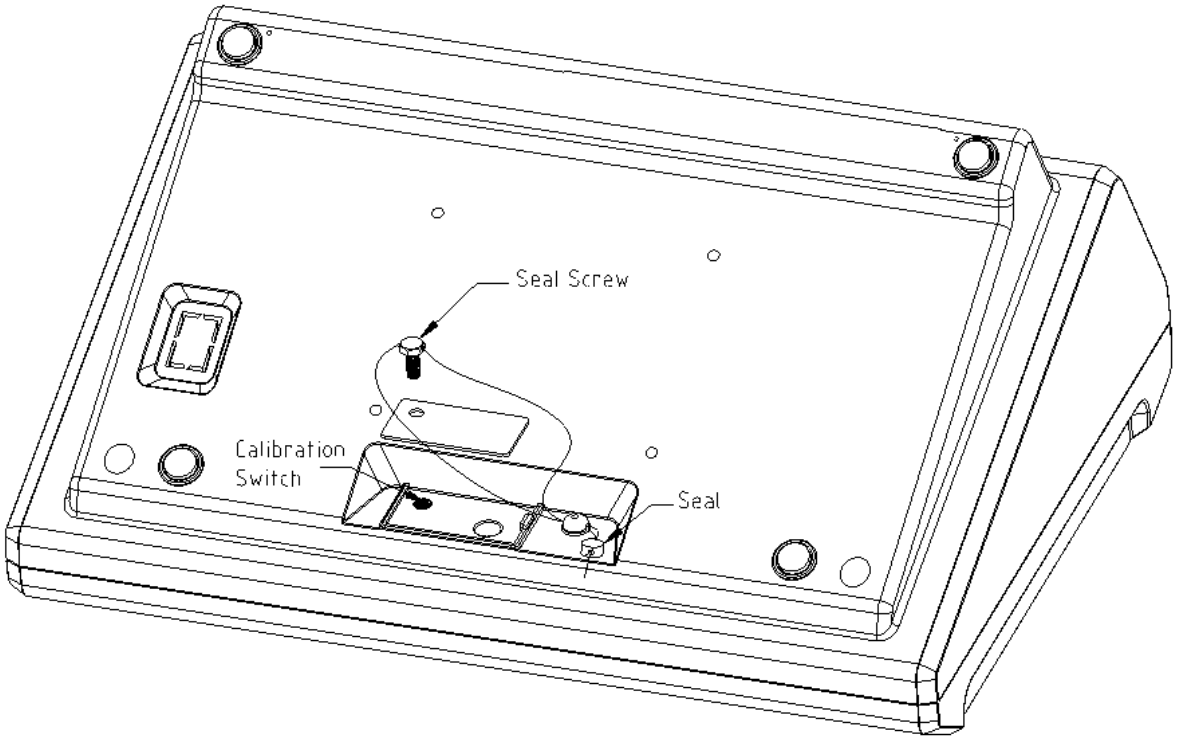

Figure 5 Sealing of EW20.

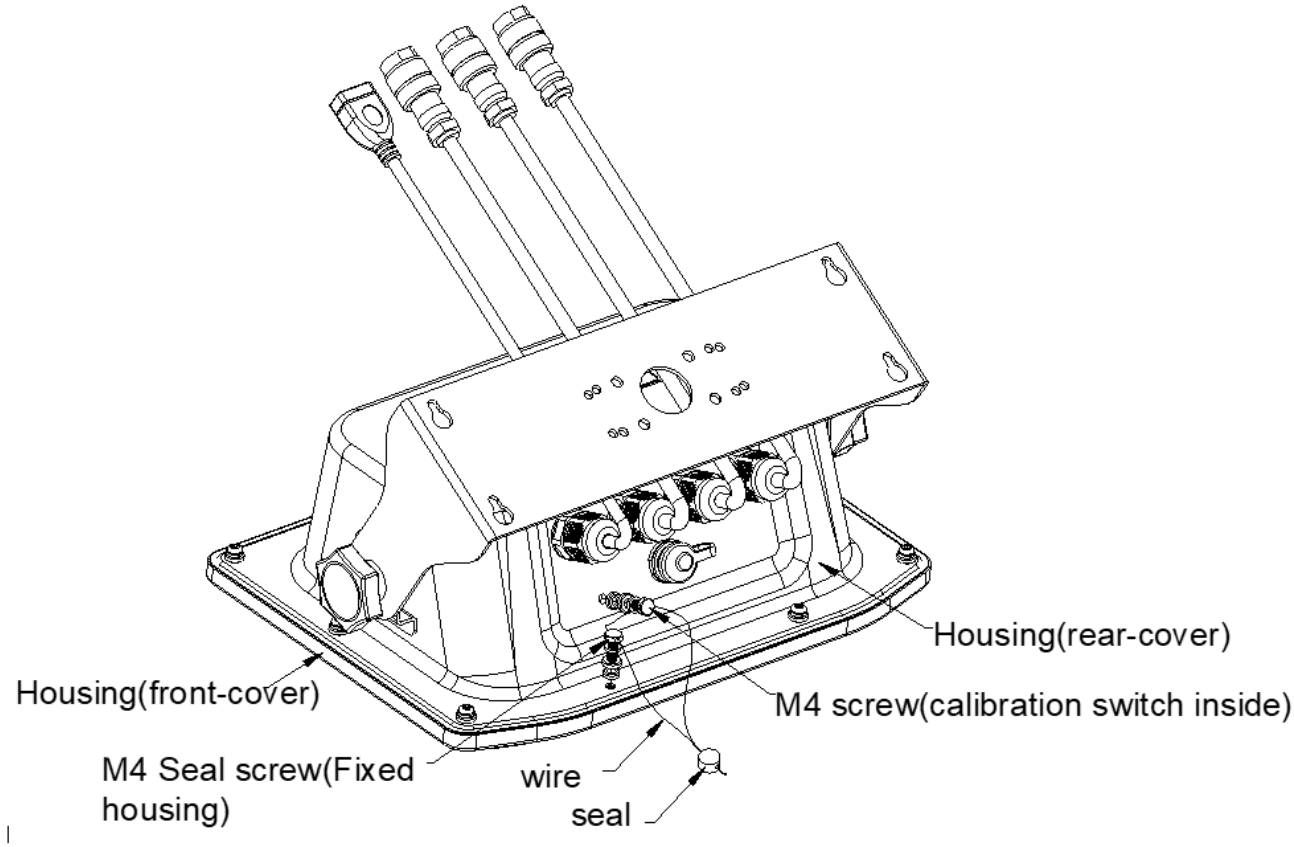

Figure 6 Sealing of NS20.

10. Composition of modules – an example

COMPATIBILITY OF MODULES

Ref.: WELMEC 2

Non-Automatic Weighing Instrument, single-interval.

Certificate of EU Type Examination N°: TEC: 0200-NAWI-08892

INDICATOR	A/D (Module 1)	Type:	TW20			
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}		7500		
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]	0,5		
Minimum load cell impedance:		R_{Lmin}	[Ω]	43		
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]	461		
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		
Reduction ratio of the load transmitting device:		$R=F_M / F_L$		1		
Dead load of load receptor:		DL	[% of Max]	10		
Non uniform distribution of the load:		NUD	[% of Max]	20		
Correction factor:	$Q = 1 + (DL + T^+ + IZSR^+ + NUD) / 100$			1,4		
LOAD CELL	ANALOG (Module 3)	Type:	L6E			
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]	406		
Minimum load cell verification interval:	$(v_{min\%} = 100 / Y)$	$v_{min\%}$	[% of Emax]	0,02		
Rated capacity:		E_{max}	[kg]	150		
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:			D09-03.21 rev.1			
COMPLETE WEIGHING INSTRUMENT			**Single-interval**			
Manufacturer: Tscale Electronics		Type:	BW platform scale			
Accuracy class according to EN 45501 and OIML R76:		$Class_{WI}$	(I, II, III or IIII)	III		
Fractions: $p_i = p1^2 + p2^2 + p3^2$:		p_i		1,0		
Maximum capacity:		Max	[kg]	300		
Number of verification scale intervals:		n		3000		
Verification scale interval:		e	[kg]	0,1		
Utilisation ratio of the load cell:	$\alpha = (Max / E_{max}) * (R / N)$			0,50		
Input voltage (from the load cells):	$\Delta u = C * U_{exc} * \alpha * 1000 / n$		[µV/e]	1,67		
Cross-section of each wire in the J-box cable:		A	[mm²]	0,22		
J-box cable-Length:		L	[m]	10		
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	
$Class_{WI}$	<=	$Class_{ind}$ & $Class_{LC}$	(WELMEC 2: 1)	$Class_{WI}$:	PASSED
pi	<=	1	(R76: 3.5.4.1)	1 - pi =	0,0
n	<=	n_{max} for the class	(R76: 3.2)	n_{max} for the class - n =	7000
n	<=	n_{ind}	(WELMEC 2: 4)	n_{ind} - n =	4500
n	<=	n_{LC}	(R76: 4.12.2)	n_{LC} - n =	0
E_{min}	<=	DL * R / N	(WELMEC 2: 6d)	(DL * R / N) - E_{min} =	7,5
$v_{min} * \sqrt{N} / R$	<=	e	(R76: 4.12.3)	e - (v_{min} * √N / R) =	0,040
or (if v_{min} is not given)				Alternative solutions: ↑ ↓	
$(E_{max} / n_{LC}) * (\sqrt{N} / R)$	<=	e	(WELMEC 2: 7)	e - ((E_{max} / n_{LC}) * (√N/ R)) =	
Δu_{min}	<=	Δu	(WELMEC 2: 8)	Δu – Δu_{min} =	1,17
R_{Lmin}	<=	R_{LC} / N	(WELMEC 2: 9)	(R_{LC} / N) - R_{Lmin} =	59
L / A	<=	$(L / A)_{max}^{WI}$	(WELMEC 2: 10)	$(L / A)_{max}^{WI}$ - (L / A) =	416
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: 4.12.1)	E_{max} - (Q * Max * R / N) =	45,0

Signature and date:

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

This is an authentic document made from the program: "Compatibility of NAWI-modules version 3.2".