DANAK
PROD Reg. nr 7026

FORCE Certification

EU Type Examination Certificate

No. 0200-NAWI-11248

WTB…

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 **Bosche GmbH & Co. KG**
Reselager Rieden 3
49401 Damme
Germany

In respect of Non-automatic weighing instrument designated WTB… 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 ≤ 10000 for single-interval and n ≤ 3 × 10000 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 OIML R76:2006 and EN 45501:2015.

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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Valid until **2031-08-06**

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FORCE Certification references:
Task no.: 121-30099.90.10 and ID no.: 0200-NAWI-11248-1

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Descriptive annex

Contents

		Page
1.	**Name and type of instrument and modules**	**2**
2.	**Description of the construction and function**	**2**
2.1	Construction	2
2.2	Functions	2
3.	**Technical data**	**4**
3.1	Indicator	4
3.2	Indicator - EEx version	6
3.3	Load receptors, load cells and load receptor supports	7
3.4	Composition of modules	7
3.5	Documents	7
4.	**Interfaces and peripheral equipment**	**8**
4.1	Interfaces	8
4.2	Peripheral equipment	8
5.	**Approval conditions**	**8**
5.1	Measurement functions other than non-automatic functions	8
5.2	Counting operation is not approved for NAWI	8
5.3	Compatibility of modules	8
6.	**Special conditions for verification**	**8**
6.1	Composition of modules	8
7.	**Securing and location of seals and verification marks**	**9**
7.1	Securing and sealing	9
8.	**Location of CE mark of conformity and inscriptions**	**10**
8.1	Indicator	10
9.	**Pictures**	**11**
10.	**Composition of modules - example**	**16**

1. Name and type of instrument and modules

The weighing instrument is designated WTB. 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.

The name of the instrument may be followed by alphanumeric characters for technical, legally 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 the sections 3.1, 3.2 and 3.3; 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

2.1.1 Indicator

The electronic indicator consists of two electronic boards: a main board bearing the microcontroller, the ADC and all other components and a display board. The main board's microcontroller and analogue section are identical for all models.

The display has LED indication for: NET, zero, stable and weight unit (kg, g), and 6 digits with a height of 8 mm.

The enclosure is made of ABS plastics intended for mounting in a DIN rail with screw terminals in top and bottom for connection of power, load cell and interface cables.

Behind the cover glass of the front of the enclosure are 4 keys for operating the functions of the indicator.

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). 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 for 3 seconds 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 temporary 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

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 or receiving a trigger command from interface will store the displayed weight in alibi memory, if it is a stable legal weight not already stored.

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

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

2.2.8 Weighing unstable samples (optional)

The indicator has a function for weighing unstable samples. It can only be used, if it is enabled in the configuration.

2.2.9 Operator information messages

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

2.2.10 Software version

The software version is displayed during the start-up of the indicator.

The version format is xx.yy.zz, where xx 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 approved software version is 1.yy.zz.

3. Technical data

The WTB weighing instrument ise composed of separate modules, which are set out as follows:

3.1 Indicator

The indicators have the following characteristics:

Type	WTB…
Accuracy class	III or IIII
Weighing range	Single-interval or multi-interval (2 or 3)
Maximum number of verification scale intervals (n)	10000 for Class III 1000 for Class IIII
Minimum input voltage per VSI	0.2 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
Circuit for remote sense	Active, (see below)
Minimum input impedance	43 ohm
Maximum input impedance	1200 ohm
Connecting cable to load cell(s):	See Section 3.1.1
Supply voltage:	12 - 24 VDC, or 230 VAC
Operating temperature range	Min/Max = -10 °C/+40 °C
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	1315 m/mm^2 (for n = 10,000)
Maximum resistance per wire	22.2 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 = 0.001 [%/25K]
Coefficient of resistance for the wires in the J-box cable: Sx = 0.0015 [%/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 Indicator - EEx version

The indicator has the following characteristics when connected through shunt-diode safety barrier type MTL7761ac and MTL7766Pac:

Type	WTB…
Accuracy class	III or IIII
Weighing range	Single-interval or dual-interval
Maximum number of verification scale intervals (n)	7500 for Class III 1000 for Class IIII
Minimum input voltage per VSI	0.52 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
Circuit for remote sense	Active, (see below)
Minimum input impedance	43 ohm
Maximum input impedance	1200 ohm
Connecting cable to load cell(s):	See Section 3.1.1
Supply voltage:	12 - 24 VDC, or 230 VAC
Operating temperature range	Min/Max = -10 °C/+40 °C
Shunt-diode safety barrier:	MTL7761ac, MTL7766Pac, or similar
Peripheral interface(s)	See Section 4

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

3.2.1.1 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.

3.2.1.2 6-wire system

Line	6 wires, screened

Option 1:

Maximum length	1847 m/mm^2 (for n = 7,500)
Maximum resistance per wire	31.2 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 = 0.002 [%/25K]
Coefficient of resistance for the wires in the J-box cable: Sx = 0.0012 [%/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.

3.3 Load receptors, load cells and load receptor supports

Removable platforms shall be equipped with level indicators.

3.3.1 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) There is a respective certificate (EC or PC) or an OIML R60 Certificate of Conformity 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.
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 Annex F of the EN45501:2015 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 Guide 2.4.

3.3.2 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

3.3.3 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

3.4 Composition of modules

In case of composition of modules, EN 45501 paragraph 3.5 and 4.12 shall be satisfied.

3.5 Documents

The documents filed at FORCE (reference No. A530871) are valid for the weighing instruments described here.

4. Interfaces and peripheral equipment

4.1 Interfaces

4.1.1 Load cell input

The connector pins for load cell connection are located on the bottom of the enclosure.

4.1.2 Other interfaces

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

- RS485, Profibus, DeviceNet and CANopen
- Ethernet TCP/IP, Ethernet/IP, Modbus/TCP and Profinet IO, EtherCAT, POWERLINK, and SERCOSIII
- CC-Link
- USB
- Digital output
- Digital input
- Analogue output

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 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 Compatibility of modules

In case of composition of modules, WELMEC 2 (Issue 5) 2009, paragraph 11 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 5.3.

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 that a calibration jumper is installed on 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.

The indicators have also an event counter, which increment each time the configuration is changed.

Sealing of the cover of the enclosure - to prevent access to the calibration jumper and to secure the electronics against dismantling/adjustment - is accomplished with a brittle plastic sticker. The sticker is placed so access to opening the enclosure is prohibited (see figure 5).

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:

- 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.

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, electrical data and other inscriptions.

Left to the manufacturer choice 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

Left to the manufacturer choice as provided in section 7.1.2:

- Serial no. of the indicator

9. Pictures

Figure 1 WTB indicator.

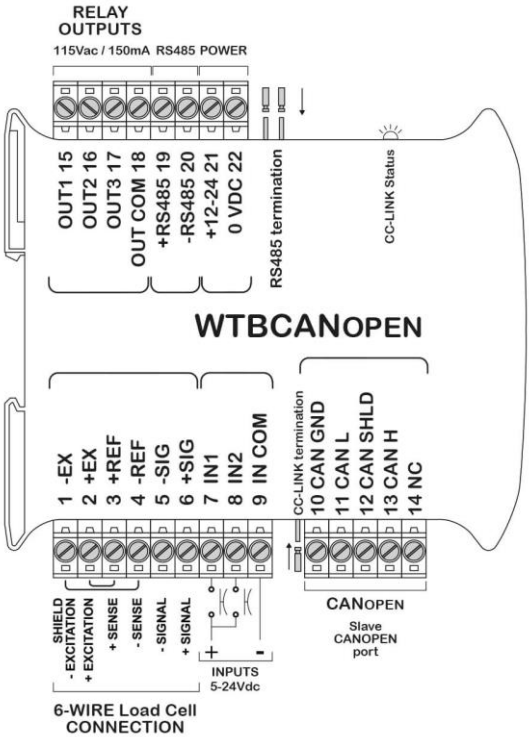

Figure 2 WTBCANOpen indicator.

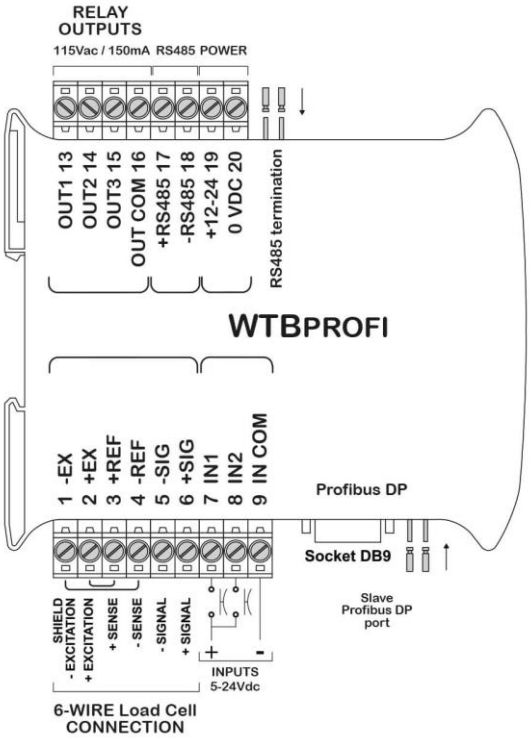

Figure 3 WTBPROFI indicator.

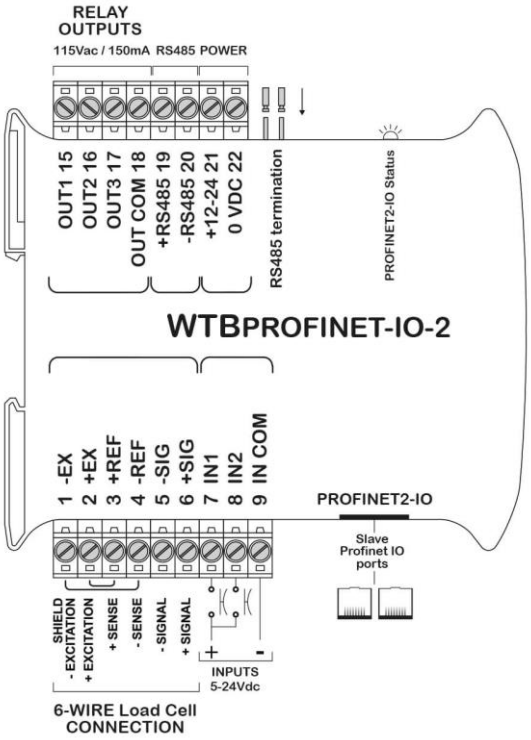

Figure 4 WTBPROFINET-IO-2 indicator.

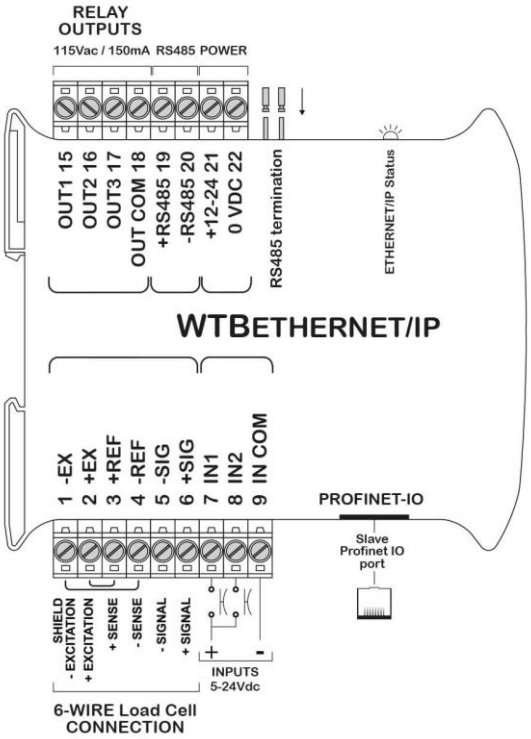

Figure 5 WTBethernet/IP indicator.

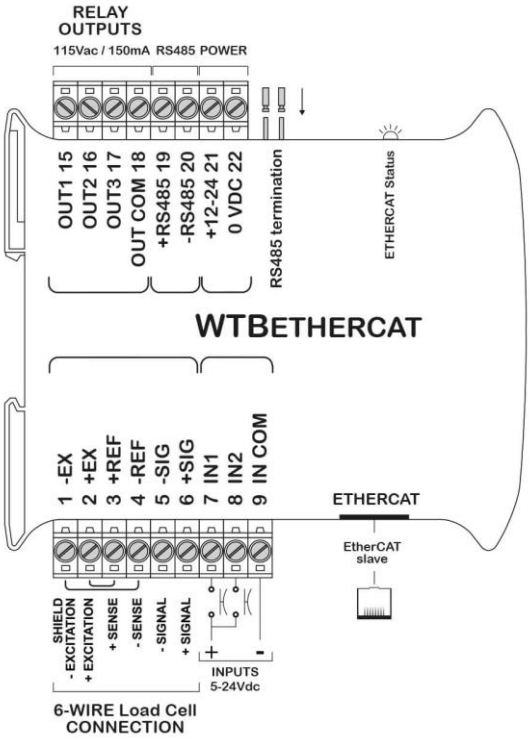

Figure 6 WTBethernetCAT indicator.

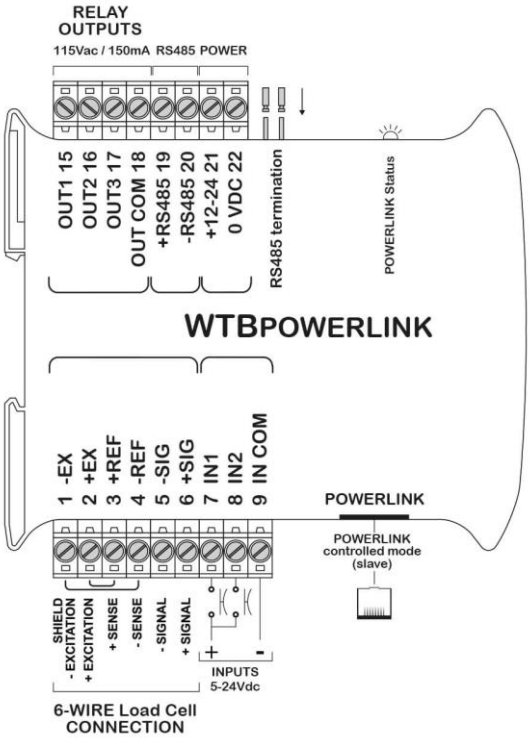

Figure 7 WTBpowerlink indicator.

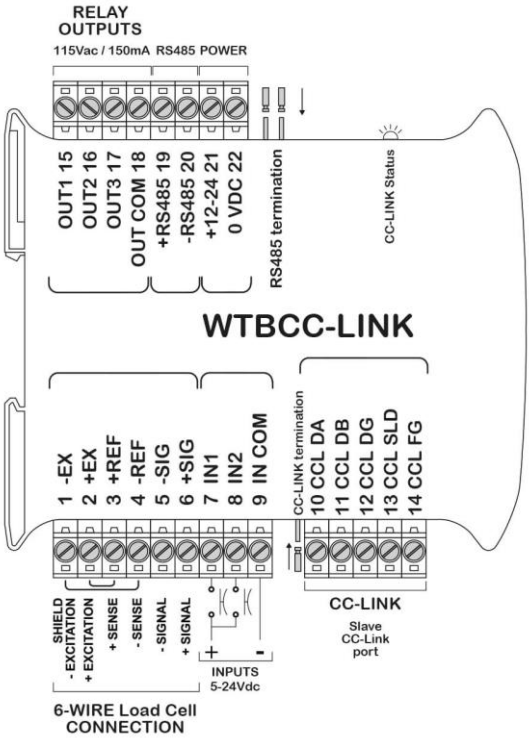

Figure 8 WTBcc-link indicator.

Figure 9 Sealing of WTB enclosure

10. Composition of modules - example

COMPATIBILITY OF MODULES

Ref.: WELMEC 2

Non-Automatic Weighing Instrument, single-interval.

Certificate of EU Type-Approval N°: TAC: 0200-NAWI-11248

INDICATOR A/D (Module 1)	Type:	WTB			
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]	43	
Coefficient of temperature of the span error:		Es	[% / 25°C]		0,001
Coefficient of resistance for the wires in the J-box cable:		Sx	[% / Ω]		0,0015
Specific J-box cable-Length to the junction box for load cells:		$(L/A)_{max}$	[m / mm²]		1282
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:		Hopper			
Fraction of mpe:		p_2		0,5	
Number of load cells:		N		3	
Reduction ratio of the load transmitting device:		$R=F_M / F_L$		1	
Dead load of load receptor:		DL	[% of Max]	35	
Non uniform distribution of the load:		NUD	[% of Max]	20	
Correction factor:	$Q = 1 + (DL + T^+ + IZSR^+ + NUD) / 100$			1,65	
LOAD CELL ANALOG (Module 3)	Type:	AZL			
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]	409	
Minimum load cell verification interval:	$(v_{min\%} = 100 / Y)$	$v_{min\%}$	[% of Emax]	0,008	
Rated capacity:		E_{max}	[kg]	100	
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:					
COMPLETE WEIGHING INSTRUMENT		Single-interval			
Manufacturer: Bosche	Type:	WTB w. hopper			
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]	150	
Number of verification scale intervals:		n		3000	
Verification scale interval:		e	[kg]	0,05	
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]	25	
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 =	7000
n	<=	n_{LC}	(R76: 4.12.2)	n_{LC} - n =	0
E_{min}	<=	DL * R / N	(WELMEC 2: 6d)	(DL * R / N) - E_{min} =	17,5
$v_{min} * \sqrt{N} / R$	<=	e	(R76: 4.12.3)	e - (v_{min} * √N / R) =	0,036
or (if v_{min} is not given)				Alternative solutions: ↑ ↓	
$(E_{max} / n_{LC}) * (\sqrt{N} / R)$	<=	e	(WELMEC 2: 7)	e - $((E_{max} / n_{LC}) * (\sqrt{N} / R))$ =	
Δu_{min}	<=	Δu	(WELMEC 2: 8)	$\Delta u - \Delta u_{min}$ =	1,47
R_{Lmin}	<=	R_{LC} / N	(WELMEC 2: 9)	(R_{LC} / N) - R_{Lmin} =	93
L / A	<=	$(L / A)_{max}^{WI}$	(WELMEC 2: 10)	$(L / A)_{max}^{WI}$ - (L / A) =	4620
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) =	17,5

Signature and date:

Conclusion . . . . . *PASSED*

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