DANAK
PROD Reg. nr 7026

FORCE Certification

EU Type-Examination Certificate

No. 0200-NAWI-14164

DAD14x.y

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 **Flintec GmbH**
Bemannsbruch 9
74909 Meckesheim
Germany

In respect of Non-automatic weighing instrument designated DAD14x.y with variants of modules of load receptors, load cells and peripheral equipment.
Accuracy class III and IIII
Maximum capacity, Max: From 0.5 kg up to 500 000 kg
Verification scale interval: e = Max / n
Maximum number of verification scale intervals: n ≤ 10000 for single-interval (however, dependent on environment and the composition of the modules).
Minimum input voltage per VSI: 0.2 µV

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 and OIML R76:2006.

Note: This certificate is a revised edition of DK0199.486 rev.1, which it replaces.

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

The annex comprises 12 pages.

Issued on **2023-02-06**
Valid until **2027-04-28**

Jens Hovgård Jensen
2023-02-06

Digitally signed by Jens Hovgård Jensen
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FORCE Certification references:
Task no.: 123-21570.90.10 and ID no.: 0200-NAWI-14164-1 **Signatory: Jens Hovgård Jensen**

Descriptive annex

Contents

1. Name and type of instrument and modules

The weighing instrument is designated DAD14x.y. 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 or multi-interval.

The x.y in the name of the instrument indicates the following,

x	=	1	Ethernet interface
		2	Profibus interface
		3	2 Ethernet interfaces
y	=	1	Analogue output
		2	No analogue output

The indicators consist of analogue to digital conversion circuitry, microprocessor, control circuitry, power supply conditioner, keyboard, non-volatile memory for storage of calibration and setup data, and a weight display, all contained within a single enclosure.

The modules appear from Sections 3.1, 3.2, and 3.3; 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 two electronic boards: A main board bearing the microcontroller and all other components and a display board.

The display has LED indication for: '-' (negative weight), center zero, NET and status of the two logic Inputs and the three logic Outputs. The weight display has 6 seven-segment digits with a height of 5 mm. The weight unit (t, kg or g) is displayed at a separate label fixed to the inside of the transparent lid covering the entire display and keyboard.

The enclosure is made of ABS plastics intended for mounting on to a DIN rail and with pluggable screw terminals along the top and bottom for connection of power, load cell, various interface ports, voltage- and current outputs and logic I/O.

Behind the transparent lid at 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 10 - 30 VDC, ≤ 4 W.

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 (a) strain gauge load cell(s). The weight information appears in the digital display located on the front section and may be transmitted to peripheral equipment for recording, processing or additional displaying. 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

2.2.3.1 Initial zero-setting

If the selected Zero mode permit initial Zero-setting it will operate within a range of ± 10 % of Max. Zero-setting is possible only when the load receptor is not in motion.

2.2.3.2 Zero-tracking

If the selected Zero mode permits the zero-tracking feature, it operates over a range of ±2% of Max and only when the display shows zero (gross or net) and the load receptor is not in motion.

2.2.3.3 Semi-automatic zero-setting

If the selected Zero mode permits semi-automatic zero setting, the following procedure applies: Pressing the “ZERO” key causes a new zero reference to be established and turn on ZERO lamp indicating the display is within the central $1/5^{th}$ of zero state.

The semi-automatic zero-setting feature operates over a range of ±2% of Max and only when the load receptor is not in motion.

2.2.4 Tare

The instrument models are provided with a semi-automatic subtractive tare feature activated using the “TARE” key. Tare is possible only when the load receptor is not in motion.

2.2.5 Operator information messages

The weight indicator has a number of general and diagnostic messages, which are described in detail in the User’s Guide.

2.2.6 Software version

The software version is displayed during the start-up of the indicator. After that the TAC number is shown. The version format is x.yy, where x is the basic software family, while yy version numbers for changes and corrections not influencing the legal function of the software.

The approved hardware and software versions are:

Model	Hardware revision	Software version
DAD141.y	141.101.v.1.1x	1.06
	141.101.v.2.xx	2.01
DAD142.y	142.205.v.1.xx	1.06
	142.205.v.2.xx	2.01
DAD143.y	Rev.1	1.04

2.2.7 TAC number

The non-resettable Traceable Access Code is displayed during the start-up of the indicator in the format:

xxxxx

3. Technical data

The DAD14x.y weighing instrument is composed of separate modules, which are set out as follows:

3.1 Indicator

The indicators have the following characteristics:

Type:	DAD14x.y
Accuracy class:	III or IIII
Weighing range:	Single-interval or multi-interval
Maximum number of verification scale intervals (n):	10000 per interval for Class III 1000 per interval for Class IIII
Minimum input voltage per VSI:	0.2 µV
Maximum capacity of interval or range (Max):	n × e
Verification scale interval, e_i =	Max/n
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:	58 ohm
Maximum input impedance:	1200 ohm
Connecting cable to load cell(s):	See Section 3.1.1
Supply voltage:	10 - 30 VDC, ≤ 4 W.
Operating temperature range:	Min/Max = -15 °C/+55 °C
Peripheral interface(s):	See Section 4

3.1.1 Connecting cable between the indicator and the load cell or the junction box for load cells

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. (No junction box is allowed).

3.1.1.2 6-wire system

Line: 6 wires, shielded

Option 1:

Maximum length: 2028 m/mm^2 (for n = 10,000)
Maximum resistance per wire: 34.3 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 = 0.0019 [%/25K]
Coefficient of resistance for the wires in the J-box cable: Sx = 0.0008 [%/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.

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) An evaluation / part / 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 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 (EN45501:2015 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 EN45501:2015 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

3.2.4 Small scale constructions

Construction in brief:	Compositions of single point Load cells or Load cell connected with Beranger or Roberval assemblies to support a scale platform or composition of two or four load cells to support a larger platform with or without a conveyor belt or rollers etc.
Reduction ratio:	1
Junction box (if any)	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 paragraph 3.5 and 4.12 shall be satisfied.

3.4 Documents

The documents filed at FORCE (reference No. 121-26905) 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 in addition to the standard RS485/RS232 and Logic inputs/outputs be equipped with one of following protective interfaces,

- Ethernet
- Profibus
- Modbus RTU
- CAN-open
- Device Net
- Analogue outputs

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 a suitable 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 Compatibility of modules

Composition of modules according to EN 45501:2015 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.

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, module F or D of Directive 2014/31/EU.

7.1.1 Indicator

Access to the set-up and calibration facility requires that a calibration jumper is removed from the main board. The jumper can be accessed from the outside, top part of the housing.

The indicator also has a Traceable Access Counter, which increment each time the calibration or legal part of the set-up has been changed.

The sealing of the calibration jumper, which also prevents the housing from being dismantled - is accomplished with a brittle plastic sticker. The sticker is placed across the opening behind which the calibration jumper is located.

7.1.2 Indicator - load cell connector - load receptor

Sealing of the connection between the DAD14x.y indicator and the load receptor and load cell(s) is accomplished by sealing the connector(s) with brittle plastic sticker(s) or with wire and seal.

In the rare cases where this is not possible the connection can be secured in one of the following ways:

- Inserting the serial number of the load receptor as part of the principal inscriptions contained on the DAD14x.y weighing indicator identification label.
- The load receptor bears the serial number of the DAD14x.y weighing indicator on its data plate.

7.1.3 Junction box for load cells

If a junction box for the load cells is part of the construction, it shall be sealed against opening with wire and seal or brittle plastic sticker(s).

7.1.4 Peripheral interfaces

All peripheral interfaces are either “protective” or galvanically isolated. Via the serial interface zero and span adjust can be performed, similar to what the operator can, but protected through the same measures as detailed in Section 7.1.1 of the above. 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

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

8.1.2 Inscriptions

The following details are found at the identification section, which is printed directly at the enclosure or at a label placed at the enclosure of the weight indicator:

- Max, Min, e =
- Manufacturer's name, postal address of manufacturer, model no., serial no., type examination certificate No. and accuracy class.

Additional information such as serial no. of the load receptor or various trademarks are printed separately or found at separate label(s).

8.1.2.1 Load receptors

On a data plate:

- Manufacturer's name, type, serial number, capacity
- Serial no. of the indicator

9. Pictures

Figure 1 DAD141.1 indicator.

Figure 2 DAD14x.y indicator seen from front.

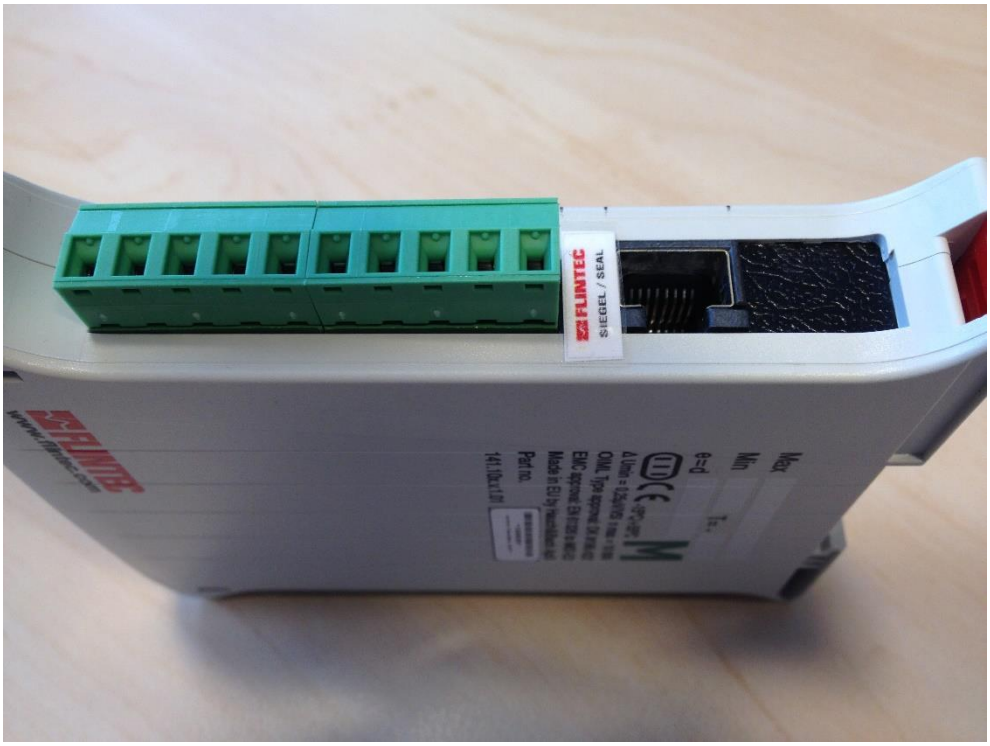

Figure 3 Sealing of DAD14x.y enclosure and calibration jumper

10. Composition of modules - example

COMPATIBILITY OF MODULES

Ref.: OIML R76-1:2006 annex F

Weighing Instrument, single-interval.

Certificate of EU Type-Approval N°: TEC: 0200-NAWI-14164

INDICATOR A/D (Module 1)	Type:	DAD143.1				
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]	58		
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]	2028		
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]	-15	/	55
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]	20		
Non uniform distribution of the load:		NUD	[% of Max]	20		
Correction factor:	$Q = 1 + (DL + T^+ + IZSR^+ + NUD) / 100$			1,5		
LOAD CELL ANALOG (Module 3)	Type:	PC6				
Accuracy class according to OIML R60:		$Class_{LC}$ (A, B, C or D)		C		
Maximum number of load cell intervals:		n_{LC}		4000		
Fraction of mpe:		p_3		0,7		
Rated output (sensitivity):		C	[mV / V]	2		
Input resistance of single load cell:		R_{LC}	[Ω]	1100		
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: Flintec GmbH	Type:	DAD143.1 hopper 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]	80		
Number of verification scale intervals:		n		4000		
Verification scale interval:		e	[kg]	0,02		
Utilisation ratio of the load cell:	$\alpha = (Max / E_{max}) * (R / N)$			0,27		
Input voltage (from the load cells):	$\Delta_u = C * U_{exc} * \alpha * 1000 / n$		[µV/e]	0,67		
Cross-section of each wire in the J-box cable:		A	[mm²]	0,22		
J-box cable-Length:		L	[m]	5		
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 =	6000
n	<=	n_{ind}	(WELMEC 2: 4)	n_{ind} - n =	6000
n	<=	n_{LC}	(R76: 4.12.2)	n_{LC} - n =	0
E_{min}	<=	DL * R / N	(WELMEC 2: 6d)	(DL * R / N) - E_{min} =	5,333333333
$v_{min} * \sqrt{N} / R$	<=	e	(R76: 4.12.3)	e - (v_{min} * √N / R) =	0,006
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} =	0,47
R_{Lmin}	<=	R_{LC} / N	(WELMEC 2: 9)	(R_{LC} / N) - R_{Lmin} =	309
L / A	<=	$(L / A)_{max}^{WI}$	(WELMEC 2: 10)	$(L / A)_{max}^{WI}$ - (L / A) =	2005
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) =	60,0

Signature and date: ***Conclusion . . . . .*** ***PASSED***