CERTIFICATE
of
EU TYPE-APPROVAL
No. DK 0199.117

750

NON-AUTOMATIC WEIGHING INSTRUMENT

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

In accordance with the requirements of the non-automatic weighing instrument regulation No. 560 of 23 June 1992 that implements, in Denmark, Council Directive 90/384/EEC.

Issued to **Cardinal Scale Manufacturing Co.**
203 East Daugherty
P.O. Box 151
Webb City, MO 64870
USA

In respect of Non-automatic weighing instrument designated 750 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 125,000 kg
Verification scale interval: e = Max / n
Maximum number of verification scale intervals: n = 2,500 for class III, n = 1,000 for class IIII (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 45501:1992.

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

The annex comprises 13 pages.

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Descriptive annex

Contents

1. Name and type of instrument and modules

The weighing instrument is designated the 750 series which is a system of modules consisting of an electronic indicator that is connected to an appropriate load receptor. The instrument is a Class III or IIII, self-indicating weighing instrument with single-interval. The indicator may be powered from either an external AC mains power supply or from internal batteries. The weight indicating instrument is available in a single version that is designed for mounting on top of a load receptor column. It consists of analogue to digital conversion circuitry, microprocessor control circuitry, keyboard, non-volatile memory for storage of calibration and weight data, and a weight display contained within a single steel enclosure.

The modules are listed in sections 3.1 to 3.4. The principle of composition is set out in section 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.

2.1.1.1 Enclosures and keyboard

The Model 750 is housed in a steel enclosure 204 mm wide x 168 mm high x 54 mm deep and is designed to be mounted on a vertical column attached to the load receptor. This enclosure is designed to meet an IP55 rating. It is designed primarily for clinical use.

The Model 750 keyboard contains 9 membrane keys used to control the functions of the instrument.

The front panel of the indicator comprises:

- A 7-segment LCD display 17.8 mm in height with a total of six digits and appropriate status indicators.
- A keyboard containing 9 keys used to enter commands or data to the weight indicator. Each key is identified with a name.

The rear panel of the enclosure contains the following:

- A circular connector for a DC input voltage from the external modular power supply.
- A 9-pin "D" sub-miniature female connector for the connection to the load cell or load cell junction box.
- A battery access panel for access to the internal batteries.

2.1.1.2 Electronics

The Model 750 weight indicating instrument uses a single printed circuit board which contains all of the instrument circuitry including an Atmel Atmega 329 8-bit micro-controller which has 32 KB of flash program memory, 2 KB of static ram and 1 KB of EEPROM. All instrument calibration and metrological setup data is contained in non-volatile memory. The power supply is an external universal switching type and can accept an input voltage from

the power mains of from 100 to 240 VAC 50 or 60 Hz. The indicator produces a load cell excitation voltage of 5 VDC.

2.1.2 Load cells

Set out in section 3.3.

2.1.3 Load receptors

Set out in section 3.4.

2.1.4 Interfaces and peripheral equipment

Set out in section 4.

2.2 Function

The Model 750 weight indicating instrument is a microcontroller based electronic weight indicator that requires the external connection of strain gauge load cells. The weight information appears in the digital display located on the front panel. The Model 750 operates from the power mains at 100 to 240 VAC 50 or 60 Hz or from six internal Ni-Cad or NiMH batteries.

The primary functions provided are detailed below.

2.2.1 Power-up

On power-up, the weight indicator will perform a display test, then show the instrument model number and the software revision level for one and a half seconds. After that it will display the current weight using either the previously established zero reference or, if configured to do so, will automatically establish the current weight as a new zero reference.

2.2.2 Test function

On power-up, the weight indicator will test all memory functions followed by a display test. The display test consists of displaying the indicator model number and software version, followed by turning on all horizontal segments followed by turning on all vertical and decimal points, then turning on all annunciators. Each test segment takes about one second. At the conclusion of the display test, the indicator is ready for normal operation.

2.2.3 Display range

The weight indicators will display weight from –99,999e to Max +9e (gross weight) within the limits of the display capacity.

2.2.4 Zero-Setting

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

Zero-setting range: 4% of Max.
Zero-setting can only take place when the weight display is not in motion.

2.2.5 Zero-tracking

The weight indicator is equipped with a zero-tacking 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.

2.2.6 Units

The UNITS key may be used to select the units in which the weight is displayed. The selected unit of measure is indicated in the weight display. Available units of measure are kilograms, pounds, stones, and pound-ounce.

2.2.7 Lock – Release

The LOCK-RELEASE key may be configured during setup of the indicator to lock and unlock the weight display. This feature is not to be used in trade applications but may be convenient in clinical or health care weighing applications. With this feature enabled, pressing the LOCK-RELEASE key will lock the weight display and turn on the LOCK annunciator. Pressing the key a second time will unlock the weight display and turn the LOCK annunciator off.

2.2.8 BMI - Enter

The BMI-ENTER key is used to access the Body Mass Index feature of the indicator. This allows the operator to enter the height of the person on the load receptor allowing the 750 weight indicator to calculate and display the Body Mass Index (BMI). Display of the BMI is indicated by turning the BMI annunciator on.

2.2.9 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 consists of turning on and off all of the display segments in sequence to verify that the display is fully functional.

2.2.10 Operator information messages

The indicator has several general and diagnostic messages that are described in detail in the 750 Series Owner's Manual.

2.2.11 Software version

The software revision level is displayed during the power up sequence of the instrument.

2.3 Available options

There are no options available for this weight indicator.

3. Technical data

The Model 750 weighing instrument is composed of separate modules, which are set out as follows:

3.1 Indicator

The indicator models have the following characteristics:

Type:	Model 750
Accuracy class:	III and IIII
Weighing range:	Single-interval
Maximum number of Verification Scale Intervals:	2,500 (class III). 1,000 (class IIII)
Internal resolution:	> 100,000 counts
Maximum tare effect:	-Max within display limits
Factional factor:	p'I = 0.5
Minimum input voltage per VSI:	2 μV
Minimum signal voltage for dead load:	0.5 mV
Excitation voltage:	5 VDC
Maximum analogue range:	1 to 24 mV
Circuit for remote sense:	None
Minimum input impedance:	87.5 ohms (4 load cells of 350 ohm)
Maximum input impedance:	1,100 ohms
Mains power supply:	100 to 240 VAC, 50 or 60 Hz
Temperature range	+5 to +40 °C
Peripheral interface:	Set out in section 4

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

Cable between indictor and load cell(s): 4 wires, shielded

Maximum length between indicator and junction box (J-box) for load cell(s) if any:

- Option 1: 10 m/mm^2

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 an OIML Certificate of Conformity (R60) respectively is issued for the load cell by a Notified Body responsible for type examination under the Directive 90/384/EEC.

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 4, 2004, No. 11), and any particular installation requirements. A load cell marked NH is allowed only if humidity testing to EN 45501 has been conducted on the 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 Load cells

The load cells, which are set out below, are approved as modules in the weighing instrument:

Manufacturer	Load cell type
Cardinal	TSSP
Cardinal	CB6
Cardinal	TSP
Cardinal	SB
Cardinal	TB
Cardinal	LFB

3.2.3 Platforms

Construction in brief	All-steel platforms
Reduction ratio	1
Junction box	Mounted in or on the platform
Load cells	Any R60 certified load cell according to section 3.2.2 or 3.2.1
Drawings	Various

3.2.4 Weigh bridge platforms

Construction in brief	All-steel, concrete or steel-reinforced concrete construction, surface or pit mounted
Reduction ratio	1
Junction box	Mounted in, on or near the platform
Load cells	Any R60 certified load cell according to section 3.2.2 or 3.2.1
Drawings	Various

3.2.5 Scales with lever system

All load receptors with lever system according to article 6.3 of EN45501.

Construction in brief	"V" shape design in steel construction fitted with levers, cutters and bearings in hardened steel.
Reduction ratio	between 1:1 to 1:400
Junction box	Mounted on dead structure, in or on the platform.
Load cells	Any R60 certified load cell according to section 3.2.2 or 3.2.1

3.3 Composition of modules

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

4. Interfaces and peripheral equipment

4.1 Interfaces

The interfaces are characterised as "Protective Interfaces" according to paragraph 8.4 in the Directive.

4.1.1 Load cell interface

A 9-pin female "D" sub-miniature connector for the load cell is positioned on the bottom panel of the indicator enclosure.

4.2 Peripheral equipment

The Model 750 weight indicator is not to be connected to any peripheral equipment.

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 Load cells

The indicator may be connected to any other load cell which is technically compatible as mentioned in section 3.3 and which has a test certificate issued by a EU-notified body in any member state, documenting the conformity with OIML R60.

5.3 Compatibility of modules

In the case of composition of modules, WELMEC (Issue 4), July 2004, 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 90/384/EEC.

7.1.1 Indicator

Access to the configuration and calibration facility is achieved by turning the indicator off, removing the calibration jumper (located behind the enclosure rear panel), turning the indicator on then replacing the calibration jumper. This is accomplished by removing the screws from the rear panel on the instrument enclosure and removing the calibration jumper then replacing it.

Sealing of the indicator is accomplished using an event counter. To view the value of this event counter, turn the indicator off then, holding the Units key down, turn the indicator on. The display will show CAL CH (Calibration Check) for two seconds followed by a six-digit event counter value. This value is contained in non-volatile memory and cannot be manipulated or reset. To return to normal operation, press the Units key again or turn the power off then on.

A non-removable label having the text 'CAL CH: xxxxxx', where xxxxxx is the value of the event counter at the time of verification, is placed on the top of model 750.

The sealing of the indicator is regarded as broken, if the value on the label differs from the displayed value.

7.1.2 Indicator – load cell connector – load receptor

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

- sealing of the load cell connector / cable by a lead wire seal
- 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

Access to the junction box, if any, is prevented by the use of lead wire seals or by sealing it with brittle plastic stickers.

7.1.4 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.

7.2 Verification marks

7.2.1 Indicator

A green M-sticker and a sticker with verification marks may be placed on the top side of the indicator.

7.2.2 Non-verified peripheral equipment

If such equipment is connected to the weighing instrument, it shall bear a red M-sticker.

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 top of the enclosure.

8.1.2 Inscriptions

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

On a single brittle plastic sticker located on the top of the Model 750:

- Certificate no. and the accuracy class

On a single brittle plastic sticker located on the front panel overlay:

- Max, Min, e=

On a label located on the top of the Model 750:

- Model no., serial no., temperature limits, electrical data and other inscriptions

8.2 Load receptors

On a data plate:

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

Left to the manufacturer's choice as provided in section 7.1.2:

- Serial no. of the indicator

9. Pictures

Figure 1

Model 750 front panel.

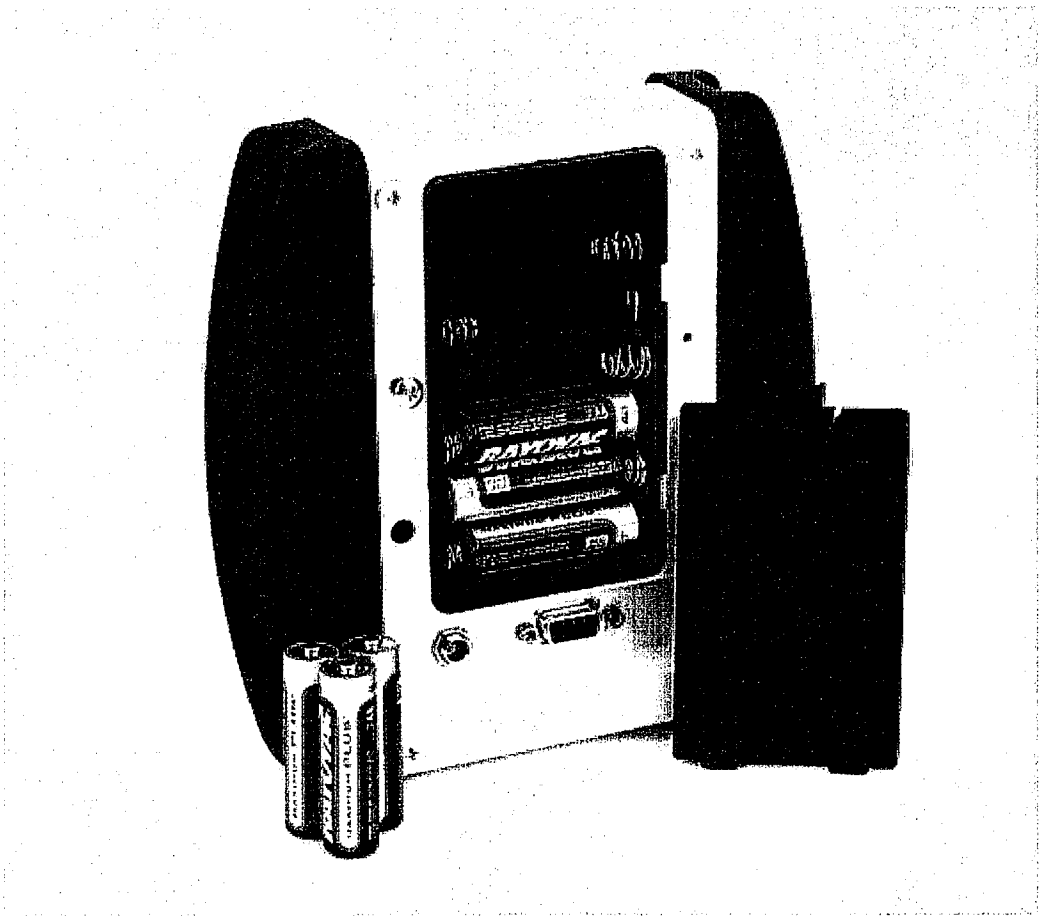

Figure 2

Model 750 back panel

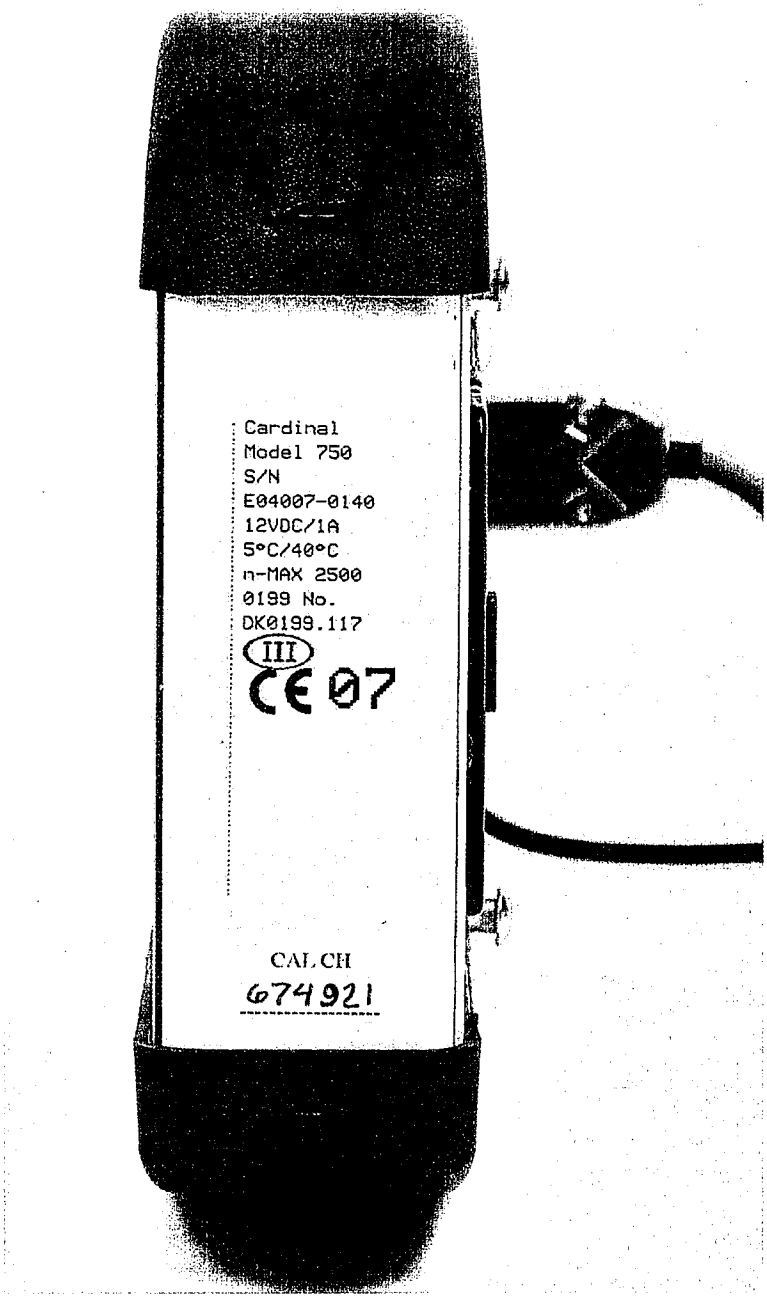

Figure 3

Model 750 marking

10. Composition of modules - illustrated

COMPATIBILITY OF MODULES

Ref.: WELMEC 2

Non-Automatic Weighing Instrument, single-interval

Certificate of EU Type-Approval N°: TAC: DK0199.117

INDICATOR A/D (Module 1)	Type:	750				
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}		2500		
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]	2		
Minimum load cell impedance:		R_{Lmin}	[Ω]	87		
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]	10		
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]	5	/	40
Test report (TR), Test Certificate (TC) or OIML Certificate of Conformity:		DK0199-R76-07.01				
LOAD RECEPTOR (Module 2)	Type:	6875 Chair				
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]	5		
Non uniform distribution of the load		NUD	[% of Max]	0		
Correction factor:	$Q = 1 + (DL + T + IZSR + NUD) / 100$			1.15		
LOAD CELL ANALOG (Module 3)	Type:	LFB-250M				
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]	350		
Minimum load cell verification interval:	($v_{min\%}$ = 100 / Y)	$v_{min\%}$	[% of Emax]	0.02		
Rated capacity:		E_{max}	[kg]	125		
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		R60/1991-DK-00.02				
COMPLETE WEIGHING INSTRUMENT				Single-interval		
Manufacturer: Cardinal Scale Manufacturing Co.	Type:					
Accuracy class according to EN 45501 and OIML R76:		$Class_{WI}$ (I, II, III or IIII)		III		
Fractions: $p_1 = p_1^2 = p_2^2 = p_3^2$:		p_1		1.0		
Maximum capacity:		Max	[kg]	250		
Number of verification scale intervals:		n		2500		
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]	2.00		
Cross-section of each wire in the J-box cable:		A	[mm²]	0.22		
J-box cable-Length		L	[m]	2		
Temperature range to be marked on the instrument		T_{min} / T_{max}	[°C]	5	/	40
Peripheral Equipment subject to legal control		Cardinal P500 printer				

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 =	7500
n	<=	n_{ind}	(WELMEC 2: 4)	n_{ind} - n =	0
n	<=	n_{LC}	(R76: 4.12.2)	n_{LC} - n =	500
E_{min}	<=	DL * R / N	(WELMEC 2: 6d)	(DL * R / N) - E_{min} =	3.125
$v_{min} = \sqrt{N} / R$	<=	e	(R76: 4.12.3)	e - (v_{min} * $\sqrt{N}$ / R) =	0.050
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)	$\Delta u - \Delta u_{min}$ =	0.00
R_{Lmin}	<=	R_{LC} / N	(WELMEC 2: 9)	(R_{LC} / N) - R_{Lmin} =	1
L / A	<=	$(L / A)_{max}^{WI}$	(WELMEC 2: 10)	$(L / A)_{max}^{WI}$ - (L / A) =	1
T_{range}	<=	$T_{max} - T_{min}$	(R76: 3.9.2.2)	(T_{max} - T_{min}) - T_{range} =	5
Q * Max * R / N	<=	E_{max}	(R76: 4.12.1)	E_{max} - (Q * Max * R / N) =	53.1

Signature and date:

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

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