

TEST CERTIFICATE

No. **DK0199-R76-05.04, Revision 1**

Instrument type: 788P Scale input card

Test item device: A/D device

Issued by: DELTA Danish Electronics, Light & Acoustics
 EU - Notified Body No. 0199
 address: Venlighedsvej 4, DK-2970 Hørsholm, Denmark

In accordance with: Paragraph 8.1 of the European Standard EN 45501:1992
 WELMEC Guide 2.1

Fractional factor (p_i): 0.5 (refer to 3.5.4 of the standard)

Issued to **Cardinal Scale Manufacturing Co.**
 Address: 203 E. Daugherty, 64870 Webb City, Michigan, USA

Manufacturer: Cardinal Scale Manufacturing Co.

In respect of: The model of an A/D device, tested as a module of a weighing instrument.

Characteristics: Suitable for a non-automatic weighing instrument with the following characteristics:
 Self indicating with Single-interval

Accuracy class	III	IIII	
Maximum capacity	n * e	n * e	[count]
Verification scale interval, e =	Maxi / n	Maxi / n	[count]
n _{max} =	6000	1000	[count]
Minimum input-voltage per VSI:	0.75	0.75	[µV]

The essential characteristics are described in the annex.

Description and documentation The A/D device is described and documented in the annex to this certificate.

Remarks: Summary of tests involved: Test report no. DANAK-199762
 This test certificate cannot be quoted in an EU type approval certificate without permission of the holder of the certificate mentioned above.

The ANNEX comprises 5 pages

Issued on **2005-09-29**

Signatory 
J. Hovgård



1 NAME AND TYPE OF INSTRUMENT

The A/D device is designated 788P Scale input card suitable to be incorporated in a non-automatic weighing instrument.
Class III or Class IIII, Single-interval.

2 DESCRIPTION OF THE CONSTRUCTION AND FUNCTION

2.1 Construction

The model 788P Scale input card is inserted into a 788 display unit to form a weighing indicator with data transmission.
Further, see the EU type-approval certificate no. DK 0199.22/4

Each load cell input board contains a 24-bit sigma-delta analog to digital converter used to convert the load cell signal into a digital value. The load cell input board provides an excitation voltage of 12 VDC to power the strain gauge load cell connected to it.

SOFTWARE

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

ACCESS TO METROLOGICAL CHARACTERISTICS AND SPAN ADJUSTMENT

788 Weight Display Unit:

Access to the configuration and calibration facility is achieved by pressing the MENU key then selecting the SETUP from the displayed menu. The calibration screw must be removed from the rear panel of the weight display unit before the setup function can be accessed. A security seal can be installed to prevent access to the switch. The wire is passed through the hole in the head of the calibration switch screw, the adjacent rear panel retaining screw and an adjacent screw on the enclosure end cap.

CE MARK AND INSCRIPTIONS

A sticker with the CE mark of conformity followed by the last two digits of the year the device was certified along with a serial number containing a date code of production are located on the identification plate which is located on the back of the 788 weight display unit.

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 back of the weight display unit enclosure.

- 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 back of the weight display unit enclosure:

- Model No., Serial No., electrical data and other inscriptions.

2.2 Function

The 788P Scale input card is a microprocessor based electronic unit for load cell signal(s) which, when inserted into the model 788 electronic indicator serving as the display controller, together with it make up a non-automatic weighing instrument. Furthermore, the weight information may be transmitted to peripheral equipment by a protective bi-directional serial RS 232C / RS485 interface. The interface for connection of load cells has been tested and examined thoroughly. The maximum length and resistance of the connecting cable between the test item and a junction box for load cell(s) has been determined by testing and evaluation. The result appears from Summary of results.

Setting devices:

Zero-setting devices:	Semi-automatic,	Initial zero-setting	range: 20 % Max
Tare device(s):	Subtractive tare,	Tare range:	100 [% of Max]

3 TECHNICAL DATA

3.1 A/D device

Manufacturer:	Cardinal Scale Manufacturing Co.		
Type:	788P Scale input card		
Accuracy class:	III	&	IIII
Maximum number of VSI's (n_{max}):	6000		1000
Minimum input-voltage per VSI (Δ_{min}):	0.75 [μ V]		0.75 [μ V]
Weighing range:	Single-interval		
Number (i) of Intervals / ranges specified:	1		
Maximum capacity of partial ranges (Maxi):	$n * e$		[count]
Verification scale interval, $e =$	Maxi / n		[count]
Internal resolution:	> 100000		
Initial zero-setting:	20 [% of Max]		
Maximum tare effect:	100 [% of Max]		
Fractional factor (p_i):	0.5		
Minimum dead load (D_{min}):	0.5 [mV]		
Maximum input range:	50 [mV]		
Excitation voltage:	10.75 [Vdc]		
Circuit for remote sense:	Active (see below)		
Minimum input-impedance:	27 [ohm]		
Nominal input-impedance:	350 [ohm]		
Maximum input-impedance:	1200 [ohm]		
Load cell linearizing feature:	None		
Connecting cable to load cell(s):	See 3.3.1		
Operating temperature range:	Min / Max = °C / [°C]		
Temperature effect on no-load confirmed:	5 [ppm/K]	range:	-10.9 / 39.7 [°C]
Temperature effect on span confirmed:	1.3 [ppm/K]	range:	-10.9 / 39.7 [°C]
Peripheral Interface(s):	See section 4		
AC power supply:	90 - 260 [Vac]		Built-in supply
	none		

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

3.1.1.1 4-wire system

Maximum length	The certified cable length for the load cell.
Line	4 wires, shielded

3.1.1.2 6-wire system

Line	6 wires, shielded
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Option 1:

Maximum length	666 [m/mm ²]
Maximum resistance per wire	11.3 [ohm]

In case the actual (n) for the weighing instrument is less than (n_{max}), the following apply:

Option 2:

Coefficient of temperature of the span error of the indicator:	$E_s =$	0.0033	[% / 25K]
Coefficient of resistance for the wires in the J-box cable:	$S_x =$	0.0041	[% / ohm]

$$(L/A)_{max} = 295.86 / S_x * (emp / n - E_s) \text{ [m / mm}^2\text{]} \text{ in which } emp = p_i * mpe * 100 / e$$

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: WELMEC 2.1, annex 5.

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

4 INTERFACES

4.1 Load cell interface

Refer section 3.1.1.

Any load cell(s) can be used for instruments under this certificate, provided the following conditions are met:

- 1) There is a respective OIML Certificate of Conformity (R60) or a test certificate (EN 45501) 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, paragraph 11), and any particular installation requirements).
- 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.

4.2 Peripheral interfaces

1:	RS232C serial I/O		Security: Protective	Connected cable: unshielded
2:	Digital I/O	Protective	Protective	unshielded

5 CONDITIONS FOR USE

None

6 LOCATION OF SEALS AND INSCRIPTIONS

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.

Location of CE mark of conformity:

See sect. 2.1

Inscriptions on the overlay:

See sect. 2.1

Other inscriptions on the overlay:

Other inscriptions:

7 TESTS

The A/D device type 788P Scale input card has been tested according to EN 45501 and WELMEC 2.1 Guide for testing of indicators.

Tests and Examinations		
Input impedance:	High	Low
Temperature tests: 21/40/-11/6/21 (tested at minimum input-voltage sensitivity)	X	X
Temperature effect on no-load indication		X
Temperature effect on span	X	X
Repeatability		X
Tare		X
Warm-up time		X
Voltage variations		X
Short time power reductions	X	
Electrical bursts	X	
Electrostatic discharges	X	
Immunity to radiated electromagnetic fields	X	
Damp heat, steady state		X
Span stability		X
Examination of the construction		
Checklist		
Maximum length and impedance of cable to the junction box for load cell(s), if any	X	X
Load cell interface measurements with interruptions of the sense circuit	X	X

The test item fulfilled the maximum permissible errors at all tests ticked off.

8 DOCUMENTATION

Contents of the technical documentation held by the notified body:

8.1 Product specification
- description
- drawings
etc.

8.2 Examination report

OIML R76 report No. DANAK-199762

8.3 Test results

Report No. DANAK-199762