



Parts Certificate

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Project number: SO 14200549
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Issued by NMI Certin B.V.

In accordance with – WELMEC guide 8.8 "General and Administrative Aspects of the Voluntary System of Modular Evaluation of Measuring Instruments under the MID".
– OIML R117-1 Edition 2007 (E) "Dynamic measuring systems for liquids other than water".

Producer Emerson Process Management
Remote Automation Solutions
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Part An **electronic calculating and indicating device** for use as part of a liquid measurement installation.

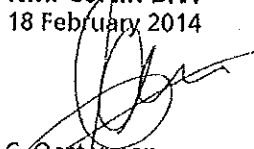
Brand : Emerson
Designation : FloBoss S600 Flow computer or S600+ Flow computer
Software versions : see paragraph 1.2.1 of the descriptor
Mechanical environmental class : M1
Electromagnetic environment class : E2
Temperature range ambient : -10 °C ... +55 °C
Humidity environment class : Non condensing

Further properties and test results are described in the annexes:

- Description number TC8218 revision 5;
- Documentation folder number TC8218-2.

Remarks This TC8218 revision 5 replaces the previous TC8218 revision 4. The documentation folder is not changed.

Issuing Authority **NMI Certin B.V.**
18 February 2014


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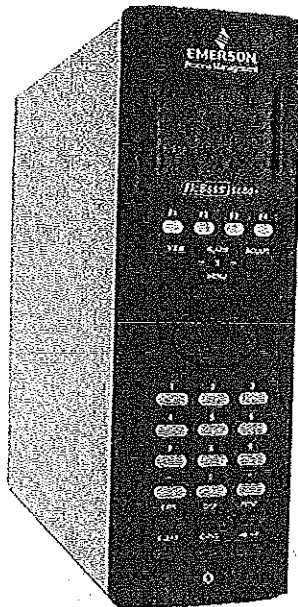
1 General information on the electronic calculating and indicating device for liquid measuring installations

Properties of this electronic calculating and indicating device, mentioned or not, shall not be in conflict with the Legislation.

This Parts Certificate is the positive result of the applied voluntary, modular approach, for a component of a measuring instrument, as described in WELMEC guide 8.8. The complete measuring instrument must be covered by an EC type-examination certificate.

This Parts Certificate describes an electronic calculating and indicating device intended for processing the signals from one up to 12 single or one up to 6 double input signals, depending on the system configuration. The calculating and indicating device is capable of handling Modbus signals, double impulse signals representing volume or mass measurements from meters such as turbine, Coriolis, Ultrasonic & PD meters for custody transfer purposes and also single impulse line for indication purposes.

The picture below shows the FloBoss S600+; the FloBoss S600 is identical, however with the exception that it shows the inscription FloBoss S600.





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Remark: The electronic calculating and indicating device is capable of fulfilling the condition(s) as might be laid down in the Parts certificates or Evaluation certificates of temperature transmitters or pressure transmitters for a non-interruptible system.

1.1 Essential Parts

Part	Type	Documentation	Remarks
Processor board	FloBoss S600 CPU board P152.R4	8218/0-01, -02	Processor boards include an RS232C printer connection with parity check and an RS485 connection for bi-directional Modbus protocol.
Processor board	FloBoss S600+ P152.R5.	8218/0-03, -04	
Intelligent I/O board	Daniel Spectra 600 type P144.R4,	8218/0-05, -06	Including: resistance input devices for Pt-100 temperature transmitters, also called RTD; 4 to 20 mA current loop or 1 to 5V signals, for input of temperature and/or pressure and/or density; frequency input representing density or specific gravity.
S600 DIFF DF MEZZ board	P148.R3.	8218/0-07, -08	Pulse input for single or dual pulse representing mass or volume flow. (only double pulses approved for custody transfer purposes)
Front Panel	Spectra S600, part number P153, revision 3.	8218/0-09, -10	Brand: either Daniel or Emerson Process Management.
Display board with display device	Data Vision SS-21V0	-	OEM device.



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Part	Type	Documentation	Remarks
S600 Power and connector board	P155.R2	8218/0-11, -12	-
Spectra 600 HART board	P188.R2	8218/2-01, -02	HART communication interface.

1.2 Essential Characteristics

1.2.1 The characteristics as described on the front page of this Parts certificate.

1.2.2 Software versions

FloBoss S600	
software version	checksum
05.35g	-
05.35i	-
05.35j	-
05.35db	-
05.44	-
5.55	-
FloBoss S600+	
06.09	-
06.09a	-
06.09b	-
06.09c	-
06.09d	-
06.09e	-
06.09f	0x8E78
06.09fb	0xe331
06.09g	0x33B8
06.09h	0x13E0

1.2.1 Software specification (refer to WELMEC guide 7.2, issue 4):

- Software type P;
- Risk Class C;
- Extensions L, T, S and D apply.
- Extension U does not apply

1.2.3 Calculation of flow rates and flow totals from Mass or Volume pulses and / or serial data to produce Volumetric & Mass flow totals and flow rates. This may include linearization of the Flow Meter and / or Dual Pulse Integrity to Level A or B to ISO 6551 / IP 252/76. The software corresponds to class C of Welmec guide 7.2; checking facilities are type P (permanently).

1.2.4 Conversions

The calculating and indicating device can perform conversion calculations according to the following methods:

- API Manual of Petroleum Measurements Standards, Chapter 11.1, also known as ASTM D-1250-04 incorporating Amendment 2007; methods 53A, 53B, 53D, 59A, 59B, 59D, 54A, 54B, 54C, 54D, 60A, 60B, 60C and 60D.



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With the methods 59A, 59B, 59D, 60A, 60B, 60C and 60D the minimum reference temperature is -50 °C and the maximum reference temperature is 150 °C.

- ASTM D-1250-80 53A, 53B, 53D, 54A, 54B, 54C, 54D methods. When using these methods the minimum and maximum boundaries should be set up manually, in accordance to the standard.
- API Manual of Petroleum Measurements Standards, Chapter 11.2.4, Tables 53E, 54E, 59E and 60E; this document is also known as ASTM publication TP27 and as GPA Technical Publication TP-27.
- API Manual of Petroleum Measurements Standards, Chapter 11.2.1M, issued August 1984;
- API Manual of Petroleum Measurements Standards, Chapter 11.2.2M, issued August 1986 and reaffirmed December 2007.
- ASTM Publication D1555M-00, ASTM D1555M-04a, ASTM D1555M-08.
- GPA Technical Publication TP-15 (revision 2003). Though this standard uses imperial units, it may be used within a metric environment by converting input values and output values from metric to imperial units and back.

Remark:

The following non metric tables, though not within the scope of this Parts Certificate, are also available within the calculating and indicating device.

- API Manual of Petroleum Measurements Standards, Chapter 11.1, also known as ASTM D-1250-04; methods 5A, 5B, 5D, 23A, 23B, 23D, 6A, 6B, 6C, 6D, 24A, 24B, 24C and 24D.
- ASTM D-1250-80 5A, 5B, 5D, 23A, 23B, 23D, 6A, 6B, 6C, 6D, 24A, 24B, 24C and 24D methods. When using these methods the minimum and maximum boundaries should be set up manually, in accordance to the standard.
- API Manual of Petroleum Measurements Standards, Chapter 11.2.4, Tables 23E, 24E; this document is also known as ASTM publication TP27 and as GPA Technical Publication TP-27; also covered by the GPA Technical Publication TP-25.
- API Manual of Petroleum Measurements Standards, Chapter 11.2.1, issued August 1984;
- API Manual of Petroleum Measurements Standards, Chapter 11.2.2, issued August 1986.
- ASTM Publication D1555-95 (Reapproved 2000)
- ASTM Publication D1555-08

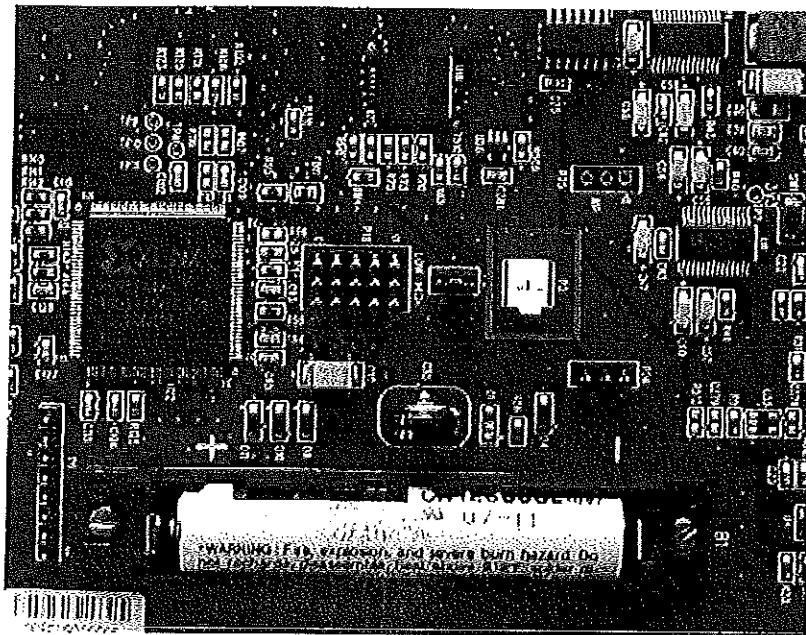
Conversion is based on the measured liquid temperature, measured liquid density and measured liquid pressure. Actual liquid temperature, actual liquid density and actual liquid pressure may also be input manually.



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- 1.2.5 Other legal Items, such as checking on data integrity and on parameter seals.
- 1.2.6 Presentation of actual volume, converted volume (= base volume) and mass, as well as other parameters necessary for the measurement
- 1.2.7 Calculation of batch totals and periodic totals
- 1.2.8 Security
 - 1.2.8.1 The Weights & Measures officer and /of the Weights & Measures accredited verification body shall be assigned security level 1. The password shall not be known to other parties. The security level 1 password can be changed by the officer at any time via the TECH/ENGINEERING, SECURITY page or equivalent web server page. It is possible for the officer to physically prevent any security level 1 parameter from being changed by removing the P3 jumper from the main CPU board:



Remark: the above shown printed circuit board is present in the FloBoss S600+. The printed circuit board in the FloBoss S600 is slightly different, while the jumper is marked as J8.

More information is available in the manufacturer's documents A6115, chapter 3.4 and A6169 Chapter 7.4. If this jumper is removed, the software does not allow the user to select or change the security level 1 parameter.

- 1.2.8.2 All Weights & Measures items and parameters shall be secured by level 1. The display editor allows any measurement parameter on the display to be assigned a security level 1 password level. For more information see the manufacturer's document A6169, chapter 13.



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- 1.2.8.3 Any changes to level 1 parameters will appear in the event log. In addition to this, a CRC-16 for all security level 1 parameters is constantly recalculated and forms the first part of the NMI CONSTANTS (see page SYSTEM SETTINGS, SOFTWARE VERSIONS, NMI CONSTANTS). This constant is displayed in two parts, ie, CSUM 45F2-00000. This first part 45F2 is the current CRC-16 of the level 1 constants. The second part 00000 is a count on the number of times the CRC-16 has changed. When the CRC-16 changes, an alarm is raised.
- 1.2.9 Custody Transfer parameters
The Custody Transfer parameters and the mandatory settings are given in paragraph 1.5.2 of this Parts certificate.
- 1.2.10 Alarm-handling
Alarm is signaled by a flashing red LED on the S600 front; alarms are also logged in a special file and printed, if configured that way.

An option is available to disable the Coriolis application flow rate integrity check when the flow rate is zero. This check is disabled by setting the 'Flow Integral Acceptance' constant to 0. This only applies to Coriolis applications using a MODBUS interface.

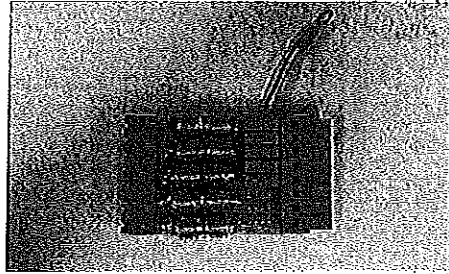
A check is added to filter out large increments during times of no flow. Note: this only applies to Coriolis applications using a MODBUS interface.

- 1.2.11 Communication using a Modbus protocol to host DCS/Supervisory.
- 1.2.12 Communication using a Modbus protocol to a flow meter with the capability to handle Modbus communication.
- 1.2.13 Preset functions
- 1.2.14 Valve status
- 1.3 **Essential Shapes**
- 1.3.1 In case a printing device is connected, an additional feedback from the printing device to the flow computer for power off detection and paper out detection shall be provided.
- 1.3.2 EMC measures.
- 1.3.2.1 The connections between the field and the FloBoss S600 Flow computer or S600+ Flow computer's contact blocks are within a metal case that acts as an EMC shield.
- 1.3.2.2 When HART devices are connected to part P188.R2, all serial and Ethernet connections from the metal case shall be via Fibre optic cable.
- 1.3.2.3 Filter on the power supply lines, as demonstrated in the photographs below and in the documentation. This does not apply when the metal case as mentioned in the above article 1.3.2.1 is applied.



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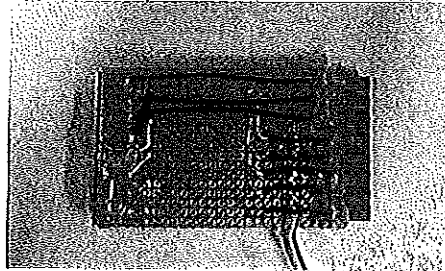
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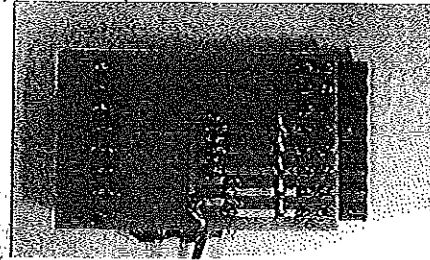
Type 1, component side



Type 2, component side



Type 1, track side



Type 2, track side

Component values:

PIN	Description	Type 1 L (uH)	Type 1 C (nF)	Type 2 L (uH)	Type 2 C (nF)
1	+24V Supply	120	68	120	68
2	0V Supply	120	68	120	68
3	+24V Floating	120	68	100	100
4	+15V Floating	120	68	100	100
5	0V Floating	120	68	100	100

1.3.2.4 HF Filter units on all SKT-A and SKT-B connectors, make Selectronix, typified as EMI STOP T filter, or similar.

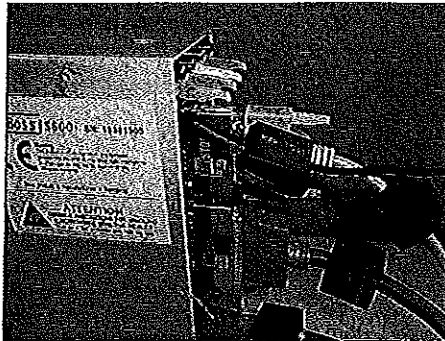
Ferrites, make Kitagawa, type KCF-100 (impedance = 150 ohm @ 25 MHz), or similar. All cables are shielded.

Applications of both the HF filter units and the ferrites are demonstrated in the photographs below.

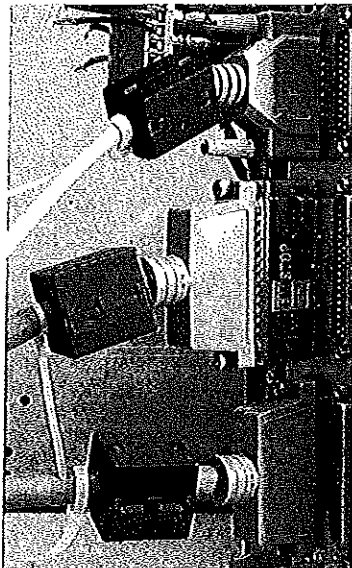


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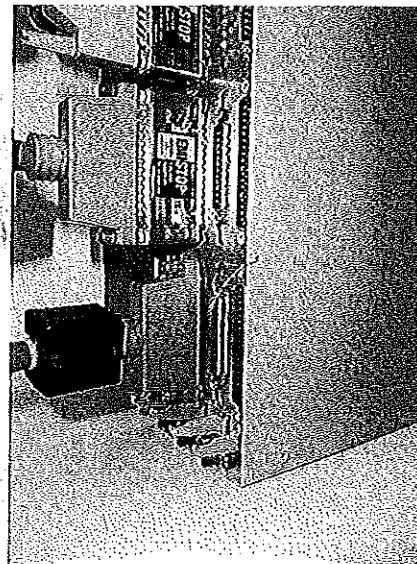
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When a metal case is applied for connecting the field to the FloBoss S600 Flow computer or S600+ Flow computer connector box the power supply connection is decoupled with a ferrite, make Kitagawa, type KCF-100 (impedance = 150 ohm @ 25 MHz), or similar, as shown in the picture left.



As an example: Ferrites and Selectronix filter in data lines



As an example: Ferrites and Selectronix filter in data lines

- 1.3.3 Inscriptions.
At least the inscription TC8218 is mentioned on the data plate.
- 1.3.4 The unit of indication is liter or m³ for volume and kg or ton for mass. Remark: liters should always be combined with kg's and m³ 's should be combined with tons.
- 1.3.5 The minimum measured quantity is inscribed on the calculating and indicating device or on a separate plate in the direct vicinity of the display.
- 1.3.6 In installations where more than one measurement transducer is applied, an identification of the connected measurement transducer shall also be applied onto the calculating and indicating device.
- 1.3.7 Seals
See chapter 2 of this description.



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1.4 Conditional Parts

1.4.1 Digital in- and outputs

The calculating and indicating device is equipped with several in- and outputs. As an example, the in- and outputs may be applied for: receiving and/or transmitting alarm conditions, controlling valves, reading valve positions, receiving/transmitting batch-start/stop signals, etc.

1.4.2 Ethernet board (applicable to FloBoss S600 only); part P190, revision 1.

1.5 Conditional Characteristics

1.5.1 Use in a network

Floboss S600 communicates using MODBUS client/server implementation. Because of that method, there is no need for making a distinction between the use within open networks and the use within closed networks exists, because it is always necessary to define the link between a unique pair of master slave addresses. The FloBoss S600 Flow computer or S600+ Flow computer address is protected by the seal.

This is not totally under the control of the FloBoss S600 Flow computer or S600+ Flow computer supplier. However correct design of the network should guarantee that the above described link between the unique pair of master slave address is realized in a proper way.

To realize that the received data is not too old (Welmec 7.2, issue 4, article T4,1b demand), the user may choose for the following option.

The Modbus map could be structured such that the time and / or date registers are aligned in one contiguous block with the measurement variable, ie, registers are:

Register	
1000	HH (hour)
1001	MM (minute)
1002	SS (second)
1003	Variable 1 / ADC01 INUSE etc.
1004	Variable 2 / ADC02 INUSE etc.
1005	Etc.
N	Variable n

The 3rd party would poll the whole block and not individual registers, ie, function 3 read 1000 - n. The register HH / MM / SS now form a time stamp. Further, Modbus TCP gives a message identifier in its header which ensures that the reply received by the master is the correct reply to the poll the master sent.



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1.5.2 Custody Transfer parameters

The configuration of Custody Transfer parameters of the calculating and indicating device must comply with what is given below. At the time of initial verification it shall be clear which parameters must be considered as Weights & Measures parameters. The highest security level, being the Weights & Measures security level, shall protect these parameters. The password necessary to change Weights & Measures parameters shall only be known to bodies that are accredited for changing and approving of Weights & Measures parameters.

Each parameter has a specific number (for instance 17.5), that can be used for direct access and presentation on the display, and represents the parameter position in a menu matrix. Regarding these numbers, they are the typical display numbers for a particular application. However, should the application change slightly, for example by introducing valve control or by changing the density measurement philosophy, then most of the display numbers will get moved around. This would also be the case if a station or additional streams were to be used instead of a single stream/meter run.

Because of that, during verification of the FloBoss S600 Flow computer or S600+ Flow computer in the field **a list of the applicable parameters, with their numbers and values or settings, shall be available.**

Parameter name	Setting
Base temperature	1)
Vapour pressure mode	1)
LF C/O limit (min. mass flow)	1)
Pressure source selection	1)
Temperature source selection	1)
Density source selection	1)
KDPF	1)
Density calibration pressure	1)
KTPF	1)
Temperature	1)
Pressure	1)
Pressure limits	1)
Density	1)
Density limits	1)
Volume conversion source selection	1)
Volume conversion limits	1)
Volume conversion methods	1)
Standard density source selection	1)
Standard density limits	1)
Temperature input scale	1)
Alarm mode (fixed item)	latched



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Parameter name	Setting
Alarm enable (fixed item)	yes
Flow Integral Acceptance	2)
Totals reset	default = idle
PC-setup	disable
Slave address (if applicable)	1)
Conversion table selection	1) (Depending on the (application)).
Compressibility method	1) (Depending on the (application)).
Rounding	disabled
alpha source selection	1)
beta source selection	1)
CTL source selection	1)
CPL source selection	1)

- 1) This value shall be determined and motivated by the manufacturer or the user.
- 2) This value shall be determined and motivated by the manufacturer or the user, or may be set to zero to disable the test.

1.5.3 Flow meters proving on a mass or volume basis.

1.5.4 Sampler interface and control for one or multiple streams

1.6 Conditional Shapes

1.6.1 Presentation on the display

Basic delivery display for one meter at a time.

Custom display may give information for more than one meter at a time. In this case meter identification shall be on the display.

1.6.2 Printed Ticket

In applications where volume conversion is performed and a ticket printer is connected, at least the following is printed on the ticket:

- a unique print-identification;
- the converted volume, expressed in SI-units;
- an identification of the measured liquid.

1.6.3 In applications where no volume conversion is carried out and a ticket printer is connected, at least the following is printed:

- a unique print-identification;
- the volume at metering conditions, expressed in SI-units;
- an identification of the measured liquid.

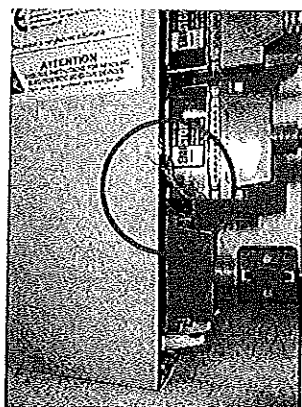


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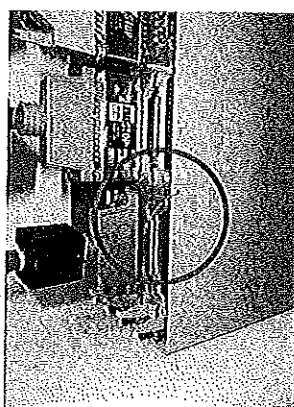
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2 Seals

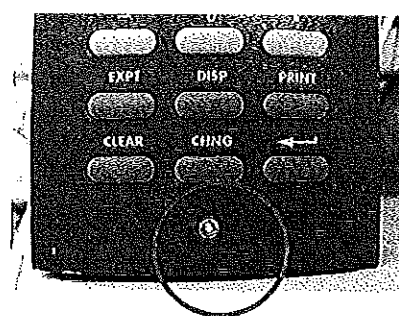
- 2.1 After placing the security level 1 jumper in the correct position, the housing has to be sealed against unauthorized opening.



Seal position rear left



Seal position rear right



Front can be sealed against removal with a seal sticker over the screw.

3 Conditions for Conformity Assessment

- 3.1 If the electronic calculating and indicating device is applied in a measuring system:
- 3.1.1 The electronic calculating and indicating device must be constructed in accordance with the Description and Documentation Folder appertaining to this Parts certificate.
- 3.1.2 The seals shall be applied as described in chapter 3.
- 3.2 The Parts Certificate may be used without permission from the holder of this document.

4 Test reports

An overview of the performed tests is given in the following test reports, issued by NMI Certin;

- CVN/204736/01
- NMI-10200876-1
- NMI-10200876-2
- NMI-12200241-1