



Parts Certificate

Number : **TC8219** revision 5
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".
- European Standard EN 12405-1/A1 Edition 2006 "Gas meters – Conversion devices – Part 1: volume conversion".

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Measuring Instrument An **indicating device for a gas meter** with additional volume conversion features.

Type : FloBoss S600 Flow computer or S600+ Flow computer
Conversion principle : PTZ
Device type : 2
Mechanical environment 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 TC8219 revision 5;
- Documentation folder number TC8219-2.

Remarks This TC8219 revision 5 replaces the previous TC8219 revision 4.
The documentation folder is not changed.

Issuing Authority **NMI Certin B.V.**
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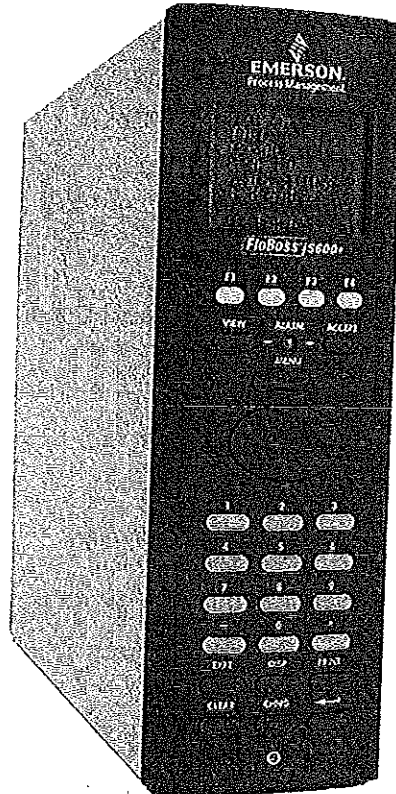
1 General information about the electronic indicating device

Properties of this indicating device for a gas meter with additional volume conversion features, mentioned or not, shall not be in conflict with the Legislation.

The indicating device is a so-called type 2 device, which can be fitted with external separate transducers for pressure, temperature (PTZ) and gas composition. One up to ten volume or mass input signals can be handled.

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.

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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1.1 Essential parts

The indicating device is composed of the following parts:

Part	Type	Documentation	Remarks
Processor board	FloBoss S600 CPU board P152.R4	8219/0-01, -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.	8219/0-03, -04	
Intelligent I/O board	Daniel Spectra 600 type P144.R4,	8219/0-05, -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.	8219/0-07, -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.	8219/0-09, -10	Brand: either Daniel or Emerson Process Management.
Display board with display device;	Data Vision SS-21V0	-	OEM device.
S600 Power and connector board	P155.R2	8219/0-11, -12	-
Spectra 600 HART board	P188.R2	8219/2-13, -14	HART communication interface.



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1.2 Essential characteristics

1.2.1 Software specification (refer to WELMEC guide 7.2, issue 5):

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

1.2.2 Software versions

FloBoss S600	
software version	checksum
05.35g	-
05.35i	-
05.35l	-
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

Remark: The software version can be read on the display by selecting System settings / Application SW and System settings / File CSUM.

- 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, for instance from a turbine meter, a Coriolis meter or an Ultrasonic meter. 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.

1.2.4 Conversion

The conversion is performed according to the following formula as stated below:

$$V_b = V \times \frac{p_{abs}}{p_b} \times \frac{273,15 + t_b}{273,15 + t} \times \frac{Z_b}{Z}$$



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Symbol	Represented quantity	Unit
V_b	volume at base conditions	m^3
V	volume at measurement conditions	m^3
P_{abs}	absolute pressure at measurement conditions	bar
p_b	absolute pressure at base conditions	bar
t	gas temperature at measurement conditions	$^{\circ}C$
t_b	temperature at base conditions	$^{\circ}C$
Z_b	compression factor at base conditions	-
Z	compression factor at measurement conditions	-

1.2.5 Compression

The correction for the deviation from the ideal gas law is calculated by using the NX19 algorithm or the SGERG algorithm or the AGA 8-DC92 algorithm. The gas properties used by the algorithm are either programmed in the EVCD as fixed parameters or come as actual values from a gas chromatograph, either via RS232c, RS485 or Ethernet data connections. If the connection between the EVCD and the gas chromatograph is broken or if the gas chromatograph is defective, the EVCD raises an alarm.

When using a fixed compression factor (T or PT conversion), the pressure and temperature range are limited such, that the error of the EVCD remains within the maximum permissible error limits.

1.2.6 Other calculation methods

Energy calculation on the basis of ISO 6976.

1.2.7 Presentation of legal data

By pressing the menu key and the arrow keys, the display will indicate the relevant data as below mentioned in paragraph 1.5.3.

The menu structure, keyboard, display and (alarm) indicators are further described in chapter 4.1 up to and including 4.7 of the flow computer's manual, identified as A6115.

The energy totalizers are not part of the legal data.

1.2.8 Accountable alarms

The EVCD has to be configured such that an accountable alarm will be generated when a system alarm arises (failures in the flow computer itself) and also if extreme values are measured by the EVCD or the measurement transmitters. An accountable alarm will be generated as well if otherwise then described above (e.g. by the impulse control, if applicable) a defect arises (input alarms). See paragraph 4.8 of the flow computer's manual.

Accountable alarms cause the registration of the volume at measurement conditions and the volume at base conditions in the main totalizers to stop, while the registration of the volume at measurement conditions is continued in alarm totalizers.

By pressing the view key the displays shows information about latched and actual alarms. New unacknowledged alarms cause the alarm LED to flash red (in case of a system alarm yellow), which changes to solid red as soon as the alarm is acknowledged by pressing the "Accept" key. If the alarm is no longer present, after acknowledging and clearing, the LED will glow green and the counting in the main totalizers is continued.



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Apart from registration in the main totalizer, during the alarm the volume at measurement conditions will also be registered in the alarm totalizer.

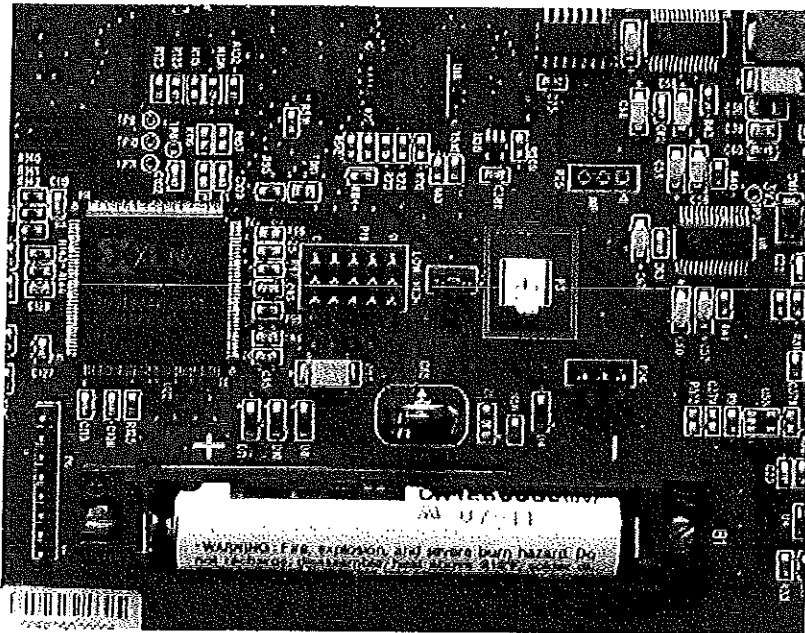
The alarm indication can be reset by using the keyboard or the configuration software ("reset alarm" button). However, it is not possible to clear an alarm as long as the cause of the alarm is still present.

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. This only applies to Coriolis applications using a MODBUS interface.

1.2.9 Security

- 1.2.9.1 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.



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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.

- 1.2.9.2 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.
- 1.2.9.3 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.
- 1.2.9.4 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.
- 1.2.9.5 Communication using a Modbus protocol to host DCS/Supervisory.
- 1.2.9.6 Communication using a Modbus protocol to a flow meter with the capability to handle Modbus communication.
- 1.2.9.7 Preset functions
- 1.2.9.8 Valve status

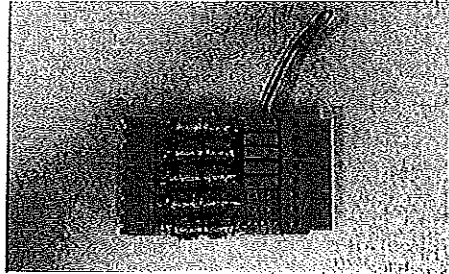
1.3 Essential shapes

- 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. Detailed information is shown in the documentation, page 2. This does not apply when the metal case as mentioned in the above article 1.3.2.1 is applied.

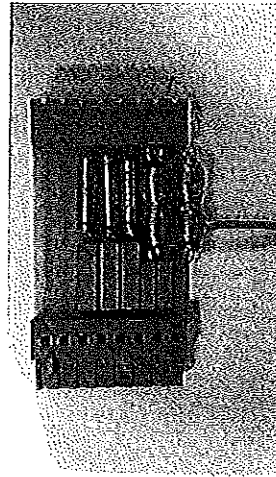


Description

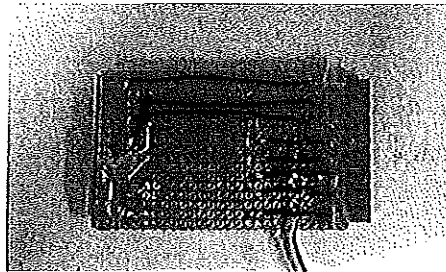
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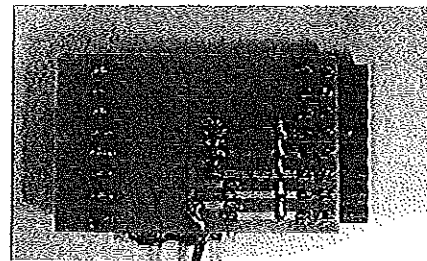
Type 1, component side



Type 2, component side



Type 1, track side



Type 2, track side

Photos above: Filters in power line

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



Description

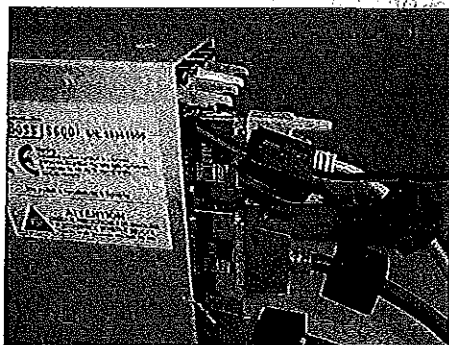
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1.3.2.4 HF Filter units on all SKT-A and SKT-B connectors, make Selectronix, typlified as EMI STOP T filter, or similar.

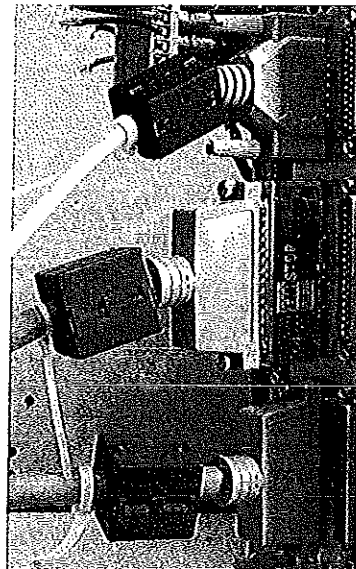
Ferrites, make Kitagawa, type KCF-100 (impedance = 150 ohm @ 25 MHz), or similar.

All cables are shielded.

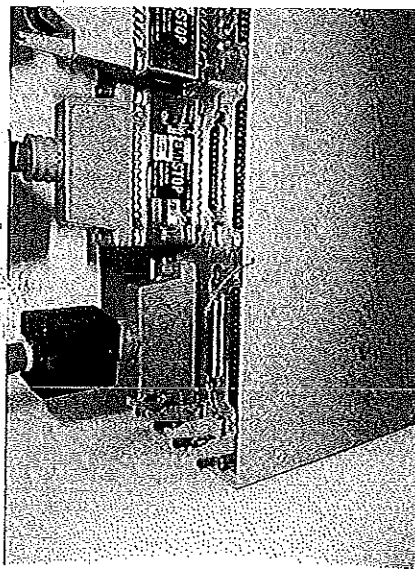
Applications of both the HF filter units and the ferrites are demonstrated in the photographs below.



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



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1.3.3 The nameplate is legible bearing at least the information as mentioned in the regulations on electronic gas volume conversion devices. If the EVCD also functions as a gas meter primary indicating device, the gas meter's serial number and year of manufactory shall also be part of the inscriptions.

1.3.4 Seals: see chapter 2.

1.4 Conditional parts

1.4.1 Housing

The EVCD has a metal housing with a plastic front, which has sufficient tensile strength. For an example of the housing see the appertaining documentation, page 2.
Metrological important parts only are accessible after breaking one or more seals.

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

1.4.3 External power supply The EVCD is supplied by an external 24V dc power supply.

1.4.4 Digital in- and outputs

The indicating device is equipped with several in- and outputs.

1.5 Conditional characteristics

1.5.1 The maximum frequency of HF impulses shall not exceed 10 kHz at Q_{max} .

1.5.2 Use in a network

FloBoss S600 Flow computer or S600+ Flow computer 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 address. 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:



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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, for instance 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.

1.5.3 Custody Transfer parameters

The configuration of Custody Transfer parameters of the 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
Pressure source selection	1)
Pressure	1)
Pressure limits	1)
Pressure input scale	1)
Temperature source selection	1)
Temperature	1)
Temperature limits	1)
Temperature input scale	1)
Alarm mode (fixed item)	latched
Alarm enable (fixed item)	yes
Totals reset	default = idle
PC-setup	disable



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Parameter name	Setting
Slave address (if applicable)	1)
Compressibility method	SGERG or AGA 8-DC92 NX19
Rounding	disabled
Z source selection	1)
Product settings / table select	1)
Fluid settings [u, k, RD@reference temperature]	1)
Product Quality settings [GC analysis, CV]	1)
Flow Integral Acceptance	2)
Flowmeter settings(Pulse) [kFactor Curve, MF]	1)
Base Conditions [Tb, Pb, Air dens@base]	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.

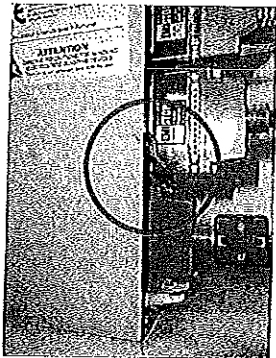
1.6 Non-essential characteristics

1.6.1 Digital, analogue and pulse outputs

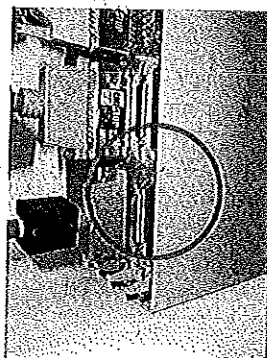
2 Seals

The following items are sealed:

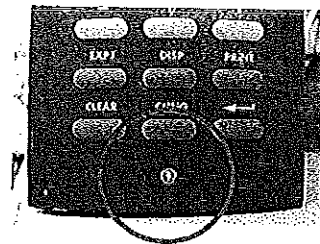
- the nameplate with the housing;
- a plate covering the access to the terminals of the pressure- and temperature transmitter;
- the housing, thus covering the access to the security level 1 Jumper and the processor board (see pictures below).



Seal position rear left



Seal position rear right



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



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3 Conditions for Conformity Assessment

- 3.1 If the indicating device for a gas meter with additional volume conversion features is applied in a measuring system:
 - 3.1.1 The indicating device for a gas meter with additional volume conversion features 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-12200241-2