Universal measuring instrument for Pressure, Level, Temperature and Volume Flow measuring

Typ SMALL-EX®

I Ex ia/ib I Ma/Mb
Ex ia/ib I Ma/Mb
PO Ex ia I X

II 1/2 G Ex ia IIC T4/T6 Ga/Gb
Ex ia IIC T4/T6 Ga/Gb
General Information

Dear Customer,

The flow control device purchased, is a product of Grünewald GmbH, 59069 Hamm and is manufactured as a SMALL-Device for Pressure, Level and Temperature measuring for the use for liquid media in closed and filled systems.

To ensure long term and safe operation of the control device, read the operating manual attentively.

If further information is required please do not hesitate to contact our technical support via Grünewald GmbH, Oberallener Weg 7, 59069 Hamm, Tel. +49 (0)2385 922670, Fax +49 (0)2385 922672.

Internet: www.gruenewald.eu
E-Mail: info@gruenewald.eu

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1. Introduction

This operating manual will assist to operate SMALL-Device for Pressure, Level and Temperature measuring in a safe, proper and economical manner.

Observing the instructions of this manual will:
• Increase reliability and lifespan of the control facility.
• Prevent possible danger.
• Avoid down times caused by failures and repairs.

This manual must:
• be present whilst any installation, maintenance and repair work is performed.
• be read, acknowledged and applied by any person performing tasks to and at the SMALL-Device for Pressure, Level and Temperature measuring.

Grünewald monitoring and measuring devices are delivered ready for installation. No other preparations of the device are necessary.

The general installation and operating manuals as well as the product information’s do therefore refer to the mechanical and electrical data of the individual device or assembly.

The SMALL-Device for Pressure, Level and Temperature measuring is manufactured to latest technical and safety relevant standards, rules and regulations. However, abuse and operation of the device within incorrect applications may result in serious injury or death of the user and/or a third party, as well as it may endanger equipment and other property.

2. General

2.1 General information to the operating manual

This operating manual contains all necessary information required, to ensure correct and safe installation as well as operation of the device. The manufacturer or distributor must be contacted for further information and assistance, if arising difficulties and problems can not be solved within the operating manual provided information. Changes to specification and design as well as improvements to the device are subject to change without notice and are fully to the discretion of the manufacturer. Users of this operating manual must fulfil required qualification standards. Operating personnel must be trained in accordance to the operating manual.

2.2 General safety instructions

Read the operating manual of the SMALL-Device for Pressure, Level and Temperature measuring prior commencement of any work and acknowledge instructions during execution and operation.

The correct condition and operation of the device as well as the compliance with safety rules and regulations is to the full responsibility of the operator. The SMALL-Device is manufactured to latest technical and safety relevant standards, rules and regulations. However, abuse and operation of the device within incorrect applications may result in serious injury or death of the user and/or a third party, as well as it may endanger equipment and other property.
Use and operation of the flow control device is only permitted when:

- the compliance with the intended purpose of use is granted.
- the condition of the device complies with safety relevant rules.

Take note of the technical data of the SMALL-Device for Pressure, Level and Temperature measuring and the ambient temperatures. The intended purpose of use of SMALL-Device for Pressure, Level and Temperature measuring is described with in chapter 8 of this Documentation and must be acknowledged. Awareness of the basic safety instructions and rules is the minimal requirement for the safe use and trouble free operation of SMALL-Device for Pressure, Level and Temperature measuring. Additionally, all site specific rules and regulations, such as, but not limited to, occupational health and safety rules, rules and standards for erecting and using of electric and mechanical facilities, as well as radio noise suppression rules and standards, must be complied with.

Pay attention and care to tidiness of workspace during performance of repair and maintenance tasks. Do not eat or smoke during work. Unauthorized altering or modifying the equipment will cause loss of any warranty and liability provided by the manufacturer.

Take note of the operating manual and pay special attention to safety symbols and safety instructions on the device and the documentation. Please store the operating manual carefully.

3. Obligations of the Operator

It is the full responsibility of the operator that only persons complying with below outlined regulations are authorized to work on and with the devices.

Persons authorised must,
- be confident and trained with rules of occupational health and safety and the handling and operation of the equipment.
- has read, understood and acknowledged the safety instructions and warnings of this operating manual and all other, with the device associated documentations.
- is examined for compliance and consciousness of work place safety rules on regular bases.

Installation, maintenance and repair work must be performed by trained and qualified personnel only. Faults, which may influence safety, must be rectified immediately.

4. Obligations of User Personnel

Personnel authorized to fulfil tasks at the SMALL-Device for Pressure, Level and Temperature measuring must be familiar with the operating manual.

Persons authorized to work on the device must permanently commit them self's to:
- Acknowledge the basic occupational health and safety rules at all times.
• Read and acknowledge safety instructions and warnings of this operating manual.

4.1 Qualified personnel

These are persons, familiar with the installation, assembly, commissioning and operation of the product. Furthermore these persons must be qualified and trained for tasks, these persons are authorized to perform. (E.g. training and obligation to maintain required operating conditions in accordance to regional and site-specific rules and regulations).

Education or training for care and use of safety and protective equipment, according relevant standards of safety techniques.

5. Warranty and Liability

Our standard terms and conditions of sale and delivery apply, unless other conditions for warranty and liability were explicitly mutually agreed upon. Claims of warranty or liability leading back to any of the below described causes is not legitimate.

• Using the SMALL-Device for Pressure, Level and Temperature measuring not in compliance with the intended purpose of use of this item.

• Incorrect installation, commissioning, operation and maintenance of the SMALL-Device for Pressure, Level and Temperature measuring

• Operation of the SMALL-Device for Pressure, Level and Temperature measuring in conjunction with defective safety devices or in correctly installed safety and protective devices.

• Neglecting of instructions regarding transportation, storing, installation, commissioning, operation and maintenance of the SMALL-Device for Pressure, Level and Temperature measuring

• Unauthorized modification or adjustments of the SMALL-Device for Pressure, Level and Temperature measuring.

• Inappropriate condition monitoring of parts subject to wear.

• Incorrect repairs, inspections and maintenance.

• Catastrophic failures caused by external forces and force majeure.

Any liability for damages caused by in correct operation of the SMALL-Device for Pressure, Level and Temperature measuring will be rejected.
6. Warnings and Safety relevant Standards

For references to special hazards and uncommon information’s signal the terms DANGER, WARNING, ATTENTION and REMARK are used within this operating manual.

**DANGER**: Neglecting may cause danger to life and/or serious damage to property.

**WARNING**: Neglecting may cause, serious injury and/or damage to property.

**ATTENTION**: Neglecting may cause, injury and/or damage to property.

**REMARK**: Indicates that special attention to technical correlations is required.

To prevent injury and damage of property due to failure of the device, the acknowledgement of the not specially marked instructions for transportation, installation, product range and maintenance is an absolute necessity.

7. Observing of Environmental Rules and Regulations

Rules and regulations for waste prevention and disposal must be followed at all times when working with or at the SMALL-Device for Pressure, Level and Temperature measuring Materials that may endanger and pollute water such as:

- Grease, oil and Lubricants
- Hydraulic fluids
- Coolants
- Cleaning fluids containing solvents

must not be emitted to surrounding soil, waters and drains. Such materials must be stored, transported and caught, in suitable containers. For safe and environmentally friendly disposal of hydraulic fluids and with such fluids contaminated materials, national and international laws, rules and regulations must be acknowledged.
8. Intended Purpose of Use

The SMALL-Device for Pressure, Level and Temperature measuring is exclusively designed to monitor liquid mediums within closed and filled systems. Any adaptation as well as modification or extension of the device, not complying with the intended purpose of use is prohibited and requires the explicit and exclusive approval of the manufacturer.

Acknowledgement of the operating manual and instructions for inspection and maintenance as well as the observance of inspection and maintenance intervals are subject of the intended purpose of use.

Any damage that may arise out of the incorrect use will not be at the responsibility of the manufacturer. The sole risk devolves at the user.

8.1 Range of Application

The usage of the SMALL-Device for Pressure, Level and Temperature measuring is only allowed in pipelines which are suitable in diameter and pressure, and are only for water or water like mediums without a great deal of pollution.

Changes to specifications are only permitted prior to consent from Grünewald GmbH, 59069 Hamm.

9. Installation / Commissioning / Assembly Instructions

- **DANGER**
  - Take notice of operating pressure and pressure level
  - Use device with fluids specified only
  - Take notice of maximum flow
  - Bleed system prior start up

- **WARNING**
  - Take notice of flow direction
  - Do not install directly after a pump
  - Do not weld with built-in unit!
  - The device will be destroyed

- **ATTENTION**
  - Seal during installation
  - Use circuit diagram when wiring
  - Check circuit to prevent overloading

- **NOTE**
  - If required take notice of mounting position
  - Notice the specifications of the switch and gauge tolerances
  - A tranquiliser length of 5 x pipe diameter is recommended
  - The System pressure must exceed the pressure drop caused by the device
  - Overhead assembly only for clean medium
9.1 Installation directions for the SMALL differential pressure measuring instrument

When installing-/commissioning the differential measuring instrument the following installation directions must be heeded:

(For a secure and safe operation of the differential measuring instrument, we recommend an installation frame from Grünewald GmbH)

The installation of the measuring instrument with frame should be carried out as follows:

![Diagram of installation directions]

**Commissioning the Differential pressure measuring instrument**

Before installing the frame, all of the valves must be closed and the connection pipes must be pressureless. Connection of the pressure pipes and electrical parts are only allowed to be carried out by qualified personnel. The technical handbook must be read and understood before installation.

1.) At first open valve in the middle (C) position.
2.) Then left valve (A) and right valve (B) in "open" position
3.) Let removing whole air from system.
4.) Close middle valve (C).
5.) Measurement can be started.

**Notice/Important:**

If more than 7,5 / 15 bar maximal pressure is applied from one side, the measuring instrument will fail.

<table>
<thead>
<tr>
<th>Measuring Range 0 – 2 bar:</th>
<th>max. Differential pressure 7,5 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring Range 0 – 5 bar:</td>
<td>max. Differential pressure 15 bar</td>
</tr>
</tbody>
</table>
9.2 Installation information only for the pipe less Small level measuring device.

When installing/commissioning the pipe less level measuring device, the following instructions must be heeded to ensure that the level device operates correctly.

Owing to the low operating area of the level device, it must not be mounted next to a closed shut off valve or in/outlet pipe.

Strong circulation velocity inside the measuring tank may lead to incorrect measuring, if needed, the measuring device can be separated by mounting a bulkhead in front of the measuring device.

The housing connection for the internal pressure equalisation, must be mounted facing downwards to protect the device from moisture (see sketch).

9.3 Installation information for the Small temperature measuring device.

When installing/commissioning the temperature measuring device, the following instructions must be heeded to ensure that the temperature device operates correctly.

The device probe length must be coherent to the pipe diameter.

The measuring device can be directly installed into a maximum pressure system of 80 bars (1160 psi).

When using an immersion sleeve, the temperature device must have adequate conductivity paste between the housings. (Art Nr 7-05-99-024).
9.4 Installation information for the Small Volume Flow measuring instrument

- only for use in defined medium (water)
- pay attention to maximum volume flow
- pay attention to maximum pressure
- exhaust the system before commissioning
- attend the direction of flow
- avoid the installation with adaptors/reducers and 90° bends
- straight unimpeded in- and outflow section of 5xD (before and behind the instrument) is recommended
- avoid to install the instrument directly behind a pump station
- use seals at the mechanical connection

9.5 Installation information SMALL-V "MicroFlow"

It is important to ensure that magnetic and inductive effects are minimized.

The device should only be horizontally mounted with the electronics up through the mounting holes on the bottom.

Avoided any type of mechanical Adapters (like connect-o) unless they are pre-assembled by Gruenewald.
9.6 Installation information SMALL-V “ViscoFlow”

The SMALL “ViscoFlow” is made to measure the volume flow of pure oil. It is important **not** to use this instrument for other liquids especially water!

It is important to ensure that only filtered oil flows through the instrument.

Because of the measuring principle the ViscoFlow generates a differential pressure in the system. Make sure the differential pressure is much lower than the system pressure! Please ask Grünwald for the differential pressure of your instrument which depends on the used instrument, max. volume flow and viscosity of the measured oil.

You do not need to install the instrument in special direction, horizontal or vertical. You also do not need to use in- and outflow section of 5xD.

It is important to ensure that magnetic and inductive effects are minimized.
9.7 Installation information SMALL Inclinometer

The sensor is mounted on a level, even in the X and Y plane horizontally aligned surface. The mounting surface must be free of any irregularities and surface contaminants otherwise. The mounting of the tilt sensor must be carried out safely and permanently resistant in accordance with local conditions.

Mounting position: A B C D

The angle association with the x- and y- axis is seen from the axis from zero:

- Clockwise: Positive  e.g. -70° ... +70°
  e.g. 4 ... 20mA

- Counter clockwise: Negative  e.g. +70° ... -70°
  e.g. 20 ... 4mA

The relevant axis (X or Y) applies when viewing always considered the evaluated rotational axis.
10. Connections

<table>
<thead>
<tr>
<th></th>
<th>Wire connection [Wire type A, DIN EN 50394-1]</th>
<th>Wire connection</th>
<th>Plug connector PROMOS system</th>
<th>Plug connector HARTING system</th>
<th>Plug connector SOURIAU system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage $V_{CC}$</td>
<td>12V DC white</td>
<td>Wire 1</td>
<td>PIN 7</td>
<td>PIN 1</td>
<td>PIN 1</td>
</tr>
<tr>
<td></td>
<td>24V DC brown</td>
<td>Wire 2 $- I_{out}$</td>
<td>PIN 5</td>
<td>PIN 2</td>
<td>PIN 2</td>
</tr>
</tbody>
</table>

**SMALL ... F**

![Diagram](image1)

- green = C
- yellow = E
- (galvanically separated)
- PIN 4 = C
- PIN 5 = E
- PIN 3 = C
- PIN 2 = E

**SMALL ... S0**

![Diagram](image2)

- Wire 2 $- I_{out}$
- Wire 3 $+ I_{out}$
- PIN 4 $- I_{out}$
- PIN 5 $+ I_{out}$
- PIN 3 = Screen
- PIN 2 $- I_{out}$

**SMALL ... S4**

![Diagram](image3)

- Wire 5 (N) $- I_{out}$
- Wire 4 (T) $- I_{out}$
- Wire 3 $= I_{out}$
- PIN 5 = Screen
- PIN 3 = C
- PIN 2 = E

**SMALL N+T ... F**

![Diagram](image4)

- Wire 5 (N) $- I_{out}$
- Wire 4 (T) $- I_{out}$
- Wire 3 $= I_{out}$
- PIN 5 = Screen
- PIN 3 = C
- PIN 2 = E

**SMALL N+T ... S0**

![Diagram](image5)

- Wire 5 (N) $- I_{out}$
- Wire 4 (T) $- I_{out}$
- Wire 3 $= I_{out}$
- PIN 5 = Screen
- PIN 3 = C
- PIN 2 = E

**SMALL N+T ... S4**

![Diagram](image6)

- Wire 5 (N) $- I_{out}$
- Wire 4 (T) $- I_{out}$
- Wire 3 $= I_{out}$
- PIN 5 = Screen
- PIN 3 = C
- PIN 2 = E

**SMALL ... U**

![Diagram](image7)

- Wire 3 $= U_{out}$
- PIN 4 $= U_{out}$
- PIN 5 $= U_{out}$
- PIN 3 = Screen
- PIN 2 $= U_{out}$

**SMALL 24...S4 (2-Leiter)**

![Diagram](image8)

- white (+24V) $- I_{out}$
- brown (0V) $- I_{out}$
- wire 1 (+24V) $- I_{out}$
- wire 2 (0V) $- I_{out}$
- PIN 1 (+24V) $- I_{out}$
- PIN 2 (0V) $- I_{out}$
- PIN 3 $= U_{out}$
- PIN 2 $= U_{out}$
If not otherwise stated, the supply voltage and the exit signal are not galvanically separated.

Devices with 2 combined measuring systems (for example level and temperature measuring), the power supply must be used corporately by one power supply unit exclusively.

When connecting the power supply cable, the earthing from the supply unit must be connected.

11. Operation, Maintenance and Repair

Rules and regulations for workplace safety and occupational health and safety apply for the operation of the device.

Modifications, add-ons and / or changes to the SMALL-Device for Pressure, Level and Temperature measuring may influence safety and must not be performed unless approved by the manufacturer.

The devices are maintenance-free apart from periodically cleaning which depends on the amount of contamination in the medium and the surrounding environment.

- Appropriate workshop equipment is absolutely necessary for the execution of maintenance measures.
- Regulations for electrical equipment must be observed.
- Incorrect use, operation or repair may result in severe injury or death.
- Prior any repair or maintenance task commences local rules and regulations must be acknowledged.

Special note for the explosion-protection:

- The devices may be installed inside the - group 1, category M1
  - group 2, category 1/2

  The construction of the installation of the intrinsically safe electric circuit is to conduct accordingly of the effective mounting-appointment (by specialists).
  (Competence of assembler verified, protected transferring of the intrinsically safe electric circuit, etc.)

- The devices are constructed in the protection category IP67 and the level instruments IP 54 and therefore they must be protected accordingly at adverse environmental requirements for example splash water or dirt above pollution degree 2.

The EG-mark-verification certificate contains “special term” restrictions exclusively on the mechanical device-mounting by usage in group 2.
By usage of the devices in group 1, no special requirements exist.

Excerpt from the type examination certificate:

(17) Special terms for safe application:
17.1 The installation of the sensor and the connector when mounting the device on the wall, that category 1 G equipment needs, must be carried out in such a way that the protection class IP67 according to EN 60529 is heeded and that the metal sensor housing/connector pin inside the potential equalisation is taken into consideration.

17.3 The technical information from the manufacturer of the application of the sensor in connection with aggressive and/or corrosive mediums and to prevent mechanical hazards are to be heeded.

- The device must only be used according to construction regulations.
- The connection to the power supply must be checked and tested.
- Fluid technical connection: before connection to the pipeline, check pipeline for pollution and contamination.
- Only after correct fitting and examination are the medium supply to be opened.

The electrical connections are to use the connection clamps and/or plug. A professional and secure installation and a continual maintenance of the IP protection is required.

12. Transportation / Storage

- Transport temperatures shall not exceed the range of -20°C to 60°C within a dry and clean environment.
- Protect against external forces.
- Storage temperatures shall not exceed the range of -20°C to 60°C within a dry and clean environment.
- To prevent any condensation of water when stored in rooms with a high degree of humidity, measures such as heating of the room or application of drying agents is required.

13. Description of the device

The universal measuring device type SMALL is an uniformed standardised device for Pressure, Level and Temperature measuring. The devices are made to withstand very hard and difficult areas of deployment. Because of their very solid construction they are able to withstand very high levels of burden.

The round device version are fitted with or without a digital display optionally. The In-Line version are categorically not fitted with a digital display.

The mechanical fitting can be optionally be fitted with a thread selectively, flange or a coupling system. The electrical fitting can be optionally fitted with a coupling plug in any chosen form, a PROMOS connector or wire connection in various lengths.

For the subsequent measuring value transmission there are various exit signals available, they are 5 – 15 Hz optionally 0 – 20 mA or 4 – 20 mA and optionally a currant with * to ** V.

When using measuring devices with stepped sensor and evaluation unit, the corresponding sensor must be used.
14. Functioning of the SMALL-Device

The SMALL-Device for Pressure, Level and Temperature measuring transforms the physical quantities of the medium (pressure, temperature) into an electrical signal. These measurable quantities are available and stand behind the following superior systems (control system).

The measuring signals can be:
- Frequency: (5-15Hz)
- Current: (0/4-20mA)
- Voltage: (*-*V)

A direct display of the locally measured data is possible, using the optional digital display. Because of good readability the digital display is generously dimensioned. Because of safety technical reasons the exit signals have a minimal offset tolerance programmed.

These are as follows:

- Frequency: +0,05Hz (5,05Hz)
- Current: +0,1mA (0,1/4,1mA)
- Voltage: +0,1V (*+0,1V)

The following signal evaluations are to be accordingly matched and adjusted.

If the range is exceeded by more than +10%, a fault message is given in the form of P_High, and a P_Low is displayed if the measuring range is below -10%.

The display also performs an internal system check at regular intervals.

15. Hazards

To avoid risk of damage or injury, the safety instructions of this operating manual must be applied and carried out!

When fitting or dismantling the device, the safety regulations of the country regarded must be applied by. Especially when working on electrical components, are the work safety rules to be followed. In Germany the ZH 1/94 “Safety handbook for qualified craftsmen” is to be applied.

It is not known that the device concerning the guidelines 89/336/EWG is not affected against electromagnetic disturbance that occur during normal operating procedures.

Special terms, that are given from the EMV-environment are to be applied and the manufacturer is to be notified.

Dangers that arise whilst fitting and connecting the device are to be considered and the corresponding actions are to be taken and a hazard analysis is to be rendered.

16. Technical assistance

For assistance in an event of malfunctioning or failure of the device please contact

Grünewald GmbH, 59069 Hamm

Tel. +49 02385 922670, Fax +49 02385 922672

or E-Mail: info@gruenewald.eu

17. Scope of delivery

- SMALL-Device for Pressure, Level and Temperature measuring
- Operating manual
- Additional documentation: Datasheets
# 18. Model Key

**SMALL-V/**/**/*** ***/**/**/***/**/**/**/**/*/*/*

<table>
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<tr>
<th>Measure mode</th>
<th>Constr.</th>
<th>Nominal Voltage</th>
<th>Range</th>
<th>Scale Unit</th>
<th>Mech. connection</th>
<th>Electr. connection</th>
<th>Display</th>
<th>Sensor adjustment</th>
<th>Port 1</th>
<th>Port 2</th>
<th>Port 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>*** [0.***]</td>
<td>*** [F***]</td>
<td>G [inside thread]</td>
<td>** [System **]</td>
<td>G [HARTING]</td>
<td>L...m [Leitung mit Lange in m]</td>
<td>** [no display]</td>
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**SMALL-P/**/**/*** ***/**/**/***/**/**/**/**/*/*/*

<table>
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<th>Port 2</th>
<th>Port 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>*** [0.***]</td>
<td>** [Special]</td>
<td>G [1/4 A]</td>
<td></td>
<td>S [SOURIAU]</td>
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<td>** [Special]</td>
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<td>O [Connect-O]</td>
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<td>H [HART]</td>
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subject to modifications 08/18
### SMALL-T

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<thead>
<tr>
<th>Meas. mode</th>
<th>Constr.</th>
<th>Nominal Voltage</th>
<th>Range</th>
<th>Scale Unit</th>
<th>Mech. connection</th>
<th>Electrical connection</th>
<th>Display</th>
<th>Sensor adj.</th>
<th>Port 1</th>
<th>Port 2</th>
<th>Port 3</th>
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<tbody>
<tr>
<td>T Temperature</td>
<td>RG [Round]</td>
<td>12 [12V DC]</td>
<td>12 [12V DC Extern]</td>
<td>&gt;0.1°C</td>
<td>[°C]</td>
<td>[°C]</td>
<td>A (with Display)</td>
<td>KG [Compact Design]</td>
<td>S0 [0-20 mA]</td>
<td>3-Wire</td>
<td>C [CAN-Open]</td>
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### SMALL-TS

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<th>Constr.</th>
<th>Nominal Voltage</th>
<th>Range</th>
<th>Scale Unit</th>
<th>Mech. connection</th>
<th>Electrical connection</th>
<th>Display</th>
<th>Sensor adj.</th>
<th>Port 1</th>
<th>Port 2</th>
<th>Port 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS Temperature-switch</td>
<td>RG [Round]</td>
<td>12 [12V DC]</td>
<td>12 [12V DC Extern]</td>
<td>&gt;0.1°C</td>
<td>[°C]</td>
<td>[°C]</td>
<td>A (with Display)</td>
<td>KG [Compact Design]</td>
<td>S0 [0-20 mA]</td>
<td>3-Wire</td>
<td>C [CAN-Open]</td>
</tr>
</tbody>
</table>
Other types of connections, fittings, measuring-ranges, ... on request.
19. Technical Details

Nominal voltage: 
7,5 – 14,0 V DC (3 – wire)
9,6 – 16,1 V DC (3 – wire)
20,4 – 26,6 V DC (2 – wire)
8,0 – 14,0 VDC (CANOpen)

Nominal current pro measuring system: 
12mA (Frequency output); 21mA with Dspl.
12/16 – 32mA (0/4–20mA currency output)
21/25-41 mA with Display
16mA (Voltage output); 25mA with Dspl.
31mA (incl. 20mA Output)
11mA (without 20mA Output)
With multiple measurements may be dependent on the configuration of the total rated current of up to 130mA at maximum expansion. Detailed data are available on request from the manufacturer.

Output Signal: 
5 – 15Hz using Optocoupler
0 – 10V active output (potential linked)
Working resistance min. 15KΩ
0/4 – 20mA active output (potential linked)
Working resistance max. 200Ω
CAN-Open (High speed)

Signal range: 
5 – 15,2Hz, 0 – 10,75V, 0/4 – 21,5mA

Dimensions: 
Round-Design: Ø = 50mm
In-Line-Design: Ø = 30mm
(without Sensor, without connector)
H = 55mm
L = 100mm

Weight: 
depending on type

depending on type

Environmental Temperature: 
-50 to +100°C at group I
-50 to +80°C at group II
and at level-measuring

Measuring ranges: 
Pressure: - 0 to 0,3bar - 0 to 0,5bar
- 0 to 1,0bar - 0 to 2,0bar
- 0 to 5,0bar - 0 to 10bar
- 0 to 20bar - 0 to 50bar
- 0 to 100bar - 0 to 200bar
- 0 to 400bar - 0 to 600bar
- 0 to 1000bar
(1000bar with reservation / after consulting)

Level: - 0 to ***mm
Temperature: - 0 to 40°C
- 0 to 60°C

Gauging accuracy: ± 0,5 % FS

EG- mark-verification- certificate:

- BVS 06 ATEX E 005 X
- IECEx BVS 09.0056X
- IECEx TSA 13.0023X
- ROSS DE.GB 05.W02997
- 18-ISA 15 0004-0

Marking:

I Ex ia/ib I Ma/Mb
Ex ia/ib I Ma/Mb

II 1/2 G Ex ia IIC T4/T6 Ga/Gb
Ex ia IIC T4/T6 Ga/Gb
PO Ex ia I X

We reserve the right to make changes to our equipment that are due to technical progress.
20.1 EG-Model test certificate
Module designed to be connected to a DEKRA-Device supply and signal circuit providing (a) absolute current, (b) voltage, (c) frequency, and (d) output impedance. The modules may be extended optionally with geographically separated 2x54 mm plug-in modules.

15.3.2.1 Current signal output, nominal: 50, 100, 200, 500 mA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>50 mA</th>
<th>100 mA</th>
<th>200 mA</th>
<th>500 mA</th>
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<tbody>
<tr>
<td>Voltage</td>
<td>DC 0 V</td>
<td>DC 0 V</td>
<td>DC 0 V</td>
<td>DC 0 V</td>
</tr>
<tr>
<td>Current</td>
<td>50 mA</td>
<td>100 mA</td>
<td>200 mA</td>
<td>500 mA</td>
</tr>
<tr>
<td>Power</td>
<td>N/A</td>
<td>2 W</td>
<td>5 W</td>
<td>10 W</td>
</tr>
<tr>
<td>Effective current</td>
<td>negligible</td>
<td>negligible</td>
<td>negligible</td>
<td>negligible</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>negligible</td>
<td>0.005 mV</td>
<td>0.01 mV</td>
<td>0.02 mV</td>
</tr>
<tr>
<td>Resistance</td>
<td>N/A</td>
<td>150 ohms</td>
<td>300 ohms</td>
<td>600 ohms</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-50°C ~ +150°C</td>
<td>-50°C ~ +150°C</td>
<td>-50°C ~ +150°C</td>
<td>-50°C ~ +150°C</td>
</tr>
<tr>
<td>Parameters</td>
<td>Interface 1 and 2 DC not present</td>
<td>Interface 1 and 2 DC not present</td>
<td>Interface 1 and 2 DC not present</td>
<td>Interface 1 and 2 DC not present</td>
</tr>
</tbody>
</table>

The effective current and voltage drop are given at nominal current and voltage. The temperature range is specified in manufacturer's documents.
<table>
<thead>
<tr>
<th>Parameter</th>
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<th>Type SMALL-TR</th>
<th>Type SMALL -TR</th>
<th>Type SMALL-TR-2</th>
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<tr>
<td>V_{max}</td>
<td>30 mV</td>
<td>30 mV</td>
<td>30 mV</td>
<td>30 mV</td>
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<tr>
<td>I_{max}</td>
<td>20 mA</td>
<td>20 mA</td>
<td>20 mA</td>
<td>20 mA</td>
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<tr>
<td>O_{max}</td>
<td>10 mV</td>
<td>10 mV</td>
<td>10 mV</td>
<td>10 mV</td>
</tr>
<tr>
<td>C_{eff}</td>
<td>3 µF</td>
<td>3 µF</td>
<td>3 µF</td>
<td>3 µF</td>
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<tr>
<td>G_{eff}</td>
<td>negligible</td>
<td>negligible</td>
<td>negligible</td>
<td>negligible</td>
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<tr>
<td>Z_{eff}</td>
<td>N/A</td>
<td>150 µm</td>
<td>150 µm</td>
<td>150 µm</td>
</tr>
<tr>
<td>Z_{internal} &amp; connected</td>
<td>N/A</td>
<td>50 µm</td>
<td>N/A</td>
<td>50 µm</td>
</tr>
<tr>
<td>Z_{internal} &amp; not connected</td>
<td>N/A</td>
<td>50 µm</td>
<td>N/A</td>
<td>50 µm</td>
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<tr>
<td>W_{max}</td>
<td>rectangular</td>
<td>rectangular</td>
<td>rectangular</td>
<td>rectangular</td>
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Notes:
- +23 V version
- +15 V versions
- +12 V versions
- suitable for multiple connections as specified in manufacturer's documentation
- N/A = not applicable
20.2 IECEx - Certificate

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: IECEx BVS 09.0096X
Issue No. 1

Status: Current

Date of Issue: 2012-07-24 Page 1 of 4

Applicant: Grünewald GmbH
Oberaller Weg 7
D-59069 Hamm
Germany

Electrical Apparatus:

Optional accessory:

Measuring Gages type SMALL

Type of Protection:

Equipment protection by intrinsic safety "I". Equipment with equipment protection level (EP) EP 3 Ga

Marking:
Ex ia IIC T6/75 Ga5b or
Ex ia IIC T6 Ga5b or
Ex ia IIB T6 Ga5c or
Ex ia IIB T6 Ga5b

Approved for issue on behalf of the IECEx Certification Body: P. Manda

Position: Deputy Head of Certification Body

Signature: (for printed version)

Date: 2012-07-24

1. This certificate and schedule may only be reproduced in full.
2. The certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the official IECEx Website.

Certificate issued by: DEKRA EXAM GmbH
Dienendenfelde 9
44699 Bochum
Germany

Page 1/1

Grünewald GmbH · Oberaller Weg 7 · D-59069 Hamm · Tel.: (+49) 0 2385 922670
Fax: (+49) 0 2385 922672 · www.gruenewald.eu · E-Mail: info@gruenewald.eu
20.3 IECEx – Certificate Australia

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

Certificate No.: IECEx T3A 13.0223X
Status: Current
Date of Issue: 2013-12-16
Applicant: Grünewald GmbH
Oberallener Weg 7
D-59069 Hamm
Germany

Electrical Apparatus: Measuring Gauge type SMALL

Type of Protection: Intrinsic safety ‘ia’

Marking: Grünewald GmbH
Measuring Gauge type SMALL

Approved for issue on behalf of the IECEx Certification Body: Debbie Wouters

Position: Acting Quality & Certification Manager

Signature: [Signature]
Date: 18 December 2013

Certificate issued by:
TestSafe Australia
919 Londonderry Road
Londonderry NSW 2753
Australia

subject to modifications 08/18
20.5 EAC Ex-Certificate
21 EU-Declaration of Conformity

EU-Konformitätserklärung

EU Declaration of Conformity

Im Sinne der: In the legal scene of:

- EU-Richtlinie Explosionsschutz 2014/34/EU
  EU-directive 2014/34/EU for equipment and protective systems intended for use in potentially explosive atmospheres
  explosion prevention

- EU-Richtlinie über die elektromagnetische Verträglichkeit EMV- Richtlinie 2014/30/EU
  EU-directive over the electromagnetic sociability EMV- guidelines 2014/30/EU

Für das: For:

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<tr>
<th>Bezeichnung / description</th>
<th>Kennzeichnung / marking</th>
<th>Zulassung / certification</th>
<th>Notifizierte Stelle / notified body</th>
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<td>Fuchsmühlenweg 7 D-09599 Freiberg</td>
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<tr>
<td>MAGIN-Ex®...</td>
<td>I M1 Ex ia I Ma</td>
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<td>D-44809 Bochum</td>
</tr>
</tbody>
</table>
Diese Konformitätserklärung wurde unter der alleinigen Verantwortung des Herstellers ausgestellt.
We herewith declare conformity of the above mentioned devices of Grünewald GmbH, Mess- u. Regeltechnik, with the general directives outlined in the actual edition of the guidelines (2014/34/EU, 2014/30/EU) for equipment and protective systems with the intended purpose of use within explosive environment / atmospheres, of the council for approximation of laws of the member states.
This declaration is valid for all issues produced in accordance to the manufacturing documents of the manufacturer, which also form part of this declaration.

Zur Beurteilung der Erzeugnisse wurden folgende Normen herangezogen: / Following standards were used for the assessment of the products:

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<thead>
<tr>
<th>Bezeichnung / description</th>
<th>LT. Lieferpapieren / according to delivery documents</th>
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<tbody>
<tr>
<td>Seriennummer / serial number</td>
<td>LT. Lieferpapieren / according to delivery documents</td>
</tr>
<tr>
<td>Der Hersteller / the manufacturer</td>
<td>Grünewald GmbH Tel.: +49 (0) 2385 / 922670</td>
</tr>
<tr>
<td></td>
<td>Oberallener Weg 7 Fax: +49 (0) 2385 / 922672</td>
</tr>
<tr>
<td></td>
<td>D- 59069 Hamm Mail: <a href="mailto:info@gruenewald.eu">info@gruenewald.eu</a></td>
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<table>
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</table>
Im Sinne der EG-Richtlinie Maschinen 2006/42/EG handelt es sich hier um eine auswechselbare Ausrüstung für eine übergeordnete Maschine. Die Gefährdungsanalyse der übergeordneten Maschine muss alle wesentlichen Risiken, die durch den Zusammenbau entstehen oder dem Hersteller nicht bekanntes EMV-Umfeld, überprüfen und in eine Risikokategorie einteilen. Entsprechende Maßnahmen sind durch die Gesamtmaschine zu gewährleisten.

For the purposes of the EC Machinery Directive 2006/42/EC, these are interchangeable equipment for a superordinated machine. The hazard analysis of the superordinated machine has substantially all the risks incurred by the assembly or producer check-known EMC environment, and classified into a risk category. Appropriate measures have to be guaranteed by the entire machine.