O P E R A T I N G M A N U A L

tina20e1

PSG100-SD
PSG101-S

Part Number
350-021
350-031

Remark
This Operation Manual is a supplement to the Operating Manual of the PSG100-SD/ PSG101-S.

DeviceNet Interface of the Pirani Standard Gauge

INFICON

General Note
The right of alterations in the design and the technical data is reserved.
The illustrations are not binding.

Contents

1 Baudrate and Address Switch

Alternatively you can choose between two kinds of baudrate installations:
- Auto - Baud - Rate - Detection

If the unit is switched on during data transfer on the network (minimum: 2 nodes installed with data traffic between these nodes) the unit detects automatically the installed baudrate on the bus.
- Preinstalled baudrate

You can install three baudrates (125kBaud, 250kBaud and 500kBaud) by using the address switches (see Fig 1).

The function of the address switches (Figure 1) is as follows:

Address	Function
0 - 64	MAC ID (Address selection by address switches)
90	Baudrate 125 kBaud
91	Baudrate 250 kBaud
92	Baudrate 500 kBaud
99	Initialisation with default values and auto-baudrate detection

How to install a fixed baudrate:
- Switch off the power of the DeviceNet option.
- Set the address switches to the address 90, 91 or 92 (depending on the baudrate you want).
- Switch on the power of the DeviceNet option. The MNS-LED will glow orange.
- Switch off the power of the DeviceNet option.
- Set the address switches to the MAC ID you want the device to work with.
- Switch on the power of the DeviceNet option. The MNS-LED will flash green if a communication between the PSG100-SD / PSG101-SD and an other device takes place.

After power ON the unit must find a device to communicate with (duplicate MAC ID check) (for example a master or a monitor) otherwise the MNS LED will not flash green and it will be impossible to allocate the PSG100-SD / PSG101-SD.

The installed baudrate is saved in EEPROM. After power ON/OFF the unit works with this installed baudrate.

How to install the auto baudrate detection:
If a fixed baudrate is installed and you want to change this fixed baudrate to auto baudrate detection, you have to proceed as follows:
- Switch off the power of the DeviceNet option.
- Set the address switches to the address 99 (initialisation of all values with default values).
- Switch on the power of the DeviceNet option. The MNS-LED will glow orange.
- Switch off the power of the DeviceNet option.
- Set the address switches to the MAC ID you want the device to work with.
- Switch on the power of the DeviceNet option. The MNS-LED will flash green if a communication between the PSG100-SD / PSG101-SD and an other device takes place.

The installed auto baudrate detection is saved in EEPROM. After power ON/OFF the unit works with this installed auto baudrate detection.

After power ON the unit must find a device to communicate with (duplicate MAC ID check) (for example a master or a monitor) otherwise the MNS LED will not flash green

Key to fig. 1
1 DeviceNet plug
2 Address Switch
3 MNS-LED

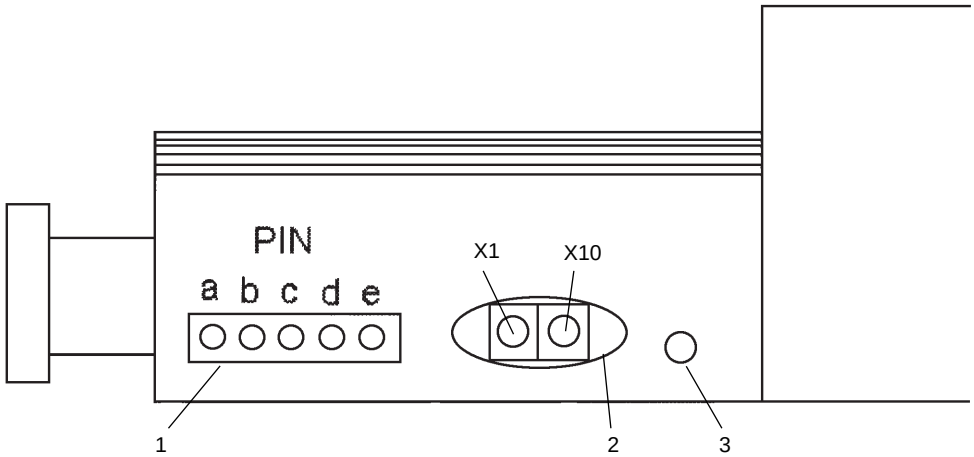

Fig. 1 Side view of the PSG100-SD / PSG101-SD

and it will be impossible to allocate the PSG100-SD / PSG101-SD.

If an address between 65 and 89 (incl.) or 93 and 98 is chosen, the MNS - LED glows red.

The unit handed over is preinitialized with the baudrate 125 kBaud.

2 Technical data

Device Type	Generic
Baud Rates	125 k, 250 k, 500 k Baud
I/O-Slave Messaging	Bit Strobe, Polling, Change of State, Cyclic
Isolated Physical Layer	
Input voltage range for DeviceNet option	11 - 25 Volt
Voltage levels CAN Lines:	
Transmitter Requirements	
Differential Output level (nominal)	2.0 V p-p
Differential Output level (minimum)	1.5 V p-p
connector, 50 Ohms load	
Minimum Recessive Bus voltage CAN H and CAN L	2.0 V **1)**
Maximum Recessive Bus voltage CAN H and CAN L	3.0 V **1)**
Output short circuit protection	internally limited
Receiver Requirements	
Differential Input Voltage dominant	0.95 V min
Differential Input Voltage Recessive	0.45 V max
Hysteresis	150 mV typ.

1) Voltages at CAN H and CAN L are referenced to the transceiver IC ground pin. This voltage (IC ground pin) is app. 0.6 Volt higher than the V-terminal.

Address adjustment	Selectable via address switches
Baudrate selection	3 fixed baudrates and auto-baud-rate detection selectable via the address switches
Status signals	1 bicolor combined **M**odule / **N**etwork **S**tatus LED (MNS)
Operating ambient temperature	0 to 50 °C
Storage temperature	- 20 °C to + 80 °C

3 DeviceNet plug

Pin description:

Pin Number	Function
a	Ground supply
b	CAN -
c	Shield
d	Can +
e	+24 Volt supply

4 MNS - LED

The MNS - LED corresponds to the ODVA standard. The following additional features were integrated:

LED Colour:	Function
ORANGE permanent	The address switches are set to one of the possible baudrate settings (90,91,92) or to "Initialisation with default values" (99).
RED permanent	Not allowed MAC ID

5 Object Structure

5.1 Identity Object (Class Code 01_{hex})

Class Code: 1 (01_{hex})
Class Attributes: None

Instance Attributes

Attribut ID	Access Rule	Name	Data/Type	Description
1 (01_{hex})	get	Leybold	UINT	Vendor Identification
2 (02_{hex})	get	Generic Device	UINT	Device Type
3 (03_{hex})	get	Product Code	UINT	Vendor Productcode
4 (04_{hex})	get	Revision	STRUCT	DeviceNet Software Version-Number
5 (05_{hex})	get	Status	WORD	Device Status
6 (06_{hex})	get	Serial Number	UDINT	Serial Number in accordance to the ODVA spec.
7 (07_{hex})	get	Product Name	SHORT String 54 54 52 32 31 31 53 2D 44	Produkt Name PSG100-SD / PSG101-SD

Services

Service Code	Name
5 (05_{hex})	Reset
14 ($0E_{hex}$)	Get Attribute Single
16 (10_{hex})	Set Attribute Single

5.2 Device Manager(DM) Object (Class Code 64_{hex})

Class Code: 100 (64_{hex})
Class Attributes: None

Instance Attributes

Attribut ID	Access Rule	Name	Data/Type	Description
49 (31_{hex})	get	Device Type	String 3 56 47 54	Device Typ SEMI "VGT" ; Vacuum Gauge Thermal
50 (32_{hex})	get	Standard Revision Level	String [5] 44 52 41 46 54	Version SEMI specification "DRAFT"
51 (33_{hex})	get	Device Manufacturer Identifier	String [7] 4C 45 59 42 4f 4c 44	Vendor Identifikation "INFICON"
52 (34_{hex})	get	Manufacturer Model Number	String [5] 38 39 36 35 31	Catalog Number 89651
53 (35_{hex})	get	Firmware Revision Level	String [5] 31 2e 30 30 30	Software Version 1.000
54 (36_{hex})	get	Hardware Revision	String [5]	

Attribut ID	Access Rule	Level Name	31 2e 30 30 30 Data/Type	Hardware Version 1.000 Description
55 (37_{hex})	get	Serial Number	String [30] 38 39 36 35 31 44 39 36 31 32 30 30 30 35 30	Serial Number for example: 89651D961200050
56 (38_{hex})	get	Device Configuration	String [50] 54 54 52 32 31 31 53 2D 44	Device Configuration PSG100-SD / PSG101-SD
60 ($3C_{hex}$)	get	Exception Status	BYTE	0 = ok 1 Filament broken

Services

Service Code	Name	Specification
14 ($0E_{hex}$)	Get Attribute Single	DeviceNet
16 (10_{hex})	Set Attribute Single	DeviceNet

5.3 Assembly Objects (Class Code 04_{hex})

5.3.1 Input Assemblies

Point of masters view

The meaning of the Status bits in the following input and output assemblies is explained in the corresponding objects.

Input Assembly 3

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	res	res	res	res	Trip Point Source	Trip Point Status	res	Sensor Status
1	Exception Status							
2	Pressure value (Low Byte)							
3	Pressure value (Low Middle Byte)							
4	Pressure value (High Middle Byte)							
5	Pressure value (High Byte)							

Input Assembly 4

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	res	res	res	res	Trip Point Source	Trip Point Status	res	Sensor Status
1	Exception Status							
2	Pressure value (Low Byte)							
3	Pressure value (Low Middle Byte)							
4	Pressure value (High Middle Byte)							
5	Pressure value (High Byte)							
6	Trip Point (Low Byte)							
7	Trip Point (Low Middle Byte)							
8	Trip Point (High Middle Byte)							
9	Trip Point (High Byte)							
10	Trip Point Hysteresis (Low Byte)							

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	res	res	res	res	Trip Point Source	Trip Point Status	res	Sensor Status
11	Trip Point Hysteresis (Low Middle Byte)							
12	Trip Point Hysteresis (High Middle Byte)							
13	Trip Point Hysteresis (High Byte)							

Input Assembly 5

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Pressure value (Low Byte)							
1	Pressure value (Low Middle Byte)							
2	Pressure value (High Middle Byte)							
3	Pressure value (High Byte)							

Input Assembly 6

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Exception Status							

5.3.2 Output Assemblies

Point of masters view.

Output Assembly 1

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	res	res	res	res	res	res	Trip Point Source	res

Output Assembly 2

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	res	res	res	res	res	res	Trip Point Source	res
1	Trip Point (Low Byte)							
2	Trip Point (Low Middle Byte)							
3	Trip Point (High Middle Byte)							
4	Trip Point (High Byte)							
5	Trip Point Hysteresis (Low Byte)							
6	Trip Point Hysteresis (Low Middle Byte)							
7	Trip Point Hysteresis (High Middle Byte)							
8	Trip Point Hysteresis (High Byte)							

5.4 Sensor Pressure Object (Class Code 67_{hex})

Class Code: 103 (67_{hex})

Class Attributes: None

Instance Attributes

Attribut ID	Access Rule	Name	Data Type	Description
3 (03_{hex})	get	Sensor Status	Byte	Sensor Status (Gauge ON) 0 = something is wrong 1 = everything is ok

Services

Service Code	Name	Spezification
14 ($0E_{hex}$)	Get Attribute Single	DeviceNet
16 (10_{hex})	Set Attribute Single	DeviceNet

5.5 Transform Pressure Object (Class Code 68_{hex})

Class Code: 104 (68_{hex})

Class Attributes: None

Instance Attributes

Attribut ID	Access Rule	Name	Data Type	Description
1 (01_{hex})	get	Pressure Value	REALseechapter 6	
3 (03_{hex})	get/set	Pressure Units	BYTE	0 = mbar 1 = Torr /default setting 2 = Pascal

Services

Service Code	Name	Spezification
14 ($0E_{hex}$)	Get Attribute Single	DeviceNet
16 (10_{hex})	Set Attribute Single	DeviceNet

5.6 Discrete Output Point Object (Class Code 69_{hex})

IMPORTANT The Discrete Output Point Object is described in this operating manual although it is not possible to activate or deactivate the trigger relay respectively to use the functionality of the trigger relay in the first prototypes. A little change in the series version will be made. All attributes can be written and read but the prototype doesn't show any useful reactions.

Class Code: 105 (69_{hex})

Class Attributes: None

Instance Attributes

Attribut ID	Access Rule	Name	Data/Type	Description
3 (03_{hex})	get	Trip Point Status	Byte	Status of the trigger relay 0 = relay not activated 1 = relay activated
100 (64_{hex})	get/(set)	Trip Point	REAL see chapter 6	value between 1E-3 mbar and 833 mbar
102 (66_{hex})	get/(set)	Trip Point Hysteresis	REAL see chapter 6	minimal 20 % of trip point
103 (67_{hex})	get/(set)	Trip Pointupper Value	REAL see chapter 6	upper limit trip point + trip point hysteresis
104 (68_{hex})	get/(set)	Trip Pointlower Value	REAL see chapter 6	lower limit trip point
105 (69_{hex})	get/set	Trip Point Control Source	Byte see chapter 6	The trigger values can be installed by a potentiometer or by the DeviceNet master 0 = Potentiometer 1 = DeviceNet

The attributes 100 - 104 will also be saved in EEPROM when the "Trip Point Control Source" is set to "Potentiometer", but the values will not be evaluated until the "Trip Point Control Source" is set to "DeviceNet".

Services

Service Code	Name	Specification
14 ($0E_{hex}$)	Get Attribute Single	DeviceNet
16 (10_{hex})	Set Attribute Single	DeviceNet

Explanation to attributes 100 - 104

It is possible to set the trip point by the two values "trip point" and "trip point hysteresis" or by "trip point lower value " and "trip point upper value".

If the pressure decreases under the trip point (trip point lower value) the relay gets activated, if the pressure increases over the trip point upper value (trip point + hysteresis) the relay gets deactivated.
The two modes
- trip point upper value / trip point lower value or
- trip point / trip point hysteresis

can be used alternatively.

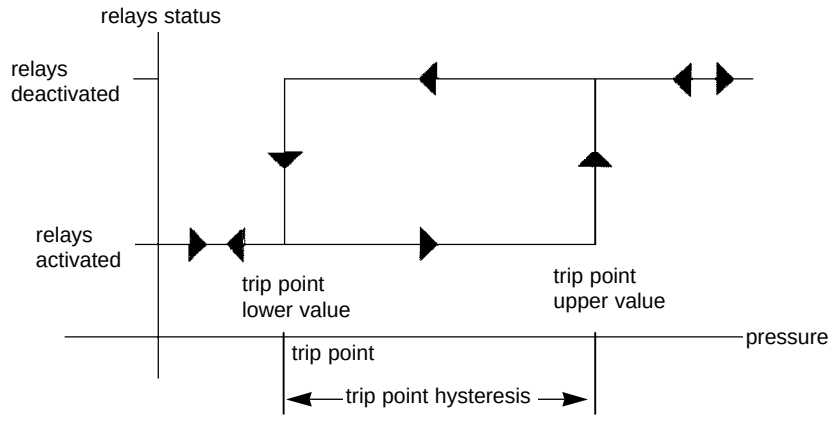

Fig. 2

5.7 Analog Output Point Object (Class Code $0B_{hex}$)

Class Code: 112 (70_{hex})

Class Attributes: None

Instance Attributes

Attribut ID	Access Rule	Name	Data/Type	Description
101 (65hex)	get	Analog Output Mode	BYTE	Output Modus 0=log;

Services

Service Code	Name
14 ($0E_{hex}$)	Get Attribute Single

This object is inserted in order to guarantee general reactions of all INFICON Gauges with DeviceNet.

6 Supported Modes

The PSG100-SD acts as a "DeviceNet Group Two Only Slave". It supports the modes Polling, Bit-Strobe and Change of State/ Cyclic.

6.1 Bit Strobe

As bit strobe application the measurement value is returned.

6.2 Change of State

Vendor specific Extension

Connection Object Instance Attribute (Class 5 / Instance 4/ Attribut 100)

Attribut ID	Access Rule	Name	Data Type	Description	Spez.
100 (64_{hex})	get/set	Pressure Change	BYTE	see below	DeviceNet

Pressure Change
The attribute means the deviation in percent of the measurement value which will result in a COS message on the bus. Possible values for "Pressure Change": 1 - 100 %.

7 Format of real values

According to the IEEE-754 standard real values are stored in floating point format. The floating point values are transmitted according to the following format:

Byte	2	3	4	5
Content	SEEE EEEE	EMMM MMMM	MMMM MMMM	MMMM MMMM

S means: Sign Bit, which means 1 = negative, 0 = positive
E means: Two-complement exponents with offset 127
M means: 23 bit mantissa. The most significant bit is always 1 and is, therefore, not stored.

Example:
The value -12.5

Byte number of the floating point value	Byte 3: C1 hex	Byte 2: 48 hex	Byte 1: 00 hex	Byte 0: 00 hex
Content	SEEE EEEE	EMMM MMMM	MMMM MMMM	MMMM MMMM
Content in this example	1100 0001 binary	0100 1000 binary	0000 0000 binary	0000 0000 binary

Sign bit:
The bit S in this example is 1. That means the sign bit of the whole value (or of the mantissa) is „minus“.

Exponent:
The EEEE EEEE have the value: 1000 0010 binary. This value converted in decimal it is: 130 decimal. This value has the offset 127. So the exponent is: 130 - 127 = 3

Mantissa:
Because the mantissa is normalized the most significant bit has the value 1, the next bit has the value 0.5, the next bit has the value 0.25.

Bit number	Value of the bit, if the bit is set to 1
bit 24 (MSB)	1
bit 23	0.5
bit 22	0.25
bit 21	0.125
bit 20	0.0625
bit 19	0.03125
bit 18	0.015625
bit 17	0.0078125
and so on	

The MMM MMMM MMMM MMMM MMMM MMMM (23bit) have the value 100 1000 0000 0000 0000 0000. The most significant bit (MSB) is always 1 (and not stored). You have to implement this most significant bit.

So the value of the mantisse is: 1100 1000 0000 0000 0000 0000 (binary).

Bit number		Value
Bit 24 is set to 1	→	1
Bit 23 is set to 1	→	+ 0.5
Bit 20 is set to 1	→	+ 0.0625

So the mantissa has the value 1.5625

Whole Value:
The whole value is: $-1.5625 \cdot 2^3 = -12.5$

8 Service at INFICON

Warning

Contaminated products (e.g. radioactive, toxic, caustic or microbiological hazard) can be detrimental to health and environment.

Products returned to INFICON should preferably be free of harmful substances. Adhere to the forwarding regulations of all involved countries and forwarding companies and enclose a duly completed declaration of contamination (see Annex).

Products that are not clearly declared as „free of harmful substances“ are decontaminated at the expense of the customer.

Products not accompanied by a duly completed declaration of contamination are returned to the sender at his own expense.

9 Disposal

Warning

Contaminated parts

Contaminated parts can be detrimental to health and environment.

Before beginning to work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handlinmg contaminated parts.

Warning

Substance detrimental to the environment

Products or parts thereof (mechanical and electric components, operating fluids etc.) can be detrimental to the environment.

Dispose of such substance in accordance with the relevant local regulations.

Separating the components

After disassembling the product, separate its components according to the following criteria:

Contaminated components

Contaminated components (radioactive, toxic, caustic or biological hazard etc.) must be decontaminated in accordance with the relevant national regulations, separated according to their materials, and disposed of.

Other components

Such components must be separated according to their materials and recycled.

EEC Declaration of Conformity

as defined by the Directive relating to machinery 98/37/EG, Appendix IIb.

We -INFICON - herewith declare that the products defined below meet the basic requirements regarding safety and health of the relevant EEC directives by design, type and the versions which are brought in to circulation by us.

We also declare that the equipment mentioned below complies with the provisions of the Directive relating to electrical equipment designed for use within certain voltage limits 73/23/ EEC and the Directive relating to electromagnetic compatibility 89/336/EEC.

Product:

DeviceNet Interface of the
Pirani standard Gauge
PSG100-SD / PSG101-SD

Part Number

350-021

350-031

Standards

Harmonized and international / national standards and specifications:

- EN 61010 - 1 - 03.1993
- EN 50081 - 1 - 1992
- EN 50082 - 2 - 1995

Balzers, 03 April 2001

Hannes Fischer, Product Manager

Balzers, 03 April 2001

Dr. Georg Sele, Technical Support Manager;
Quality Representative

Declaration of Contamination

The service, repair, and/or disposal of vacuum equipment and components will only be carried out if a correctly completed declaration has been submitted. Non-completion will result in delay.
This declaration may only be completed (in block letters) and signed by authorized and qualified staff.

1 Description of product

Type _____
Article Number _____
Serial Number _____

2 Reason for return

_____
_____
_____

3 Operating fluid(s) used (Must be drained before shipping.)

_____
_____

4 Process related contamination of product:

toxic	no ❑ 1)	yes ❑
caustic	no ❑ 1)	yes ❑
biological hazard	no ❑	yes ❑ 2)
explosive	no ❑	yes ❑ 2)
radioactive	no ❑	yes ❑ 2)
other harmful substances	no ❑ 1)	yes ❑

1) or not containing any amount of hazardous residues that exceed the permissible exposure limits

2) Products thus contaminated will not be accepted without written evidence of decontamination!

The product is free of any substances which are damaging to health yes ❑

5 Harmful substances, gases and/or by-products

Please list all substances, gases, and by-products which the product may have come into contact with:

Trade/product name	Chemical name (or symbol)	Precautions associated with substance	Action if human contact

6 Legally binding declaration:

I/we hereby declare that the information on this form is complete and accurate and that I/we will assume any further costs that may arise. The contaminated product will be dispatched in accordance with the applicable regulations.

Organization/company _____
Address _____ Post code, place _____
Phone _____ Fax _____
Email _____
Name _____

Date and legally binding signature _____

Company stamp

This form can be downloaded from our website.

Copies:
Original for addressee - 1 copy for accompanying documents - 1 copy for file of sender

INFICON

INFICON The Instrumental Difference

INFICON LIMITED:

FL-9496 Balzers, Principality of Liechtenstein
Phone: +423 388 3111 Fax: +423 388 3700 www.inficon.com

UNITED STATES FRANCE GERMANY LIECHTENSTEIN UNITED KINGDOM CHINA JAPAN KOREA SINGAPORE TAIWAN