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

tina12e1

PEG100-D

Part Number
351-003
351-004

Remark
This Operation Manual is a supplement to the Operating Manual of the PEG100.

DeviceNet Interface for the Penning Gauge

INFICON

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

Contents

1 Penning Gauge PEG100-D

The PEG100-D are equipped with a fieldbus interface DeviceNet. Thus, process automatization devices can easily be interconnected.

1.1 DeviceNet - Interface

The fieldbus-system DeviceNet is described in the DeviceNet specification of the Open DeviceNet Vendor Association (ODVA). The technical and functional features of the DeviceNet Standards are specified herein.

The PEG100-D have the functionality of DeviceNet Group 2 Only Slaves.

1.2 Pin Description of DeviceNet plug

Pin description:

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

1.3 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) connector, 50 Ohms load	1.5 V p-p
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

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

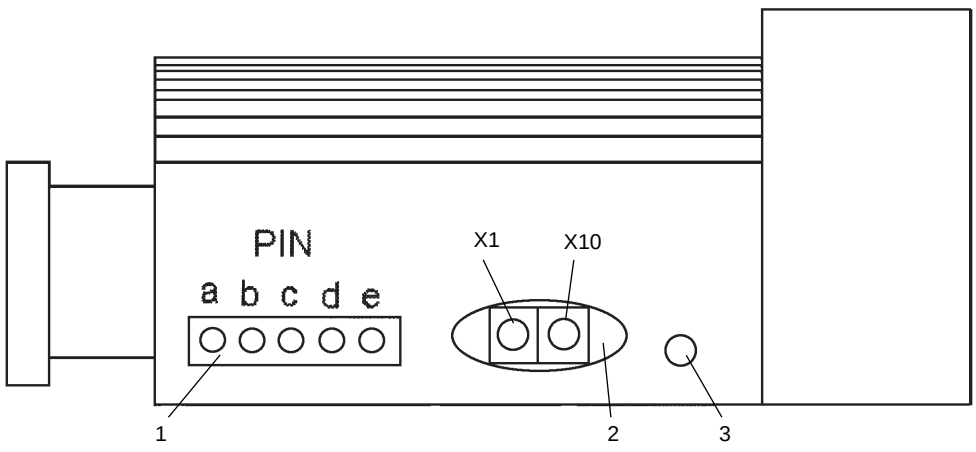

Fig. 1 Side view of the PEG100

2 Starting-up of the PEG100-D

For starting-up the fieldbus
- the whole system has to be installed electronically.
- the master has to be configurated
- the address of the slaves has to be set

2.1 Baudrate and Address Switch

2.1.1 Baudrate

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.
- Pre-installed baudrate

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

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 PTR 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 and it will be impossible to allocate the PTR.

2.1.2 Address Setting

It is necessarry in a network to give each device a specific address. Therefore the address switches have to be set to the requested MAC ID (addresses between 0 and 64 are possible).

2.2 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

3 Object Structure

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

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

Instance Attributes

Attribut ID	Access Rule	Name	Description
1 (01_{hex})	get	INFICON	Vendor Identification Vendor ID: 144dez.
2 (02_{hex})	get	Generic Device	Device Type
3 (03_{hex})	get	Product Code	Vendor Productcode
4 (04_{hex})	get	Revision	DeviceNet Software Version-Number
5 (05_{hex})	get	Status	Device Status
6 (06_{hex})	get	Serial Number	
7 (07_{hex})	get	Product Name	PEG100-D

Services

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

3.2 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] 43 49 47	Device Typ SEMI "CIG" ; Cold cathode ion gauge
50 (32_{hex})	get	Standard Revision Level	String [5] 44 52 41 46 54	"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]	Catalog Number
53 (35_{hex})	get	Firmware Revision Level	String [5] 31 2e 30 30 30	Software Version
54 (36_{hex})	get	Hardware Revision Level	String [5] 30 2e 30 30 30	Hardware Version

Attribut ID	Access Rule	Name	Data/Type	Description
55 (37_{hex})	get	Serial Number	String [5]	
56 (38_{hex})	get	Device Configuration	String [8]	PEG100-D
57 (38_{hex})	get	Device Status	UNIT	Device status 1 = Initialising 2 = Idle (HV on) 4 = Executing (HV on)
58 ($3A_{hex}$)	get / set	Reporting Mode	BYTE	Polling, Bit Strobe = 6 COS / Cyclic = 0
60 ($3C_{hex}$)	get	Exception Status	BYTE	0_{hex} = ok 1_{hex} = HV on, no plasma 2_{hex} = HV off

Services

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

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

A collection of assembly objects allows the sending of attributes from different application objects in one message (i.e.: Polling I/O).

3.3.1 Output Assemblies

Messages which a master sends to the PEG100-D.

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	HV ON / OFF	HV ON / OFF Control

3.3.2 Input Assemblies

Messages which the PEG100-D sends to the master.

Input 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	HV ON / OFF Source	HV Status	Sensor Satus
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 3

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	res	res	res	res	res	HV ON / OFF Source	HV Status	Sensor Satus
1	Exception Status							

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

The Sensor Pressure Object contains characteristics and behavior of the PEG. This object is specified as a SAC-Object. All defined services for SAC-Objects are valid.

Class Code: 103 (67_{hex})

Class Attributes: None

Instance Attributes

Attribut ID	Access Rule	Name	Data Type	Description
3 (03_{hex})	get	Sensor Status	BOOL	Sensor Status (Gauge ON = 1 / Gauge OFF)
100 (64_{hex})	get / set	HV ON / OFF	BIT	1 = HV ON 2 = HV OFF
101 (65_{hex})	get / set	HV ON/OFF Source	BYTE	0 = Control by analog input signal 1 = Control by DeviceNet
102 (66_{hex})	get / set	HV State	Byte	0 = OFF 1 = ON

Services

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

3.5 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	REAL	Pressure value
3 (03_{hex})	get / set	Pressure Units	BYTE	0 = mbar default 1 = Torr 2 = Pascal

Services

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

3.6 Analog Output Point Object (Class Code 6Ahex)

Class Code: 106 ($6A_{hex}$)
Class Attributes: None

Instance Attributes

Attribut ID	Access Rule	Name	Data Type	Description
101 (65_{hex})	get	Analog Output Mode	BYTE	0 =log

Services

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

4 Supported Modes

The PEG100-D acts as a "DeviceNet Group Two Only Slave". It supports the modes Polling, Bit-Strobe, Change of State/ Cyclic and explicit messagges. Please set the „Interscan Delay“ of your master to app. 20ms if your system is as fast that is polls the PEG100-D at regular intervals shorter than 20ms.

4.1 Bit Strobe

The HV may be switched on and off by the Bit-Strobe application.
Bit-Strobe Bit = 1 → HV on, and response with Input Assembly 1
Bit-Strobe Bit = 0 → HV off

4.2 Change of State

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

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

Pressure Change
The attribute describes 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 %.

5 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: $-1.5625 \cdot 2^3 = -12.5$

6 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.

7 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 PEG100-D

Part Number

351-003

351-004

Standards
Harmonized and international / national standards and specifications:

- EN 61010 - 1 - 3.1994
- EN 50081 - 1 - 1992
- EN 50082 - 2 - 1995

Balzers, 14 July 2001

Hannes Fischer, Product Manager

Balzers, 14 July 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 ❑

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

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

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