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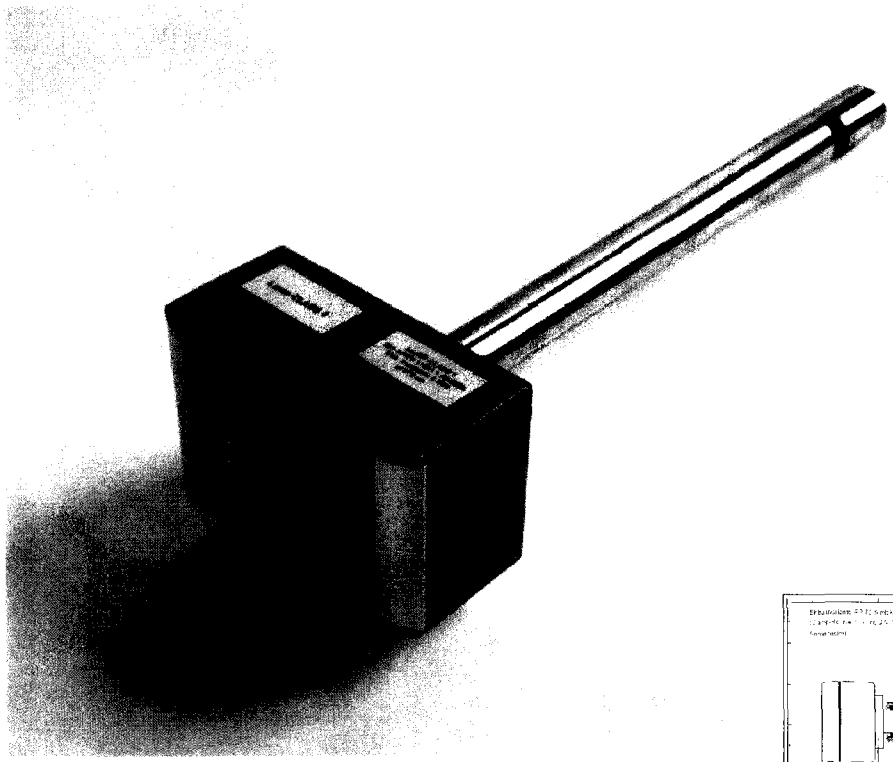
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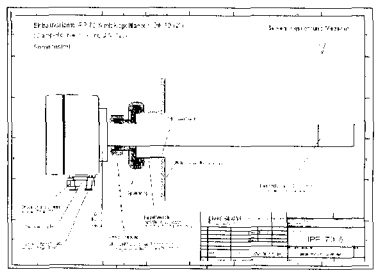
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Hardware Manual

In-line Particle Probe IPP 70

Last revised 09/2007

parsum® - Gesellschaft für Partikel-, Strömungs- und Umweltmeßtechnik mbH
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Hardware specifications

Contents

Technical Data of the IPP 70 measurement system 2

Probe installation (variants)..... 3

Probe-connector contact assignment 4

NI 5102 (A/D-converter card) 5

I/0 connection 5

Signal connections 6

Analogue inputs 6

Specifications (extract) 6

PCI-6308A (D/A-converter card, power interface) 8

Pin assignment 8

Specifications (extract) 9

Terminal block XE1 for PCI-6308A (4...20mA analogue signals) 10

Pneumatic units 11

Purge cell overview 12

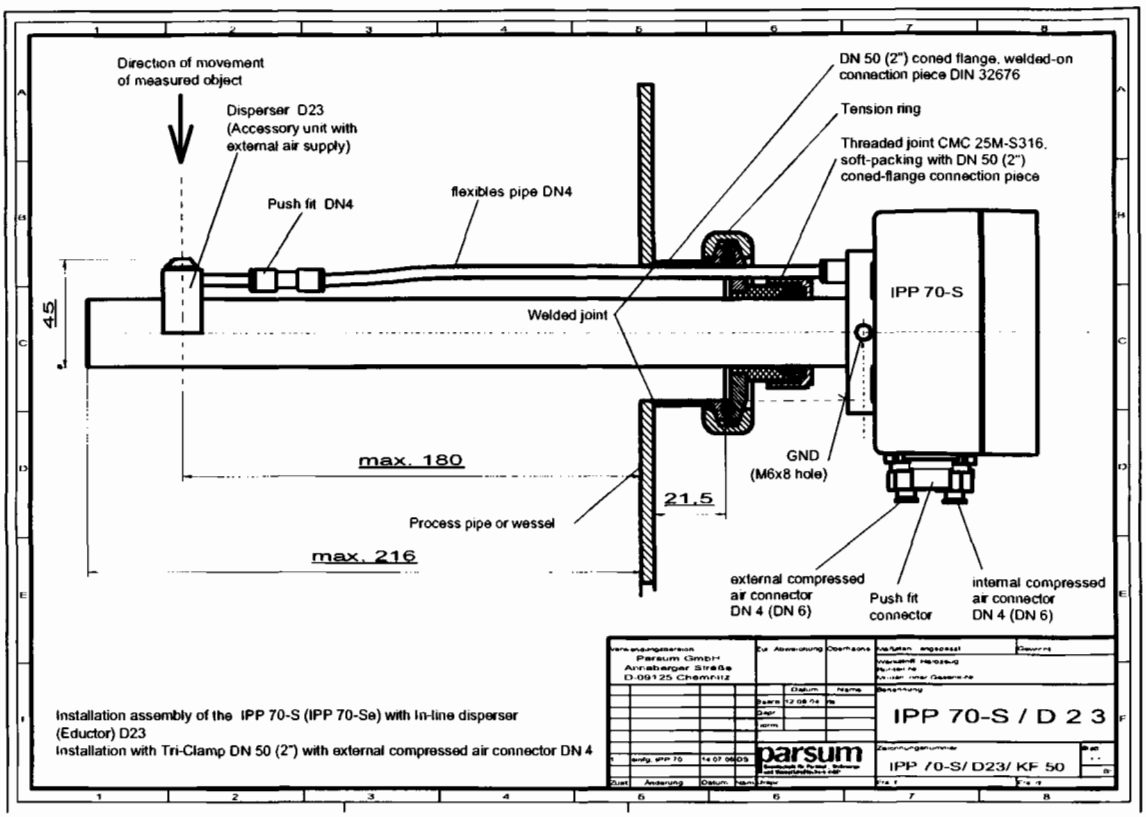
Additions for Ex use – Type IPP70-Se 13

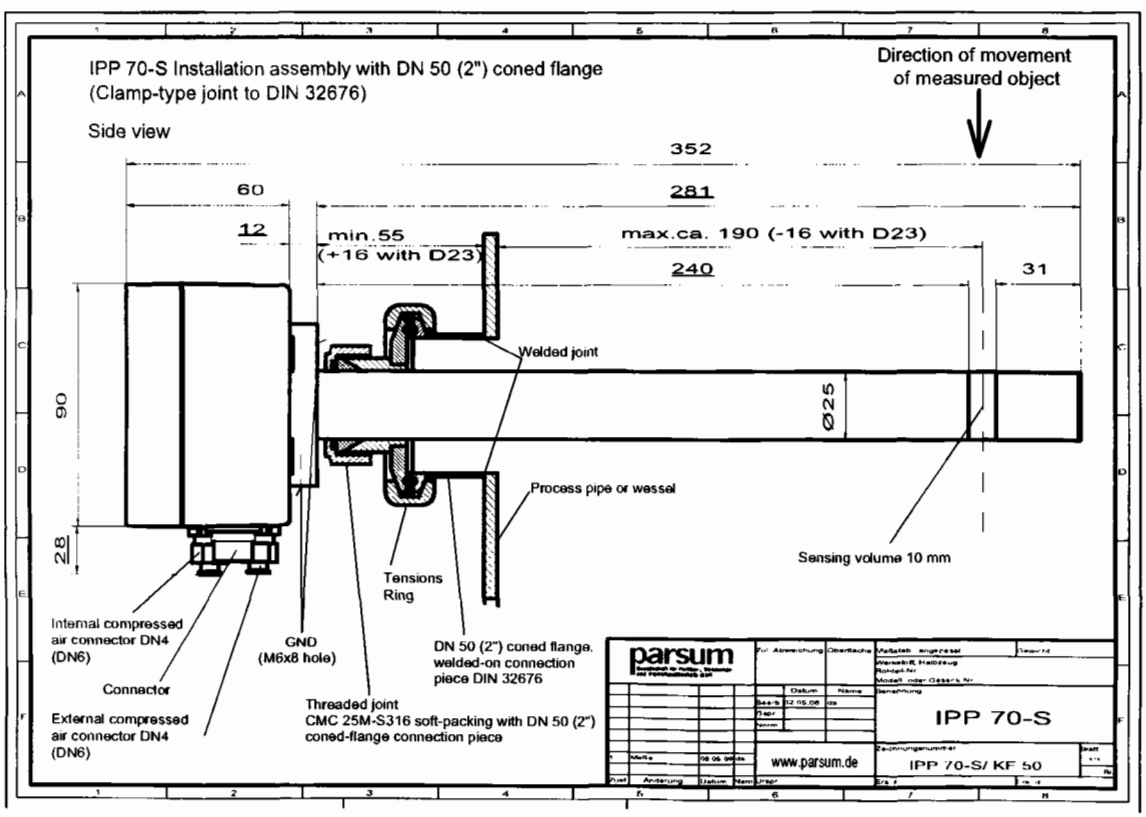
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Technical Data of the IPP70 measurement system

Particle-size measurement range:	50 µm to 6000 µm
Velocity measurement range:	0.01 m/s to 50 m/s
Particle concentration:	200 .... 120,000 ppm volume content (dependent on particle size and velocity)
Data rate:	up to ca. 10,000 /s (process-dependent)
Data output:	Distributions and characteristic particle properties as ASCII file (text file, Excel-compatible), optional interfaces: RS485/RS232 and (0)4 mA...20 mA current interface
Temperature range:	-20°C to 100°C at the measuring point in continuous operation; -20 °C to 60 °C on the probe housing
Pressure range:	4 bar (at the probe's sensing volume)
Degree of protection:	IP 65 (probe)
Mechanical details:	Rod probe tube length L = 280 mm, tube diameter D = 25 mm
Probe voltage:	12V, DC, ⎓
Probe current:	typ. 150mA (max. 210 mA)
Materials:	
media-contacting parts:	stainless steel 316L (probe tube) sapphire window, epoxy resin (optics)
housing:	pressure-cast aluminium
Accessories for IPP70-S	purge cells SZxx; (see Purge cell overview) pneumatic unit, Eductor, status signalisation LEDs

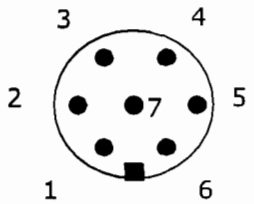
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Direction of movement
of measured object
Disperser D23
(Accessory unit with
external air supply)
Push fit DN4
flexibles pipe DN4
DN 50 (2") coned flange, welded-on
connection piece DIN 32676
Tension ring
Threaded joint CMC 25M-S316,
soft-packing with DN 50 (2")
coned-flange connection piece
IPP 70-S
Welded joint
45
max. 180
21.5
GND
(M6x8 hole)
Process pipe or wessel
max. 216
external compressed
air connector
DN 4 (DN 6)
Push fit
connector
internal compressed
air connector
DN 4 (DN 6)
Installation assembly of the IPP 70-S (IPP 70-Se) with In-line disperser
(Eductor) D23
Installation with Tri-Clamp DN 50 (2") with external compressed air connector DN 4
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IPP 70-S / D 2 3
IPP 70-S/ D23/ KF 50


IPP 70-S Installation assembly with DN 50 (2") coned flange
(Clamp-type joint to DIN 32676)
Side view
Direction of movement
of measured object
352
281
60
12
min.55
(+16 with D23)
max.ca. 190 (-16 with D23)
240
31
Welded joint
90
Ø25
28
Process pipe or wessel
Sensing volume 10 mm
Tensions
Ring
Internal compressed
air connector DN4
(DN6)
Connector
External compressed
air connector DN4
(DN6)
GND
(M6x8 hole)
DN 50 (2") coned flange,
welded-on connection
piece DIN 32676
Threaded joint
CMC 25M-S316 soft-packing with DN 50 (2")
coned-flange connection piece
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IPP 70-S
IPP 70-S/ KF 50

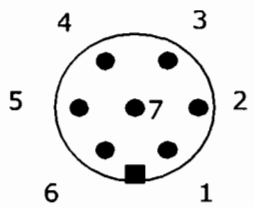
Probe-connector contact assignment

If in the plant unit concerned probe-cable extensions are necessary, both the cable type and pin assignment of the probe connector must be complied with. Cable glands should be fitted in accordance with the pin assignment. In accordance with the temperature range of up to max. +60 °C on the probe housing specified in the Technical Data for the measurement system only cables approved under UL Style No. 2464/1061 and with heat resistance up to 105 °C as per VDE 0207 (outer covering) may be used as probe cables (e.g. 4PxAWG C, 0.22mm², 8-core, shielded; Metrofunk).



1. GND (analogue earth)
2. GND
3. Pulse
4. Laser (+12V, DC, < 70 mA)
5. GND
6. Burst
7. Receiver (+12V, DC, < 120 mA)

Fig. 1.1: Probe-connector pin assignment at the probe and probe-cable connector (plug)



1. GND (analogue earth)
2. GND
3. Pulse
4. Laser (+12V, DC, < 70 mA)
5. GND
6. Burst
7. Receiver (+12V, DC, < 120 mA)

Fig. 1.2: Pin assignment of the probe-cable sockets and probe-cable coupling (jack)

The probe cable's GND conductor, cable shield and coupling housing are connected to the earth potential. They may not be used as the probe's protective conductor. The probe must always be additionally connected to the plant unit's earth with a protective conductor. This is done using the protective-conductor terminal ⏚ on the probe housing.

Summary of symbols used (as per VDE 0411)

⏚ Protective-conductor terminal on the IPP probe

⊥ GND (earth terminal on the 12V power-supply card in the measurement PC)

⎓ DC, direct current

NI 5102 (A/D-converter card)

I/0 connection

The NI 5102 A/D-converter card (PCI or PCMCIA type) has two standard BNC jacks (CH0 and CH1) for analogue measurement signals, a standard BNC terminal for the TRIG channel and two standard SMB terminals (PFI1 and PFI2) for digital time and trigger signals.

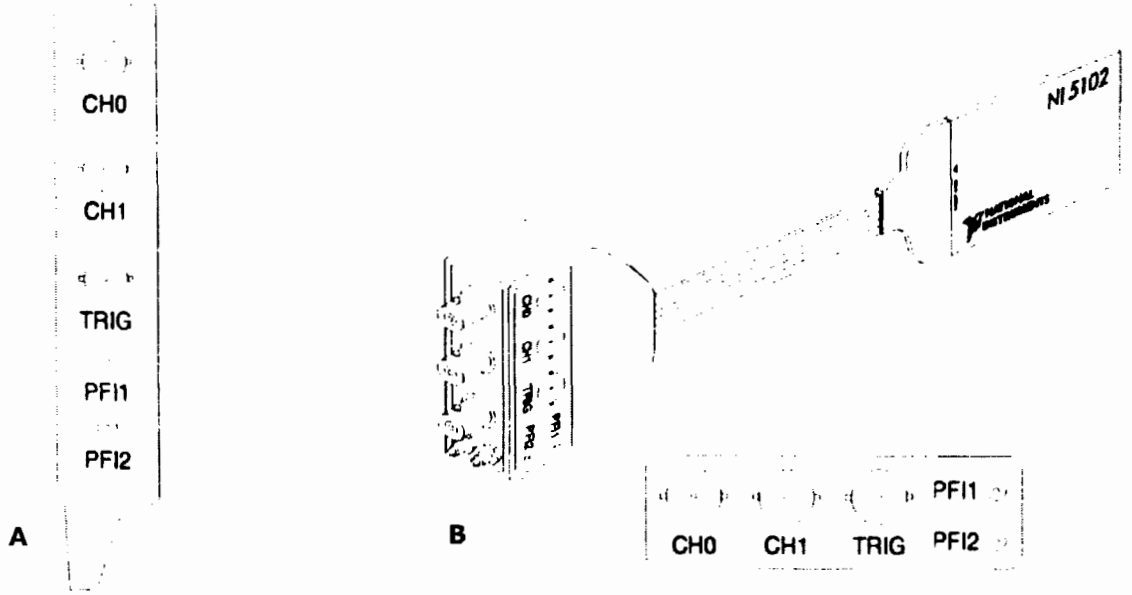


Fig. 1.3: **A** Ni 5102 (PCI) I/O ports; **B** Ni 5102 (PCMCIA) I/O ports

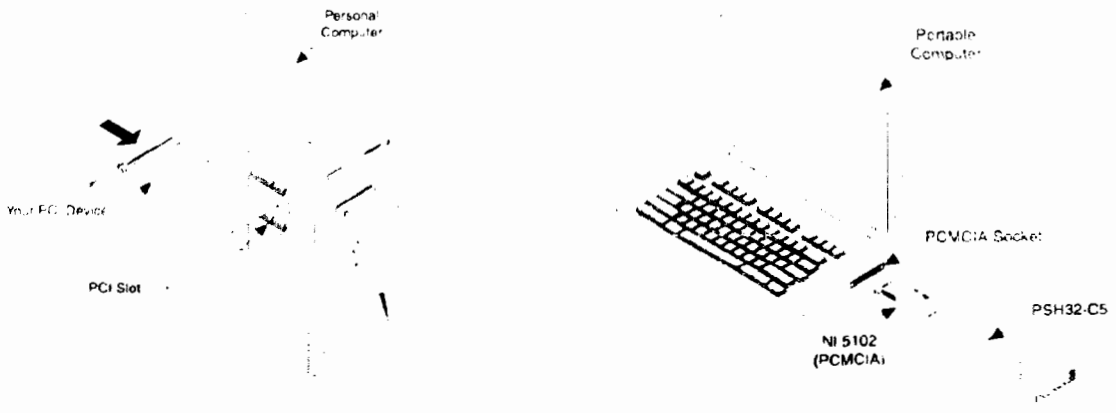


Fig. 1.4: **A** Ni 5102 (PCI) PC installation; **B** Ni 5102 (PCMCIA) Laptop installation

Signal connections

Description of I/0 port signals:

Signal	Description
CH0, CH1	2 x analogue signal input
TRIG	for external analogue triggering
PFI1, PFI2	software-configurable digital triggers, external time base / digital outputs

Analogue inputs

CHO and CH1 measurement range:

Amplification	under direct access (without attenuation)
1	±5V (standard setting)
5	±1V
20	±0.25V
100	±50mV

Specifications (extract)

These specifications are typical for an ambient temperature of 25°C. The operating temperature is 0°... 50°C.

Input characteristics

Number of input channels	2, scanning simultaneously
Input impedance	1 MOhm ±1% parallel with 25pF±10pF CH0, CH1, TRIG
Resolution	8 bit, 1 in 256
Maximum scanning rate (internal)	20 MS/s each channel in real-time mode
Minimum scanning rate	1 kS/s (internal/external)
Maximum measurement range	±5 V, DC + peak AC<15Mhz
Input measurement range (CHO, CH1) (direct access)	±5V at amplification 1 ±1V at amplification 5 ±0.25V at amplification 20 ±50mV at amplification 100
Input coupling	AC or DC, software-selectable
Overvoltage protection	±42V (DC + peak AC< 10Khz without external attenuation) CH0, CH1, TRIG

Dynamic characteristics

Bandwidth	
small signal (-3 dB)	15 MHz typical
large signal (2% THD)	10 MHz typical

Stability

Recommended warm-up time	15 min.

DC characteristic over operating range:

Symbol	Parameter	Conditions	Min	Max
V_{IH}	Input voltage HIGH	-	2.0 V	V_{CC}+ 0.5 V
V_{IL}	Input voltage LOW	-	-0.5	0.8 V
V_{OH}	Output voltage HIGH	OH = -4 mA	3.7 V	-
		I_{OH} = -16 mA	2.4 V	
		I_{OH} = -10 µA	VCC-0.1V	
V_{OL}	Output voltage LOW	I_{OL} = 16 mA	-	0.45 V
		I_{OL} = 10 µA		0.1 V
C_{in}	Input capacitance (nominal)	-	-	10 pF
I_{OS}	Output short-circuit current (one output only; duration should not exceed 30s)	V_o = GND	-15mA	-120mA
		V_o = V_{cc}	40mA	210mA

Power consumption

NI 5102 (PCI) 5 V DC (±5%)	500 mA typical
NI 5102 (PCMCIA) 5 V DC (±5%)	260 mA typical, active (60 mA in standby mode)

Ambient conditions

Operating temperature	0°....55°C
Storage temperature	-55°....150°C
Rel. atmospheric humidity	5%....90%, no condensation

PCI-6308A (D/A-converter card, power interface)

Pin assignment

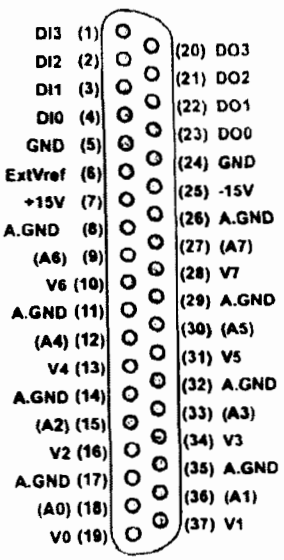


Fig. 1.5 : PCI-6308A : pin assignment

Key:

Vn:	voltage output from channel *n* for PCI-6308A
An:	current output for channel *n* (*n* = 0 – 7)
ExtVref:	external reference voltage for voltage output
AGND:	earth for analogue output channels and +/- 15V
-15V:	-15V voltage output
+15V:	+15V voltage output
DIx:	digital input x
DOx:	digital output x
GND:	isolated earth for digital inputs and outputs

Warning!
The output range of the PCI-6308A D/A-converter card should be set with jumpers JP1 ... JP12 to:
0...+10V, unipolar. Otherwise destruction may occur in the vicinity of the active current converters.

Output Range	Unipolar/Bipolar JP1~JP8	Unipolar/Bipolar JP9~JP10	external/internal JP11~JP12
-10V to +10V Bipolar (Default)	1 2 3	1 2 3	1 2 3
0V to +10V Unipolar	1 2 3	1 2 3	1 2 3
0V to ExtRef Voltage Unipolar	1 2 3	1 2 3	1 2 3

Fig. 1.6 : Jumper setting on the PCI-6308A

Specifications (extract)

Voltage output

Number of channels:	8 channels for PCI-6308A
Resolution:	12-bit
Voltage-output range:	(jumper-selectable)
• bipolar:	±10V
• unipolar:	0....10V
Current load per output:	± 5mA min.
Settling time:	16µs (-10V ... +10V)
DA output time:	90µs for 4 channels, simultaneous
Insulation voltage:	2500Vrms (opt. insulated PC9D10)
Initial state:	0V (after RESET or POWER-ON)

Current output

Number of channels:	8 channels for PCI-6308A
Current-out range:	(software-programmable) 0 ... 20mA, 4 ... 20mA, 5 ... 25mA.
Settling time:	17µs (0 ... 20mA)
Slew rate:	1.3mA / µs
Output resistance:	10Ohm max.
Initial state:	0mA (after RESET or POWER-ON)

Digital input

Number of channels:	4 isolated input channels
Insulation voltage:	5000Vrms
Input voltage:	up to 34Vdc * "L": 0 ... 3.0V * "H": 3.2 ... 34V
Input resistance:	4.7 kOhm; 0.5W

Digital output

Number of channels:	4 isolated output channels
Insulation voltage:	5000Vrms
Output type:	optocoupler - transistor, open collector up to 35Vdc
Current load:	50mA max.

Power supply

+15V output (pin #7 on CN1):	20mA max.
-15V input (pin #25 on CN1):	20mA max.

General specifications

Operating temperature:	0° ... 55°C
Storage temperature:	-20° ... 80°C
Atmospheric humidity:	5 ... 95%, no condensation
Connections:	37-pin D-Sub contact strip
Bus interface:	32-bit slave PCI bus
Power consumption:	+5VDC at 220mA typically + 12VDC at 250mA typically or +12VDC at 530mA (all 25mA current channels)

Terminal block XE1 for PCI-6308A (4...20mA analogue signals):

Terminal	Assignment	Signal from measurement program	Note
1	DI3		
2	DI2		
3	DI1		
4	DI0		
5	Iso.GND		
6	ExtRef		
7	+15V		
8	A.GND	Current 6 (GND)	
9	A6	Current 6 (4...20mA, active)	
10	V6		
11	A.GND	Current 4 (GND)	
12	A4	Current 4 (4...20mA, active)	
13	V4		
14	A.GND	Current 2 (GND)	
15	A2	Current 2 (4...20mA, active)	
16	V2		
17	A.GND	Current 0 (GND)	
18	A0	Current 0 (4...20mA, active)	
19	V0		
20	DO3	DigitOut 3	
21	DO2	DigitOut 2	
22	DO1	DigitOut 1	
23	DO0	DigitOut 0	
24	Iso.GND	Iso.GND (Digital I/O)	
25	-15V		
26	A.GND	Current 7 (GND)	
27	A7	Current 7 (4...20mA, active)	
28	V7		
29	A.GND	Current 5 (GND)	
30	A5	Current 5 (4...20mA, active)	
31	V5		
32	A.GND	Current 3 (GND)	
33	A3	Current 3 (4...20mA, active)	
34	V3		
35	A.GND	Current 1 (GND)	
36	A1	Current 1 (4...20mA, active)	
37	V1		

Pneumatic unit

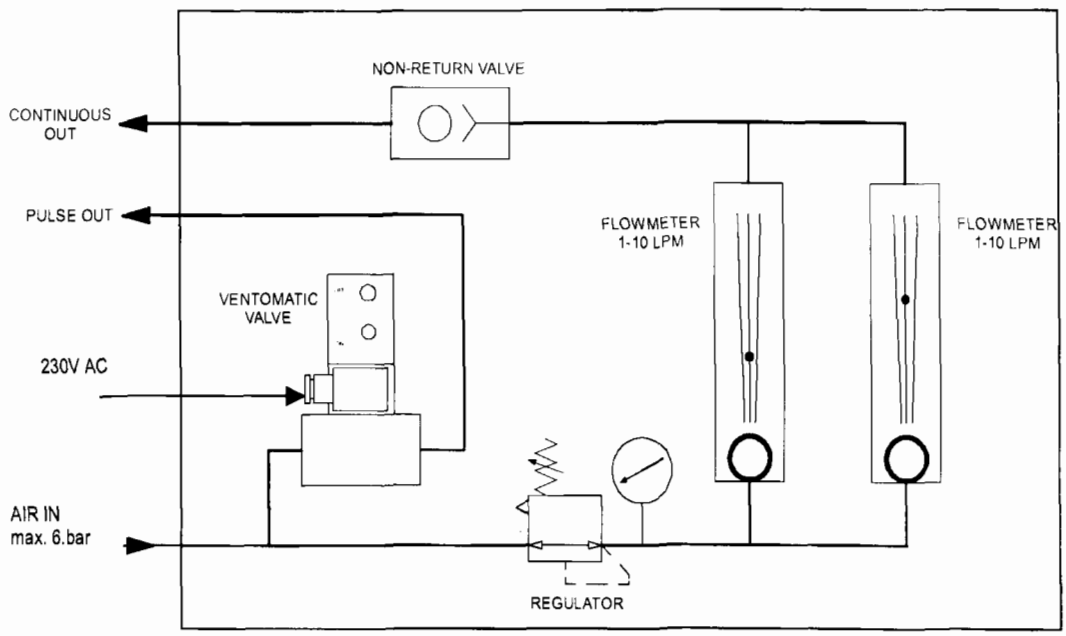


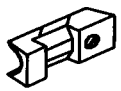
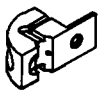
Fig. 1.7: Block diagram of pneumatic unit including pulsed purge unit as example

Note:
Actual designs may vary from that shown in the sketch (e.g. single- or multi-channel units with or without pulsed-flow purging).

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Overview: flow cells for IPP 70

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Type		Description	Particle size range X05...X95 (volume distribution) µm	middle particle size X50 (volume distribution) µm	fine part in product	air stream l/min	remarks to air stream	remarks to use	use with impulse cleaning unit 1)
	SZ 11	open flow cell slit width 0,2 mm, air stream slantwise to falling direction of particles	100 - 4000	> 500	very low	4	less air for light weight particles (~ 2 l/min)	free falling particles with enough falling height for separation	yes - if optics is fast contaminated
	SZ 20-4	like SZ 20-3 frontside opened aperture 6 mm	50 - 2500	> 200	low .... middle	8	less air for light weight particles (~ 4 - 6 l/min)	like SZ 11 but also for products with single very coarse particles (agglomerated)	no
	D23	Disperser with ring injector, diluter and back flush funktion aperture 4 mm with external and internal air connection	50 - 2000	50 1200	high	internal **20**, external **3**	Impuls causes back flush to remove sticking material at the aperture	Fluidized Beds with very small particles or much fines	- yes (external air only)

Remarks:

1) adjust pressure to 4...5 bar, short pipes, short impulses (<=1s) with longer breaks (>2min) - depending of tendency of contamination

Additions for Ex use – Type IPP70-Se

Installation set-up instructions

Warning!
The "Type IPP70-Se Inline Particle-Size Probe" is a sensitive optical measuring instrument. In process use and in set-up and servicing operations the probe should therefore always be treated with extreme care, since otherwise designed-in explosion-protection features may be disabled by the user among other things. The installer standards EN61241-0, EN61241-1, EN60079-14 (VDE0165) must be complied with.

The system components:

- **Inline Particle Probe IPP 70-Se**
- **Signal cable**
- **Feeding device**
- **Air supply unit**
- **Measurement PC**

are one unit and may not be used in combination with other devices or other means of production.

The "Type IPP70-Se Inline Particle-Size Probe" may be installed at a user's premises only by his own specialist Ex-authorised personnel.
The entire installation must take place with the whole measurement system electrically de-energised.

Assembling the barrier enclosure

The barrier enclosure should be set up pre-fitted against a wall in an area free of explosion hazard. The barrier enclosure should be earthed to PE2 with a flexible yellow/green 4mm^2 copper conductor.
The light-blue probe cable pre-fitted at Parsum should be routed to the particle-size measuring point in accordance with the "intrinsic safety" requirement. The probe cable should be connected in the barrier enclosure as shown in the drawing "Ex installation diagram for IPP70-Se".
The light-blue probe cable should be marked as required by company rules.

Installing the pneumatic unit

For supplying the purge medium (e.g. air or oxygen) for the "Type IPP70-Se Inline Particle-Size Probe" the pneumatic unit with manometer and flowmeter should be installed in the immediate vicinity of the particle-size measuring point and connected to the purge-media supply.

Installing the probe in the plant unit

Before the probe is installed in the plant unit the earthing connection to PE1 between probe and plant unit should be established using flexible yellow/green 4mm^2 copper conductors.
The probe should be installed in the plant unit using a standard clamp stub and the, parts (Clamp flange with threaded joint, 2 inches), delivered with the system.
The probe should be connected to the pneumatic unit with pneumatic hose. The purge-medium pressure should be set by manometer to 6 bar. The quantity should be set according to requirements at the flowmeter. Note that the temperature of the purge medium Ts must be within the range -20 °C < Ts < +40 °C.

Discharge of the purge medium at the probe's sensing head should be checked.
The probe should be aligned in the plant unit according to the particle flow by means of a DN50 flange joint and mounted securely.
The two caps should be unscrewed from the plug and socket elements of the plug-in cable coupling.

Warning!

Before joining the connectors it must always be ensured that the insulation-material holders for the contacts are free of all extraneous material. Only after this visual inspection and cleaning if necessary may the connection be closed and screwed firmly home.

Checking of installation in the Ex zones

The complete electrical and pneumatic installation should be checked by the company's specialist personnel.
Once error-free installation has been established, the measurement PC may be powered up and, when the measurement program has finished loading, the power supply in the barrier enclosure switched on. The measurement system's intrinsically safe circuits are now energised. The measurement results from particle-size measurement can be read on the measurement PC's monitor.

Instructions for inspecting / servicing

Inspection and servicing of the probe may be performed only by the company's specialist personnel with the intrinsically safe circuits de-energised.

The measurement system should be dismantled in reverse order to the Ex-zone installation procedure described above:
Switch off the power supply in the barrier enclosure and disconnect from the mains.
Power the measurement PC down, switch it off and disconnect from the mains.
Undo the cable coupling and close off both plug and socket elements with the screw caps.
Detach the probe from the plant-unit flange.
Inspect and clean sensing head, check purge flow at the sensing head etc.
Re-assemble as described in sections 3 and 4.

Technical data on the Ex version of the Type IPP 70-Se

(Last revised: July 2007)

Configuration

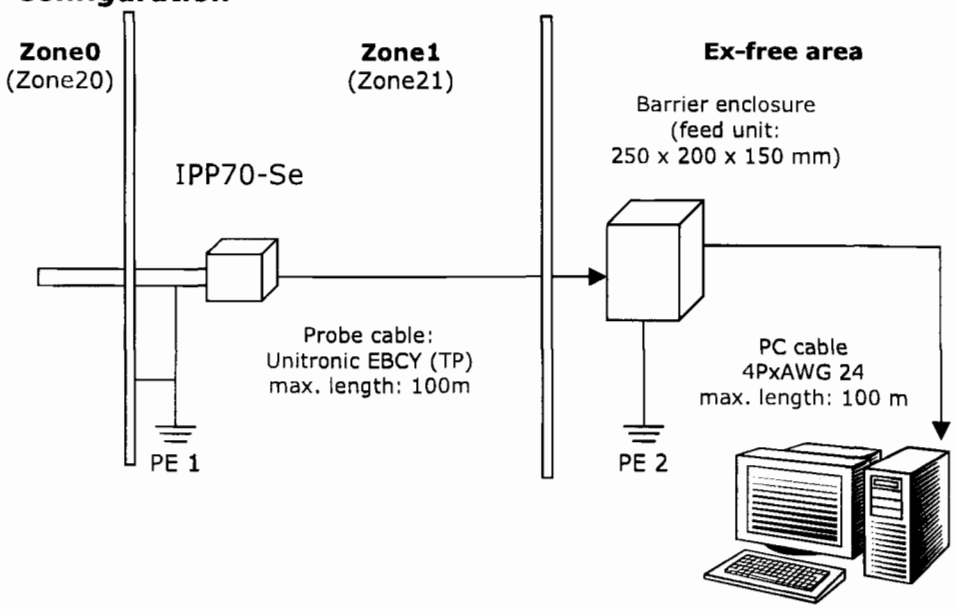


Fig. 1.8: Configuration of the measurement system

Certification

Corresponding to the old standarisation (for probes with manufacturing date before April 2007)

II 1/2 GD EEx ib IIB T4 IP65 T_0<50°C
Conforming to EN 50 014 ... 50020, EN 50281-1-1, EN 50284,
EN 60079-14 (DIN VDE 0165 Part 1)

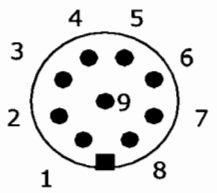
Corresponding to the new standarisation (for probes with manufacturing date after March 2007)

II 1/2 G Ex ib IIB T4
II 1/2 D Ex tD A20/A21 IP65 T4 T_0<80°C
Conforming to EN60079-0, EN60079-11, EN60079-26, EN61241-0, EN61241-1
EN 60079-14 (DIN VDE 0165 Part 1)

Protection level: intrinsically safe
Explosion group: IIB (IIC: Certification note!)
Temperature class: T4

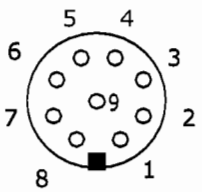
Contact assignment for the IPP50-Se probe connector

If cable extensions (max. 100m) are necessary in the Ex plant unit, care must be taken with the cable type and contact assignment. Plug and socket elements must be connected correctly. In conformity with the measurement system's certification for the ambient-temperature range -20...+40 °C only cables for protection level -**i**- (DIN VDE 0165) with heat resistance of -40...+70 °C (outer covering) may be used (e.g. UNITRONIC®, EBCY(TP), paired, 8-core, shielded; Lapp cables).



1. GND
2. Burst
3. GND
4. Puls
5. GND
6. Laser (<10VDC, ⎓ <70mA)
7. GND
8. Receiver (<10VDC, ⎓ <45mA)
9. -

Fig. 1.1: Contact assignment of the probe connector on the probe and the probe-cable connector (male end)



1. GND
2. Burst
3. GND
4. Puls
5. GND
6. Laser (<10VDC, ⎓ <70mA)
7. GND
8. Receiver (<10VDC, ⎓ <45mA)
9. -

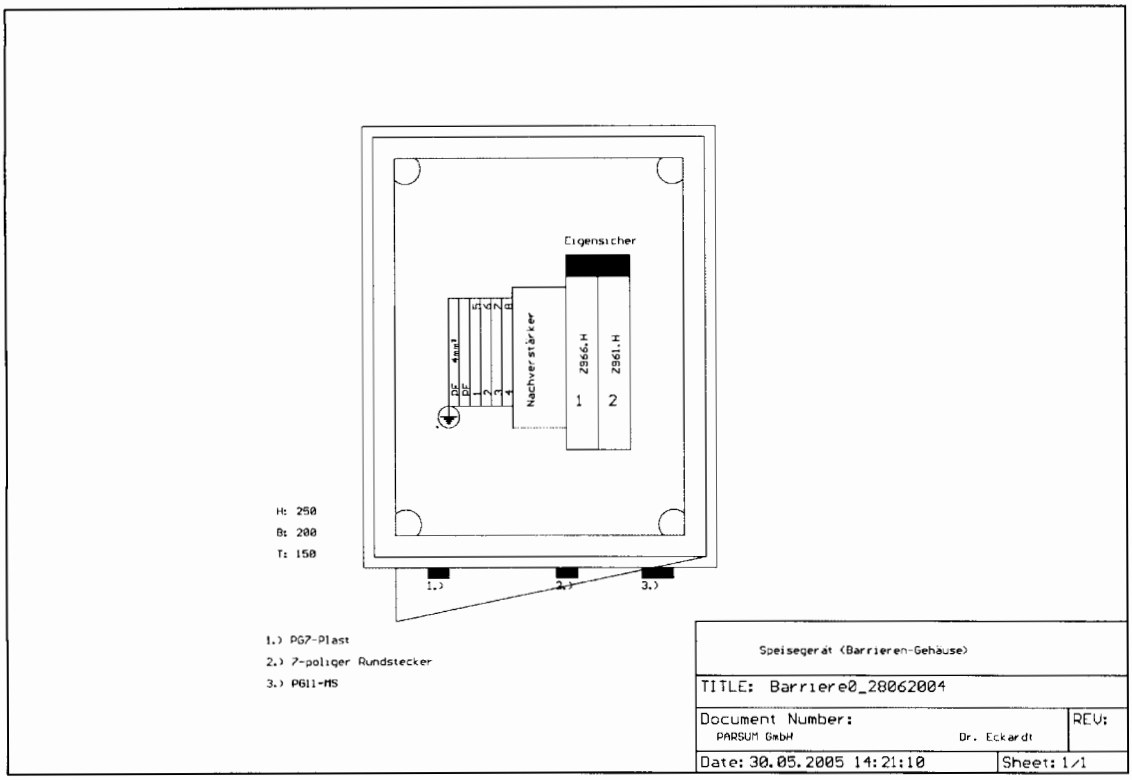
Fig. 1.2: Contact assignment of the probe-cable sockets and probe-cable coupling (female end)

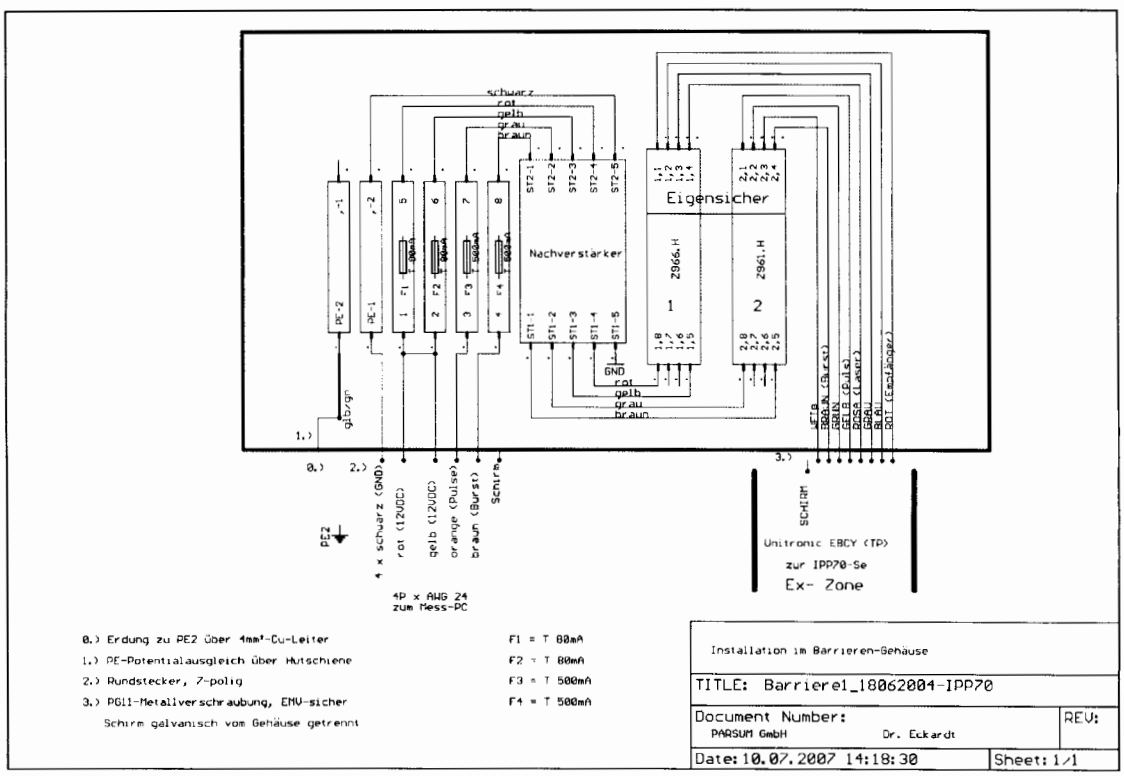
The probe housing, cable shield and probe-cable coupling housing are connected to earth potential. They may not be used as the probe's protective-earth conductor. The probe must always be additionally connected to the plant unit's earth by a protective conductor. The protective-conductor terminal on the probe housing is provided for this purpose.

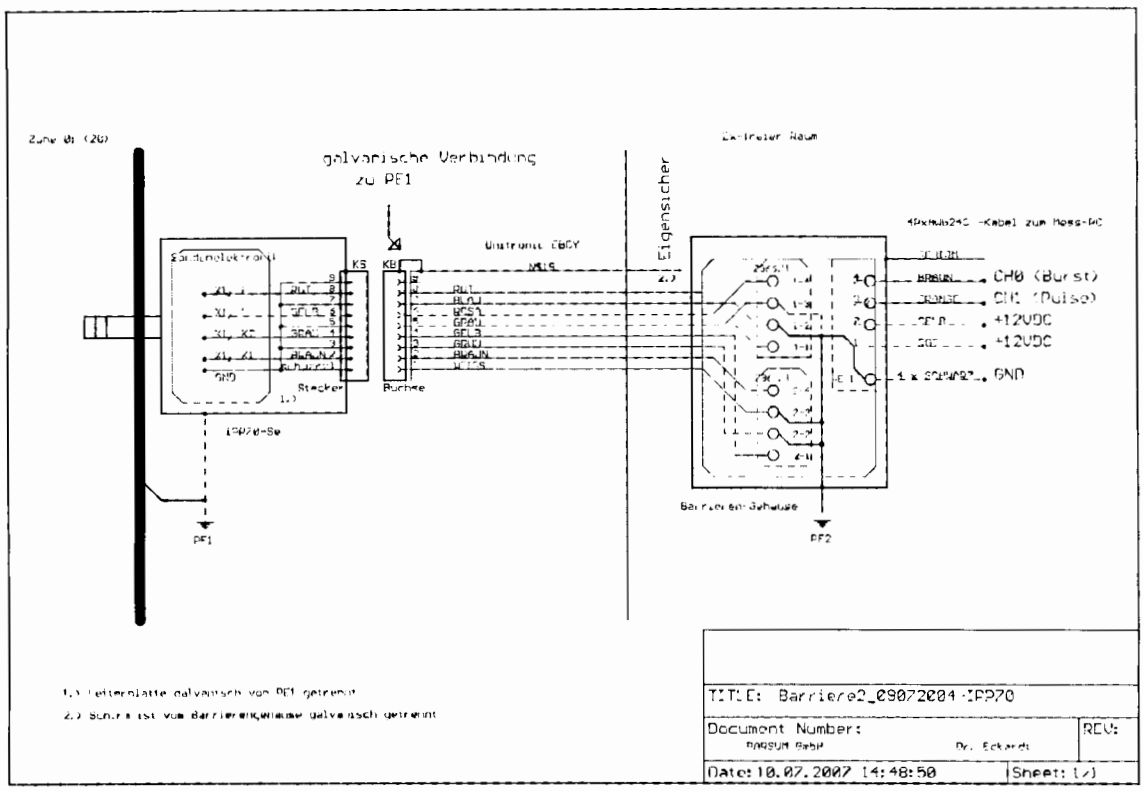
Summary of symbols used (as per VDE 0411):

⏚ Protective-conductor terminal on the IPP probe

⏚ DC, direct current.


Eigensicher
Nachverstärker
2966.H
2961.H
1
2
PE
DF
4mm²
H: 250
B: 200
T: 150
1.)
2.)
3.)
1.) PG7-Plast
2.) 7-poliger Rundstecker
3.) PG11-MS
Speisegerät (Barrieren-Gehäuse)
TITLE: Barriere0_28062004
Document Number:
PARSUM GmbH
Dr. Eckardt
REV:
Date: 30.05.2005 14:21:10
Sheet: 1/1


schwarz
rot
gelb
grau
braun
Nachverstärker
Eigensicher
2966.H
2961.H
GND
rot
gelb
grau
braun
PE-2
PE-1
F1
F2
F3
F4
1.)
0.)
2.)
3.)
4 x schwarz (GND)
rot (12VDC)
gelb (12VDC)
orange (Pulse)
braun (Burst)
Schirm
PE2
4P x AWG 24
zum Mess-PC
SCHIRM
Unitronic EBCY (TP)
zur IPP70-Se
Ex- Zone
0.) Erdung zu PE2 über 4mm²-Cu-Leiter
1.) PE-Potentialausgleich über Hutschiene
2.) Rundstecker, 7-polig
3.) PG11-Metallverschraubung, EMV-sicher
Schirm galvanisch vom Gehäuse getrennt
F1 = T 80mA
F2 = T 80mA
F3 = T 500mA
F4 = T 500mA
Installation im Barrieren-Gehäuse
TITLE: Barriere1_18062004-IPP70
Document Number:
PARSUM GmbH
Dr. Eckardt
REV:
Date: 10.07.2007 14:18:30
Sheet: 1/1


galvanische Verbindung
zu PE1
Eigensicher
Stecker
Buchse
CH0 (Burst)
CH1 (Pulse)
+12VDC
+12VDC
GND
PE1
PE2
TITLE: Barriere2_20072004-IPP70
Document Number:
REV:
Date: 10.07.2007 14:48:50
Sheet: 1/1

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