PFEIFFER VACUUM

PI 300D / DN, PE 300DC9
CP 300C9 / C10 / T11 / T11L
IF 300A / B / C / P

Plug-In Boards for Total Pressure Gauge Controller TPG 300

Operating Instructions

BG 5972 BEN / B (2015-03)

EN

About this Document

About this document

This document describes the plug-in boards for the total pressure gauge controller TPG 300, intended as a supplement to the documentation of the basic unit TPG 300 (→ 🕮 [1]).

Validity

This document applies to plug-in boards listed below

Type	Description	Part number
PI 300D	Pirani measurement board	PT 546 920-T
PI 300DN	Pirani measurement board	PT 549 214-T
PE 300DC9	Cold cathode measurement board	PT 441 375-T
CP 300C9	Pirani/cold cathode measurement board	PT 441 000-T
CP 300C10	Pirani/cold cathode measurement board	PT 441 114-T
CP 300T11	Pirani/cold cathode measurement board	PT 441 080-T
CP 300T11L	Pirani/cold cathode measurement board	PT 441 120-T
IF 300A	Interface and relay Board (RS232C)	PT 441 130-T
IF 300B	Interface and relay Board (RS232C)	PT 441 250-T
IF 300C	Interface and relay Board (RS422C)	PT 441 390-T
IF 300P	Interface and relay Board (Profibus)	PT 441 395-T

The part number (No) can be taken from the product nameplate.

We reserve the right to make technical changes without prior notice.

Contents

1 Safety

1.1 General Safety Information

a) Take the necessary precautions when doing installation work.

It may be necessary implement additional protective measures in the system.

b) Before connecting any external elements, check that they are compatible with the technical data in this document.

c) Take the necessary precautions when doing maintenance or repair work.

1.2 Symbols Used

Danger:
Information on preventing any kind of personal injury or extensive equipment damage.

Caution:
Special information on damage prevention.

Note:
Special information on cost-effective use.

Skilled Personnel:
This work may only be carried out by persons with suitable technical training and the necessary experience.

Waiting time, reaction time, duration of test

< … > Marking

→ 🗎 See page …

→ 🕮 See document …

1.3 General Stipulations

Since the individual components are delicate, appropriate measures must be taken to protect them from static electricity. Store modules in antistatic bags or containers.

Damage resulting from incorrect handling may lead to a revocation of the guarantee.

Pfeiffer Vacuum accepts no responsibility nor warranty if the user or third parties

- utilize the product not according to the defined use
- make any kind of changes (modifications, alterations, etc.) to the product.

2 Description

2.1 Pirani Measurement Boards

Pirani boards have tow independent medium vacuum measurement circuits, each with one gauge cable connector, two trimmer potentiometers and one analog signal output. When the control unit is on, the Pirani measurement circuits are in continuous operation. The analog signals are constantly available, independent of what is shown on the pressure display.

2.2 Cold Cathode Measurement Boards

Cold cathode measurement boards for the measurement of high and ultra high vacuum contain one or two measurement circuits, each with one gauge cable connector and one analog signal output. When the gauge is turned on, the analog signals are constantly available, independent of what is shown on the pressure display.

This measurement board contains special electronics to limit the measurement current to 100 µA, a feature that considerably extends the lifetime of the gauge.

2.3 Pirani/Cold Cathode Measurement Boards

As the name indicates, these are combined boards containing one Pirani and one cold cathode measurement circuit each. They have the same characteristics as the boards described above.

Measurement boards for the range of 10^{-10} and 10^{-11} hPa contain special electronics to limit the measurement current to 100 µA, a feature that considerably extends the lifetime of the gauge

2.4 Interface and Relay Board

Four types of interface and relay boards are available: Two contain an RS232C interface, one an RS422 and an other one a Profibus-DP interface. All four types have five relays with one floating changeover contact each. The main difference between these four boards is the switching voltage of the relays and the type of interface port.

2.5 Pirani Measurement

Within certain limits the thermal conductivity of gases is a function of the pressure. Pirani thermal conductivity vacuum gauges exploit this phenomenon for pressure measurements.

The measurement element consists of a thin filament with a high temperature coefficient. The resistance of the wire and consequently its temperature are maintained at a constant value by means of a suitable control circuit. The electrical power supplied to the filament is, therefore, a measure of the thermal conductivity and consequently the gas pressure.

2.6 Cold Cathode Measurement

The current flowing in a self-sustained gas discharge with a cold cathode (similar to Penning) depends on the applied voltage, the gas composition, and the pressure. A magnetic field that penetrates the measurement chamber has the effect that the electrons move along a spiral trajectory from the cathode to the anode and thereby cause even at low gas densities a sufficient number of ionizing impacts for maintaining the discharge. If (with a known gas type) the anode voltage and magnetic field are kept constant, the discharge current is a measure of the pressure.

3 Technical Data

3.1 Pirani Measurement Boards

		PI 300D for Pirani gauges with tungsten filament	PI 300DN for Pirani gauges with nickel filament
Number of measurement cirquits		2	2
Measurement range [1]			
from 1000 hPa …	hPa	8×10^{-4}	8×10^{-4}
Cable length, max.	m	100	100
Signal output			
Measured value, analog	V	0 … +10	0 … +10
Error message	V	>11.5	>11.5
Current, max.	mA	2	2
Output resistance	Ω	400	400
Reaction time (10 ⇨ 90%) for sudden pressure step			
$<10^{-3}$ ⇨ 10^{3} hPa	ms	<50	<50
10^{3} ⇨ $<10^{-3}$ hPa	ms	<600	<600
Connection, (equipment side)			
TPR gauge	Female	Amphenol C91E 6 pin	Amphenol C91E 6 pin
Signal output	Female	ø2 mm	ø2 mm
Weight	kg	≈0.14	≈0.14

[1] N_2-equivalent

3.2 Cold Cathode Measurement Board

		PE 300DC9
Number of measurement circuits		2
Measurement range [1]		
from 5×10^{-3} hPa …	hPa	1×10^{-9}
Cable length, max.	m	60 [2] … 100
Power supply for gauge		
Operating voltage	kV	3.3
Measurement current	µA	≤100
Signal output		
Measured value, analog	V	0 … +10
Error message	V	>11.5
Current, max.	mA	2
Output resistance	Ω	400
Reaction time (10 ⇨ 90%) for sudden pressure step		
$<10^{-9}$ ⇔ 10^{3} hPa	ms	<20
Connection, equipment side		
Cold cathode gauge	Female	SHV coaxial
Signal output	Female	ø2 mm
Weight	kg	≈0.26

[1] N_2-equivalent

[2] when using the lower measurement range limit (→ 🗎 15)

3.3 Pirani/ Cold Cathode Measurement Boards

		CP 300C9	CP 300C10	CP 300T11	CP 300T11L
Number of measurement circuits		1 each	1 each	1 each	1 each
Measurement range [1]					
Pirani: from 1000 hPa …	hPa	8×10^{-4}	8×10^{-4}	8×10^{-4}	8×10^{-4}
Cold cathode: from 5×10^{-3} hPa …	hPa	5×10^{-9}	1×10^{-10}	1×10^{-11}	1×10^{-11}
Cable length					
Pirani, max.	m	100	100	100	500
Cold cathode, max.	m	60 [2] … 100	60 [2] … 100	500	500
Power supply Cold cathode gauges					
Operating voltage	kV	3.3	3.3	3.3	3.3
Measurement current	µA	≤600	≤100	≤100	≤100
Signal output					
Measured value, analog	V	0 … +10	0 … +10	0 ... +10	0 ... +10
Error message	V	>11.5	>11.5	>11.5	>11.5
Current, max.	mA	2	2	2	2
Output resistance	Ω	400	400	400	400
Reaction time (10 ⇨ 90%) for sudden pressure step					
Pirani					
$<10^{-3}$ ⇨ 10^{3} hPa	ms	<50	<50	<50	<50
10^{3} ⇨ $<10^{3}$ hPa	ms	<600	<600	<600	<600
Cold cathode					
10^{-9} ⇔ 10^{3} hPa	ms	<10	<50	<50	<50
Connection, equipment side					
Pirani gauge	Female	Amphenol C91E 6 pin	Amphenol C91E 6 pin	Amphenol C91E 6 pin	Amphenol C91E 6 pin
Cold cathode gauge	Female	SHV coaxial	SHV coaxial	triaxial	triaxial
Signal output	Female	ø2 mm	ø2 mm	ø2 mm	ø2 mm
Weight	kg	≈0.21	≈0.23	≈0.25	≈0.25

[1] N_2-equivalent

[2] when using the lower measurement range limit (→ 🖹 15)

3.4 Interface and Relay Boards

	IF 300A	IF 300B
Relay		
Number	5	5
Contact type	1 change over contact each floating max. 50 VAC relative to other contacts and ground	1 change over contact each floating max. 250 VAC relative to other contacts and ground
Characteristic data AC		
Switching voltage, max. Switching current, max. Switching power, max.	50 VAC 1.5 A 75 VA	250 VAC 4 A 1000 VA
Characteristic data DC		
Switching current, max.	Switching voltages >50 VDC are inadmissible for savety reasons 0.6 A at 50 VDC 0.8 A at 40 VDC 1.5 A at 30 VDC	0.25 A at 200 VDC 0.3 A at 140 VDC 0.4 A at 100 VDC 0.5 A at 60 VDC 0.6 A at 50 VDC 0.8 A at 40 VDC 4.0 A at 30 VDC
Switching power, max.		120 W
Connection, equipment side		
Type	D-Sub connector, 15-pin, male	GdsA-H, DIN 41 612 15-pin, male
Transition resistance with socket	125 mΩ	70 mΩ
Interface		
Type	RS232C, asynchronous	RS232C, asynchronous
Baud rates	300, 1200, 2400, 4800, 9600	300, 1200, 2400, 4800, 9600
Data format	ASCII 1 start bit, 8 data bits, 1 stop bit, no parity bit	ASCII 1 start bit, 8 data bits, 1 stop bit, no parity bit
Connection, equipment side	D-Sub connector, 9 pin, male	0.4 m cable with D-Sub connector, 25 pin, male
Cable length, max.	30 m	30 m
Weight	≈0.14 kg	≈0.15 kg

Before connecting any external elements, check that they conform to the above technical data.

	IF 300C	IF 300P
Relay		
Number	5	5
Contact type	1 change over contact each floating max. 50 VAC relative to other contacts and ground	1 change over contact each floating max. 50 VAC relative to other contacts and ground
Characteristic data AC		
Switching voltage, max. Switching current, max. Switching power, max.	50 VAC 1.5 A 75 VA	50 VAC 1.5 A 75 VA
Characteristic data DC		
Switching current, max.	Switching voltages >50 VDC are inadmissible for safety reasons 0.6 A at 50 VDC 0.8 A at 40 VDC 1.5 A at 30 VDC	Switching voltages >50 VDC are inadmissible for safety reasons 0.6 A at 50 VDC 0.8 A at 40 VDC 1.5 A at 30 VDC
Connection, equipment side		
Type	D-Sub connector, 15-pin, male	D-Sub connector, 15-pin, male
Transition resistance with socket	125 mΩ	125 mΩ
Interface		
Type	RS-422, asynchronous	Profibus-DP [1]
Baud rates	300, 1200, 2400, 4800, 9600	<12Mbaud [1]
Data format	ASCII 1 start bit, 8 data bits, 1 stop bit, no parity bit	[1]
Connection, equipment side	D-Sub connector, 9 pin, female	D-Sub connector, 9 pin, male
Cable length, max.	1200 m	[1]
Weight	≈0.14 kg	≈0.16 kg

[1] Detailed information on the Profibus-DP Interface can be found in the communication protocol (→ 🕮 [2]).

Before connecting any external elements, check that they conform to the above technical data.

4 Installation

General

Use screened cables only (connect screen to barrel of connector). If both ends of the screen are connected to ground, compensating currents must be prevented (e.g. by connecting all involved units to a common power distributor).

In a Profibus-DP installation (IF 300P board), use the recommended special cable only (→ 🕮 [2]).

Installing/Removing the Plug-In Boards

Description → 🗎14

Connecting the Relays of the Interface and Relay Boards

Type	Description
IF 300A	→ 🗎19
IF 300B	→ 🗎19
IF 300C	→ 🗎21
IF 300P	→ 🗎21

Connecting the Interfaces

	Description		
Type	RS232	RS422	Profibus-DP
IF 300A	→ 🗎22	–	–
IF 300B	→ 🗎23	–	–
IF 300C	–	→ 🗎24	–
IF 300P	–	–	→ 🗎25

Installing the Measurement Boards

Board type	→ Installing/removing plug-in boards	→ Connecting the Pirani gauge	→ Connecting the cold cathode gauge	→ Connecting the analog signal
PI 300D PI 300DN	14	15	–	17
PE 300DC9	14	–	15	17
CP 300C9 CP 300C10	14	15	15	17
CP 300T11 CP 300T11L	14	15	15	17

4.1 Installing/Removing the Plug-In Boards

For safety reasons, vacant slots should always be covered with blank panels.

Disconnect all cables from the unit before installing/removing any plug-in modules.

Modules should only be handled on an ESD protected bench.

Procedure

- Switch off the unit and wait one minute
- Remove all cables (power cable last)
- Unscrew the blind plate / plug-in module
- Insert / remove plug-in module
- Screw on the plug-in module / blind plate
- Connect the cables (mains cable first)
- Switch on the unit again

To ensure correct operation, check that the screws of the plug-in modules are tightened.

4.2 Connecting the Pirani Gauge

Additional protective measures must be taken if certain processes in the vacuum system (e.g. flashovers) can cause hazardous voltages on the gauge terminals.

Although the gauge cables are screened, they should not be routed in parallel to lines producing strong electrical noise.

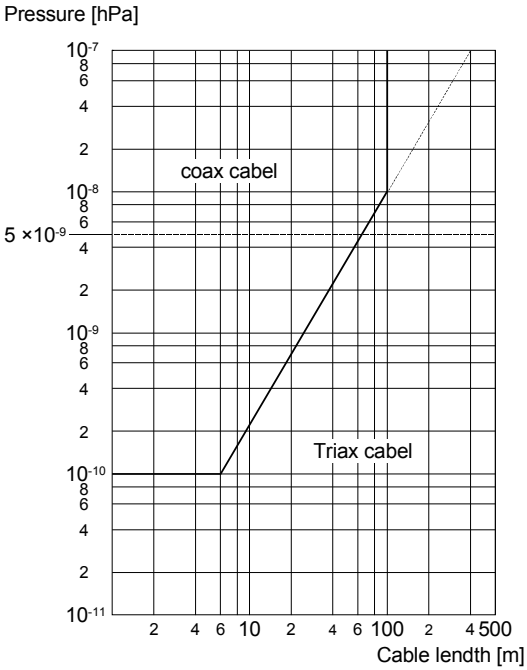
Connect the gauge to the <TPR> connector on the rear panel. The connectors are locked so that they cannot be separated accidentally.

4.3 Connecting the Cold Cathode Gauge

Additional protective measures must be taken if certain processes in the vacuum system (e.g. flashovers) can cause hazardous voltages on the gauge terminals.

Although the gauge cables are screened, they should not be routed in parallel to lines producing strong electrical noise.

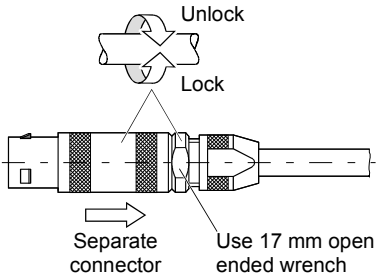
Connect the gauge to the <IKR> connector. Coaxial cables normally suffice. The following diagram indicates the conditions under which a triaxial cable is required.



The maximum length of 100 m for coaxial cables is specified by EN 61010. Greater lengths are not admissible without additional protective measures.

If the gauge is not grounded via the vacuum chamber, it must be grounded separately.

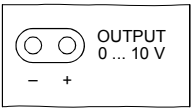
If the cable length is >100 m (only admissible with triaxial cable), the connectors must be protected against unintentional separation and contact of the center conductor. The cable must only be plugged in or detached while the unit is switched off.



Protection against unintentional separation of the triaxial connector.

4.4 Connecting the <OUTPUT> Analog Signal

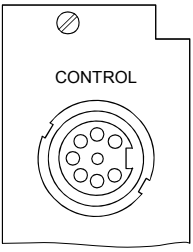
(except for PE 300DC9)



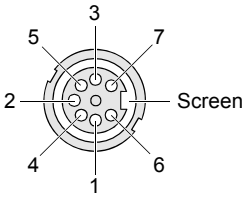
Each measurement circuit is equipped with an analog signal output. Matching connectors are included with each measurement board.

4.5 Connecting the <CONTROL> Analog Signals

(only for PE 300DC9)



Each measurement circuit is equipped with a control input and an analog signal output. Matching connectors are included with each measurement board.



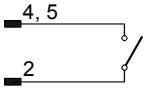
Pin assignment

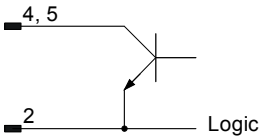
Pin 1	Analog GND IKR 1
Pin 2	Digital GND
Pin 3	Analog GND
Pin 4	IKR ON 1
Pin 5	IKR ON 2
Pin 6	Analog Output
Pin 7	Analog Output
Housing	Screen

External Switching On/Off of the Measurement Circuit

There are various ways to switch a measurement circuit on/off:

- manually
- automatically
- externally, via a contact on the <control> connection



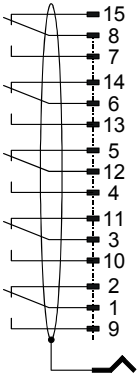


Switch on the gauge manually or automatically before initiating gauge control via an external input.

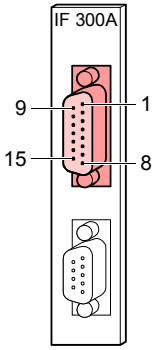
4.6 Connecting the Relays of the IF 300A

Pin Assignment

The relay connector on the rear of the IF 300A has the following pin assignment:



Contacts shown de-energized

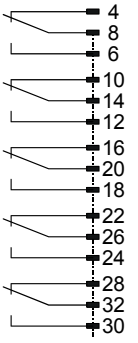


Pin location

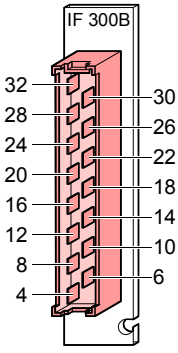
4.7 Connecting the Relays of the IF 300B

Pin Assignment

The relay connector on the rear of the IF 300B has the following pin assignment (no screened cables required):



Contacts shown de-energized



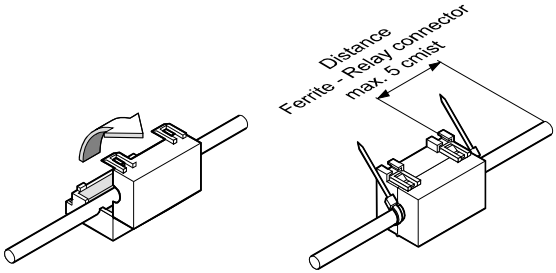
Pin location

The connectors may only be wired, mounted, plugged in, and unplugged in de-energized condition.

At voltages <50 V insulated blade receptacles 4.8×0.8 mm may be used. However, also in this case we recommend the use of the relay connector because it permits fast separation of the connection as well as strain relief.

Always use the relay connector at voltages ≥50 V (→ 31) for safety reasons.

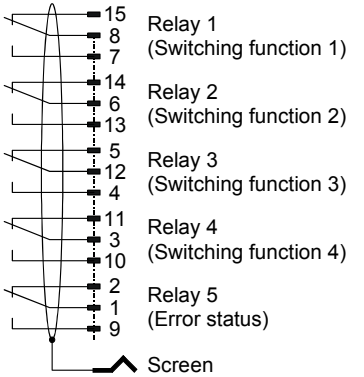
Mount the enclosed ferrite clamp In order to reduce the electromagnetic interference.



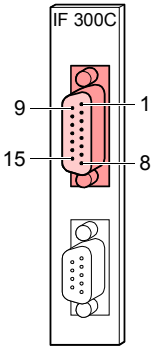
4.8 Connecting the Relays of the IF 300C

Pin Assignment

The relay connector on the rear of the IF 300C has the following pin assignment:



Contacts shown de-energized

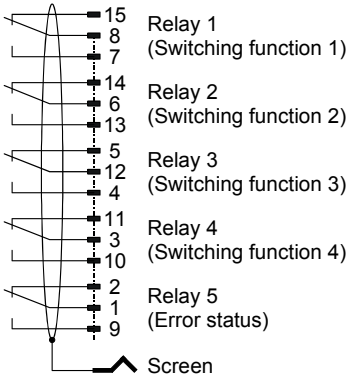


Pin location

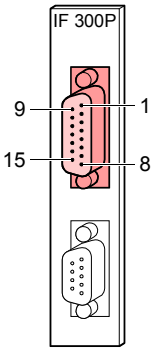
4.9 Connecting the Relays of the IF 300P

Pin Assignment

The relay connector on the rear of the IF 300P has the following pin assignment:



Contacts shown de-energized

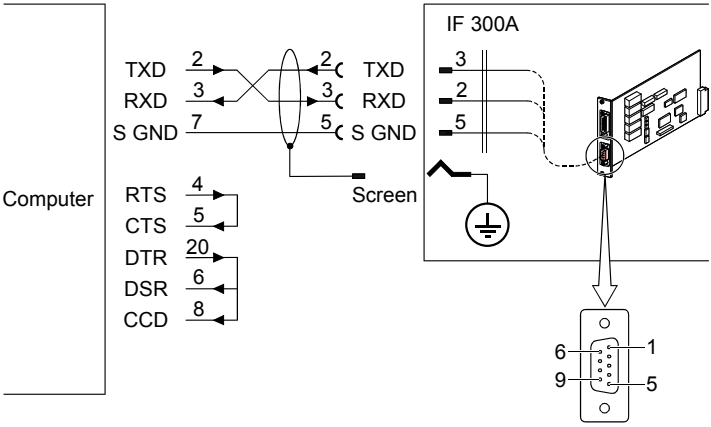


Pin location

4.10 Connecting the RS232C Interface to the IF 300A

Pin Assignment

The interface connector on the rear of the IF 300A has the following pin assignment:



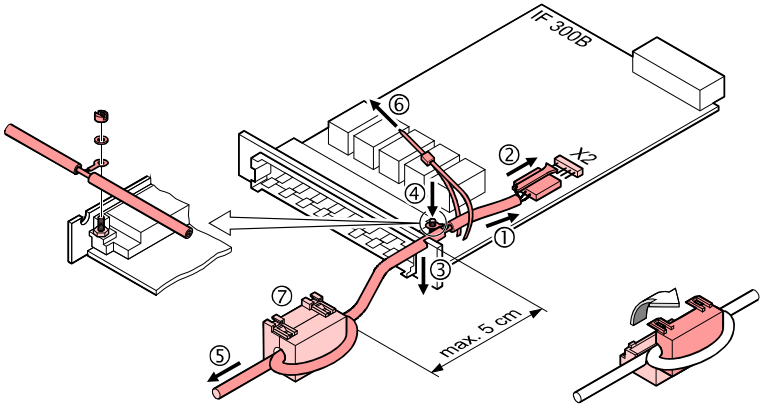
Pin 3 = Transmit data TXD *)
Pin 2 = Receive data RXD *)
Pin 5 = Signal gnd
Housing = Screen

*) Reference point: IF 300A

4.11 Connecting the RS232C Interface to the IF 300B

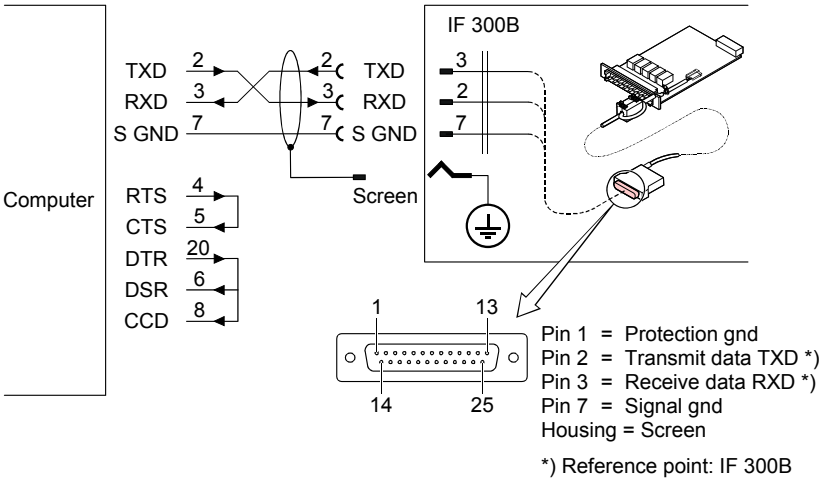
Interface Cable

If you intend to use the RS232C interface, the interface cable has to be installed in the specified sequence first:



Pin Assignment

The interface connector on the rear of the IF 300B has the following pin assignment:



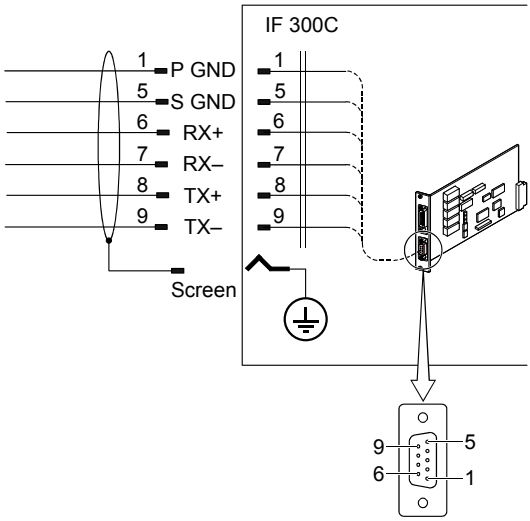
Pin 1 = Protection gnd
Pin 2 = Transmit data TXD *)
Pin 3 = Receive data RXD *)
Pin 7 = Signal gnd
Housing = Screen

*) Reference point: IF 300B

4.12 Connecting the RS422 Interface to the IF 300C

Pin Assignment

The interface connector on the rear of the IF 300C has the following pin assignment:



Pin 1 = Protection gnd
Pin 5 = Signal gnd
Pin 6 = Receive data +
Pin 7 = Receive data –
Pin 8 = Transmit data +
Pin 9 = Transmit data –
Housing = Screen

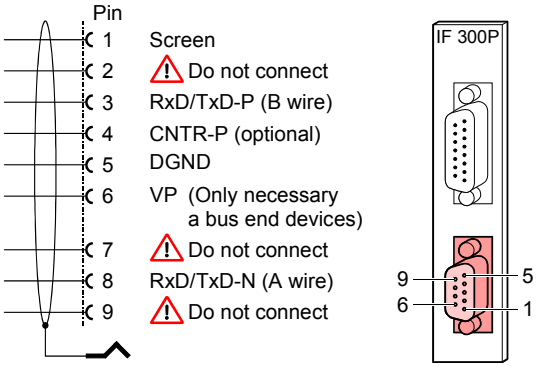
*) Reference point: IF 300C

4.13 Connecting the Profibus-DP Interface to the IF 300P

In a Profibus-DP installation, use the recommended special cable only (→ 🕮 [2]).

Pin Assignment

The interface connector on the rear of the IF 300P has the following pin assignment:

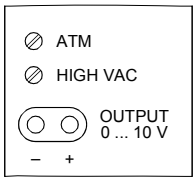


5 Adjustment

Pirani measurement circuits are factory-adjusted to the standard gauge. Due to manufacturing tolerances, contamination of the gauges, and different cable lengths, deviations are inevitable.

Cold cathode measurement circuits are factory-adjusted and require no readjustment.

5.1 Adjusting the Pirani Measurement Circuit



Two trimmer potentiometers are available for compensating the gauge tolerances, gauge contamination, or different cable lengths, within certain limits.

The adjustment should only be performed after the equipment has attained operating temperature (≈10 Minutes).

Adjustment at High Vacuum

- With gauge connected, lower the vacuum chamber pressure to <1×10^{-4} hPa
- Select the measurement circuit to be adjusted (»sensor« mode)
- With the <HIGH VAC> potentiometer adjust the display to 8.0×10^{-4} hPa
- Turn the potentiometer clockwise by 90°
- «ur 10^{-4}» should now be displayed (→ 🕮 [1]).

Adjustment at Atmospheric Pressure

- Expose the gauge to atmospheric pressure (vent the vacuum chamber)
- Turn the <ATM> potentiometer to obtain a reading of 1.0×10^{3} hPa
- Decrease the pressure to <1×10^{-4} hPa
- Check the high vacuum reading and readjust, if necessary.

6 Troubleshooting

In addition to the guidelines below, take the documentation of the other system components into account (→ Literature 36).

6.1 Installation Problems

Problem	Possible cause	Correction
Gauge cable cannot be connected to IKR gauge	Old IKR gauge with MHV connector	Use the correct cable (→ 31)
		Change the connector (→ [4], [5], [6])
Gauge cable cannot be connected to the measurement board	Gauge cable with old connector	Use the correct cable (→ 31)
		Remove and replace connector (→ 31)

6.2 Operating and Adjustment Problems

Problem	Possible cause	Correction
Pirani reading too high	Pirani gauge contaminated	Adjust Pirani measurement circuit (→ 26)
		Clean gauge (→ [3])
		Replace gauge
Cold cathode reading too high	Connector insulation contaminated or moist	Clean insulation or replace connector
	Air humidity (⇨ leakage current)	Keep the air humidity low
		Keep the equipment in constant operation
Cold cathode reading too low	Cold cathode gauge contaminated	Clean gauge (→ [4], [5], [6])
Pirani can not be adjusted	Incorrect combination measurement board — gauge — cable	Select correct combination (→ 15)
	Gauge severely contaminated	Clean or replace gauge (→ [3])

6.3 Defects

Problem	Possible cause	Correction
Cold cathode constantly indicates « OR » (overrange), (even though the pressure is within the measuring range)	Short circuit in the cold cathode cable / gauge	Replace or repair the cable / gauge
	Cold cathode measurement board defective	Replace the cold cathode measurement board(→ 15)
Cold cathode indicates « UR » (underrange), even though the pressure is within the measuring range	No IKR gauge connected	Connect the gauge
	Interruption in cold cathode cable	Replace or repair the cable
	Cold cathode gauge defective	Replace the gauge (→ [4], [5], [6])
	Cold cathode measurement board defective	Replace the cold cathode measurement board (→ 15)

6.4 Problems with the RS232C Interface

Problem	Possible cause	Correction
No communication	Pin 2 and 3 of the interface cable not crossed	Use cable according to 22, 23
	Incorrect Baud rate	Match Baud rate
	Incorrect data format	Adhere to the format specified for the TPG 300 (→ [1])

6.5 Problems with the RS422 Interface

Problem	Possible cause	Correction
No communication	Incorrect Baud rate	Match Baud rate
	Incorrect data format	Adhere to the format specified for the TPG 300 (→ [1])

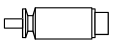
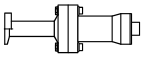
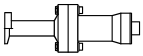
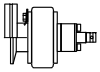
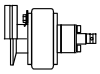
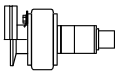
6.6 Problems with the Profibus-DP Interface

Problem	Possible cause	Correction
No communication	Incorrect Baud rate [1]	Set Baud rate to 19200 Baud
	Incorrect data format	Adhere to the standardized Profibus-DP data format (→ 🕮 [2])
Cycle time >100 ms	Incorrect firmware	Firmware TPG 300: 302-654 Firmware Profibus: V1.5
	Incorrect Baud rate [1]	Set Baud rate to 19200 Baud

[1] At the controller TPG 300, firmware 302-654 or higher

7 Accessories

7.1 Gauges

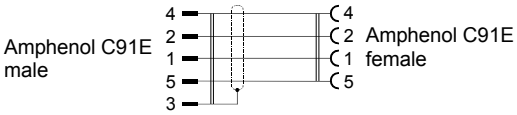
Gauge		Compatible to measurement board:	Vacuum connection	Ordering number
	TPR 010 → 🕮 [3]	PI 300D, CP 300C9 CP 300C10	DN 10 ISO-KF	PT R02 270
	TPR 017 → 🕮 [3]	PI 300DN	DN 16 ISO-KF DN 16 CF-F	PT R13 270 PT R13 271
	TPR 018 → 🕮 [3]	PI 300D, CP 300C9 CP 300C10	DN 16 ISO-KF DN 16 CF-F DN 40 CF-F	PT R15 010 PT R15 011 PT R15 014
	IKR 050 → 🕮 [4]	PE 300DC9, CP 300C9 CP 300C10	DN 25 ISO-KF DN 40 ISO-KF DN 40 CF-F	PT R18 500 PT R18 501 PT R18 502
	IKR 060 → 🕮 [5]	PE 300DC9, CP 300C9 CP 300C10	DN 40 ISO-KF DN 40 CF-F	PT R18 753 PT R18 751
	IKR 070 → 🕮 [6]	CP 300T11, CP 300T11L	DN 40 ISO-KF DN 40 CF-F	PT R20 501 PT R20 502

7.2 Measurement Cables

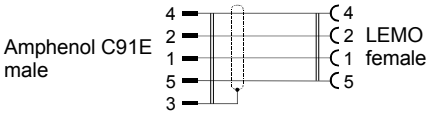
Pirani Measurement and Extension Cables

Length [m]	Pirani Measurement cables (80 °C) for: (Ordering numbers)			Measurement cables, high temperature version (250 °C)	Extension cables
	TPR 010 (PT R02 270) [1]	TPR 017 (PT R13 270, PT R13 271) [2]	TPR 018 (PT R15 010, PT R15 011, PT R15 014) [2]	for TPR 017 TPR 018 [2]	for TPR 010 TPR 017 TPR 018 [3]
2	PT 548 401-T	-	-	-	-
3	PT 548 402-T	PT 548 308-T	PT 548 308-T	PT 548 414-T	-
6	PT 548 403-T	PT 548 309-T	PT 548 309-T	PT 548 465-T	-
10	PT 548 450-T	PT 548 456-T	PT 548 456-T	PT 448 047-T	PT 548 466-T
15	PT 548 451-T	PT 548 457-T	PT 548 457-T	PT 548 043-T	-
20	PT 548 452-T	PT 548 458-T	PT 548 458-T	PT 548 044-T	PT 548 468-T
25	PT 548 453-T	PT 548 459-T	PT 548 459-T	-	-
30	PT 548 415-T	PT 548 460-T	PT 548 460-T	-	PT 548 470-T
35	PT 548 454-T	PT 548 461-T	PT 548 461-T	-	-
40	PT 548 416-T	PT 548 462-T	PT 548 462-T	-	PT 548 472-T
45	PT 548 455-T	PT 548 463-T	PT 548 463-T	-	-
50	PT 548 417-T	PT 548 464-T	PT 548 464-T	-	PT 548 474-T

[1] Pirani measurement cable for TPR 010:



[2] Pirani measurement cable for TPR 017, TPR 018:



[3] Extension cable for Pirani gauges TPR 010, TPR 017 and TPR 018:

Amphenol C91E male connector — C91E female connector (1:1)

Cold Cathode Measurment Cables (Test voltage: 6 kVDC)

Length [m]	Cold cathode measurement cables (80 °C) for: (Ordering numbers)			High temperature versions (250 °C)
	IKR 050 (PT R18 500, PT R18 501, PT R18 502) 1)	IKR 060 (PT R18 753, PT R18 751) 1)	IKR 070 (PT R20 501, PT R20 502) 2)	for IKR 050 / IKR 060 1)
3	PT 548 406-T	PT 548 406-T	PT 548 306-T	PT 548 542-T
6	PT 548 407-T	PT 548 407-T	PT 548 317-T	PT 548 543-T
10	PT 548 419-T	PT 548 419-T	PT 548 490-T	PT 448 045-T
15	PT 548 483-T	PT 548 483-T	PT 548 491-T	PT 548 989-T
20	PT 548 484-T	PT 548 484-T	PT 548 492-T	PT 548 046-T
25	PT 548 485-T	PT 548 485-T	PT 548 780-T	-
30	PT 548 422-T	PT 548 422-T	PT 548 493-T	-
35	PT 548 486-T	PT 548 486-T	PT 548 550-T	-
40	PT 548 487-T	PT 548 487-T	PT 548 494-T	-
45	PT 548 488-T	PT 548 488-T	PT 548 495-T	-
50	PT 548 489-T	PT 548 489-T	PT 548 748-T	-

1) Cold cathode measurement cable for IKR 050 and IKR 060:

Coaxial cable, SHV connector

2) Cold cathode measurement cable for IKR 070:

Triaxial cable, triaxial connector

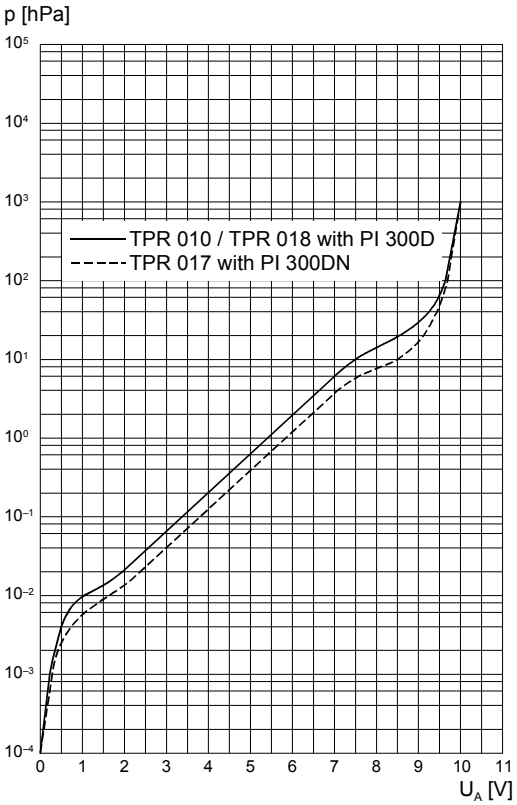
7.3 Accessories for Plug-In Boards

		for	Ordering number
D-Sub connector	15-pin, female	IF 300A	PT 441 129-T
D-Sub connector	9-pin, female	IF 300A	PT 441 128-T
Relay connector	15-pin, DIN 41 612	IF 300B	PT 546 999-T
Interface cable RS232C	0.4m	IF 300B	PT 548 932-T
D-Sub connector	15-pin, female	IF 300C	PT 441 129-T
D-Sub connector	9-pin, female	IF 300C	PT 441 145-T
Connector Amphenol C91E, 7-pin (<Control>, spare part)		PE 300DC9	B 4722 107CC

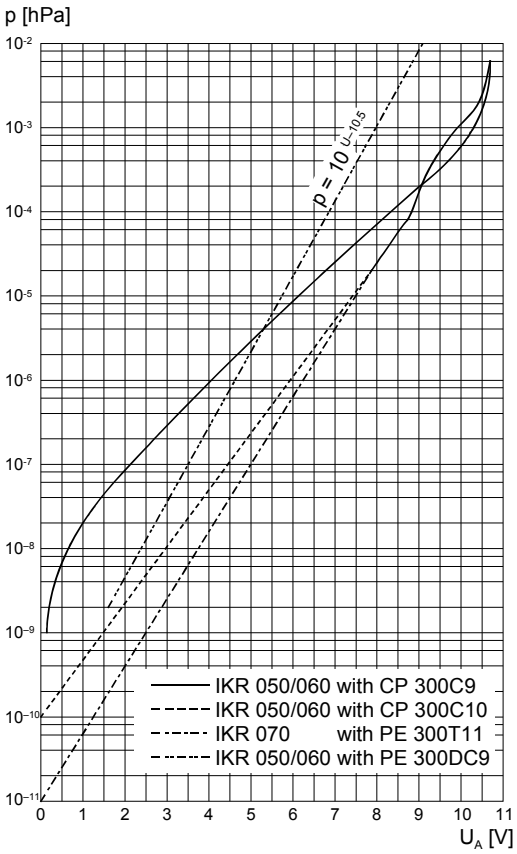
Appendix

A: Output Signals of the Measurement Boards

Pirani Gauges



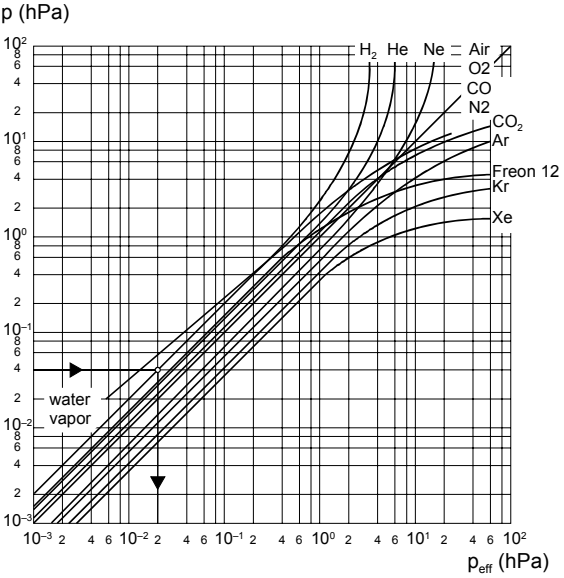
Cold Cathode Gauges



B: Gas Type Dependence

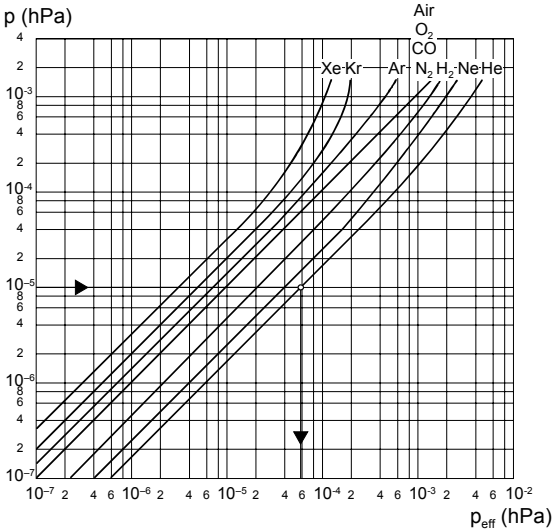
Pirani Gauges

Indicated pressure (Instrument calibrated for air)



Cold Cathode Gauges

Indicated pressure (Instrument calibrated for air)



(Mean values, deviations possible depending on degree of contamination).
Reference gauge: Hot cathode ionization gauge

C: Literature

🕮 [1] www.pfeiffer-vacuum.com
Operating Instructions
Total Pressure Gauge Controller TPG 300
BG 5970 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

🕮 [2] www.pfeiffer-vacuum.com
Communication Protocol
Profibus-DP Interface Board IF 300 P
BG 5973 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

🕮 [3] www.pfeiffer-vacuum.com
Operating Instructions
Pirani Gauge TPR 010 / 017 / 018
BG 5976 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

🕮 [4] www.pfeiffer-vacuum.com
Operating Instructions
Cold Cathode Gauge IKR 050
BG 5031 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

🕮 [5] www.pfeiffer-vacuum.com
Operating Instructions
Cold Cathode Gauge IKR 060
BG 5032 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

🕮 [6] www.pfeiffer-vacuum.com
Operating Instructions
Cold Cathode Gauge IKR 070
BG 5033 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

Notes

Notes

Notes

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