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PFEIFFER VACUUM

Plug-In Boards

for Total Pressure Gauge Controller
TPG 300

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



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	PT546920-T
PI 300DN	Pirani measurement board	PT549214-T
PE 300DC9	Cold cathode measurement board	PT441375-T
CP 300C9	Pirani/cold cathode measurement board	PT441000-T
CP 300C10	Pirani/cold cathode measurement board	PT441114-T
CP 300T11	Pirani/cold cathode measurement board	PT441080-T
IF 300A	Interface and relay Board (RS232C)	PT441130-T
IF 300B	Interface and relay Board (RS232C)	PT441250-T
IF 300C	Interface and relay Board (RS422C)	PT441390-T
IF 300P	Interface and relay Board (Profibus)	PT441395-T

The part number can be taken from the product name-plate.

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

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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} mbar 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 mbar …	mbar	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} mbar	ms	<50	<50
10^{3} ⇨ $<10^{3}$ mbar	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} mbar …	mbar	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} mbar	ms	<20
Connection, equipment side		
Cold cathode gauge	Female	SHV coaxial
Signal output	Female	Amphenol C91E 7 pin
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
Number of measurement circuits		1 each	1 each	1 each
Measurement range [1]				
Pirani: from 1000 mbar …	mbar	8×10^{-4}	8×10^{-4}	8×10^{-4}
Cold cathode: from 5×10^{-3} mbar …	mbar	5×10^{-9}	1×10^{-10}	1×10^{-11}
Cable length				
Pirani, max.	m	100	100	100
Cold cathode, max.	m	60 [2] … 100	60 [2] … 100	500
Power supply Cold cathode gauges				
Operating voltage	kV	3.3	3.3	3.3
Measurement current	µA	≤600	≤100	≤100
Signal output				
Measured value, analog	V	0 … +10	0 … +10	0 ... +10
Error message	V	>11.5	>11.5	>11.5
Current, max.	mA	2	2	2
Output resistance	Ω	400	400	400
Reaction time (10 ⇨ 90%) for sudden pressure step				
Pirani				
$<10^{-3}$ ⇨ 10^{3} mbar	ms	<50	<50	<50
10^{3} ⇨ $<10^{3}$ mbar	ms	<600	<600	<600
Cold cathode				
10^{-9} ⇔ 10^{3} mbar	ms	<10	<50	<50
Connection, equipment side				
Pirani gauge	Female	Amphenol C91E 6 pin	Amphenol C91E 6 pin	Amphenol C91E 6 pin
Cold cathode gauge	Female	SHV coaxial	triaxial	triaxial
Signal output	Female	ø2 mm	ø2 mm	ø2 mm
Weight	kg	≈0.21	≈0.23	≈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	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.

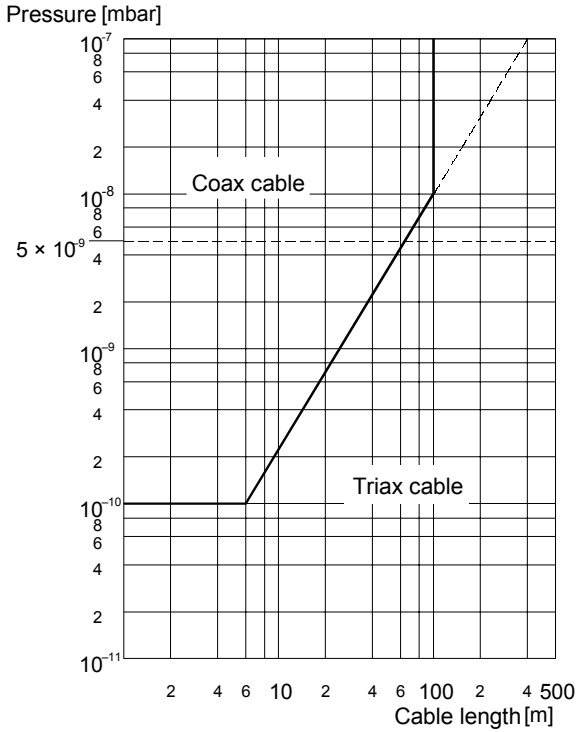
4.3 Connecting the Cold Cathode Gauge



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.



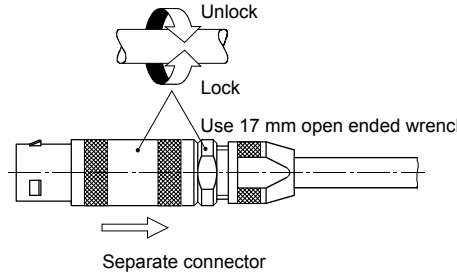


The maximum length of 100 m for coaxial cables is specified by EN 61010. Greater lengths are not admissible without additional protective measures.

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



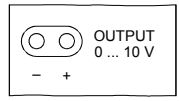
If the cable length is >100 m (only admissible with triaxial cable), the connectors must be protected against unintentional separation and contact of the center conductor. The cable must only be plugged in or detached while the unit is switched off.



Protection against unintentional separation of the triaxial connector.

4.4 Connecting the <OUTPUT> Analog Signal

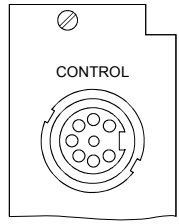
(except for PE 300DC9)



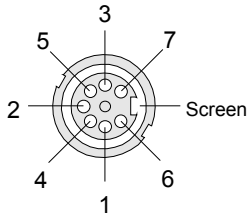
Each measurement circuit is equipped with an analog signal output. Matching connectors are included with each measurement board.

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.



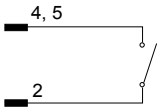
Pin assignment

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

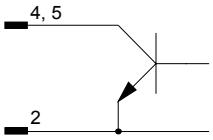
External Switching On/Off of the Measurement Circuit

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

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



Switch



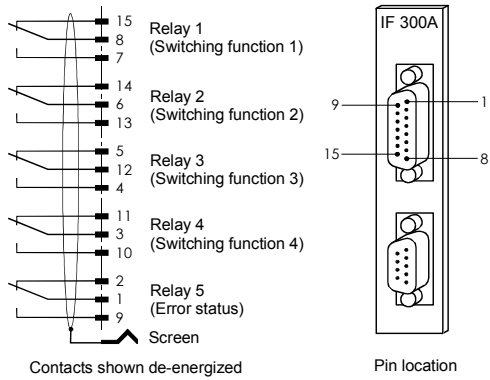
Logic

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:



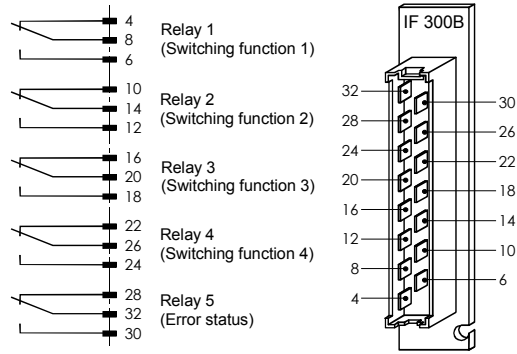
Contacts shown de-energized

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



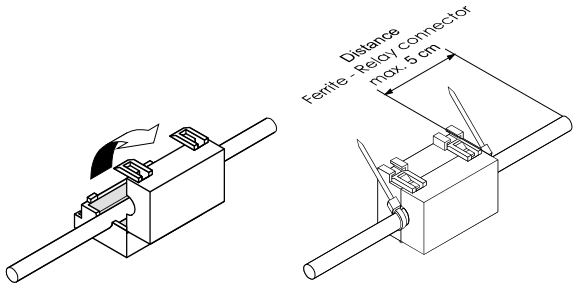
The connectors may only be wired, mounted, plugged in, and unplugged in de-energized condition.

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.



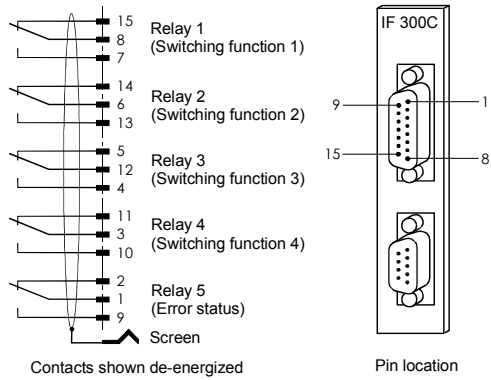
Mount the enclosed ferrite clamp In order to reduce the electromagnetic interference.



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:



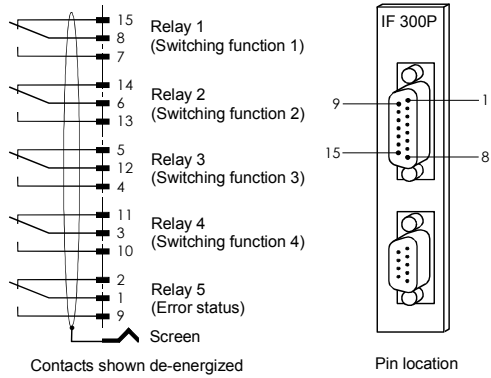
Contacts shown de-energized

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:



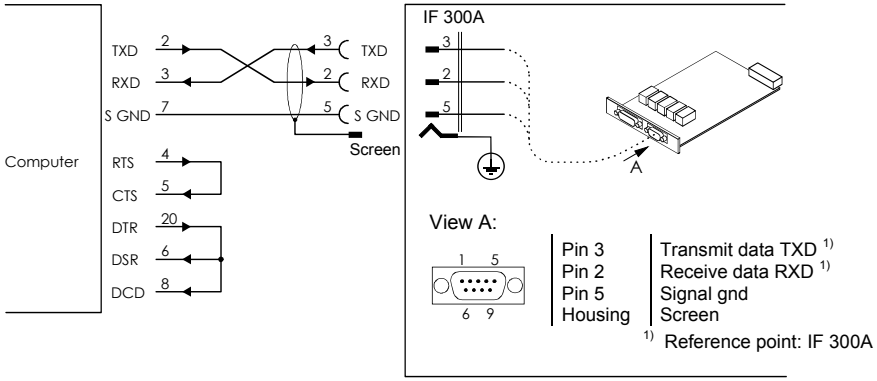
Contacts shown de-energized

Pin location

4.10 Connecting the RS232C Interface to the IF 300A

Pin Assignment

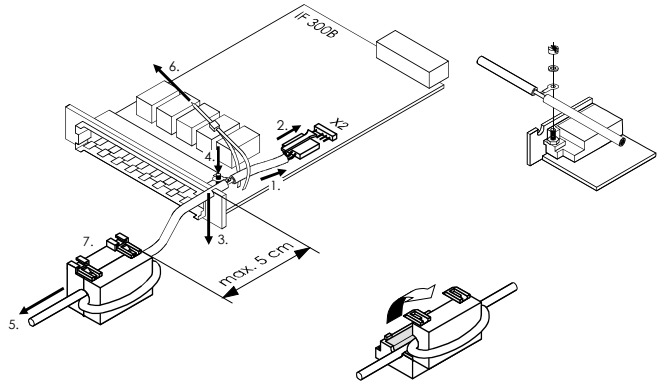
The interface connector on the rear of the IF 300A has the following pin assignment:



4.11 Connecting the RS232C Interface to the IF 300B

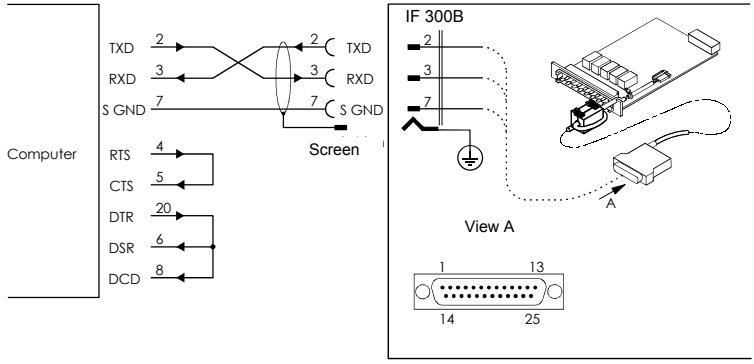
Interface Cable

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:



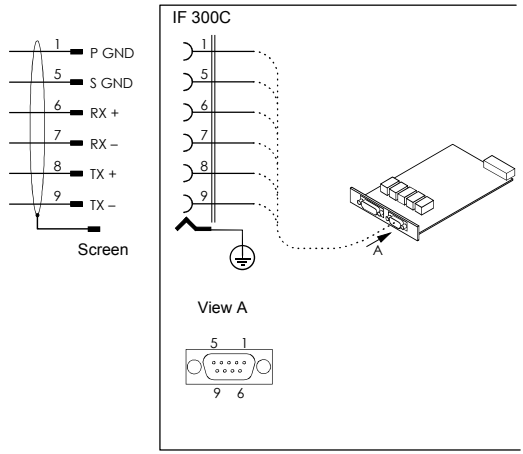
Pin 1	Protection gnd
Pin 2	Transmit data TXD [1]
Pin 3	Receive data RXD [1]
Pin 7	Signal gnd
Housing	Screen

[1] 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 assignment:	Pin 1	Protection gnd
	Pin 5	Signal gnd
	Pin 6	Receive data + [1]
	Pin 7	Receive data – [1]
	Pin 8	Transmit data + [1]
	Pin 9	Transmit data – [1]
	Housing	Screen

[1] Reference point: IF 300C

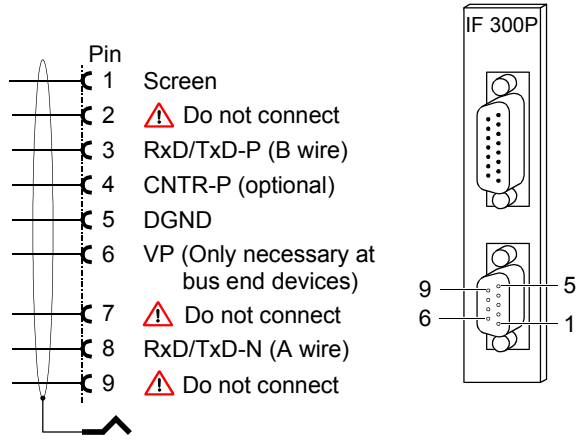
4.13 Connecting the Profibus-DP Interface to the IF 300P



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:

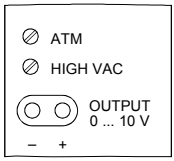


5 Adjustment

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} mbar
- Select the measurement circuit to be adjusted (»sensor« mode)
- With the <HIGH VAC> potentiometer adjust the display to 8.0×10^{-4} mbar
- 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} mbar
- Decrease the pressure to <1×10^{-4} mbar
- 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 (→ [6], [7], [8])
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], [4], [5])
		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 (→ [6], [7], [8])
Pirani can not be adjusted	Incorrect combination measurement board — gauge — cable	Select correct combination (→ 15)
	Gauge severely contaminated	Clean or replace gauge (→ [3], [4], [5])

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 (→ [6], [7], [8])
	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

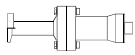
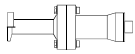
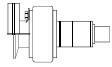
Problem	Possible cause	Correction
No communication	Incorrect Baud rate	Match Baud rate
	Incorrect data format	Adhere to the format specified for the TPG 300 (→ [1])

6.6 Problems with the Profibus-DP Interface

Problem	Possible cause	Correction
No communication	Incorrect Baud rate	Set Baud rate to 9600 Baud (TPG 300)
	Incorrect data format	Adhere to the standardized Profibus-DP data format (→ 🕮 [2])

7 Accessories

7.1 Gauges

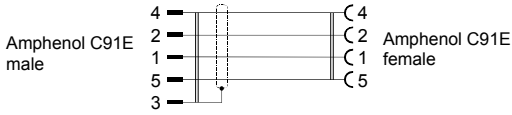
Gauge		Compatible to measurement board:	Vacuum connection	Ordering number
	TPR 010 → 🕮 [3]	PI 300D, CP 300C9 CP 300C10	DN 10 ISO-KF	PTR02270
	TPR 017 → 🕮 [4]	PI 300DN	DN 16 ISO-KF DN 16 CF-F	PTR13270 PTR13271
	TPR 018 → 🕮 [5]	PI 300D, CP 300C9 CP 300C10	DN 16 ISO-KF DN 16 CF-F DN 40 CF-F	PTR15010 PTR15011 PTR15014
	IKR 050 → 🕮 [6]	PE 300DC9, CP 300C9 CP 300C10	DN 25 ISO-KF DN 40 ISO-KF DN 40 CF-F	PTR18500 PTR18501 PTR18502
	IKR 060 → 🕮 [7]	PE 300DC9, CP 300C9 CP 300C10	DN 40 ISO-KF DN 40 CF-F	PTR18753 PTR18751
	IKR 070 → 🕮 [8]	CP 300T11	DN 40 ISO-KF DN 40 CF-F	PTR20501 PTR20502

7.2 Measurement Cables

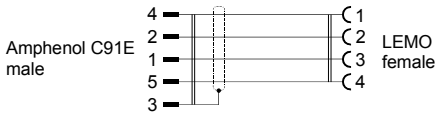
Pirani Measurement and Extension Cables

Length [m]	Pirani Measurement cables (80 °C) for: (Ordering numbers)			Measurement cables, high temperature version (250 °C)	Extension cables
	TPR 010 (PTR02270) [1]	TPR 017 (PTR13270, PTR13271) [2]	TPR 018 (PTR15010, PTR15011, PTR15014) [2]	for TPR 017 TPR 018 [2]	for TPR 010 TPR 017 TPR 018 [3]
2	PT548401-T	PT448212-T	PT448212-T	-	-
3	PT548402-T	PT548308-T	PT548308-T	PT548414-T	-
6	PT548403-T	PT548309-T	PT548309-T	PT548465-T	-
10	PT548450-T	PT548456-T	PT548456-T	PT448047-T	PT548466-T
15	PT548451-T	PT548457-T	PT548457-T	PT548043-T	-
20	PT548452-T	PT548458-T	PT548458-T	PT548044-T	PT548468-T
25	PT548453-T	PT548459-T	PT548459-T	-	-
30	PT548415-T	PT548460-T	PT548460-T	-	PT548470-T
35	PT548454-T	PT548461-T	PT548461-T	-	-
40	PT548416-T	PT548462-T	PT548462-T	-	PT548472-T
45	PT548455-T	PT548463-T	PT548463-T	-	-
50	PT548417-T	PT548464-T	PT548464-T	-	PT548474-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 (PTR18500, PTR18501, PTR18502) [1]	IKR 060 (PTR18753, PTR18751) [1]	IKR 070 (PTR20501, PTR20502) [2]	for IKR 050 / IKR 060 [1]
2	PT548405-T	PT548405-T	PT448041-T	-
3	PT548406-T	PT548406-T	PT548306-T	PT548542-T
6	PT548407-T	PT548407-T	PT548317-T	PT548543-T
10	PT548419-T	PT548419-T	PT548490-T	PT448045-T
15	PT548483-T	PT548483-T	PT548491-T	PT548989-T
20	PT548484-T	PT548484-T	PT548492-T	PT548046-T
25	PT548485-T	PT548485-T	PT548780-T	-
30	PT548422-T	PT548422-T	PT548493-T	-
35	PT548486-T	PT548486-T	PT548550-T	-
40	PT548487-T	PT548487-T	PT548494-T	-
45	PT548488-T	PT548488-T	PT548495-T	-
50	PT548489-T	PT548489-T	PT548748-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

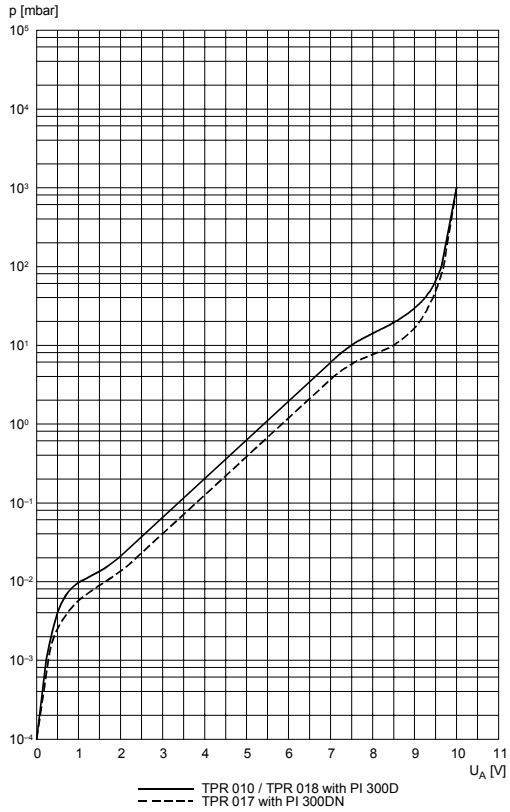
7.3 Accessories for Plug-In Boards

		for	Ordering number
D-Sub connector	15 pin, female	IF 300A	PT441129-T
D-Sub connector	9 pin, female	IF 300A	PT441128-T
Relay connector	15 pin, DIN 41 612	IF 300B	PT546999-T
Interface cable RS232C	0.4m	IF 300B	PT548932-T
D-Sub connector	15 pin, female	IF 300C	PT441129-T
D-Sub connector	9 pin, female	IF 300C	PT441145-T
Connector Amphenol C91E, 7 pin (<Control>, spare part)		PE 300DC9	B4722107CC

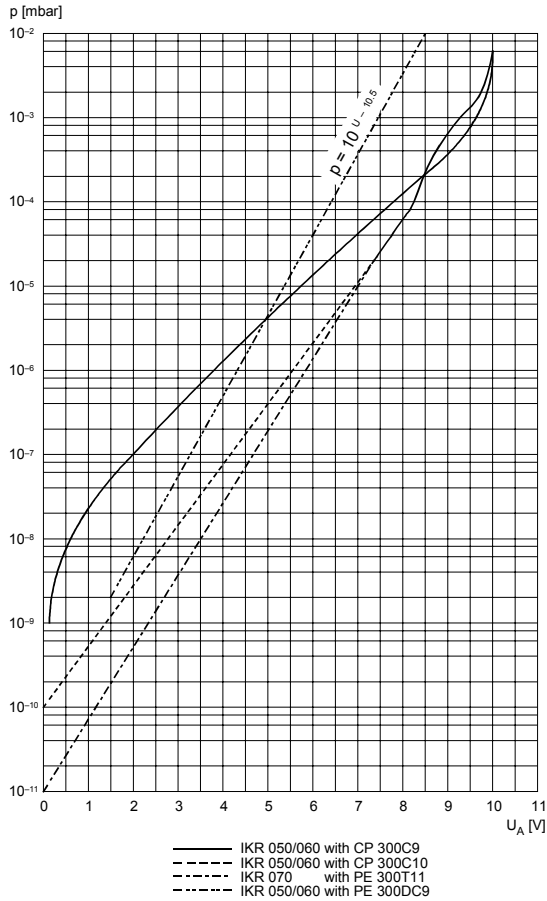
Appendix

A: Output Signals of the Measurement Boards

Pirani Gauges



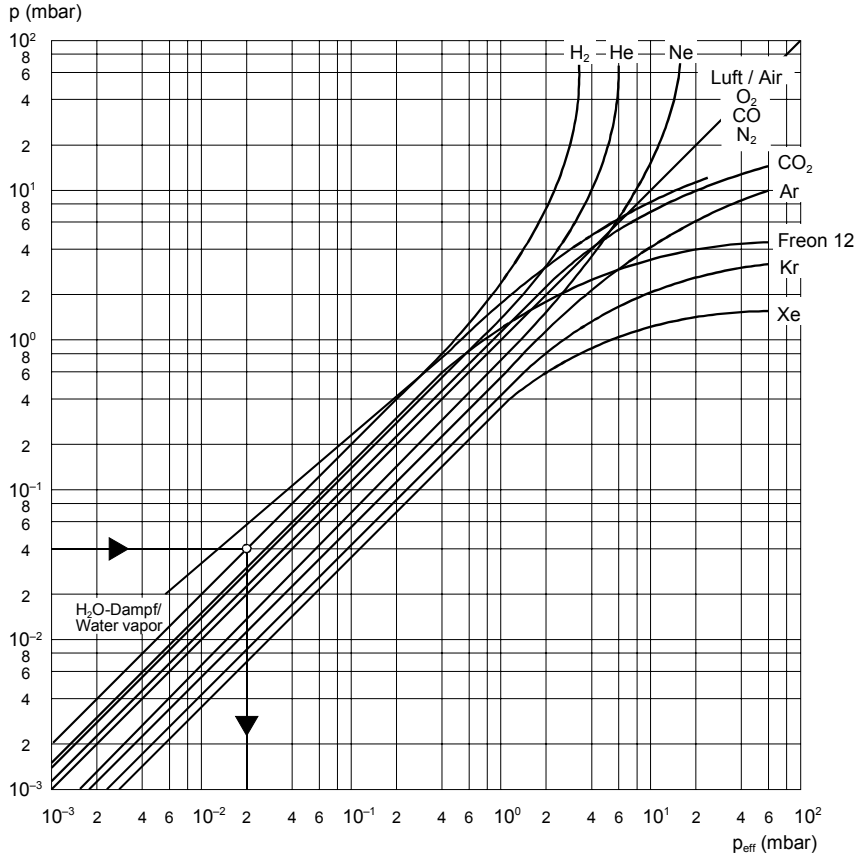
Cold Cathode Gauges



B: Gas Type Dependence

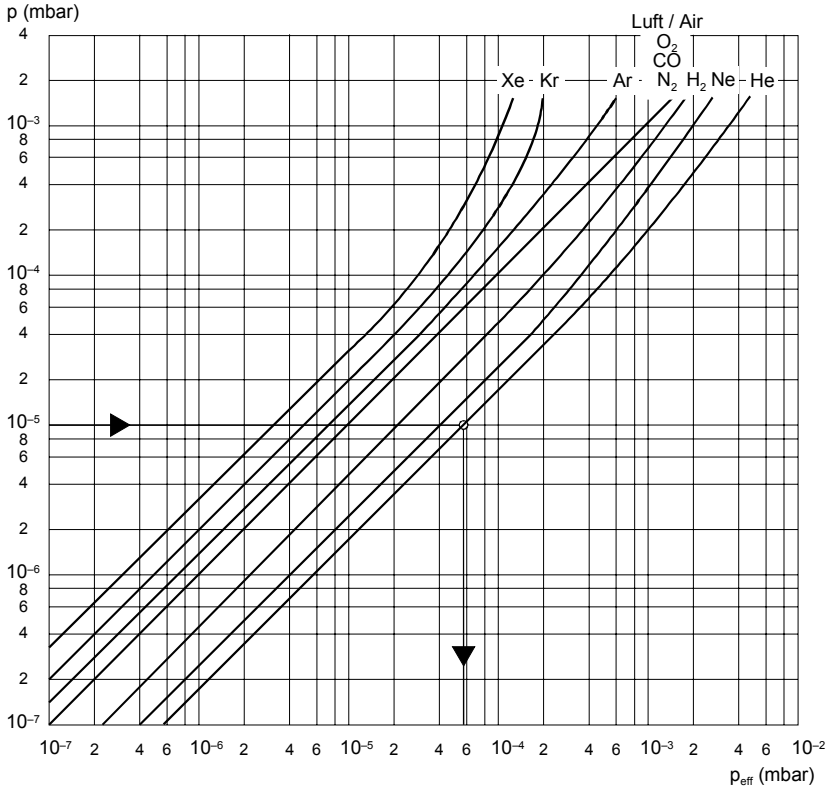
Pirani Gauges

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.de
Operating Instructions
Total Pressure Gauge Controller TPG 300
BG 805 970 BE
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

[2] www.pfeiffer-vacuum.de
Communication Protocol
Profibus-DP Interface and Relay Board
BG 805 980 BE
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

[3] www.pfeiffer-vacuum.de
Operating Instructions
Pirani Gauge TPR 010
BG 805 976 BN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

[4] www.pfeiffer-vacuum.de
Operating Instructions
Pirani Gauge TPR 017
BG 805 977 BE
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

[5] www.pfeiffer-vacuum.de
Operating Instructions
Pirani Gauge TPR 018
BG 805 978 BE
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

[6] www.pfeiffer-vacuum.de
Operating Instructions
Cold Cathode Gauge IKR 050
BG 805 031 BE
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

[7] www.pfeiffer-vacuum.de
Operating Instructions
Cold Cathode Gauge IKR 060
BG 805 032 BE
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

[8] www.pfeiffer-vacuum.de
Operating Instructions
Cold Cathode Gauge IKR 070
BG 805 033 BE
Pfeiffer Vacuum GmbH, D–35614 Asslar,
Deutschland

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