 Vacuum measurement,
analysis, leak detection

Part **3.2**



Vacuum measurement, analysis, leak detection

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Measurement equipment

Vacuum gauges for all vacuum areas and applications



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Measurement equipment

Vacuum gauges for all vacuum areas and applications

Many vacuum applications operate only in a specific pressure range. Analog and digital total vacuum or pressure measurement instruments are used to measure and control the total pressure in a vacuum system. Pfeiffer Vacuum offers three different lines of total pressure gauges.

The criteria for selecting a vacuum gauge are based upon various conditions:

- The pressure range to be detected
- Gas composition (inert or corrosive)
- Required accuracy and repeatability
- Ambient conditions such as ionizing radiation

Each series separately covers the entire pressure range. Pfeiffer Vacuum provides you with the best solution for your total pressure measurement tasks based on the relevant application.

DigiLine

- Total pressure vacuum gauge with digital signal outlet

ActiveLine

- Total pressure vacuum gauge with analog signal outlet

ModulLine

- Total pressure measurement in areas with ionizing radiation



Overview of series and applications

	Analytics					Semiconductors					Coating					Industry					R & D																								
	Electron microscopy	Leak detection	Mass spectrometry	Surface analysis	Plasma monitoring	Residual gas analysis	Lithography	PVD (Physical Vapor Deposition)	CVD (Chemical Vapor Deposition)	Plasma etching	Implantation – source	Implantation – beamline	Inspection	Bonding	MBE (Molecular Beam Epitaxy)	Load locks, transfer chambers, handling systems	Flat panel displays (FPD)	LED / OLED	Hard disk coating	Photovoltaics	Glass coating (PVD)	CD, DVD, Blu-ray production (PVD)	Optical coating (PVD)	Wear protection (PVD, CVD)	Hard coating	Medical technology	Industrial leak detection	Electron beam welding	Insulation vacuums	Bulb and tube manufacture	Heat treatment	Vacuum drying	Vacuum furnaces	Nuclear research	Fusion technology	Plasma research	Particle accelerators	Space simulation	Low temperature research	Elementary particle physics	Nanotechnology	Biotechnology	Page		
Measuring equipment and controllers																																													
DigiLine																																													
Transmitter																																													
Piezo	■	■	■	■	■														■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■						16				
Piezo/Pirani	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	18	
Pirani	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	20	
Pirani/ Cold cathodes	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	22	
Pirani/ Bayard-Alpert	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	24	
ActiveLine																																													
Transmitter																																													
Piezo	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	32	
Capacitive temperature compensated	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	36	
Capacitive temperature controlled	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	38	
Pirani/ Capacitive	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	44	
Pirani	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	46	
Cold cathode	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	50	
Pirani/ Cold cathode	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	54	
Hot cathodes	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	56	
Pirani/ Bayard-Alpert	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	58	
ModulLine																																													
Vacuum gauges																																													
Pirani																										■																		70	
Cold cathode																									■																				72

Features at a glance

Gauges	Vacuum hPa	Model	Pressure range														Page
			Ultra-high				High				Medium		Rough				
			10 ⁻¹¹	10 ⁻¹⁰	10 ⁻⁹	10 ⁻⁸	10 ⁻⁷	10 ⁻⁶	10 ⁻⁵	10 ⁻⁴	10 ⁻³	10 ⁻²	10 ⁻¹	10 ⁰	10 ¹	10 ²	
DigiLine																	
Piezo resistive transmitter	CPT 200																16
Piezo/Pirani transmitter RP	RPT 200																18
Pirani transmitter	PPT 200																20
Pirani/Cold cathode transmitter	MPT 200																22
Pirani/Bayard Alpert transmitter	HPT 200																24
ActiveLine																	
Piezo transmitter	APR 250																32
	APR 260																32
	APR 262																32
	APR 265																32
	APR 266																32
	APR 267																32
Capacitive transmitter Temperature compensated	CMR 361																36
	CMR 362																36
	CMR 363																36
	CMR 364																36
	CMR 365																36
Capacitive transmitter Temperature controlled	CMR 371																38
	CMR 372																38
	CMR 373																38
	CMR 374																38
	CMR 375																38
Pirani/Capacitive transmitter	PCR 280																44
Pirani transmitter	TPR 280																46
	TPR 281																48
Cold cathode transmitter	IKR 251																50
	IKR 261																50
	IKR 270																52
Pirani/Cold cathode transmitter	PKR 251																54
	PKR 261																54
Hot cathode transmitter	IMR 265																56
Pirani/Bayard Alpert transmitter	PBR 260																58
ModulLine																	
Pirani vacuum gauge	TPR 010																70
	TPR 017																70
	TPR 018																70
Cold cathode transmitter	IKR 050																72
	IKR 060																72
	IKR 070																72

Depending on the measuring principle the measurement precision will decline at the area limits.



Customer benefits

- Easy integration
- Flexible use
- Low installation effort
- Secure data transmission
- Proven long life

DigiLine

Innovative vacuum measurement for the digital age



DigiLine

The DigiLine series is designed for industrial and research applications that need wiring that is easy to install and reliable. The series covers the entire technically relevant vacuum range with measuring principles encompassing Piezo, Pirani, and hot and cold cathode vacuum gauges. All transmitters have an RS-485 interface which can be used to connect up to 16 measuring points to a controller. An additional voltage outlet that is proportional to the pressure and two switch-points as well as Profibus and DeviceNet interfaces are available as options. Protection class IP 54 and DIN M12 connector assemblies qualify these vacuum gauges for usage in heavy-duty environments.

Customer benefits

- Pressure range $5 \cdot 10^{-10}$ to 2,000 hPa covers the entire vacuum range.
- Digital outlet signal for error-free data transmission
- Transmission of numerical pressure values saves characteristics and recalculations
- Protection class IP 54 and DIN M12 connector assemblies for reliable operation in heavy-duty environments.
- Remote control for easy adjustment.
- Optional Profibus and DeviceNet fieldbus interfaces meeting industrial standards

Typical applications

- Hard disk coating
- PVD coating
- Solar cell production
- Space simulation
- Vacuum drying / Heat treatment
- Electron beam welding
- Surface coating
- Fusion technology



Space simulation



Vacuum drying



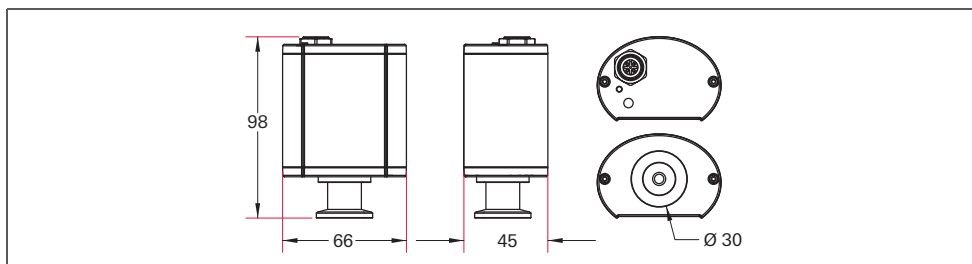
Solar cell production

Piezo-resistive Gauge CPT 200 (1 – 2000 hPa)



- 1 to 2000 hPa
- Robust sensor
- Gas type independent measurement
- Profibus DP Interface (optional)
- DeviceNet Interface (optional)
- Analog output and set points (optional)

Dimensions (in mm)



Technical data	CPT 200, DN 16 ISO-KF, RS-485	CPT 200, DN 16 ISO-KF, RS-485, analog	CPT 200, DN 16 ISO-KF, RS-485, Profibus	CPT 200, DN 16 ISO-KF, RS-485, DeviceNet
Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF
Seal	FPM	FPM	FPM	FPM
Pressure max.	400 kPa	400 kPa	400 kPa	400 kPa
Full scale	2000	2000	2000	2000
Accuracy	1-1200 hPa: ± 0.1 % F.S.; >1200 hPa: ± 1 % F.S.	1-1200 hPa: ± 0.1 % F.S.; >1200 hPa: ± 1 % F.S.	1-1200 hPa: ± 0.1 % F.S.; >1200 hPa: ± 1 % F.S.	1-1200 hPa: ± 0.1 % F.S.; >1200 hPa: ± 1 % F.S.
Weight	190 g	190 g	190 g	190 g
Materials in contact with media	Ceramic, stainless steel, FPM	Ceramic, stainless steel, FPM	Ceramic, stainless steel, FPM	Ceramic, stainless steel, FPM
Measurement range max.	2000 hPa	2000 hPa	2000 hPa	2000 hPa
Measurement range min.	1 hPa	1 hPa	1 hPa	1 hPa
Sensor cable length max.	1000 m	100 m	100 m	100 m
Method of measurement	Diaphragm, piezoresistive (gas type independent)	Diaphragm, piezoresistive (gas type independent)	Diaphragm, piezoresistive (gas type independent)	Diaphragm, piezoresistive (gas type independent)
Measuring cycle	10 ms	10 ms	10 ms	10 ms
Interface: Connection	Digital RS-485 ; M12, 5-pole	Digital RS-485 ; M12, 5-pole; Analog 0-10 V; 2 SP; M12, 8-pole	Digital RS-485 , M12, 5-pole, Profibus DP, M12, 5-pole	Digital RS-485 , M12, 5-pole, DeviceNet, M12, 5-pole
Protection category	IP 54	IP 54	IP 54	IP 54
Temperature: Bakeout	70 °C	70 °C	70 °C	70 °C
Temperature: Operating	5-60 °C	5-60 °C	5-60 °C	5-60 °C
Temperature: Storage	-40-+65 °C	-40-+65 °C	-40-+65 °C	-40-+65 °C
Supply: Voltage	24 V DC	24 V DC	24 V DC	24 V DC
Supply: Power consumption max.	1.5 W	2.2 W	3.0 W	2.0 W

Order number				
CPT 200, DN 16 ISO-KF	PT R36 130	PT R36 131	PT R36 132	PT R36 133

Accessories				
Centering ring with poral filter, Pore size: 20 µm, FPM/stainless steel, DN 16 ISO-KF	PF 117 216 -T	PF 117 216 -T	PF 117 216 -T	PF 117 216 -T
Fine filter, pore size 4 µm, DN 16 ISO-KF	PT 120 132 -T	PT 120 132 -T	PT 120 132 -T	PT 120 132 -T

Further accessories see controller DPG 202

Technical data	CPT 200, G 1/4", RS-485	CPT 200, G 1/4", RS-485, analog	CPT 200, G 1/4", RS-485, Profibus	CPT 200, G 1/4", RS-485, DeviceNet
Flange (in)	G 1/4"	G 1/4"	G 1/4"	G 1/4"
Seal	FPM	FPM	FPM	FPM
Pressure max.	400 kPa	400 kPa	400 kPa	400 kPa
Full scale	2000	2000	2000	2000
Accuracy	1-1200 hPa: ± 0.1 % F.S.; >1200 hPa: ± 1 % F.S.	1-1200 hPa: ± 0.1 % F.S.; >1200 hPa: ± 1 % F.S.	1-1200 hPa: ± 0.1 % F.S.; >1200 hPa: ± 1 % F.S.	1-1200 hPa: ± 0.1 % F.S.; >1200 hPa: ± 1 % F.S.
Weight	190 g	190 g	190 g	190 g
Materials in contact with media	Ceramic, stainless steel, FPM		Ceramic, stainless steel, FPM	Ceramic, stainless steel, FPM
Measurement range max.	2000 hPa		2000 hPa	2000 hPa
Measurement range min.	1 hPa		1 hPa	1 hPa
Sensor cable length max.	100 m	100 m	100 m	100 m
Method of measurement	Diaphragm, piezoresistive (gas type independent)	Diaphragm, piezoresistive (gas type independent)	Diaphragm, piezoresistive (gas type independent)	Diaphragm, piezoresistive (gas type independent)
Measuring cycle	10 ms	10 ms	10 ms	10 ms
Interface: Connection	Digital RS-485 ; M12, 5-pole	Digital RS-485 ; M12, 5-pole; Analog 0-10 V; 2 SP; M12, 8-pole	Digital RS-485 , M12, 5-pole, Profibus DP, M12, 5-pole	Digital RS-485 , M12, 5-pole, DeviceNet, M12, 5-pole
Protection category	IP 54	IP 54	IP 54	IP 54
Temperature: Bakeout	70 °C	70 °C	70 °C	70 °C
Temperature: Operating	5-60 °C	5-60 °C	5-60 °C	5-60 °C
Temperature: Storage	-40-+65 °C	-40-+65 °C	-40-+65 °C	-40-+65 °C
Supply: Voltage	24 V DC	24 V DC	24 V DC	24 V DC
Supply: Power consumption max.	1.5 W	2.2 W	3.0 W	2.0 W

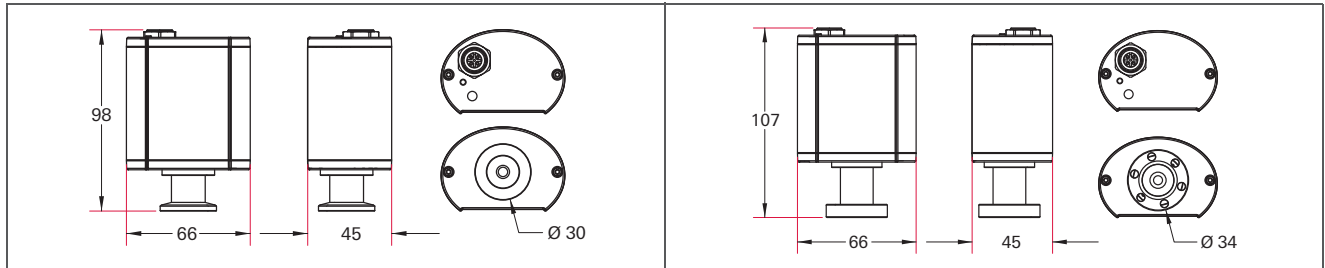
Order number				
CPT 200 , G 1/4"	PT R36 210	PT R36 211	PT R36 212	PT R36 213

Further accessories see controller DPG 202

Piezo/Pirani Gauge RPT 200 (1 · 10⁻⁴ – 1200 hPa)

- 1 · 10⁻⁴ to 1200 hPa
- Combination of two sensors
- High accuracy up to atmospheric pressure
- Profibus DP Interface (optional)
- DeviceNet Interface (optional)
- Analog output and set points (optional)

Dimensions (in mm)



RPT 200, DN 16 ISO-KF

RPT 200, DN 16 CF-F

Technical data	RPT 200, DN 16 ISO-KF, RS-485	RPT 200, DN 16 ISO-KF, RS-485, analog	RPT 200, DN 16 ISO-KF, RS-485, Profibus	RPT 200, DN 16 ISO-KF, RS-485, DeviceNet
Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF
Seal	Metal	Metal	Metal	Metal
Pressure max.	400 kPa	400 kPa	400 kPa	400 kPa
Full scale	1200	1200	1200	1200
Accuracy	< 2 · 10 ⁻³ factor 2; 2 · 10 ⁻³ - 10 hPa: ± 10 %; 10-1200 hPa: ± 0.3 % F.S.	< 2 · 10 ⁻³ factor 2; 2 · 10 ⁻³ - 10 hPa: ± 10 %; 10-1200 hPa: ± 0.3 % F.S.	< 2 · 10 ⁻³ factor 2; 2 · 10 ⁻³ - 10 hPa: ± 10 %; 10-1200 hPa: ± 0.3 % F.S.	< 2 · 10 ⁻³ factor 2; 2 · 10 ⁻³ - 10 hPa: ± 10 %; 10-1200 hPa: ± 0.3 % F.S.
Weight	195 g	195 g	195 g	195 g
Materials in contact with media	Stainless steel, Tungsten, gold, silicon oxide, glass	Stainless steel, Tungsten, gold, silicon oxide, glass	Stainless steel, Tungsten, gold, silicon oxide, glass	Stainless steel, Tungsten, gold, silicon oxide, glass
Measurement range max.	1200 hPa	1200 hPa	1200 hPa	1200 hPa
Measurement range min.	1 · 10 ⁻⁴ hPa	1 · 10 ⁻⁴ hPa	1 · 10 ⁻⁴ hPa	1 · 10 ⁻⁴ hPa
Sensor cable length max.	100 m	100 m	100 m	100 m
Method of measurement	Piezo/Pirani	Piezo/Pirani	Piezo/Pirani	Piezo/Pirani
Measuring cycle	10 ms	10 ms	10 ms	10 ms
Interface: Connection	Digital RS-485 ; M12, 5-pole	Digital RS-485 ; M12, 5-pole; Analog 0-10 V; 2 SP; M12, 8-pole	Digital RS-485 , M12, 5-pole, Profibus DP, M12, 5-pole	Digital RS-485 , M12, 5-pole, DeviceNet, M12, 5-pole
Protection category	IP 54	IP 54	IP 54	IP 54
Temperature: Bakeout	125 °C	125 °C	125 °C	125 °C
Temperature: Operating	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C
Temperature: Storage	-40-+65 °C	-40-+65 °C	-40-+65 °C	-40-+65 °C
Supply: Voltage	24 V DC	24 V DC	24 V DC	24 V DC
Supply: Power consumption max.	2.5 W	3.2 W	4.0 W	2.9 W
Repeatability: % of measurement	10-1200 hPa: ± 0.1% F.S.; 1 · 10 ⁻³ - 1 hPa: ± 1 %	10-1200 hPa: ± 0.1% F.S.; 1 · 10 ⁻³ - 1 hPa: ± 1 %	10-1200 hPa: ± 0.1% F.S.; 1 · 10 ⁻³ - 1 hPa: ± 1 %	10-1200 hPa: ± 0.1% F.S.; 1 · 10 ⁻³ - 1 hPa: ± 1 %

Order number				
RPT 200, DN 16 ISO-KF	PT R37 130	PT R37 131	PT R37 132	PT R37 133

Accessories				
Centering ring with poral filter, Pore size: 20 µm, FPM/stainless steel, DN 16 ISO-KF	PF 117 216 -T	PF 117 216 -T	PF 117 216 -T	PF 117 216 -T
Fine filter, pore size 4 µm, DN 16 ISO-KF	PT 120 132 -T	PT 120 132 -T	PT 120 132 -T	PT 120 132 -T

Further accessories see controller DPG 202

Technical data	RPT 200, DN 16CF-F, RS-485	RPT 200, DN 16 CF-F, RS-485, analog	RPT 200, DN 16 CF-F, RS-485, Profibus	RPT 200, DN 16 CF-F, RS-485, DeviceNet
Flange (in)	DN 16 CF-F	DN 16 CF-F	DN 16 CF-F	DN 16 CF-F
Seal	Metal	Metal	Metal	Metal
Pressure max.	400 kPa	400 kPa	400 kPa	400 kPa
Full scale	1200	1200	1200	1200
Accuracy	< 2 · 10 ⁻³ factor 2; 2 · 10 ⁻³ - 10 hPa: ± 10 %; 10-1200 hPa: ± 0.3 % F.S.	< 2 · 10 ⁻³ factor 2; 2 · 10 ⁻³ - 10 hPa: ± 10 %; 10-1200 hPa: ± 0.3 % F.S.	< 2 · 10 ⁻³ factor 2; 2 · 10 ⁻³ - 10 hPa: ± 10 %; 10-1200 hPa: ± 0.3 % F.S.	< 2 · 10 ⁻³ factor 2; 2 · 10 ⁻³ - 10 hPa: ± 10 %; 10-1200 hPa: ± 0.3 % F.S.
Weight	225 g	225 g	225 g	225 g
Materials in contact with media	Stainless steel, Tungsten, gold, silicon oxide, glass	Stainless steel, Tungsten, gold, silicon oxide, glass	Stainless steel, Tungsten, gold, silicon oxide, glass	Stainless steel, Tungsten, gold, silicon oxide, glass
Measurement range max.	1200 hPa	1200 hPa	1200 hPa	1200 hPa
Measurement range min.	1 · 10 ⁻⁴ hPa	1 · 10 ⁻⁴ hPa	1 · 10 ⁻⁴ hPa	1 · 10 ⁻⁴ hPa
Sensor cable length max.	100 m	100 m	100 m	100 m
Method of measurement	Piezo/Pirani	Piezo/Pirani	Piezo/Pirani	Piezo/Pirani
Measuring cycle	10 ms	10 ms	10 ms	10 ms
Interface: Connection	Digital RS-485 , M12, 5-pole	Digital RS-485 ; M12, 5-pole; Analog 0-10 V; 2 SP; M12, 8-pole	Digital RS-485 , M12, 5-pole, Profibus DP, M12, 5-pole	Digital RS-485 , M12, 5-pole, DeviceNet, M12, 5-pole
Protection category	IP 54	IP 54	IP 54	IP 54
Temperature: Bakeout	125 °C	125 °C	125 °C	125 °C
Temperature: Operating	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C
Temperature: Storage	-40-+65 °C	-40-+65 °C	-40-+65 °C	-40-+65 °C
Supply: Voltage	24 V DC	24 V DC	24 V DC	24 V DC
Supply: Power consumption max.	2.5 W	3.2 W	4.0 W	2.9 W
Repeatability: % of measurement	10-1200 hPa: ± 0.1% F.S.; 1 · 10 ⁻³ - 1 hPa: ± 1 %	10-1200 hPa: ± 0.1% F.S.; 1 · 10 ⁻³ - 1 hPa: ± 1 %	10-1200 hPa: ± 0.1% F.S.; 1 · 10 ⁻³ - 1 hPa: ± 1 %	10-1200 hPa: ± 0.1% F.S.; 1 · 10 ⁻³ - 1 hPa: ± 1 %

Order number				
RPT 200, DN 16 CF-F	PT R37 310	PT R37 311	PT R37 312	PT R37 313

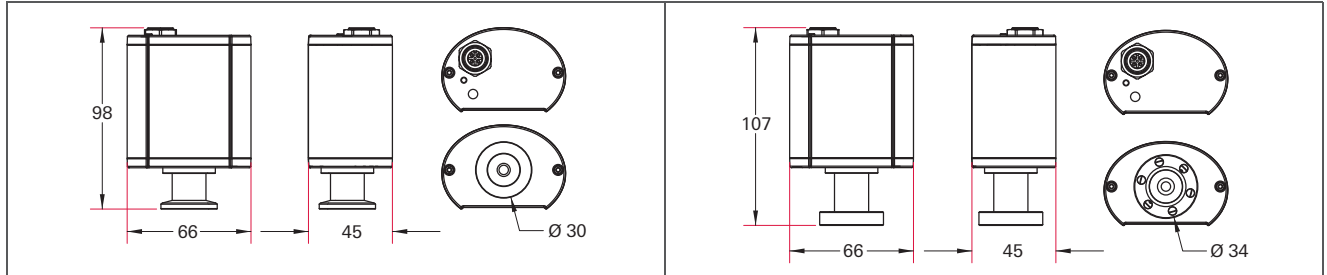
Further accessories see controller DPG 202

Pirani Gauge PPT 200 (1 · 10⁻⁴ – 1000 hPa)



- 1 · 10⁻⁴ to 1000 hPa
- High protection level for industrial applications
- Pulsed sensor for improved accuracy
- Profibus DP Interface (optional)
- DeviceNet Interface (optional)
- Analog output and set points (optional)

Dimensions (in mm)



PPT 200, DN 16 ISO-KF

PPT 200, DN 16 CF-F

Technical data	PPT 200, DN 16 ISO-KF, RS-485	PPT 200, DN 16 ISO-KF, RS-485, analog	PPT 200, DN 16 ISO-KF, RS-485, Profibus	PPT 200, DN 16 ISO-KF, RS-485, DeviceNet
Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF
Seal	Metal	Metal	Metal	Metal
Pressure max.	400 kPa	400 kPa	400 kPa	400 kPa
Accuracy: % of measurement	< 2 · 10 ⁻³ hPa: < factor 2, 2 · 10 ⁻³ - 20 hPa: ± 10 %, 20 - 1000 hPa: ± 30 %	< 2 · 10 ⁻³ hPa: < factor 2, 2 · 10 ⁻³ - 20 hPa: ± 10 %, 20 - 1000 hPa: ± 30 %	< 2 · 10 ⁻³ hPa: < factor 2, 2 · 10 ⁻³ - 20 hPa: ± 10 %, 20 - 1000 hPa: ± 30 %	< 2 · 10 ⁻³ hPa: < factor 2, 2 · 10 ⁻³ - 20 hPa: ± 10 %, 20 - 1000 hPa: ± 30 %
Weight	190 g	190 g	190 g	190 g
Materials in contact with media	Tungsten, stainless steel, glass	Tungsten, stainless steel, glass	Tungsten, stainless steel, glass	Tungsten, stainless steel, glass
Measurement range max.	1000 hPa	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	1 · 10 ⁻⁴ hPa	1 · 10 ⁻⁴ hPa	1 · 10 ⁻⁴ hPa	1 · 10 ⁻⁴ hPa
Sensor cable length max.	100 m	100 m	100 m	100 m
Method of measurement	Pirani	Pirani	Pirani	Pirani
Measuring cycle	10 ms	10 ms	10 ms	10 ms
Interface: Connection	Digital RS-485 ; M12, 5-pole	Digital RS-485 ; M12, 5-pole; Analog 0-10 V; 2 SP; M12, 8-pole	Digital RS-485 , M12, 5-pole, Profibus DP, M12, 5-pole	Digital RS-485 , M12, 5-pole, DeviceNet, M12, 5-pole
Protection category	IP 54	IP 54	IP 54	IP 54
Temperature: Bakeout	125 °C	125 °C	125 °C	125 °C
Temperature: Operating	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C
Temperature: Storage	-40...+65 °C	-40...+70 °C	-40...+70 °C	-40...+70 °C
Supply: Voltage	24 V DC	24 V DC	24 V DC	24 V DC
Supply: Power consumption max.	2.5 W	3.2 W	4.0 W	2.9 W
Repeatability: % of measurement	2 · 10 ⁻³ - 10 hPa: ± 2 %	2 · 10 ⁻³ - 10 hPa: ± 2 %	2 · 10 ⁻³ - 10 hPa: ± 2 %	2 · 10 ⁻³ - 10 hPa: ± 2 %

Order number				
PPT 200, DN 16 ISO-KF	PT R38 130	PT R38 131	PT R38 132	PT R38 133

Accessories				
Centering ring with poral filter, Pore size: 20 µm, FPM/stainless steel, DN 16 ISO-KF	PF 117 216 -T	PF 117 216 -T	PF 117 216 -T	PF 117 216 -T
Fine filter, pore size 4 µm, DN 16 ISO-KF	PT 120 132 -T	PT 120 132 -T	PT 120 132 -T	PT 120 132 -T

Further accessories see controller DPG 202

Technical data	PPT 200, DN 16 CF-F, RS-485	PPT 200, DN 16 CF-F, RS-485, analog	PPT 200, DN 16 CF-F, RS-485, Profibus	PPT 200, DN 16 CF-F, RS-485, DeviceNet
Flange (in)	DN 16 CF-F	DN 16 CF-F	DN 16 CF-F	DN 16 CF-F
Seal	Metal	Metal	Metal	Metal
Pressure max.	400 kPa	400 kPa	400 kPa	400 kPa
Accuracy: % of measurement	< 2 · 10 ⁻³ hPa: < factor 2, 2 · 10 ⁻³ - 20 hPa: ± 10 %, 20 - 1000 hPa: ± 30 %	< 2 · 10 ⁻³ hPa: < factor 2, 2 · 10 ⁻³ - 20 hPa: ± 10 %, 20 - 1000 hPa: ± 30 %	< 2 · 10 ⁻³ hPa: < factor 2, 2 · 10 ⁻³ - 20 hPa: ± 10 %, 20 - 1000 hPa: ± 30 %	< 2 · 10 ⁻³ hPa: < factor 2, 2 · 10 ⁻³ - 20 hPa: ± 10 %, 20 - 1000 hPa: ± 30 %
Weight	220 g	220 g	220 g	220 g
Materials in contact with media	Tungsten, stainless steel, glass	Tungsten, stainless steel, glass	Tungsten, stainless steel, glass	Tungsten, stainless steel, glass
Measurement range max.	1000 hPa	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	1 · 10 ⁻⁴ hPa	1 · 10 ⁻⁴ hPa	1 · 10 ⁻⁴ hPa	1 · 10 ⁻⁴ hPa
Sensor cable length max.	100 m	100 m	100 m	100 m
Method of measurement	Pirani	Pirani	Pirani	Pirani
Measuring cycle	10 ms	10 ms	10 ms	10 ms
Interface: Connection	Digital RS-485 ; M12, 5-pole	Digital RS-485 ; M12, 5-pole; Analog 0-10 V; 2 SP; M12, 8-pole	Digital RS-485 , M12, 5-pole, Profibus DP, M12, 5-pole	Digital RS-485 , M12, 5-pole, DeviceNet, M12, 5-pole
Protection category	IP 54	IP 54	IP 54	IP 54
Temperature: Bakeout	125 °C	125 °C	125 °C	125 °C
Temperature: Operating	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C
Temperature: Storage	-40...+70 °C	-40...+70 °C	-40...+70 °C	-40...+70 °C
Supply: Voltage	24 V DC	24 V DC	24 V DC	24 V DC
Supply: Power consumption max.	2.5 W	3.2 W	4.0 W	2.9 W
Repeatability: % of measurement	2 · 10 ⁻³ - 10 hPa: ± 2 %	2 · 10 ⁻³ - 10 hPa: ± 2 %	2 · 10 ⁻³ - 10 hPa: ± 2 %	2 · 10 ⁻³ - 10 hPa: ± 2 %

Order number				
PPT 200, DN 16 CF-F	PT R38 310	PT R38 311	PT R38 312	PT R38 313

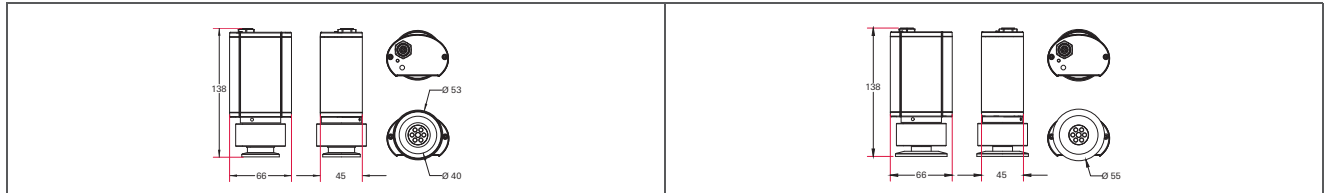
Further accessories see controller DPG 202

Pirani/Cold Cathode Gauge MPT 200 ($5 \cdot 10^{-9}$ – 1000 hPa)



- $5 \cdot 10^{-9}$ to 1000 hPa
- Insensitive to gas inrush
- Customizable to vacuum application
- Profibus DP Interface (optional)
- DeviceNet Interface (optional)
- Analog output and set points (optional)

Dimensions (in mm)



MPT 200, DN 25 ISO-KF

MPT 200, DN 40 ISO-KF

Technical data	MPT 200, DN 25 ISO-KF, RS-485	MPT 200, DN 25 ISO-KF, RS-485, analog	MPT 200, DN 25 ISO-KF, RS-485, Profibus	MPT 200, DN 25 ISO-KF, RS-485, DeviceNet
Flange (in)	DN 25 ISO-KF	DN 25 ISO-KF	DN 25 ISO-KF	DN 25 ISO-KF
Seal	Metal	Metal	Metal	Metal
Pressure max.	400 kPa	400 kPa	400 kPa	400 kPa
Accuracy: % of measurement	$1 \cdot 10^{-8} - 2 \cdot 10^{-3}$ hPa: $\pm 25\%$, $2 \cdot 10^{-3} - 10$ hPa: $\pm 10\%$, 10-100 hPa: $\pm 30\%$; 100-1000 hPa: $\pm 50\%$	$1 \cdot 10^{-8} - 2 \cdot 10^{-3}$ hPa: $\pm 25\%$, $2 \cdot 10^{-3} - 10$ hPa: $\pm 10\%$, 10-100 hPa: $\pm 30\%$; 100-1000 hPa: $\pm 50\%$	$1 \cdot 10^{-8} - 2 \cdot 10^{-3}$ hPa: $\pm 25\%$, $2 \cdot 10^{-3} - 10$ hPa: $\pm 10\%$, 10-100 hPa: $\pm 30\%$; 100-1000 hPa: $\pm 50\%$	$1 \cdot 10^{-8} - 2 \cdot 10^{-3}$ hPa: $\pm 25\%$, $2 \cdot 10^{-3} - 10$ hPa: $\pm 10\%$, 10-100 hPa: $\pm 30\%$; 100-1000 hPa: $\pm 50\%$
Weight	555 g	555 g	555 g	555 g
Materials in contact with media	Tungsten, stainless steel, nickel, molybdenum, glass	Tungsten, stainless steel, nickel, molybdenum, glass	Tungsten, stainless steel, nickel, molybdenum, glass	Tungsten, stainless steel, nickel, molybdenum, glass
Measurement range max.	1000 hPa	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	$5 \cdot 10^{-9}$ hPa	$5 \cdot 10^{-9}$ hPa	$5 \cdot 10^{-9}$ hPa	$5 \cdot 10^{-9}$ hPa
Sensor cable length max.	100 m	100 m	100 m	100 m
Method of measurement	Pirani/Cold cathode	Pirani/Cold cathode	Pirani/Cold cathode	Pirani/Cold cathode
Measuring cycle	10 ms	10 ms	10 ms	10 ms
Interface: Connection	RS-485, D-Sub-socket, 9-pole	Digital RS-485 ; M12, 5-pole; Analog 0-10 V; 2 SP; M12, 8-pole	Digital RS-485 , M12, 5-pole, Profibus DP, M12, 5-pole	Digital RS-485 , M12, 5-pole, DeviceNet, M12, 5-pole
Protection category	IP 54	IP 54	IP 54	IP 54
Cold cathode sensor control	Cold cathode sensor can be switched on and off via interface	Cold cathode sensor can be switched on and off via interface	Cold cathode sensor can be switched on and off via interface	Cold cathode sensor can be switched on and off via interface
Temperature: Bakeout (electronics removed)	180 °C	180 °C	180 °C	180 °C
Temperature: Operating	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C
Temperature: Storage	-40-+65 °C	-40-+65 °C	-40-+65 °C	-40-+65 °C
Supply: Voltage	24 V DC	24 V DC	24 V DC	24 V DC
Supply: Power consumption max.	3.0 W	3.7 W	4.5 W	3.4 W
Volume	9.5 cm ³	9.5 cm ³	9.5 cm ³	9.5 cm ³
Repeatability: % of measurement	$1 \cdot 10^{-8} - 1 \cdot 10^{-2}$ hPa: $\pm 7\%$; $1 \cdot 10^{-2} - 10$ hPa: $\pm 2\%$	$1 \cdot 10^{-8} - 1 \cdot 10^{-2}$ hPa: $\pm 7\%$; $1 \cdot 10^{-2} - 10$ hPa: $\pm 2\%$	$1 \cdot 10^{-8} - 1 \cdot 10^{-2}$ hPa: $\pm 7\%$; $1 \cdot 10^{-2} - 10$ hPa: $\pm 2\%$	$1 \cdot 10^{-8} - 1 \cdot 10^{-2}$ hPa: $\pm 7\%$; $1 \cdot 10^{-2} - 10$ hPa: $\pm 2\%$

Order number				
MPT 200, DN 25 ISO-KF	PT R40 140	PT R40 141	PT R40 142	PT R40 143

Further accessories see controller DPG 202

Technical data	MPT 200, DN 40 ISO-KF, RS-485	MPT 200, DN 40 ISO-KF, RS-485, analog	MPT 200, DN 40 ISO-KF, RS-485, Profibus	MPT 200, DN 40 ISO-KF, RS-485, DeviceNet
Flange (in)	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Seal	Metal	Metal	Metal	Metal
Pressure max.	400 kPa	400 kPa	400 kPa	400 kPa
Accuracy: % of measurement	1 · 10 ⁻⁸ - 2 · 10 ⁻³ hPa: ± 25 %, 2 · 10 ⁻³ - 10 hPa: ± 10 %, 10-100 hPa: ± 30 %; 100-1000 hPa: ± 50 %	1 · 10 ⁻⁸ - 2 · 10 ⁻³ hPa: ± 25 %, 2 · 10 ⁻³ - 10 hPa: ± 10 %, 10-100 hPa: ± 30 %; 100-1000 hPa: ± 50 %	1 · 10 ⁻⁸ - 2 · 10 ⁻³ hPa: ± 25 %, 2 · 10 ⁻³ - 10 hPa: ± 10 %, 10-100 hPa: ± 30 %; 100-1000 hPa: ± 50 %	1 · 10 ⁻⁸ - 2 · 10 ⁻³ hPa: ± 25 %, 2 · 10 ⁻³ - 10 hPa: ± 10 %, 10-100 hPa: ± 30 %; 100-1000 hPa: ± 50 %
Weight	580 g	580 g	580 g	580 g
Materials in contact with media	Tungsten, stainless steel, nickel, molybdenum, glass	Tungsten, stainless steel, nickel, molybdenum, glass	Tungsten, stainless steel, nickel, molybdenum, glass	Tungsten, stainless steel, nickel, molybdenum, glass
Measurement range max.	1000 hPa	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	5 · 10 ⁻⁹ hPa	5 · 10 ⁻⁹ hPa	5 · 10 ⁻⁹ hPa	5 · 10 ⁻⁹ hPa
Sensor cable length max.	100 m	100 m	100 m	100 m
Method of measurement	Pirani/Cold cathode	Pirani/Cold cathode	Pirani/Cold cathode	Pirani/Cold cathode
Measuring cycle	10 ms	10 ms	10 ms	10 ms
Interface: Connection	RS-485, D-Sub-socket, 9-pole	Digital RS-485 ; M12, 5-pole; Analog 0-10 V; 2 SP; M12, 8-pole	Digital RS-485 , M12, 5-pole, Profibus DP, M12, 5-pole	Digital RS-485 , M12, 5-pole, DeviceNet, M12, 5-pole
Protection category	IP 54	IP 54	IP 54	IP 54
Cold cathode sensor control	Cold cathode sensor can be switched on and off via interface	Cold cathode sensor can be switched on and off via interface	Cold cathode sensor can be switched on and off via interface	Cold cathode sensor can be switched on and off via interface
Temperature: Bakeout (electronics removed)	180 °C	180 °C	180 °C	180 °C
Temperature: Operating	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C
Temperature: Storage	-40+65 °C	-40+65 °C	-40+65 °C	-40+65 °C
Supply: Voltage	24 V DC	24 V DC	24 V DC	24 V DC
Supply: Power consumption max.	3.0 W	3.7 W	4.5 W	3.4 W
Volume	9.5 cm ³	9.5 cm ³	9.5 cm ³	9.5 cm ³
Repeatability: % of measurement	1 · 10 ⁻⁸ - 1 · 10 ⁻² hPa: ± 7 %; 1 · 10 ⁻² - 10 hPa: ± 2 %	1 · 10 ⁻⁸ - 1 · 10 ⁻² hPa: ± 7 %; 1 · 10 ⁻² - 10 hPa: ± 2 %	1 · 10 ⁻⁸ - 1 · 10 ⁻² hPa: ± 7 %; 1 · 10 ⁻² - 10 hPa: ± 2 %	1 · 10 ⁻⁸ - 1 · 10 ⁻² hPa: ± 7 %; 1 · 10 ⁻² - 10 hPa: ± 2 %

Order number				
MPT 200, DN 40 ISO-KF	PT R40 150	PT R40 151	PT R40 152	PT R40 153

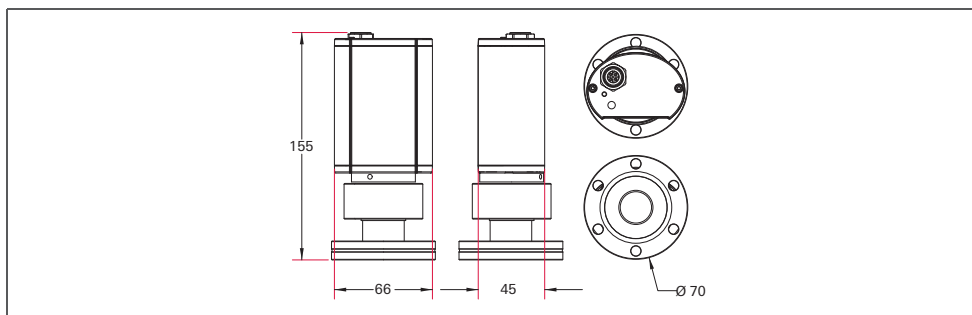
Further accessories see controller DPG 202

Pirani/Cold Cathode Gauge MPT 200 ($5 \cdot 10^{-9}$ – 1000 hPa)



- $5 \cdot 10^{-9}$ to 1000 hPa
- Insensitive to gas inrush
- Customizable to vacuum application
- Profibus DP Interface (optional)
- DeviceNet Interface (optional)
- Analog output and set points (optional)

Dimensions (in mm)



MPT 200, DN 40 CF-F

Technical data	MPT 200, DN 40 CF-F, RS-485	MPT 200, DN 40 CF-F, RS-485, analog	MPT 200, DN 40 CF-F, RS-485, Profibus	MPT 200, DN 40 CF-F, RS-485, DeviceNet
Flange (in)	DN 40 CF-F	DN 40 CF-F	DN 40 CF-F	DN 40 CF-F
Seal	Metal	Metal	Metal	Metal
Pressure max.	400 kPa	400 kPa	400 kPa	400 kPa
Accuracy: % of measurement	1 · 10 ⁻⁸ - 2 · 10 ⁻³ hPa: ± 25 %, 2 · 10 ⁻³ - 10 hPa: ± 10 %, 10-100 hPa: ± 30 %; 100-1000 hPa: ± 50 %	1 · 10 ⁻⁸ - 2 · 10 ⁻³ hPa: ± 25 %, 2 · 10 ⁻³ - 10 hPa: ± 10 %, 10-100 hPa: ± 30 %; 100-1000 hPa: ± 50 %	1 · 10 ⁻⁸ - 2 · 10 ⁻³ hPa: ± 25 %, 2 · 10 ⁻³ - 10 hPa: ± 10 %, 10-100 hPa: ± 30 %; 100-1000 hPa: ± 50 %	1 · 10 ⁻⁸ - 2 · 10 ⁻³ hPa: ± 25 %, 2 · 10 ⁻³ - 10 hPa: ± 10 %, 10-100 hPa: ± 30 %; 100-1000 hPa: ± 50 %
Weight	850 g	850 g	850 g	850 g
Materials in contact with media	Tungsten, stainless steel, nickel, molybdenum, glass	Tungsten, stainless steel, nickel, molybdenum, glass	Tungsten, stainless steel, nickel, molybdenum, glass	Tungsten, stainless steel, nickel, molybdenum, glass
Measurement range max.	1000 hPa	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	5 · 10 ⁻⁹ hPa	5 · 10 ⁻⁹ hPa	5 · 10 ⁻⁹ hPa	5 · 10 ⁻⁹ hPa
Sensor cable length max.	100 m	100 m	100 m	100 m
Method of measurement	Pirani/Cold cathode	Pirani/Cold cathode	Pirani/Cold cathode	Pirani/Cold cathode
Measuring cycle	10 ms	10 ms	10 ms	10 ms
Interface: Connection	RS-485, D-Sub-socket, 9-pole	Digital RS-485 ; M12, 5-pole; Analog 0-10 V; 2 SP; M12, 8-pole	Digital RS-485 , M12, 5-pole, Profibus DP, M12, 5-pole	Digital RS-485 , M12, 5-pole, DeviceNet, M12, 5-pole
Protection category	IP 54	IP 54	IP 54	IP 54
Cold cathode sensor control	Cold cathode sensor can be switched on and off via interface	Cold cathode sensor can be switched on and off via interface	Cold cathode sensor can be switched on and off via interface	Cold cathode sensor can be switched on and off via interface
Temperature: Bakeout (electronics removed)	180 °C	180 °C	180 °C	180 °C
Temperature: Operating	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C
Temperature: Storage	-40+65 °C	-40+65 °C	-40+65 °C	-40+65
Supply: Voltage	24 V DC	24 V DC	24 V DC	24 V DC
Supply: Power consumption max.	3.0 W	3.7 W	4.5 W	3.4 W
Volume	9.5 cm ³	9.5 cm ³	9.5 cm ³	9.5 cm ³
Repeatability: % of measurement	1 · 10 ⁻⁸ - 1 · 10 ⁻² hPa: ± 7 %; 1 · 10 ⁻² - 10 hPa: ± 2 %	1 · 10 ⁻⁸ - 1 · 10 ⁻² hPa: ± 7 %; 1 · 10 ⁻² - 10 hPa: ± 2 %	1 · 10 ⁻⁸ - 1 · 10 ⁻² hPa: ± 7 %; 1 · 10 ⁻² - 10 hPa: ± 2 %	1 · 10 ⁻⁸ - 1 · 10 ⁻² hPa: ± 7 %; 1 · 10 ⁻² - 10 hPa: ± 2 %

Order number				
MPT 200, DN 40 CF-F	PT R40 350	PT R40 351	PT R40 352	PT R40 353

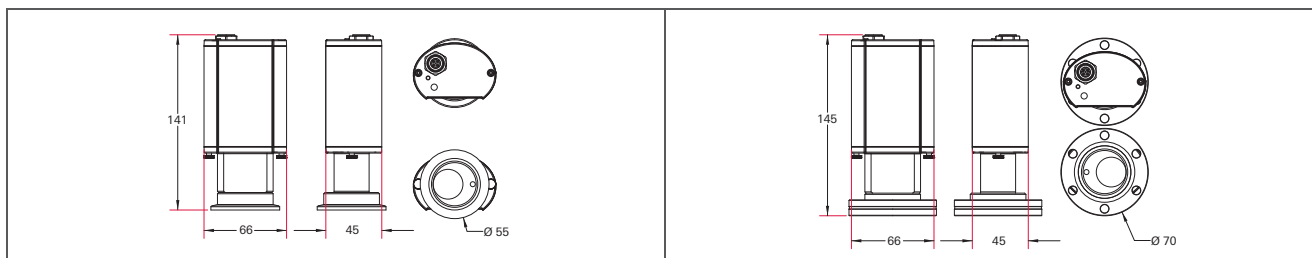
Further accessories see controller DPG 202

Pirani/Bayard-Alpert Gauge HPT 200 (5 · 10⁻¹⁰ – 1000 hPa)



- 5 · 10⁻¹⁰ to 1000 hPa
- High security by two filaments
- High accuracy
- Profibus DP Interface (optional)
- DeviceNet Interface (optional)
- Analog output and set points (optional)

Dimensions (in mm)



HPT 200, DN 40 ISO-KF

HPT 200, DN 40 CF-F

Technical data	HPT 200, DN 40 ISO-KF, RS-485	HPT 200, DN 40 ISO-KF, RS-485, analog	HPT 200, DN 40 ISO-KF, RS-485, Profibus	HPT 200, DN 40 ISO-KF, RS-485, DeviceNet
Flange (in)	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Number of filaments	2	2	2	2
Seal	Metal	Metal	Metal	Metal
Pressure max.	400 kPa	400 kPa	400 kPa	400 kPa
Filament	Iridium yttriated, twice	Iridium yttriated, twice	Iridium yttriated, twice	Iridium yttriated, twice
Accuracy: % of measurement	1 · 10 ⁻⁸ - 1 hPa: ± 10 %, 20-1000 hPa: ± 30 %	1 · 10 ⁻⁸ - 1 hPa: ± 10 %, 20-1000 hPa: ± 30 %	1 · 10 ⁻⁸ - 1 hPa: ± 10 %, 20-1000 hPa: ± 30 %	1 · 10 ⁻⁸ - 1 hPa: ± 10 %, 20-1000 hPa: ± 30 %
Weight	475 g	475 g	475 g	475 g
Materials in contact with media	Tungsten, stainless steel, nickel, glass, ceramics	Tungsten, stainless steel, nickel, glass, ceramics	Tungsten, stainless steel, nickel, glass, ceramics	Tungsten, stainless steel, nickel, glass, ceramics
Measurement range max.	1000 hPa	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	5 · 10 ⁻¹⁰ hPa	5 · 10 ⁻¹⁰ hPa	5 · 10 ⁻¹⁰ hPa	5 · 10 ⁻¹⁰ hPa
Sensor cable length max.	100 m	100 m	100 m	100 m
Method of measurement	Pirani/Bayard-Alpert	Pirani/Bayard-Alpert	Pirani/Bayard-Alpert	Pirani/Bayard-Alpert
Measuring cycle	10 ms	10 ms	10 ms	10 ms
Interface: Connection	Digital RS-485 , M12, 5-pole	Digital RS-485 ; M12, 5-pole; Analog 0-10 V; 2 SP; M12, 8-pole	Digital RS-485 , M12, 5-pole, Profibus DP, M12, 5-pole	Digital RS-485 , M12, 5-pole, DeviceNet, M12, 5-pole
Protection category	IP 54	IP 54	IP 54	IP 54
Temperature: Bakeout (electronics removed)	180 °C	180 °C	180 °C	180 °C
Temperature: Operating	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C
Temperature: Storage	-40-+65 °C	-40-+65 °C	-40-+65 °C	-40-+65 °C
Supply: Voltage	24 V DC	24 V DC	24 V DC	24 V DC
Supply: Power consumption max.	8.0 W	8.7 W	9.5 W	8.4 W
Repeatability: % of measurement	1 · 10 ⁻⁸ - 1 · 10 ⁻² hPa: ± 5%; 1 · 10 ⁻² - 10 hPa: ± 2 %	1 · 10 ⁻⁸ - 1 · 10 ⁻² hPa: ± 5%; 1 · 10 ⁻² - 10 hPa: ± 2 %	1 · 10 ⁻⁸ - 1 · 10 ⁻² hPa: ± 5%; 1 · 10 ⁻² - 10 hPa: ± 2 %	1 · 10 ⁻⁸ - 1 · 10 ⁻² hPa: ± 5%; 1 · 10 ⁻² - 10 hPa: ± 2 %

Order number				
HPT 200, DN 40 ISO-KF	PT R39 150	PT R39 151	PT R39 152	PT R39 153

Further accessories see controller DPG 202

Technical data	HPT 200, DN 40 CF-F, RS-485	HPT 200, , DN 40 CF-F, RS-485, analog	HPT 200, DN 40 CF-F, RS-485, Profibus	HPT 200, DN 40 CF-F, RS-485, DeviceNet
Flange (in)	DN 40 CF-F	DN 40 CF-F	DN 40 CF-F	DN 40 CF-F
Number of filaments	2	2	2	2
Seal	Metal	Metal	Metal	Metal
Pressure max.	400 kPa	400 kPa	400 kPa	400 kPa
Filament	Iridium yttriated, twice	Iridium yttriated, twice	Iridium yttriated, twice	Iridium yttriated, twice
Accuracy: % of measurement	1 · 10 ⁻⁸ - 1 hPa: ± 10 %, 20-1000 hPa: ± 30 %	1 · 10 ⁻⁸ - 1 hPa: ± 10 %, 20-1000 hPa: ± 30 %	1 · 10 ⁻⁸ - 1 hPa: ± 10 %, 20-1000 hPa: ± 30 %	1 · 10 ⁻⁸ - 1 hPa: ± 10 %, 20-1000 hPa: ± 30 %
Weight	670 g	670 g	670 g	670 g
Materials in contact with media	Tungsten, stainless steel, nickel, glass, ceramics	Tungsten, stainless steel, nickel, glass, ceramics	Tungsten, stainless steel, nickel, glass, ceramics	Tungsten, stainless steel, nickel, glass, ceramics
Measurement range max.	1000 hPa	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	5 · 10 ⁻¹⁰ hPa	5 · 10 ⁻¹⁰ hPa	5 · 10 ⁻¹⁰ hPa	5 · 10 ⁻¹⁰ hPa
Sensor cable length max.	100 m	100 m	100 m	100 m
Method of measurement	Pirani/Bayard-Alpert	Pirani/Bayard-Alpert	Pirani/Bayard-Alpert	Pirani/Bayard-Alpert
Measuring cycle	10 ms	10 ms	10 ms	10 ms
Interface: Connection	RS-485, D-Sub-socket, 9-pole	Digital RS-485 ; M12, 5-pole; Analog 0-10 V; 2 SP; M12, 8-pole	Digital RS-485 , M12, 5-pole, Profibus DP, M12, 5-pole	Digital RS-485 , M12, 5-pole, DeviceNet, M12, 5-pole
Protection category	IP 54	IP 54	IP 54	IP 54
Temperature: Bakeout (electronics removed)	180 °C	180 °C	180 °C	180 °C
Temperature: Operating	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C	+5 - +60 °C
Temperature: Storage	-40-+65 °C	-40-+65 °C	-40-+65 °C	-40-+65 °C
Supply: Voltage	24 V DC	24 V DC	24 V DC	24 V DC
Supply: Power consumption max.	8.0 W	8.7 W	9.5 W	8.4 W
Repeatability: % of measurement	1 · 10 ⁻⁸ - 1 · 10 ⁻² hPa: ± 5%; 1 · 10 ⁻² - 10 hPa: ± 2 %	1 · 10 ⁻⁸ - 1 · 10 ⁻² hPa: ± 5%; 1 · 10 ⁻² - 10 hPa: ± 2 %	1 · 10 ⁻⁸ - 1 · 10 ⁻² hPa: ± 5%; 1 · 10 ⁻² - 10 hPa: ± 2 %	1 · 10 ⁻⁸ - 1 · 10 ⁻² hPa: ± 5%; 1 · 10 ⁻² - 10 hPa: ± 2 %

Order number				
HPT 200, DN 40 CF-F	PT R39 350	PTR 39 351	PT R39 352	PT R39 353

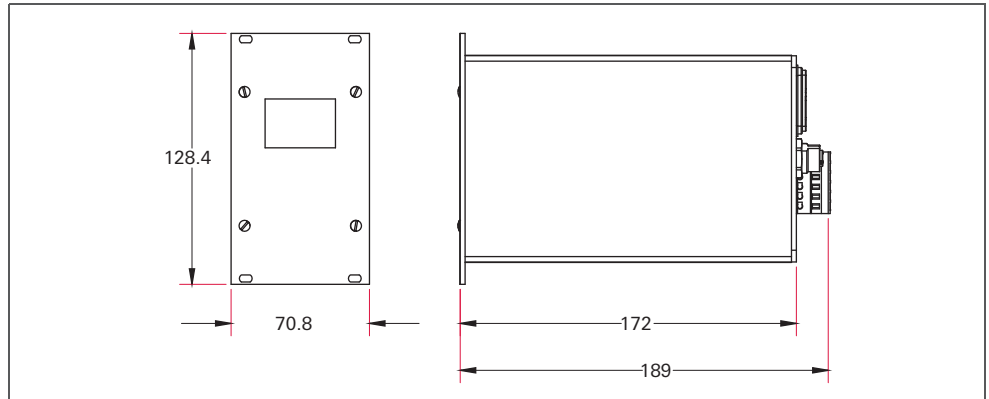
Further accessories see controller DPG 202

DPG 202, controller



- Simple operation
- For 2 transmitter
- Intuitive calibration
- 2 two-way contacts

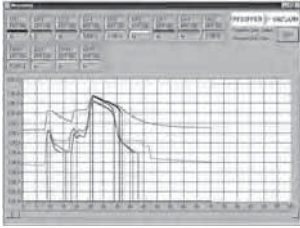
Dimensions (in mm)



Technical data	DPG 202, controller for 2 transmitter
Dimensions w x h x d	(19"-rack, 14TE/3HE) ; 71 x 128 x 178 mm
Connections for gauge	DIN M12
Display	LCD-Graphic display, backlit
Display rate	2 Hz
Weight	0.75 kg
Power consumption	max. 25 (gauges included) W
Unit of measure	mbar, bar, Pa, hPa, mTorr, Torr
Measurement rate	25 Hz
Mains requirement: frequency (range)	50/60 Hz
Mains requirement: voltage (range)	95-265 V AC
Set point: Voltage max.	250 V AC, 4 A ; 45 V DC, 2 A
Set point: Changeover contact, potential-free	2 pieces
Protection category	IP 20
Fuse	0.8 A T
Temperature: Operating	5-50 °C
Temperature: Storage	-20-+60 °C

Order number	
DPG 202, controller	PT G12 020

Software DokuStar



- System requirements:
- Software: Windows XP, Windows Vista, Windows 7 (requires administrator rights)
- Hardware: Pentium-PC (1000 MHz or more), 256 MB RAM (512 MB recommended), 150 MB free hard drive space, Super VGA monitor (with 1024x768 resolution), small letter adjustment), 24 Bit Tru Color, free COM or USB port, mouse
- Visualization and data storage

Technical data	Software DokuStar	Software DokuStar Plus
For	DPS 101, DPS 109 and DPG 202	DPG / DPS 109 and direct connection
Measuring channel	up to 2	up to 16
PC min.	Pentium 160 MHz	Pentium 160 MHz
RAM	64 MB	64 MB
Interface	RS-232 or USB	RS-232 or USB
Interfaces	RS-232 or USB	RS-232 or USB
Memory	15 MB free HD memory	15 MB free HD memory

Order number		
Software DokuStar	PT 882 500	PT 882 501

Further accessories

Power cords	Order number
Mains cable, US plug, 2.5 m	P4 564 309 YX
Mains cable, U.K. plug, 2.5 m	P4 564 309 Y1
Mains cable, Swiss plug, 2.5 m	P4 564 309 YR
Mains cable, Euro-style safety plug, 2.5 m	P4 564 309 YU

Interface cable	Order number
Interface cable, M12 m/M12 m, 0,7 m	PM 061 281 -T
Interface cable, M12 m/M12 m, 1.0 m	PM 061 282 -T
Interface cable, M12 m straight / M12 m straight, 3.0 m	PM 061 283 -T
Interface cable, M12 m/M12 m, 5.0 m	PM 061 284 -T
Interface cable, M12 m/M12 m, 10 m	PM 061 285 -T
Interface cable, M12 m/M12 m, 15 m	PM 061 286 -T
Interface cable, M12 m/M12 m, 20 m	PM 061 287 -T
Interface cable, M12 m/M12 m, 50 m	PM 061 289 -T

Further accessories	Order number
Connector M12 to RS-485	PM 061 270 -X
Plug-in bus termination for RS-485, M12 5-pole	PT 348 105-T
Y-Connector M12 to RS-485	P 4723 010
USB converter to RS-485 interface	PM 061 207 -T
Adapter M12/M12 (only RS-485, no power)	PM 348 132 -T
Gauge adapting cable RS-485, D-Sub 9-pole/M12 5-pole	PT 348 131 -T
Connection cable, RS-485, M12/D-sub 9-pole, 3.0 m	PT 348 223 -T

ActiveLine

A wide range of proven vacuum transmitters to cover all applications



ActiveLine

The ActiveLine series offers a wide range of vacuum gauges that work on a variety of measuring principles and have a classic analog outlet. The series thus covers the technically relevant vacuum range from ultra-high vacuum to overpressure. The outlet voltage of the transmitter, that is proportional to the pressure, can be displayed as pressure on the three controllers or read into controllers through analog inputs for further processing.

The series includes high precision capacitance vacuum gauges in SI units (CMR) for process monitoring and control as well as corresponding Torr types (CCR) for direct use in semiconductor processes without controllers.

Customer benefits

- Covers the entire vacuum range
- Suitable for all requirement profiles
- Space saving installation due to compact design
- Optimum cost-benefit ratio
- Universally usable due to integrated electronic drive unit
- Easy self-diagnosis
- Avoids installation errors through controllers with automatic transmitter recognition
- Easy wiring for all transmitters through uniform standard cables

Typical applications

- Research facilities
- Analysis equipment
- Research and production coating facilities
- Leak detection systems
- Semiconductor development and production
- Photovoltaics
- Industrial vacuum process systems



Semiconductor development and production



Coating



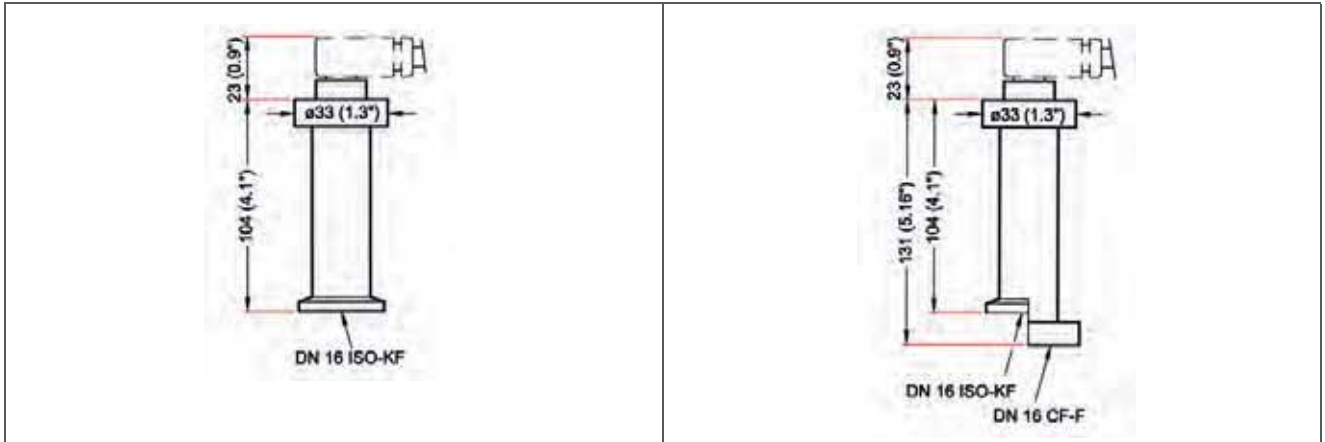
Research facilities

Piezo transmitters APR ($1 \cdot 10^{-1}$ - 55000 hPa)



- Measurement range from 0.1 hPa to 1100 hPa
- Pressure measurement independent of type of gas
- Corrosion- resistant
- Maximum pressure applies to inert gases and temperatures of less than 55 °C

Dimensions (in mm)



APR 250, DN 16 ISO-KF

APR 260, DN 16 ISO-KF

Technical data	APR 250, DN 16 ISO-KF, 2 % F.S.	APR 260, DN 16 ISO-KF, 1 % F.S.	APR 260, DN 16 CF-F, 1 % F.S.
Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 CF-F
Output signal: Sensor error below	≤ 0.4 V	≤ 0.4 V	≤ 0.4 V
Output signal: Pressure range	1.0 - 9.8 V	1.0 - 9.8 V	1.0 - 9.8 V
Output signal: Minimum load	10 kΩ	10 kΩ	10 kΩ
Bakeout temperature	80 °C	80 °C	80 °C
Pressure max.	300 kPa	300 kPa	300 kPa
Stability of sensitivity	≤ 0.5 %/year	≤ 0.2 %/year	≤ 0.2 %/year
Accuracy	2 % F.S.	1 % F.S.	1 % F.S.
Weight	120 g	120 g	150 g
Linearity and hysteresis	≤ 0.5 % F.S.	≤ 0.2 % F.S.	≤ 0.2 % F.S.
Measurement range max.	1100 hPa	1100 hPa	1100 hPa
Measurement range min.	1 · 10 ⁻¹ hPa	1 · 10 ⁻¹ hPa	1 · 10 ⁻¹ hPa
Sensor cable length	50 m	50 m	50 m
Zero stability	≤ 0.5 % F.S./year	≤ 0.3 % F.S./year	≤ 0.3 % F.S./year
Protection category	IP 65	IP 65	
Temperature: Operating	10-80 °C	10-80 °C	10-80 °C
Temperature: Storage	-40-+80 °C	-40-+80 °C	-40-+80 °C
Thermal sensitivity drift	≤ 0.5 %	≤ 0.5 %	≤ 0.5 %
Thermal zero drift	≤ 0.5 % F.S.	≤ 0.2 % F.S.	≤ 0.2 % F.S.
Supply: Voltage	13-30 V DC	13-30 V DC	13-30 V DC
Supply: Power consumption max.	≤ 0.2 W	≤ 0.2 W	≤ 0.2 W
Volume	2 cm ³	2 cm ³	6 cm ³
Material	Stainless steel	Stainless steel	Stainless steel

Order number			
Piezo Gauges APR 250/260 (1 · 10 ⁻¹ - 1100 hPa)	P 5215 102 TF	P 5215 112 TF	P 5215 114 TF

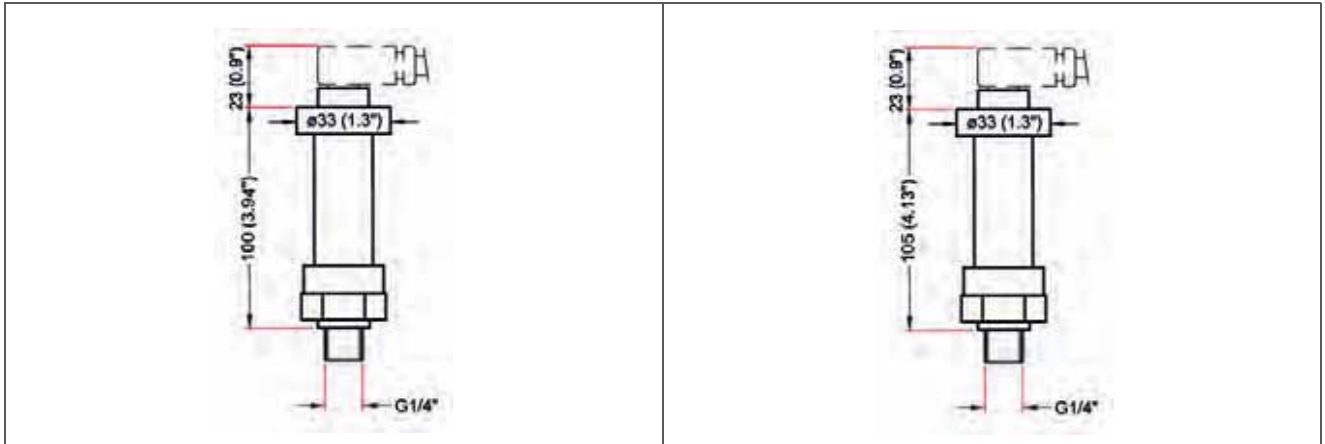
Accessories			
Sensor cable, 3 m	PT 448 250 -T	PT 448 250 -T	PT 448 250 -T
Mating connector	B 4707 283 MA	B 4707 283 MA	B 4707 283 MA

Piezo transmitters APR ($1 \cdot 10^{-1}$ - 55000 hPa)



- Pressure measurement independent of type of gas
- Corrosion-resistant
- Maximum pressure applies to inert gases and temperatures of less than 55 °C

Dimensions (in mm)



APR 262, G1/4"
 APR 265, G1/4"
 APR 266, G1/4"

APR 267, G1/4"

Technical data	APR 262, G1/4", 2200 hPa	APR 265, G1/4", 5500 hPa	APR 266, G1/4", 11000 hPa	APR 267, G1/4", 55000 hPa
Flange (in)	G 1/4"	G 1/4"	G 1/4"	G 1/4"
Output signal: Sensor error below	≤ 0.4 V	≤ 0.4 V	≤ 0.4 V	≤ 0.4 V
Output signal: Pressure range	1.0 - 9.8 V	1.0 - 9.8 V	1.0 - 9.8 V	1.0 - 9.8 V
Output signal: Minimum load	10 kΩ	10 kΩ	10 kΩ	10 kΩ
Bakeout temperature	80 °C	80 °C	80 °C	80 °C
Pressure max.	400 kPa	750 kPa	1500 kPa	7500 kPa
Stability of sensitivity	≤ 0.2 %/year	0.2 %/year	0.2 %/year	≤ 0.2 %/year
Accuracy	2 % F.S.	2 % F.S.	2 % F.S.	2 % F.S.
Weight	120 g	120 g	120 g	120 g
Linearity and hysteresis	≤ 0.5 % F.S.	0.5 % F.S.	0.5 % F.S.	≤ 0.5 % F.S.
Measurement range max.	2200 hPa	5500 hPa	11000 hPa	55000 hPa
Measurement range min.	2 · 10 ⁻¹ hPa	0.5 hPa	1 hPa	5 hPa
Sensor cable length	50 m	50 m	50 m	50 m
Zero stability	≤ 0.5 % F.S./year	0.5 % F.S./year	0.5 % F.S./year	≤ 0.5 % F.S./year
Protection category	IP 65	IP 65	IP 65	IP 65
Temperature: Operating	10-80 °C	10-80 °C	10-80 °C	10-80 °C
Temperature: Storage	-40-+80 °C	-40-+70 °C	-40-+80 °C	-40-+80 °C
Thermal sensitivity drift	≤ 0.5 %	0.5 %	0.5 %	≤ 0.5 %
Thermal zero drift	≤ 0.5 % F.S.	0.5 % F.S.	0.5 % F.S.	≤ 0.5 % F.S.
Supply: Voltage	13-30 V DC	13-30 V DC	13-30 V DC	13-30 V DC
Supply: Power consumption max.	≤ 0.2 W	≤ 0.2 W	0.2 W	≤ 0.2 W
Volume	0.5 cm ³	0.5 cm ³	0.5 cm ³	0.5 cm ³
Material	Stainless steel	Stainless steel	Stainless steel	Stainless steel

Order number				
Piezo Gauges APR 262/265/266/267 (2 · 10 ⁻¹ - 55000 hPa)	P 5215 120 TF	P 5215 126 TF	P 5215 132 TF	P5 215 138 TF

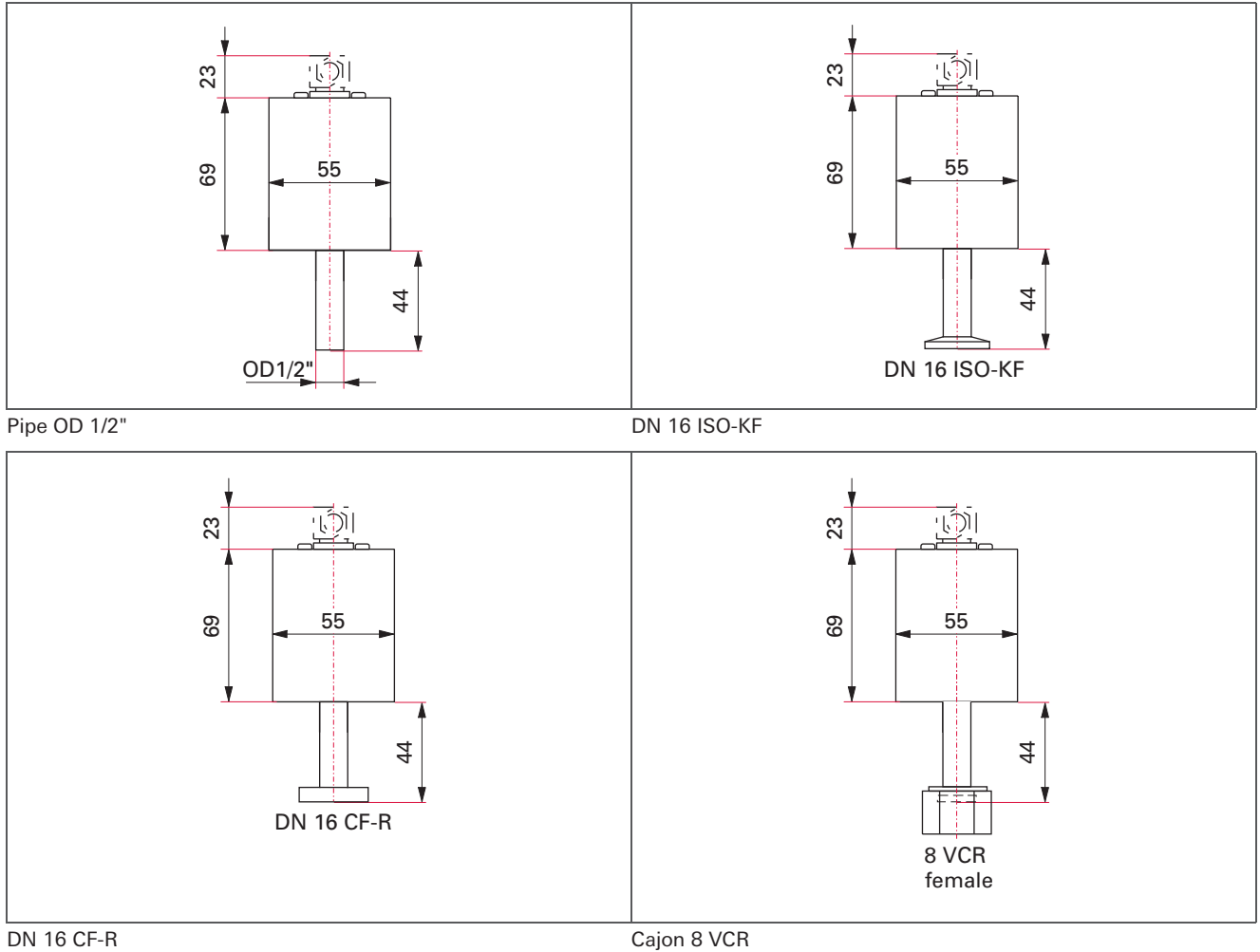
Accessories				
Sensor cable, 3 m	PT 448 250 -T	PT 448 250 -T	PT 448 250 -T	PT 448 250 -T
Mating connector	B 4707 283 MA	B 4707 283 MA	B 4707 283 MA	B 4707 283 MA

Capacitance transmitters CMR (1 · 10⁻⁵ - 1100 hPa) temperature compensated



- Sensor in ceramic technology
- No memory effects
- Materials employed have identical temperature coefficients
- Excellent temperature compensation
- Resistant to corrosive gases
- Excellent zero stability

Dimensions (in mm)



Technical data	CMR 361, 1000 hPa F.S.	CMR 362, 100 hPa F.S.	CMR 363, 10 hPa F.S.	CMR 364, 1 hPa F.S.	CMR 365, 0.1 hPa F.S.
Resolution	0.003 % F.S.	0.003 % F.S.	0.003 % F.S.	0.003 % F.S.	0.003 % F.S.
Output signal: Sensor error above	> 9.8 V	> 9.8 V	> 9.8 V	> 9.8 V	> 9.8 V
Output signal: Sensor error below	< 0.4 V	< 0.4 V	< 0.4 V	< 0.4 V	< 0.4 V
Output signal: Pressure range	1 - 9.8 V	1 - 9.8 V	1 - 9.8 V	1 - 9.8 V	1 - 9.8 V
Output signal: Minimum load	10 kΩ	10 kΩ	10 kΩ	10 kΩ	10 kΩ
Bakeout temperature max. at the flange	≤ 110 °C	≤ 110 °C	≤ 110 °C	≤ 110 °C	≤ 110 °C
Pressure max.	3 bar	2 bar	2 bar	2 bar	1.3 bar
Accuracy	0.2 % of reading	0.2 % of reading	0.2 % of reading	0.2 % of reading	0.5 % of reading
Membrane and measuring chamber	Ceramics (Al ₂ O ₃ ≤ 99,5 %)	Ceramics (Al ₂ O ₃ ≤ 99,5 %)	Ceramics (Al ₂ O ₃ ≤ 99,5 %)	Ceramics (Al ₂ O ₃ ≤ 99,5 %)	Ceramics (Al ₂ O ₃ ≤ 99,5 %)
Measurement range max.	1100 hPa	110 hPa	11 hPa	1.1 hPa	0.11 hPa
Measurement range min.	1 · 10 ⁻¹ hPa	1 · 10 ⁻² hPa	1 · 10 ⁻³ hPa	1 · 10 ⁻⁴ hPa	1 · 10 ⁻⁵ hPa
Sensor cable length	≤ 120 m	≤ 120 m	≤ 120 m	≤ 120 m	120 m
Response time	30 ms	30 ms	30 ms	30 ms	130 ms
Pipe and flange	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Protection category	IP 30	IP 30	IP 30	IP 30	IP 30
Temperature: Operating	5-50 °C	5-50 °C	5-50 °C	5-50 °C	5-50 °C
Temperature effect: on span	0.01 % of reading/°C	0.01 % of reading/°C	0.01 % of reading/°C	0.01 % of reading/°C	0.03 % of reading/°C
Temperature effect: on zero	0.005 % F.S./°C	0.005 % F.S./°C	0.005 % F.S./°C	0.015 % F.S./°C	0.02 % F.S./°C
Temperature: Storage	-40-+65 °C	-40-+65 °C	-40-+65 °C	-40-+65 °C	-40-+65 °C
Supply: Voltage	14-30 V DC	14-30 V DC	14-30 V DC	14-30 V DC	14-30 V DC
Supply: Power consumption max.	≤ 1 W	≤ 1 W	≤ 1 W	≤ 1 W	≤ 1 W
Volume	≤ 3.6 cm ³	≤ 3.6 cm ³	≤ 3.6 cm ³	≤ 3.6 cm ³	≤ 3.6 cm ³

	CMR 361, 1000 hPa F.S.	CMR 362, 100 hPa F.S.	CMR 363, 10 hPa F.S.	CMR 364, 1 hPa F.S.	CMR 365, 0.1 hPa F.S.
Flange (in)	Pipe OD 1/2"	Pipe OD 1/2"	Pipe OD 1/2"	Pipe OD 1/2"	Pipe OD 1/2"
Weight	≤ 310 g	≤ 310 g	≤ 310 g	≤ 310 g	≤ 310 g
Order number	PT R24 600	PT R24 610	PT R24 620	PT R24 630	PT R24 640
Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF
Weight	≤ 330 g	≤ 330 g	≤ 330 g	≤ 330 g	≤ 330 g
Order number	PT R24 601	PT R24 611	PT R24 621	PT R24 631	PT R24 641
Flange (in)	DN 16 CF-R	DN 16 CF-R	DN 16 CF-R	DN 16 CF-R	DN 16 CF-R
Weight	≤ 350 g	≤ 350 g	≤ 350 g	≤ 350 g	≤ 350 g
Order number	PT R24 602	PT R24 612	PT R24 622	PT R24 632	PT R24 642
Flange (in)	Cajon 8 VCR	Cajon 8 VCR	Cajon 8 VCR	Cajon 8 VCR	Cajon 8 VCR
Weight	≤ 370 g	≤ 370 g	≤ 370 g	≤ 370 g	≤ 370 g
Order number	PT R24 603	PT R24 613	PT R24 623	PT R24 633	PT R24 643

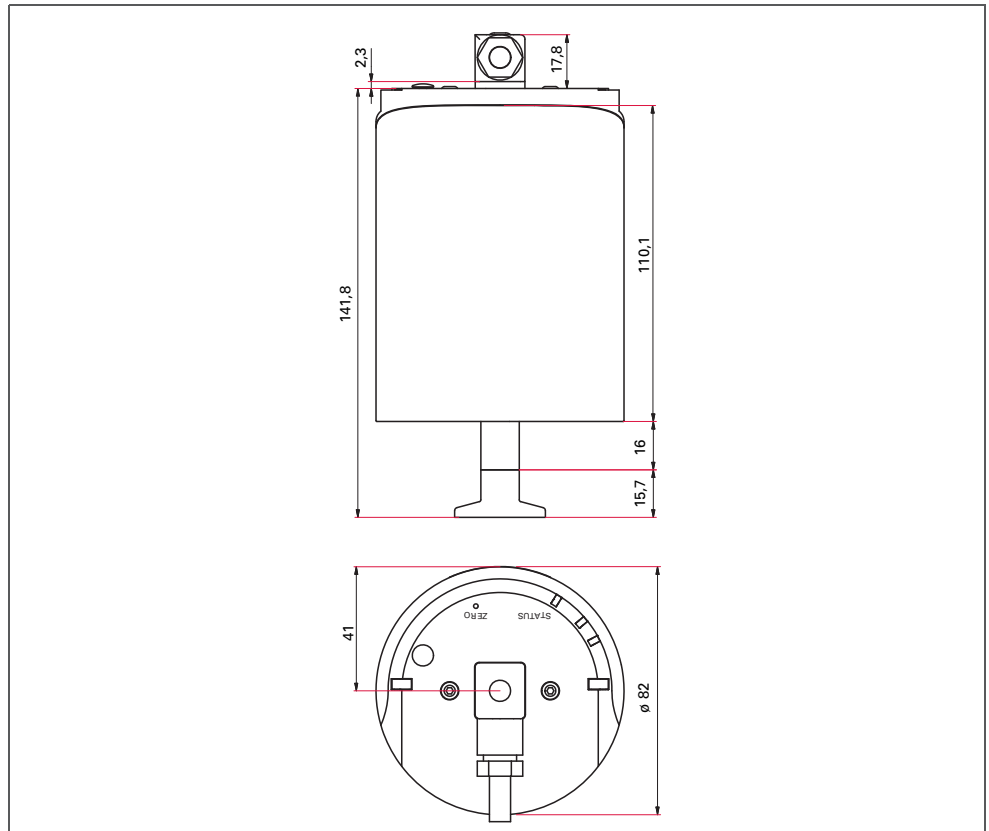
Accessories					
Sensor cable, 3 m	PT 448 250 -T	PT 448 250 -T	PT 448 250 -T	PT 448 250 -T	PT 448 250 -T
Mating connector	B 4707 283 MA	B 4707 283 MA	B 4707 283 MA	B 4707 283 MA	B 4707 283 MA

Capacitance transmitters CMR (1 · 10⁻⁵ - 1100 hPa) temperature regulated



- Sensor in ceramic technology
- No memory effects
- Materials employed have identical temperature coefficients
- Excellent temperature compensation
- Resistant to corrosive gases
- Excellent zero stability
- Additional protection against pollution by sensor shield

Dimensions (in mm)



Technical data	CMR 371, 1000 hPa F.S.	CMR 372, 100 hPa F.S.	CMR 373, 10 hPa F.S.	CMR 374, 1 hPa F.S.	CMR 375, 0.1 hPa F.S.
Resolution	0.003 % F.S.	0.003 % F.S.	0.003 % F.S.	0.003 % F.S.	0.003 % F.S.
Output signal: Sensor error above	> 9.8 V	> 9.8 V	> 9.8 V	> 9.8 V	> 9.8 V
Output signal: Sensor error below	< 0.4 V	< 0.4 V	< 0.4 V	< 0.4 V	< 0.4 V
Output signal: Pressure range	1.0 - 9.8 V	1.0 - 9.8 V	1.0 - 9.8 V	1.0 - 9.8 V	1.0 - 9.8 V
Output signal: Minimum load	> 10 kΩ	> 10 kΩ	> 10 kΩ	> 10 kΩ	> 10 kΩ
Bakeout temperature max. at the flange	≤ 110 °C	≤ 110 °C	≤ 110 °C	≤ 110 °C	≤ 110 °C
Pressure max.	300 kPa	2 bar	2 bar	2 bar	1,3 bar
Accuracy: % of measurement	0.15	0.15	0.15	0.15	0.15
Weight	≤ 900 g	≤ 900 g	≤ 900 g	≤ 900 g	≤ 900 g
Membrane and measuring chamber	Ceramics (Al ₂ O ₃ ≤ 99,5 %)	Ceramics (Al ₂ O ₃ ≤ 99,5 %)	Ceramics (Al ₂ O ₃ ≤ 99,5 %)	Ceramics (Al ₂ O ₃ ≤ 99,5 %)	Ceramics (Al ₂ O ₃ ≤ 99,5 %)
Measurement range max.	1100 hPa	110 hPa	11 hPa	1.1 hPa	0.11 hPa
Measurement range min.	1 · 10 ⁻¹ hPa	1 · 10 ⁻² hPa	1 · 10 ⁻³ hPa	1 · 10 ⁻⁴ hPa	1 · 10 ⁻⁵ hPa
Response time	30 ms	30 ms	30 ms	30 ms	130 ms
Pipe and flange	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Protection category	IP 40	IP 40	IP 40	IP 40	IP 40
Temperature: Operating	10-40 °C	10-40 °C	10-40 °C	10-40 °C	10-40 °C
Temperature effect: on span	0.01 % of reading/°C	0.01 % of reading/°C	0.01 % of reading/°C	0.01 % of reading/°C	0.01 % of reading/°C
Temperature effect: on zero	0.0025 % F.S./°C	0.0025 % F.S./°C	0.0025 % F.S./°C	0.0025 % F.S./°C	0.005 % F.S./°C
Temperature: Storage	-40-+65 °C	-40-+65 °C	-40-+65 °C	-40-+65 °C	-40-+65 °C
Temperature stabilization	45 °C	45 °C	45 °C	45 °C	45 °C
Supply: Voltage	14-30 V DC	14-30 V DC	14-30 V DC	14-30 V DC	14-30 V DC
Supply: Power consumption max.	≤ 12 W	≤ 12 W	≤ 12 W	≤ 12 W	≤ 12 W
Volume	≤ 4.2 cm ³	≤ 4.2 cm ³	≤ 4.2 cm ³	≤ 4.2 cm ³	≤ 4.2 cm ³

	CMR 371, 1000 hPa F.S.	CMR 372, 100 hPa F.S.	CMR 373, 10 hPa F.S.	CMR 374, 1 hPa F.S.	CMR 375, 0.1 hPa F.S.
Flange (in)	Tube OD 1/2"	Tube AD 1/2"	Tube OD 1/2"	Tube OD 1/2"	Tube OD 1/2"
Order number	PT R25 100	PT R25 110	PT R25 120	PT R25 130	PT R25 140
Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF
Order number	PT R25 101	PT R25 111	PT R25 121	PT R25 131	PT R25 141
Flange (in)	DN 16 CF-R	DN 16 CF-R	DN 16 CF-R	DN 16 CF-R	DN 16 CF-R
Order number	PT R25 102	PT R25 112	PT R25 122	PT R25 132	PT R25 142
Flange (in)	Cajon 8 VCR	Cajon 8 VCR	Cajon 8 VCR	Cajon 8 VCR	Cajon 8 VCR
Order number	PT R25 103	PT R25 113	PT R25 123	PT R25 133	PT R25 143

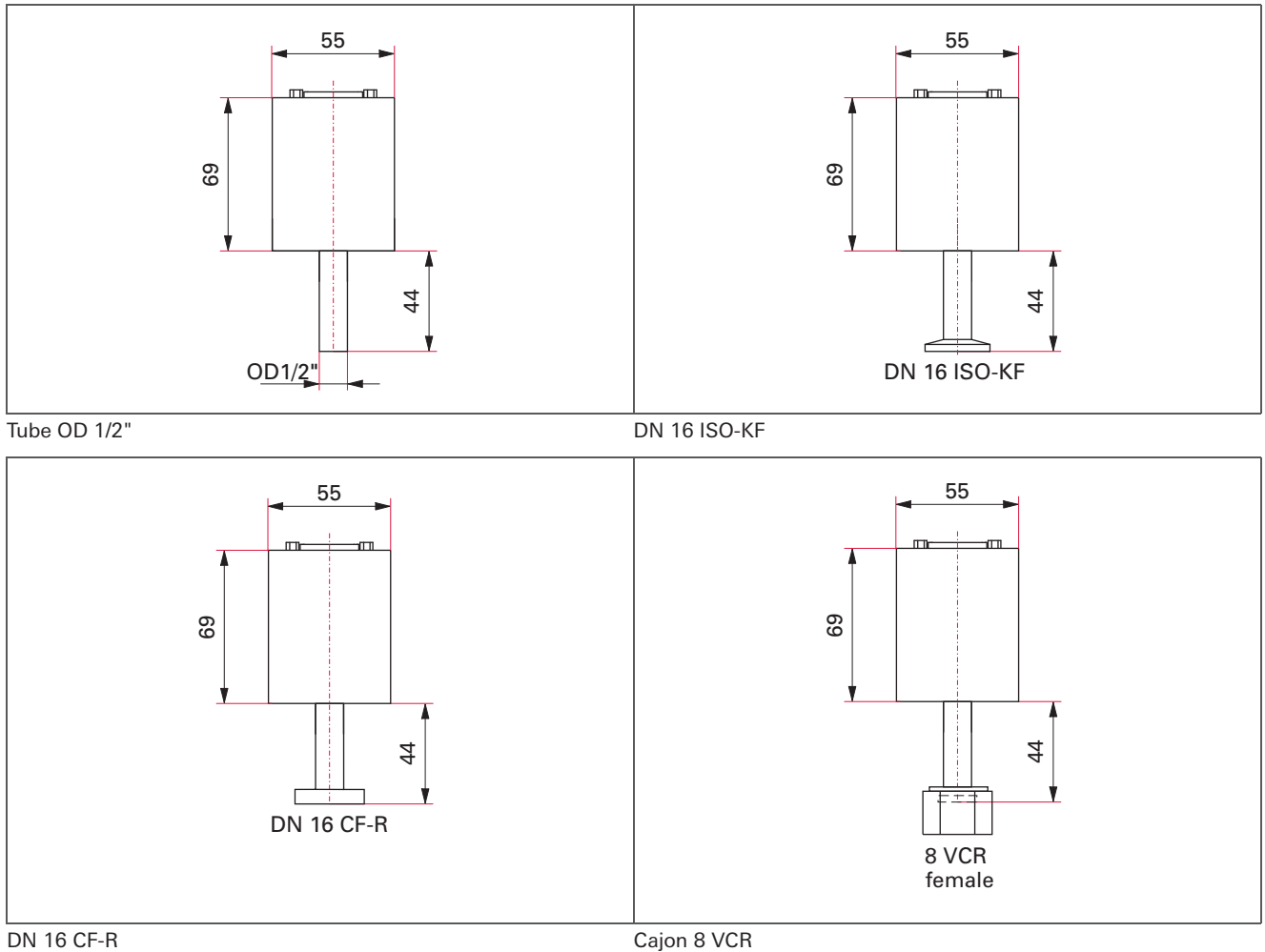
Accessories					
Sensor cable, 3 m	PT 448 250 -T	PT 448 250 -T	PT 448 250 -T	PT 448 250 -T	PT 448 250 -T
Mating connector	B 4707 283 MA	B 4707 283 MA	B 4707 283 MA	B 4707 283 MA	B 4707 283 MA

Capacitance transmitters CCR (1 · 10⁻⁵ - 1000 Torr) temperature compensated



- Accuracy: 0.2 % of measurement
 - Supply voltage: 14-30 V
 - Output signal: 0-10 V
 - Ceramic technology sensor
 - No memory effects
 - Excellent temperature compensation
 - Excellent zero stability
- Output signal and connector compatible with MKS Baratron.

Dimensions (in mm)



DN 16 CF-R

Cajon 8 VCR

Technical data	CCR 361, 1000 Torr F.S.	CCR 362, 100 Torr F.S.	CCR 363, 10 hPa F.S.	CCR 364, 1 Torr F.S.	CCR 365, 0.1 Torr F.S.
Resolution	0.003 % F.S.	0.003 % F.S.	0.003 % F.S.	0.003 % F.S.	0.003 % F.S.
Output signal: Pressure range	0-10 V	0-10 V	0-10 V	0-10 V	0-10 V
Output signal: Minimum load	> 10 kΩ	> 10 kΩ	> 10 kΩ	> 10 kΩ	> 10 kΩ
Bakeout temperature max. at the flange	≤ 110 °C	≤ 110 °C	≤ 110 °C	≤ 110 °C	≤ 110 °C
Pressure max.	300 kPa	2 bar	2 bar	2 bar	130 kPa
Accuracy	0.20 % of reading	0.20 % of reading	0.20 % of reading	0.20 % of reading	0.5 % of reading
Weight	≤ 370 g	≤ 370 g	≤ 370 g	≤ 370 g	≤ 370 g
Membrane and measuring chamber	Ceramics (Al ₂ O ₃ ≤ 99,5 %)	Ceramics (Al ₂ O ₃ ≤ 99,5 %)	Ceramics (Al ₂ O ₃ ≤ 99,5 %)	Ceramics (Al ₂ O ₃ ≤ 99,5 %)	Ceramics (Al ₂ O ₃ ≤ 99,5 %)
Measurement range max.	1333 hPa	133 hPa	13.3 hPa	1.33 hPa	0.13 hPa
Measurement range min.	1.33 · 10 ⁻¹ hPa	1.33 · 10 ⁻² hPa	1.33 · 10 ⁻³ hPa	1.33 · 10 ⁻⁴ hPa	1 · 10 ⁻⁵ hPa
Sensor cable length	≤ 100 m (0.14 mm ² conductor)	100 m (0.14 mm ² conductor)	100 m (0.14 mm ² conductor)	100 m (0.14 mm ² conductor)	100 m (0.14 mm ² conductor)
Response time	30 ms	30 ms	30 ms	30 ms	130 ms
Pipe and flange	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Protection category	IP 30	IP 30	IP 30	IP 30	IP 30
Temperature: Operating	5-50 °C	5-50 °C	5-50 °C	5-50 °C	5-50 °C
Temperature effect: on span	0.01 % of reading/°C	0.01 % of reading/°C	0.01 % of reading/°C	0.01 % of reading/°C	0.03 % of reading/°C
Temperature effect: on zero	0.0050 % F.S./°C	0.005 % F.S./°C	0.0050 % F.S./°C	0.015 % F.S./°C	0.02 % F.S./°C
Temperature: Storage	-40-+65 °C	-40-+65 °C	-40-+65 °C	-40-+65 °C	-40-+65 °C
Supply: Voltage	14-30 V DC	14-30 V DC	14-30 V DC	14-30 V DC	14-30 V DC
Supply: Power consumption max.	≤ 1 W	≤ 1 W	≤ 1 W	≤ 1 W	≤ 1 W
Volume	≤ 3.6 cm ³	≤ 3.6 cm ³	≤ 3.6 cm ³	≤ 3.6 cm ³	≤ 3.6 cm ³

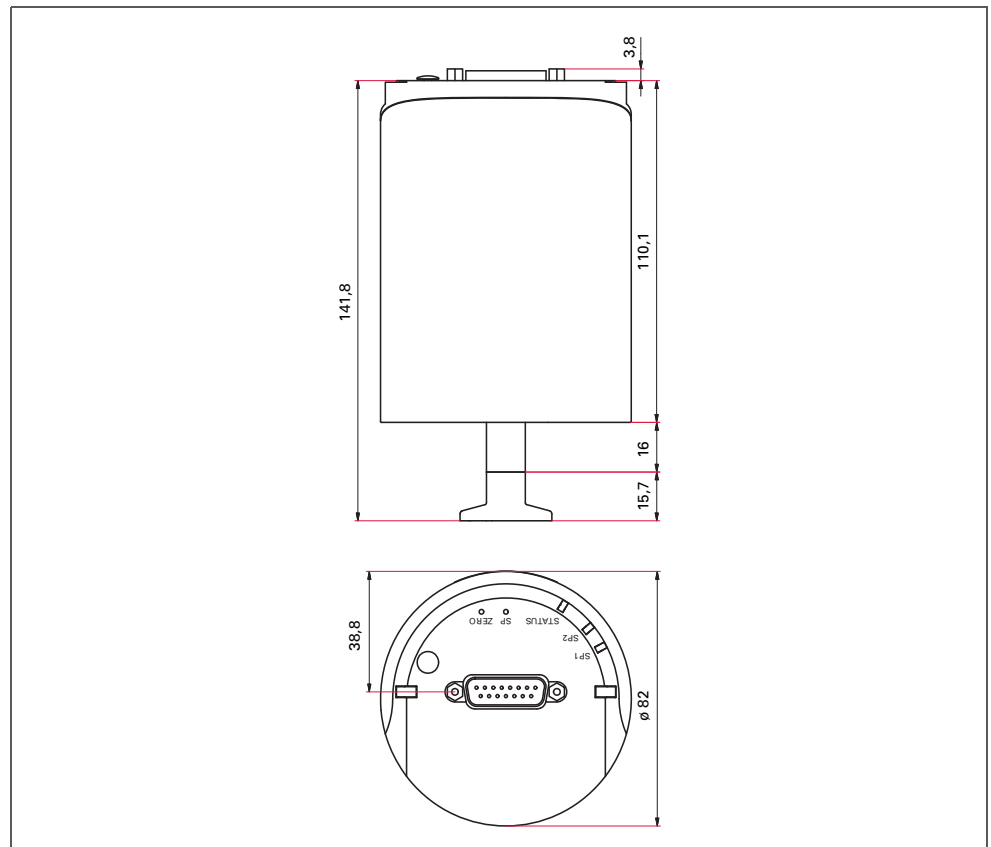
	CCR 361, 1000 Torr F.S.	CCR 362, 100 Torr F.S.	CCR 363, 10 hPa F.S.	CCR 364, 1 Torr F.S.	CCR 365, 0.1 Torr F.S.
Flange (in)	Tube OD 1/2"	Tube OD 1/2"	Tube OD 1/2"	Tube OD 1/2"	Tube OD 1/2"
Order number	PT R27 600	PT R27 610	PT R27 620	PT R27 630	PT R27 640
Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO KF
Order number	PT R27 601	PT R27 611	PT R27 621	PT R27 631	PT R27 641
Flange (in)			DN 16 CF-R	DN 16 CF-R	DN 16 CF-R
Order number			PT R27 622	PT R27 632	PT R27 642
Flange (in)	Cajon 8 VCR	Cajon 8 VCR	Cajon 8 VCR	Cajon 8 VCR	Cajon 8 VCR
Order number	PT R27 603	PT R27 613	PT R27 623	PT R27 633	PT R27 643

Capacitance transmitters CCR (1 · 10⁻⁵ - 1000 Torr) temperature regulated



- Pressure measurement independent of type of gas
 - Outstanding long-term and temperature stability
 - Only marginal zero drift
 - Corrosion-resistant ceramic technology
 - Additional protection against pollution by Sensorshield
 - Transmitter cannot be connected to controllers TPG 261, TPG 262 and TPG 256 A
- Output signal and connector compatible with MKS Baratron.

Dimensions (in mm)



Technical data	CCR 371, 1000 Torr F.S.	CCR 372, 100 Torr F.S.	CCR 373, 10 Torr F.S.	CCR 374, 1 Torr F.S.	CCR 375, 0.1 Torr F.S.
Resolution	0.003 % F.S.	0.003 % F.S.	0.003 % F.S.	0.003 % F.S.	0.003 % F.S.
Output signal: Pressure range	0-10 V	0-10 V	0-10 V	0-10 V	0-10 V
Output signal: Minimum load	> 10 k Ω	> 10 k Ω	> 10 k Ω	> 10 k Ω	> 10 k Ω
Bakeout temperature max. at the flange	≤ 110 °C	≤ 110 °C	≤ 110 °C	≤ 110 °C	≤ 110 °C
Pressure max.	300 kPa	200 kPa	200 kPa	2 bar	1.3 bar
Accuracy: % of measurement	0.15	0.15	0.15	0.15	0.15
Weight	≤ 900 g	≤ 900 g	≤ 900 g	≤ 900 g	≤ 900 g
Membrane and measuring chamber	Ceramics (Al ₂ O ₃ $\leq 99,5$ %)	Ceramics (Al ₂ O ₃ $\leq 99,5$ %)	Ceramics (Al ₂ O ₃ $\leq 99,5$ %)	Ceramics (Al ₂ O ₃ $\leq 99,5$ %)	Ceramics (Al ₂ O ₃ $\leq 99,5$ %)
Measurement range max.	1333 hPa	133 hPa	13.3 hPa	1.3 hPa	0.13 hPa
Measurement range min.	$1.33 \cdot 10^{-1}$ hPa	$1.33 \cdot 10^{-2}$ hPa	$1.33 \cdot 10^{-3}$ hPa	$1,33 \cdot 10^{-4}$ hPa	$1.33 \cdot 10^{-5}$ hPa
Response time	30 ms	30 ms	30 ms	30 ms	130 ms
Pipe and flange	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Protection category	IP 40	IP 40	IP 40	IP 40	IP 40
Temperature: Operating	10-40 °C	10-40 °C	10-40 °C	10-40 °C	10-40 °C
Temperature effect: on span	0.01 % of reading/°C	0.01 % of reading/°C	0.01 % of reading/°C	0.01 % of reading/°C	0.01 % of reading/°C
Temperature effect: on zero	0.0025 % F.S./°C	0.0025 % F.S./°C	0.0025 % F.S./°C	0.0025 % F.S./°C	0.0025 % F.S./°C
Temperature: Storage	-40-+65 °C	-40-+65 °C	-40-+65 °C	-40-+65 °C	-40-+65 °C
Supply: Voltage	14-30 V DC	14-30 V DC	14-30 V DC	14-30 V DC	14-30 V DC
Supply: Power consumption max.	≤ 12 W	≤ 12 W	≤ 12 W	≤ 12 W	≤ 12 W
Volume	≤ 4.2 cm ³	≤ 4.2 cm ³	≤ 4.2 cm ³	≤ 4.2 cm ³	≤ 4.2 cm ³

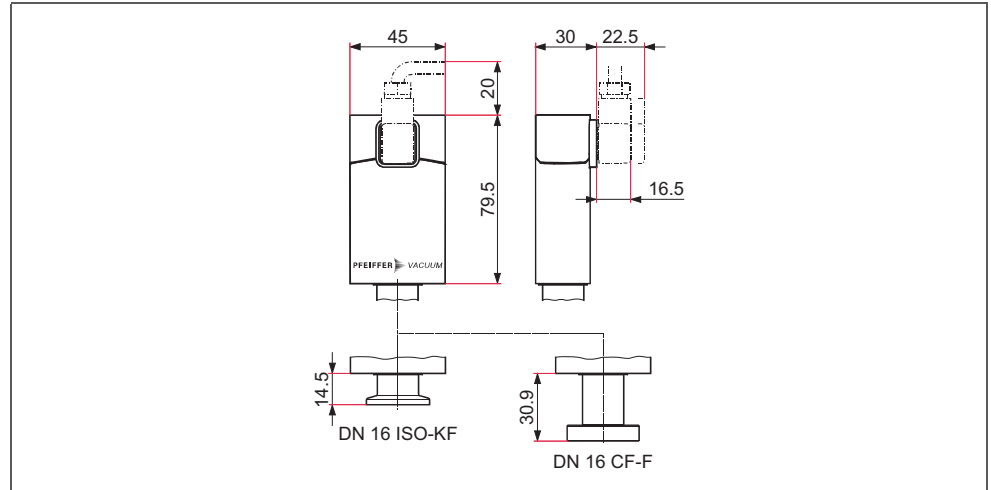
	CCR 371, 1000 Torr F.S.	CCR 372, 100 Torr F.S.	CCR 373, 10 Torr F.S.	CCR 374, 1 Torr F.S.	CCR 375, 0.1 Torr F.S.
Flange (in)	Tube OD 1/2"	Tube OD 1/2"	Tube OD 1/2"	Tube OD 1/2"	Tube OD 1/2"
Order number	PT R28 100	PT R28 110	PT R28 120	PT R28 130	PT R28 140
Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF
Order number	PT R28 101	PT R28 111	PT R28 121	PT R28 131	PT R28 141
Flange (in)	DN 16 CF-R	DN 16 CF-R	DN 16 CF-R	DN 16 CF-R	DN 16 CF-R
Order number	PT R28 102	PT R28 112	PT R28 122	PT R28 132	PT R28 142
Flange (in)	Cajon 8 VCR	Cajon 8 VCR	Cajon 8 VCR	Cajon 8 VCR	Cajon 8 VCR
Order number	PT R28 103	PT R28 113	PT R28 123	PT R28 133	PT R28 143

Pirani/Capacitance transmitters PCR (5 · 10⁻⁵ - 1500 hPa)



- Measurement range: 5 · 10⁻⁵ to 1500 hPa
- Bakeout temperature: 80 °C
- Output signal: 1,2 - 8,68 V logarithm of pressure
- Voltage supply: 15 - 30 V DC
- Metal-sealed, without plug

Dimensions (in mm)



Technical data	PCR 280, 80 °C, DN 16 ISO-KF	PCR 280, 80 °C, DN 16 CF-F
Flange (in)	DN 16 ISO-KF	DN 16 CF-F
Output signal: Pressure range	1.2 - 8,68 V	1.2 - 8.68 V
Output signal: Minimum load	10 kΩ	10 kΩ
Bakeout temperature	80 °C	80 °C
Seal	Metal	Metal
Pressure max.	5 bar	500 kPa
Feedthrough	Glass	Glass
Feature	Stainless steel, metal sealed	Stainless steel, metal sealed
Flange	Stainless steel	Stainless steel
Accuracy	5 · 10 ⁻⁴ - 1 · 10 ⁻³ hPa: ± 50 % ; 1 · 10 ⁻³ - 100 hPa: ± 15 % ; 100 - 950 hPa: ± 5 % ; 950 - 1100 hPa: ± 2,5 %	5 · 10 ⁻⁴ - 1 · 10 ⁻³ hPa: ± 50 % ; 1 · 10 ⁻³ - 100 hPa: ± 15 % ; 100 - 950 hPa: ± 5 % ; 950 - 1050 hPa: ± 2,5 %
Weight	120 g	120 g
Filament	Tungsten	Tungsten
Measurement range max.	1500 hPa	1500 hPa
Measurement range min.	5 · 10 ⁻⁵ hPa	5 · 10 ⁻⁵ hPa
Sensor cable length	100 m	100 m
Temperature: Operating	10-50 °C	10-50 °C
Temperature: Storage	-20-+65 °C	-20-+65 °C
Supply: Voltage	15-30 V DC	15-30 V DC
Supply: Power consumption max.	2.5 W	2.5 W
Volume	4.7 cm ³	4.7 cm ³
Repeatability: 10 ⁻³ - 1100 hPa	± 2 %	± 2 %

Order number		
Pirani/capacitance gauge PCR 280 (5 · 10 ⁻⁵ - 1500 hPa)	PT R26 855	PT R26 856

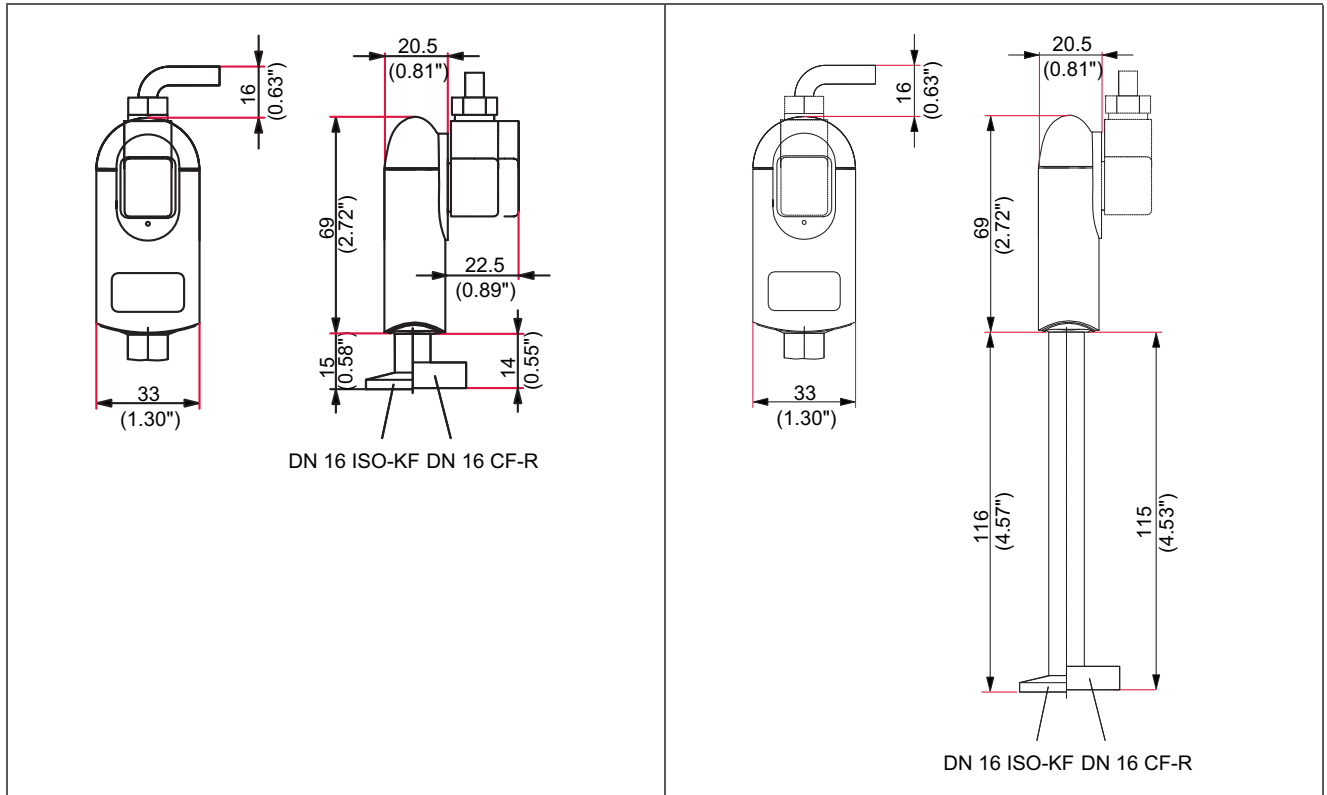
Accessories		
Centering ring with poral filter, Pore size: 20 μm, FPM/stainless steel, DN 16 ISO-KF	PF 117 216 -T	PF 117 216 -T
Sensor cable, 3 m	PT 448 250 -T	PT 448 250 -T
Mating connector	B 4707 283 MA	B 4707 283 MA

Pirani transmitter TPR (5 · 10⁻⁴ - 1000 hPa)



- Flange size: DN 16 ISO-KF
- Measurement range from 5 · 10⁻⁴ to 1000 hPa
- Compact and rugged
- Fast, stable measurement
- For general vacuum applications
- Maximum pressure refers to inert gases

Dimensions (in mm)



TPR 280, 80 °C

TPR 280, 250 °C

Technical data	TPR 280, 80 °C	TPR 280, 250 °C
Resolution	1 % of reading	1 % of reading
Output signal: Sensor error below	0.5 V	0.5 V
Output signal: Pressure range	2.2 - 8.5 V	2.2 - 8.5 V
Output signal: Minimum load	10 kΩ	10 kΩ
Bakeout temperature	80 °C	250 °C
Seal	Metal	Metal
Pressure max.	1000 kPa	1000 kPa
Feedthrough	Glass	Glass
Feature	Stainless steel, metal sealed	Stainless steel, metal sealed
Flange	Stainless steel	Stainless steel
Accuracy: 10 ⁻³ - 10 ² hPa	± 15 %	± 15 %
Filament	Tungsten	Tungsten
Measurement range max.	1000 hPa	1000 hPa
Measurement range min.	5 · 10 ⁻⁴ hPa	5 · 10 ⁻⁴ hPa
Sensor cable length max.	200 m	200 m
Response time	80 ms	80 ms
Protection category	IP 40	IP40
Temperature: Operating	5-60 °C	5-60 °C
Temperature: Storage	-20-+65 °C	-20-+65 °C
Supply: Voltage	14-30 V DC	14-30 V DC
Supply: Power consumption max.	≤ 1 W	1 W
Repeatability: 10 ⁻³ - 10 ² hPa	± 2 %	± 2 %

	TPR 280, 80 °C	TPR 280, 250 °C
Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF
Weight	80 g	130 g
Volume	1.5 cm ³	10 cm ³
Order number	PT R26 950	PT R26 960
Flange (in)	DN 16 CF-R	DN 16 CF-R
Weight	100 g	140 g
Volume	1.5 cm ³	10 cm ³
Order number	PT R26 951	PT R26 961
Flange (in)	1/8" NPT	
Weight	70 g	
Volume	2 cm ³	
Order number	PT R26 952	
Flange (in)	8 VCR	
Weight	130 g	
Volume	2 cm ³	
Order number	PT R26 953	

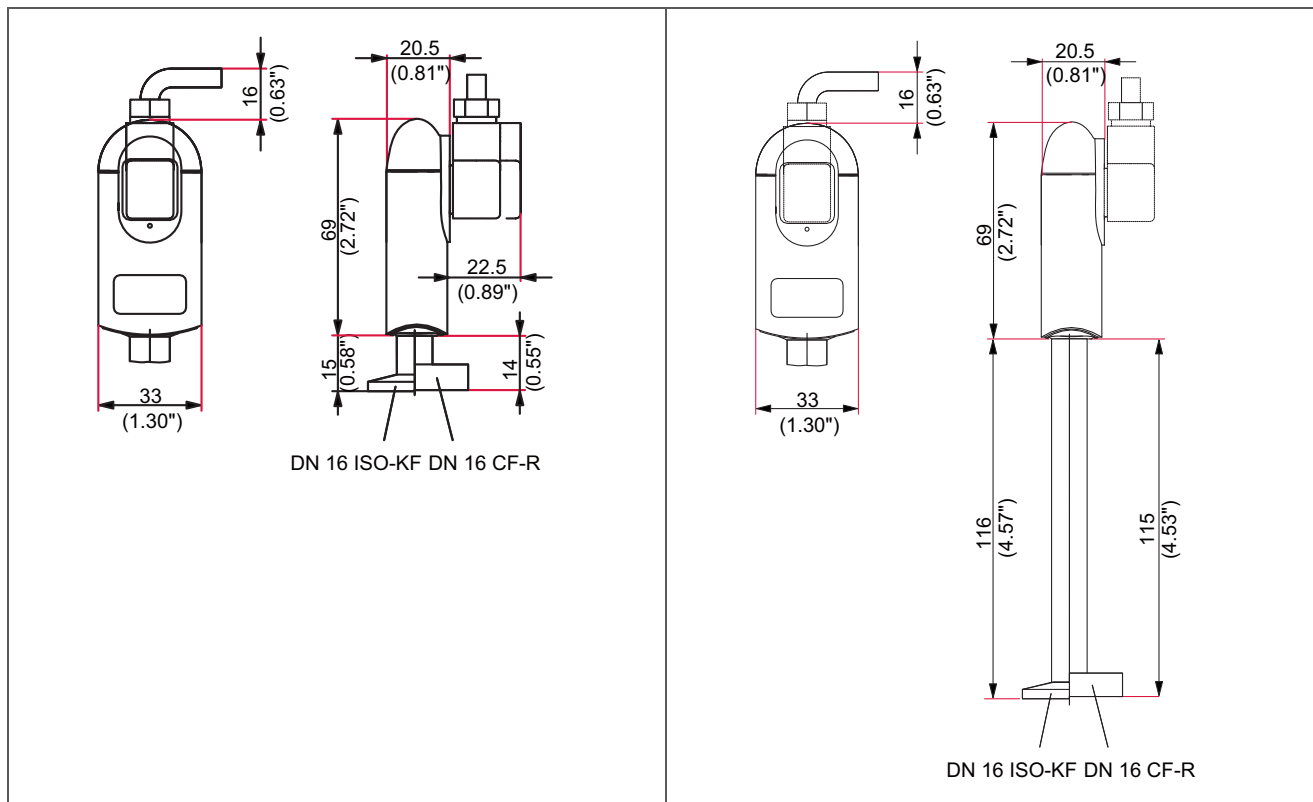
Accessories		
Centering ring with poral filter, Pore size: 20 µm, FPM/stainless steel, DN 16 ISO-KF	PF 117 216 -T	PF 117 216 -T
Mating connector	B 4707 283 MA	B 4707 283 MA
Sensor cable, 3 m	PT 448 250 -T	PT 448 250 -T
Fine filter, pore size 4 µm, DN 16 ISO-KF	PT 120 132 -T	PT 120 132 -T

Pirani transmitter TPR (5 · 10⁻⁴ - 1000 hPa)



- Flange size: DN 16 ISO-KF
- Measurement range from 5 · 10⁻⁴ to 1000 hPa
- Compact and rugged
- Fast, stable measurement
- For corrosive media
- Maximum pressure refers to inert gases

Dimensions (in mm)



TPR 281, 80 °C

TPR 281, 250 °C

Technical data	TPR 281, 80 °C	TPR 281, 250 °C
Resolution	1 % of reading	1 % of reading
Output signal: Sensor error below	0.5 V	0.5 V
Output signal: Pressure range	2.2 - 8.5 V	2.2 - 8.5 V
Output signal: Minimum load	10 kΩ	10 kΩ
Bakeout temperature	80 °C	250 °C
Seal	Metal	Metal
Pressure max.	1000 kPa	1000 kPa
Feedthrough	Glass	Glass
Feature	For corrosive media	For corrosive media
Flange	Stainless steel	Stainless steel
Accuracy: 10 ⁻³ - 10 ² hPa	± 15 %	± 15 %
Filament	Nickel	Nickel
Measurement range max.	1000 hPa	1000 hPa
Measurement range min.	5 · 10 ⁻⁴ hPa	5 · 10 ⁻⁴ hPa
Sensor cable length max.	200 m	200 m
Response time	80 ms	80 ms
Protection category	IP 40	IP 40
Temperature: Operating	5-60 °C	5-60 °C
Temperature: Storage	-20-+65 °C	-20-+65 °C
Supply: Voltage	14-30 V DC	14-30 V DC
Supply: Power consumption max.	1 W	1 W
Repeatability: 10 ⁻³ - 10 ² hPa	± 2 %	± 2 %

	TPR 281, 80 °C	TPR 281, 250 °C
Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF
Weight	80 g	130 g
Volume	1.3 cm ³	10 cm ³
Order number	PT R21 950	PT R21 960
Flange (in)	DN 16 CF-R	DN 16 CF-R
Weight	100 g	140 g
Volume	1.5 cm ³	10 cm ³
Order number	PT R21 951	PT R21 961

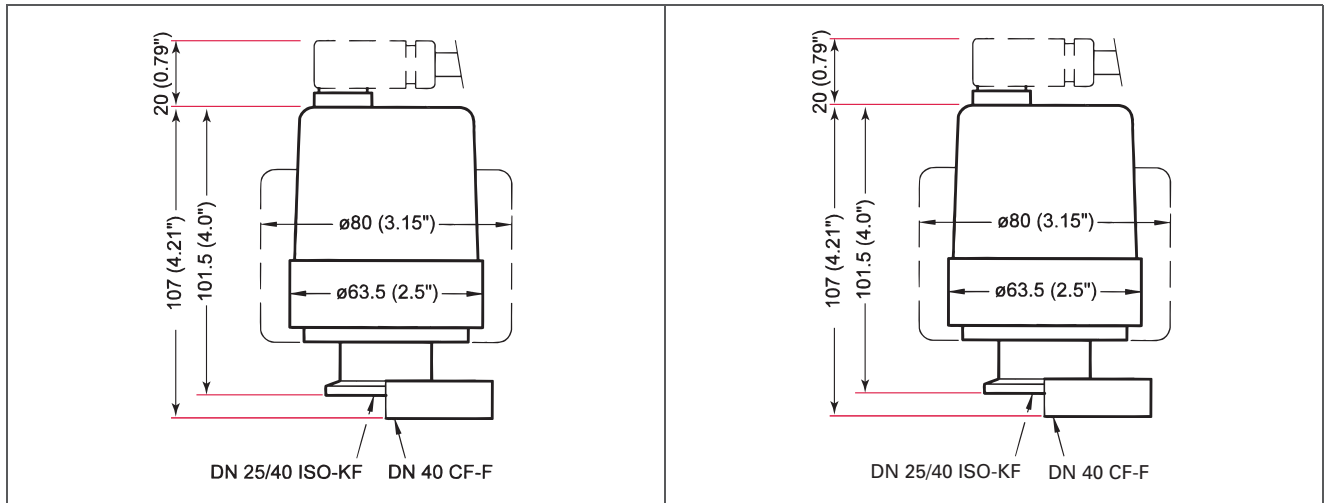
Accessories		
Centering ring with poral filter, Pore size: 20 µm, FPM/stainless steel, DN 16 ISO-KF	PF 117 216 -T	PF 117 216 -T
Mating connector	B 4707 283 MA	B 4707 283 MA
Sensor cable, 3 m	PT 448 250 -T	PT 448 250 -T
Fine filter, pore size 4 µm, DN 16 ISO-KF	PT 120 132 -T	PT 120 132 -T

Cold Cathode transmitters IKR (5 · 10⁻¹¹ - 0.01 hPa)



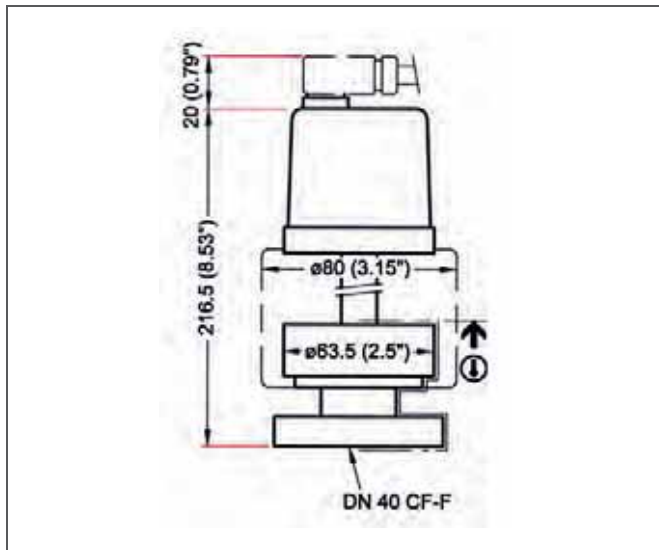
- Flange size: DN 25 ISO-KF
- Measurement range from 2 · 10⁻⁹ to 0.01 hPa
- Cold cathode (inverted magnetron)
- Rugged and dependable
- Insensitive to air ingress
- Corrosion-resistant
- Maximum pressure refers to inert gases and temperatures of less than 55 °C

Dimensions (in mm)



IKR 251, FPM sealed

IKR 261, metal sealed



IKR 261, metal sealed, long case

Technical data	IKR 251, FPM sealed	IKR 261, metal sealed	IKR 261, metal sealed, long case
Anode	Molybdenum	Molybdenum	Molybdenum
Output signal: Sensor error below	0.5 V	0.5 V	0.5 V
Output signal: Pressure range	1.8 - 8.5 V	1.8 - 8.5 V	1.8 - 8.5 V
Output signal: Minimum load	10 kΩ	10 kΩ	10 kΩ
Bakeout temperature	150 °C, electronic removed	250 °C, electronic removed	250 °C
Seal	FPM	Ag	Ag
Pressure max.	1000 kPa	10 bar	10 bar
Feedthrough	Al ₂ O ₃	Al ₂ O ₃	Al ₂ O ₃
Feature	Interior FPM sealed	Metal sealed	Metal sealed
Flange	Stainless steel	Stainless steel	Stainless steel
Accuracy: 10 ⁻⁸ - 10 ⁻³ hPa	± 30 %	± 30 %	± 30 %
Measurement range max.	0.01 hPa	0.01 hPa	0.01 hPa
Measurement range min.	2 · 10 ⁻⁹ hPa	2 · 10 ⁻⁹ hPa	2 · 10 ⁻⁹ hPa
Sensor cable length	500 m	500 m	500 m
Temperature: Operating	5-55 °C	5-55 °C	5-55 °C
Temperature: Storage	-40-+65 °C	-40-+65 °C	-40-+65 °C
Supply: Voltage	15-30 V	15-30 V	15-30 V
Supply: Power consumption max.	2 W	2 W	2 W
Volume	20 cm ³	20 cm ³	20 cm ³
Repeatability: 10 ⁻⁸ - 10 ⁻³ hPa	± 5 %	± 5 %	± 5 %

	IKR 251, FPM sealed	IKR 261, metal sealed	IKR 261, metal sealed, long case
Flange (in)	DN 25 ISO-KF		
Weight	700 g		
Order number	PT R25 500		
Flange (in)	DN 40 ISO-KF	DN 40 ISO-KF	
Weight	700 g	700 g	
Order number	PT R25 501	PT R25 750	
Flange (in)	DN 40 CF-F	DN 40 CF-F	DN 40 CF-F
Weight	950 g	950 g	1200 g
Order number	PT R25 502	PT R25 751	PT R25 761

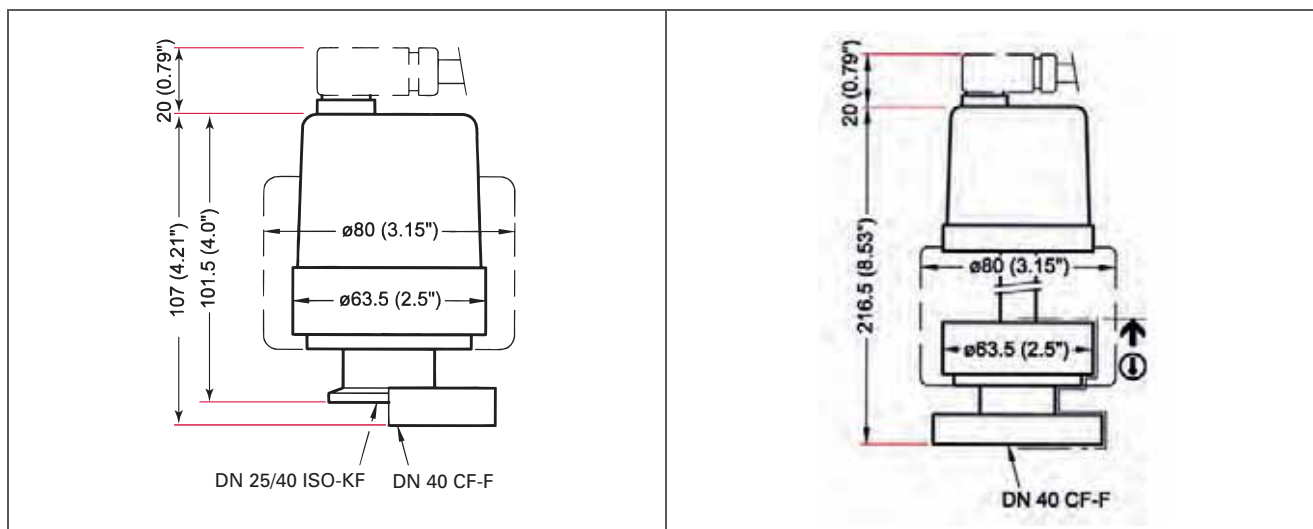
Accessories			
Sensor cable, 3 m	PT 448 250 -T	PT 448 250 -T	PT 448 250 -T
Mating connector	B 4707 283 MA	B 4707 283 MA	B 4707 283 MA

Cold Cathode transmitters IKR (5 · 10⁻¹¹ - 0.01 hPa)



- Flange size: DN 40 CF-F
- Measurement range from 5 · 10⁻¹¹ to 0.01 hPa
- Cold cathode (inverted magnetron)
- Rugged and dependable
- Insensitive to air ingress
- Corrosion-resistant
- Maximum pressure refers to inert gases and temperatures of less than 55 °C

Dimensions (in mm)



IKR 270, metal sealed

IKR 270, metal sealed, long case

Technical data	IKR 270, metal sealed, DN 40 CF-F	IKR 270, metal sealed, long case, DN 40 CF-F
Anode	Molybdenum	Molybdenum
Flange (in)	DN 40 CF-F	DN 40 CF-F
Output signal: Sensor error below	0.5 V	0.5 V
Output signal: Pressure range	1.8 - 8.5 V	1.8 - 8.5 V
Output signal: Minimum load	10 kΩ	10 kΩ
Bakeout temperature	250 °C, electronic removed	250 °C
Seal	Ag	Ag
Pressure max.	1000 kPa	1000 kPa
Feedthrough	Al ₂ O ₃	Al ₂ O ₃
Feature	Metal sealed	Metal sealed
Flange	Stainless steel	Stainless steel
Accuracy: 10 ⁻⁹ - 10 ⁻³ hPa	± 30 %	± 30 %
Weight	950 g	1200 g
Cable length	500 m	500 m
Measurement range max.	0.01 hPa	0.01 hPa
Measurement range min.	5 · 10 ⁻¹¹ hPa	5 · 10 ⁻¹¹ hPa
Temperature: Operating	5-55 °C	5-55 °C, in the bakeout range
Temperature: Storage	-40-+65 °C	-40-+65 °C
Supply: Voltage	15-30 V	15-30 V
Supply: Power consumption max.	2 W	2 W
Volume	20 cm ³	20 cm ³
Repeatability: 10 ⁻⁹ - 10 ⁻³ hPa	± 5 %	± 5 %

Order number		
Cold Cathode Gauges IKR 270 (5 · 10 ⁻¹¹ - 0,01 hPa)	PT R21 251	PT R21 261

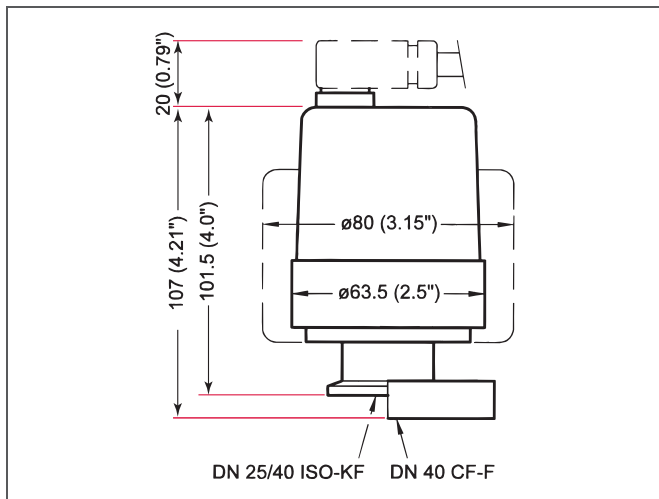
Accessories		
Sensor cable, 3 m	PT 448 250 -T	PT 448 250 -T
Mating connector	B 4707 283 MA	B 4707 283 MA

Pirani/Cold Cathode transmitters PKR (5 · 10⁻⁹ - 1000 hPa)

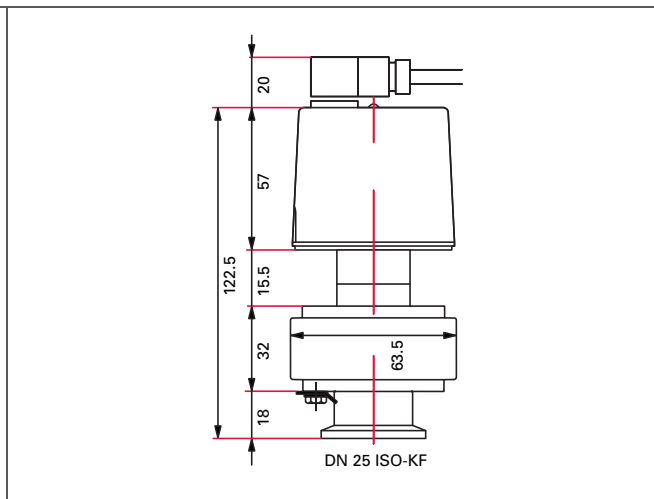


- Measurement range from 5 · 10⁻⁹ to 1000 hPa
- Two gauge heads (Pirani and cold cathode) in a single case (inverted magnetron)
- A single flange from atmospheric pressure to UHV
- Corrosion-resistant
- Maximum pressure refers to inert gases and temperatures of less than 55 °C

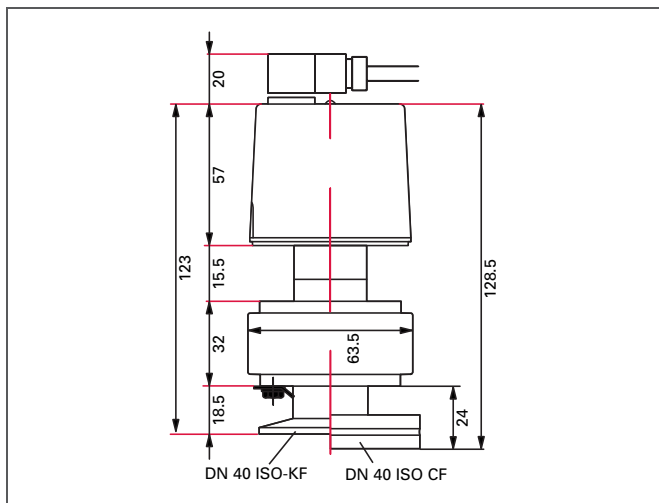
Dimensions (in mm)



PKR 251, FPM sealed



PKR 261, metal sealed



PKR 261, metal sealed

Technical data	PKR 251, FPM sealed	PKR 261, metal sealed
Anode	Molybdenum	Molybdenum
Output signal: Sensor error above	9.5 V	9.5 V
Output signal: Sensor error below	0.5 V	0.5 V
Output signal: Pressure range	1.8 - 8.6 V	1.8 - 8.6 V
Output signal: Minimum load	10 kΩ	10 kΩ
Bakeout temperature	150 °C, electronic removed	150 °C, electronic removed
Seal	FPM	Ag, Cu
Pressure max.	1000 kPa	1000 kPa
Feedthrough	Al ₂ O ₃ , Glass	Al ₂ O ₃ , Glas
Feature	Interior FPM sealed	Metal sealed
Flange	Stainless steel	Stainless steel
Accuracy: 10 ⁻⁸ - 10 ² hPa	± 30 %	± 30 %
Filament	Tungsten	Tungsten
Measurement range max.	1000 hPa	1000 hPa
Measurement range min.	5 · 10 ⁻⁹ hPa	5 · 10 ⁻⁹ hPa
Sensor cable length	300 m	300 m
Temperature: Operating	5-55 °C	5-55 °C, up to 150 °C on flange (horizontal installation)
Temperature: Storage	-40-+65 °C	-40-+65 °C
Supply: Voltage	15-30 V DC	15-30 V DC
Supply: Power consumption max.	2 W	2 W
Volume	20 cm ³	20 cm ³
Repeatability: 10 ⁻⁸ - 10 ² hPa	± 5 %	± 5 %

	PKR 251, FPM sealed	PKR 261, metal sealed
Flange (in)	DN 25 ISO-KF	DN 25 ISO-KF
Weight	700 g	700 g
Order number	PT R26 000	PT R26 250
Flange (in)	DN 40 ISO-KF	DN 40 ISO-KF
Weight	700 g	750 g
Order number	PT R26 001	PT R26 251
Flange (in)	DN 40 CF-F	DN 40 CF-F
Weight	950 g	995 g
Order number	PT R26 002	PT R26 252

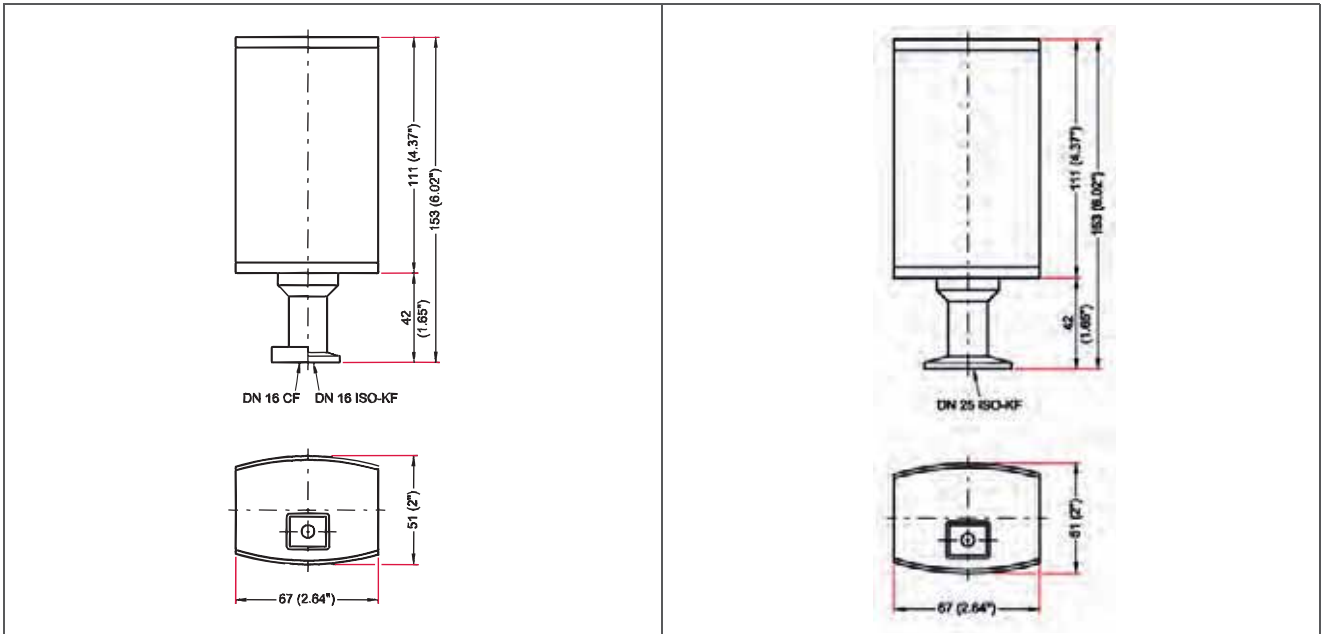
Accessories		
Sensor cable, 3 m	PT 448 250 -T	PT 448 250 -T
Mating connector	B 4707 283 MA	B 4707 283 MA

Hot Cathode transmitters IMR (2 · 10⁻⁶ - 1000 hPa)



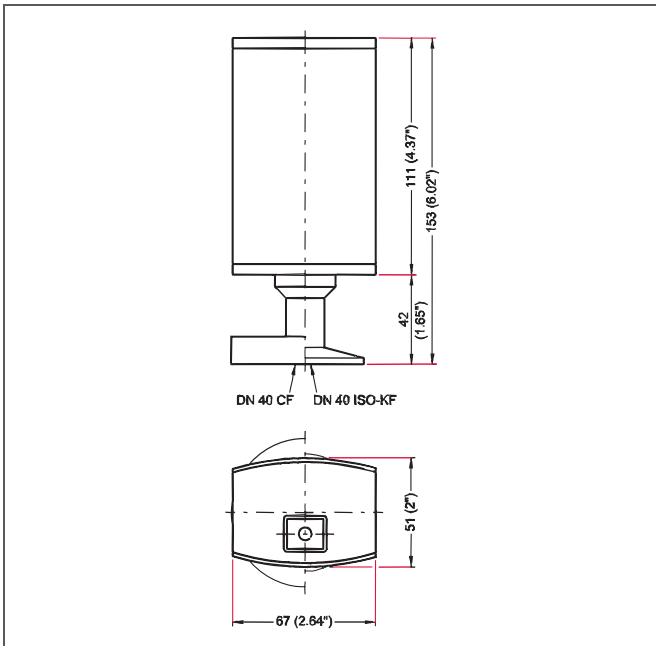
- Measurement range from 2 · 10⁻⁶ to 1000 hPa
- Two gauge heads (Pirani and hot cathode) in a single case
- Highly accurate
- Excellent reproducibility
- Automatic cathode protection
- A single flange from atmosphere to UHV
- Corrosion-resistant
- Maximum pressure refers to inert gases and temperatures of less than 55 °C

Dimensions (in mm)



IMR 265, DN 16 CF-F

IMR 265, DN 25 ISO-KF



IMR 265, DN 40 CF-F

Technical data	IMR 265, High Pressure Hot Cathode
Output signal: Sensor error	0.5 V
Output signal: Pressure range Ioni	1.5 - 7.5 V
Output signal: Pressure range Pirani	8.5 - 9.75 V
Output signal: Minimum load	10 kΩ
Bakeout temperature	150 °C, electronic removed
Pressure max.	500 kPa
Electron collector	Stainless steel
Flange	Stainless steel
Accuracy: % of measurement	10 ⁻⁵ - 1 hPa: ± 15 %
Filament holder	Molybdenum, Platinum
Ion collector	Stainless steel
Isolator	Glass
Filament	Iridium yttriated
Measurement range max.	1000 hPa
Measurement range min.	2 · 10 ⁻⁶ hPa
Sensor cable length	100 m
Pirani measurement element	Copper, Tungsten
Temperature: Operating	0-50 °C
Temperature: Storage	-20-+70 °C
Supply: Voltage	20-30 V DC
Supply: Power consumption max.	16 W
Volume	20 cm ³
Repeatability: 10 ⁻¹ - 10 ² hPa	30 % reading
Repeatability: 10 ⁻⁵ - 10 ⁻¹ hPa	2 % reading

	IMR 265, High Pressure Hot Cathode
Flange (in)	DN 16 ISO-KF
Weight	270 g
Order number	PT R26 504
Flange (in)	DN 25 ISO-KF
Weight	285 g
Order number	PT R26 500
Flange (in)	DN 40 ISO-KF
Weight	315 g
Order number	PT R26 501
Flange (in)	DN 16 CF-F
Weight	400 g
Order number	PT R26 502
Flange (in)	DN 40 CF-F
Weight	550 g
Order number	PT R26 503

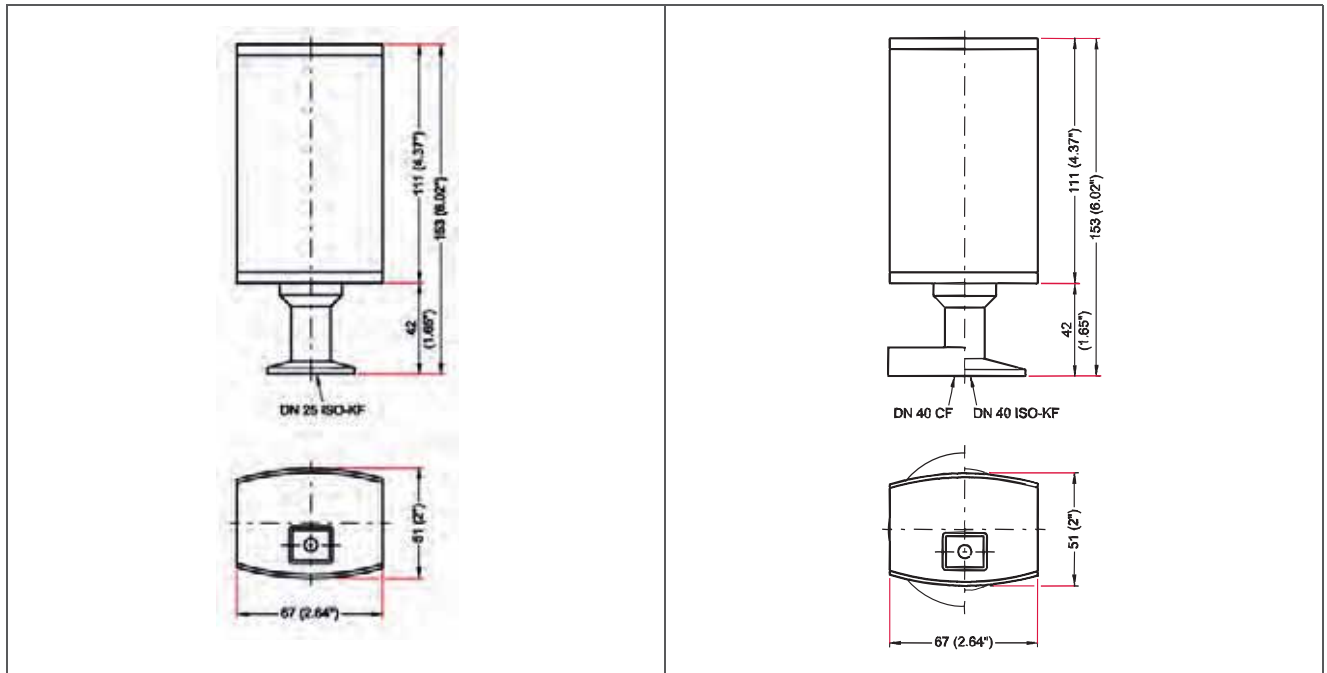
Accessories	
Sensor cable, 3 m	PT 448 250 -T
Mating connector	B 4707 283 MA

Pirani/Bayard-Alpert transmitters PBR (5 · 10⁻¹⁰ - 1000 hPa)



- Measurement range from 5 · 10⁻¹⁰ to 1000 hPa
- Two gauge heads (Pirani and BA hot cathode) in a single case
- Bayard-Alpert sensor ON/OFF automatically controlled by Pirani sensor
- Highly accurate
- A single flange from atmosphere to UHV
- Corrosion-resistant
- Maximum pressure refers to inert gases and temperatures of less than 55 °C

Dimensions (in mm)



PBR 260, DN 25 ISO-KF

PBR 260, DN 40 CF-R

Technical data	PBR 260, Pirani/Bayard- Alpert, DN 25 ISO-KF	PBR 260, Pirani/Bayard- Alpert, DN 40 ISO-KF	PBR 260, Pirani/Bayard- Alpert, DN 40 CF-R
Flange (in)	DN 25 ISO-KF	DN 40 ISO-KF	DN 40 CF-R
Output signal: Sensor error below	0.5 V	0.5 V	0.5 V
Output signal: Pressure range	0.774 - 10 V	0.774 - 10 V	0.774 - 10 V
Output signal: Minimum load	10 kΩ	10 kΩ	10 kΩ
Bakeout temperature	150 °C, electronic removed	150 °C, electronic removed	150 °C, electronic removed
Pressure max.	200 kPa	200 kPa	200 kPa
Flange	Stainless steel	Stainless steel	Stainless steel
Accuracy: 10^{-8} - 10^{-2} hPa	15 % reading	15 % reading	15 % reading
Weight	285 g	315 g	550 g
Filament	Tungsten	Tungsten	Tungsten
Filament	Iridium yttriated	Iridium yttriated	Iridium yttriated
Materials in contact with media	Cu, W, glass, NiFe, Mo, Stainless Steel, NiCr	Cu, W, glass, NiFe, Mo, Stainless steel, NiCr	Cu, W, glass, NiFe, Mo, Stainless steel, NiCr
Measurement range max.	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	$5 \cdot 10^{-10}$ hPa	$5 \cdot 10^{-10}$ hPa	$5 \cdot 10^{-10}$ hPa
Sensor cable length	100 m	100 m	100 m
Temperature: Operating	0-50 °C	0-50 °C	0-50 °C
Temperature: Storage	-20-+70 °C	-20-+70 °C	-20-+70 °C
Supply: Voltage	20-28 V DC	20-28 V DC	20-28 V DC
Supply: Power consumption max.	16 W	16 W	16 W
Volume	24 cm ³	24 cm ³	25 cm ³
Repeatability: 10^{-8} - 10^{-2} hPa	5 % reading	5 % reading	5 % reading

Order number			
Pirani/Bayard-Alpert Gauge PBR 260, ($5 \cdot 10^{-10}$ - 1000 hPa)	PT R27 000	PT R27 001	PT R27 002

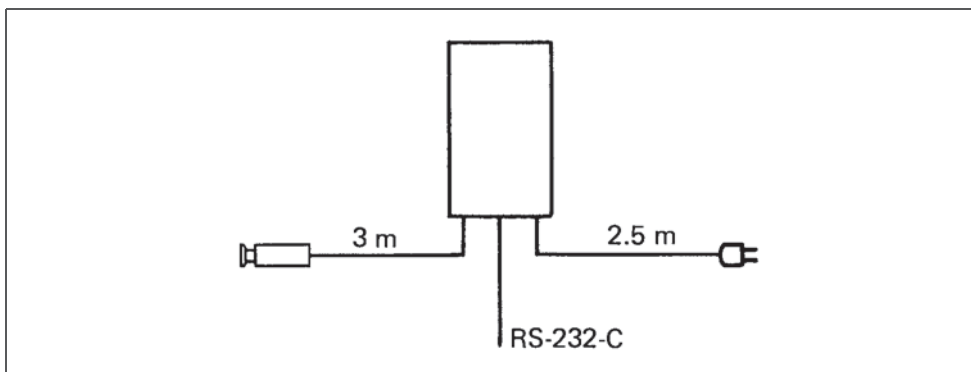
Accessories			
Sensor cable, 3 m	PT 448 250 -T	PT 448 250 -T	PT 448 250 -T
Mating connector	B 4707 283 MA	B 4707 283 MA	B 4707 283 MA

SingleGauge measurement equipment TPG 261

- SingleGauge measurement unit TPG 261
- Length: 3 m



Dimensions (in mm)



Technical data	SingleGauge measurement equipment TPG 261, 1 TPR 280, 3 m cable	SingleGauge measurement equipment TPG 261, 1 IKR 251, 3 m cable	SingleGauge measurement equipment TPG 261, 1 PKR 251, 3 m cable
Flange (in)	DN 16 ISO-KF	DN 25 ISO-KF	DN 25 ISO-KF
Connections for transmitter	1	1	1
Measurement range max.	1000 hPa	0.01 hPa	1000 hPa
Measurement range min.	$5 \cdot 10^{-4}$ hPa	$2 \cdot 10^{-9}$ hPa	$5 \cdot 10^{-9}$ hPa
Gauge head	1 TPR 280	1 IKR 251	1 PKR 251
Mains requirement: voltage (range)	90-250 V, 50/60 Hz	90-250 V, 50/60 Hz	90-250 V, 50/60 Hz
Interface	RS-232-C	RS-232-C	RS-232-C

Order number			
SingleGauge measurement equipment TPG 261	PT 441 930-T	PT 441 933-T	PT 441 935 -T

Accessories			
Centering ring with poral filter, Pore size: 20 μ m, FPM/stainless steel, DN 16 ISO-KF	PF 117 216 -T		

Technical data	SingleGauge measurement equipment TPG 261, 1 PKR 251, 3 m cable	SingleGauge measurement equipment TPG 261, 1 PKR 251, 3 m cable	SingleGauge measurement equipment TPG 261, 1 PBR 260, 3 m cable
Flange (in)	DN 40 ISO-KF	DN 40 CF-F	DN 25 ISO-KF
Connections for transmitter	1	1	1
Measurement range max.	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	$5 \cdot 10^{-9}$ hPa	$5 \cdot 10^{-9}$ hPa	$5 \cdot 10^{-10}$ hPa
Gauge head	1 PKR 251	1 PKR 251	1 PBR 260
Mains requirement: voltage (range)	90-250 V, 50/60 Hz	90-250 V, 50/60 Hz	90-250 V, 50/60 Hz
Interface	RS-232-C	RS-232-C	RS-232-C

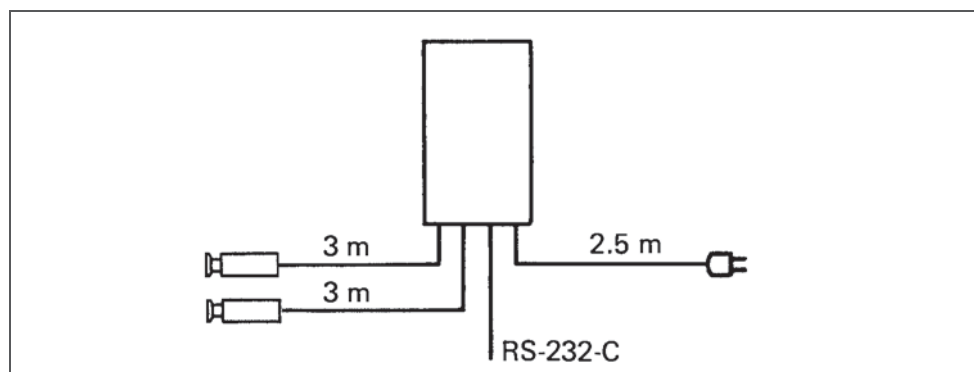
Order number			
SingleGauge measurement equipment TPG 261	PT 441 936 -T	PT 441 937 -T	PT 441 938 -T

DualGauge measurement equipment TPG 262

- DualGauge measurement unit TPG 262
- Length: 3 m



Dimensions (in mm)



Technical data	DualGauge measurement equipment TPG 262, 2 TPR 280, 3 m cable	DualGauge measurement equipment TPG 262, 1 TPR 280, 1 IKR 251, 3 m cable	DualGauge measurement equipment TPG 262, 2 PKR 251, 3 m cable	DualGauge measurement equipment TPG 262, 1 TPR 280, 1 PKR 251, 3 m cable
Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF/ DN 25 ISO-KF	DN 25 ISO-KF	DN 16 ISO-KF/ DN 25 ISO-KF
Connections for transmitter	2	2	2	2
Measurement range max.	1000 hPa	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	$5 \cdot 10^{-4}$ hPa	$2 \cdot 10^{-9}$ hPa	$5 \cdot 10^{-9}$ hPa	$5 \cdot 10^{-9}$ hPa
Gauge head	2 TPR 280	1 TPR 280, 1 IKR 251	2 PKR 251	1 TPR 280, 1 PKR 251
Mains requirement: voltage (range)	90-250 V, 50/60 Hz	90-250 V, 50/60 Hz	90-250 V, 50/60 Hz	90-250 V, 50/60 Hz
Interface	RS-232-C	RS-232-C	RS-232-C	RS-232-C

Order number				
DualGauge measurement equipment TPG 262	PT 441 940-T	PT 441 943-T	PT 441 945-T	PT 441 948-T

Accessories				
Centering ring with poral filter, Pore size: 20 μ m, FPM/stainless steel, DN 16 ISO-KF	PF 117 216 -T	PF 117 216 -T		PF 117 216 -T

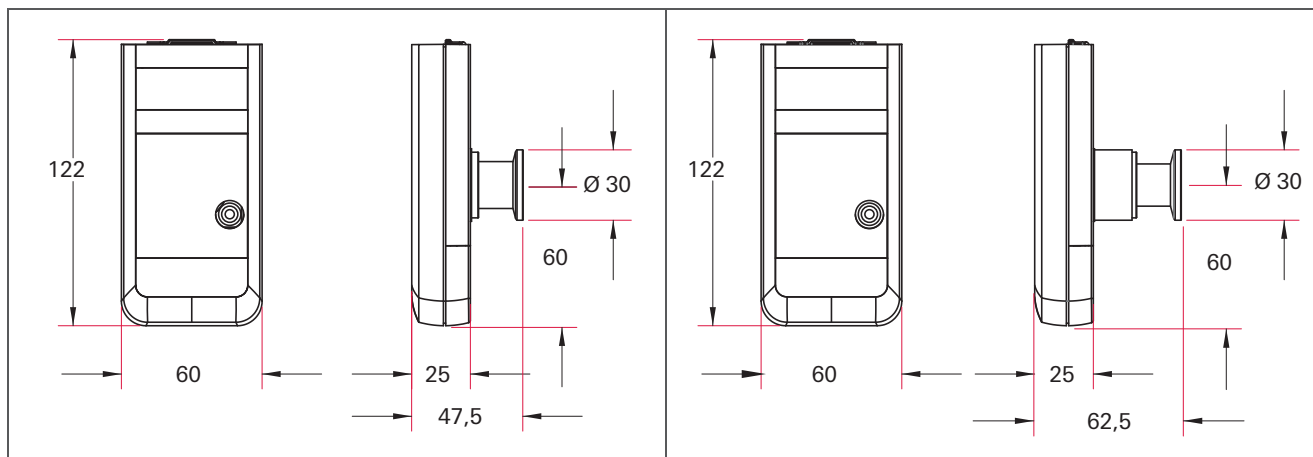
TPG 201, Pirani Handheld Vacuum Gauge

TPG 202, Piezo/Pirani Handheld Vacuum Gauge



- Battery-operated manual measurement unit
- Measurement range from $5 \cdot 10^{-4}$ to 1000 hPa
- Data logging function
- Data readout by PC
- Scope of delivery: Battery not included

Dimensions (in mm)



TPG 201, Pirani manual measurement unit

TPG 202, Pirani manual measurement unit

Technical data	TPG 201, Pirani manual measurement unit	TPG 202, Pirani manual measurement unit
Connection: Vacuum side	DN 16 ISO-KF	DN 16 ISO-KF
Battery type	9 V AIMn E bloc, 6 LR6 ; 9 V Lithium E bloc	9 V AIMn E bloc, 6 LR6 ; 9 V Lithium E bloc
Seal	Metal	Metal
Pressure max.	400 kPa	200 kPa
Accuracy 10 - 100 hPa: % of measurement	approx. 30	
Accuracy 10 ⁻² - 10 hPa: % of measurement	approx. 10	
Accuracy		1200 - 1000 hPa: 0,3 % Full Scale ; 10 ⁻² · 10 ⁻³ of reading ; ≤ 2 · 10 ⁻³ hPa : ≤ factor 2 of reading
Weight	0.195 kg	0.230 (battery included) kg
Materials in contact with media	Nickel, stainless steel, tungsten, glass- feedthroughs	Stainless steel, gold, nickel, tungsten, glass, FPM
Measurement range max.	1000 hPa	1200 hPa
Measurement range min.	5 · 10 ⁻⁴ hPa	5 · 10 ⁻⁴ hPa
Method of measurement	Pirani	Piezo and Pirani
Protection category	IP 40	IP 40
Temperature: Operating	5-40 °C	+5-+50 °C

Order number		
TPG 201, Pirani Handheld Vacuum Gauge	PT G28 201	PT G28 202

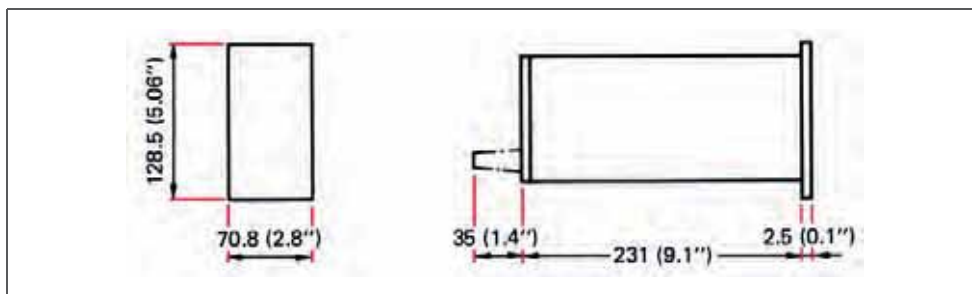
Accessories		
Accessories kit with AC adapter, battery, USB cable, DocuStar software	PT 350 102 -T	PT 350 102 -T

TPG 261, controller for 1 gauge



- For operation of one ActiveLine transmitter
- Simple to operate
- Easy readable display

Dimensions (in mm)



Technical data	TPG 261, controller for 1 transmitter
Connections for transmitter	1
Display rate	10 1/s
Error signal: Working contact, potential-free	1 piece
Error signal: Switching voltage max.	60 V DC
Filter time constant	1.2/0.4/0.02 s
Weight	1.1 kg
Measurement range max.	55000 hPa
Measurement range min.	$5 \cdot 10^{-11}$ hPa
Measurement rate	50 1/s
Mains requirement: frequency (range)	50/60 Hz
Mains requirement: power consumption	45 VA
Mains requirement: voltage (range)	90-250 V
Set point: Voltage max.	60 V DC
Set point: Current max.	1 A
Set point: Changeover contact, potential-free	2 pieces
Interface	RS-232-C
Protection category	IP 30
Safety	EN61010-1 / EN 50081-1 / EN50082-2 / IEC1010
Signal output: Measuring value, analog	0-10 V
Temperature: Operating	5-50 °C
Temperature: Storage	-20-+65 °C

Order number	
TPG 261, controller for 1 gauge	PT G28 030

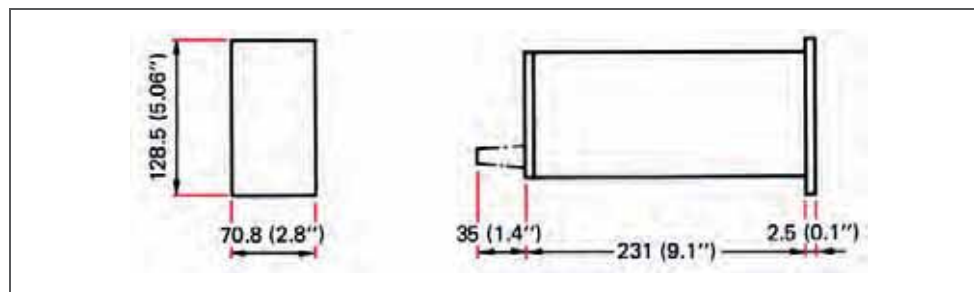
Accessories	
Sensor cable, 1 m	PT 448 248 -T
Sensor cable, 3 m	PT 448 250 -T
Sensor cable, 6 m	PT 448 251 -T
Sensor cable, 10 m	PT 448 252 -T
Sensor cable, 15 m	PT 448 253 -T
Sensor cable, 20 m	PT 448 254 -T
Sensor cable, 25 m	PT 448 255 -T
Sensor cable, 30 m	PT 448 256 -T
Sensor cable, 35 m	PT 448 257 -T
Sensor cable, 40 m	PT 448 258 -T
Sensor cable, 45 m	PT 448 259 -T
Sensor cable, 50 m	PT 448 260 -T

TPG 262, controller for 2 gauges



- For operation of two ActiveLine transmitters
- Simple to operate
- Easy readable display

Dimensions (in mm)



Technical data	TPG 262 controller for 2 transmitter
Connections for transmitter	2
Display rate	10 1/s
Automatic changeover: Pirani-cold cathode	$6 \cdot 10^{-3}$ hPa
Error signal: Working contact, potential-free	1 piece
Filter time constant	1.2/0.4/0.02 s
Weight	1.1 kg
Measurement range max.	55000 hPa
Measurement range min.	$5 \cdot 10^{-11}$ hPa
Measurement rate	50 1/s
Mains requirement: frequency (range)	50/60 Hz
Mains requirement: power consumption	45 VA
Mains requirement: voltage (range)	90-250 V
Set point: Voltage max.	60 V DC
Set point: Current max.	1 A
Set point: Changeover contact, potential-free	4 pieces
Interface	RS-232-C
Protection category	IP 30
Safety	EN61010-1 / EN 50081-1 / EN50082-2 / IEC1010
Signal output: Measuring value, analog	0-10 V
Temperature: Operating	5-50 °C
Temperature: Storage	-20-+65 °C

Order number	
TPG 262, controller for 2 gauges	PT G28 280

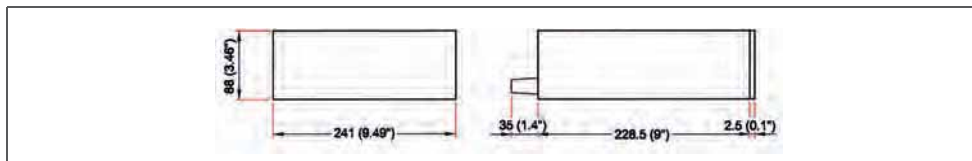
Accessories	
Sensor cable, 1 m	PT 448 248 -T
Sensor cable, 3 m	PT 448 250 -T
Sensor cable, 6 m	PT 448 251 -T
Sensor cable, 10 m	PT 448 252 -T
Sensor cable, 15 m	PT 448 253 -T
Sensor cable, 20 m	PT 448 254 -T
Sensor cable, 25 m	PT 448 255 -T
Sensor cable, 30 m	PT 448 256 -T
Sensor cable, 35 m	PT 448 257 -T
Sensor cable, 40 m	PT 448 258 -T
Sensor cable, 45 m	PT 448 259 -T
Sensor cable, 50 m	PT 448 260 -T

TPG 256 A, controller for 6 gauges



- For operating 6 ActiveLine transmitters

Dimensions (in mm)

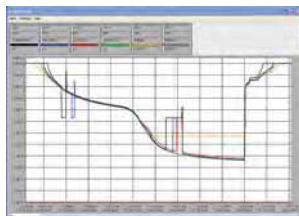


Technical data	TPG 256 A MaxiGauge controller, seriell interface	TPG 256 A MaxiGauge controller, seriell interface isolated
Connections for transmitter	6 (max. 3 IMR 265 / PBR 260 / CMR 27x)	6 (max. 3 IMR 265 / PBR 260 / CMR 27x)
Display rate	4 1/s	4.0 1/s
Error signal: Working contact, potential-free	1 piece	1 piece
Error signal: Switching voltage max.	60 V DC	60 V DC
Error signal: Switching current max.	3 A	3 A
Filter time constant	2.1/0.32/0.1 s	2.1/0.32/0.1 s
Weight	2.1 kg	2.1 kg
Measurement range max.	55000 hPa	55000 hPa
Measurement range min.	$5 \cdot 10^{-11}$ hPa	$5 \cdot 10^{-11}$ hPa
Measurement rate	100 1/s	100 1/s
Mains requirement: frequency (range)	50-60 Hz	50-60 Hz
Mains requirement: power consumption	60 VA	60 VA
Mains requirement: voltage (range)	90-250 V	90-250 V
Set point: Voltage max.	60 V DC	60 V DC
Set point: Current max.	3 A	3 A
Set point: Changeover contact, potential-free	6 pieces	6,0 pieces
Switching voltage	240 V with RI 256	240 V with RI 256
Interface	RS-232-C, RS-422	RS-232-C, RS-422, RS-422 isolated, RS-485 isolated
Protection category	IP 30	IP 30
Safety	EN61010-1 / IEC 1010, EN60950, EN 50081-1 / EN50082-1	EN61010-1 / IEC 1010, EN60950, EN 50081-1&2
Signal output: Output resistance	660 Ω	660 Ω
Signal output: Measuring value, analog	0-10 V DC	0-10 V DC
Temperature: Operating	5-40 $^{\circ}\text{C}$	5-40 $^{\circ}\text{C}$
Temperature: Storage	-20-+60 $^{\circ}\text{C}$	-20-+60 $^{\circ}\text{C}$

Order number		
TPG 256 A, controller for 6 gauges	PT G28 760	PT G28 761

Accessories		
Sensor cable, 1 m	PT 448 248 -T	PT 448 248 -T
Sensor cable, 3 m	PT 448 250 -T	PT 448 250 -T
Sensor cable, 6 m	PT 448 251 -T	PT 448 251 -T
Sensor cable, 10 m	PT 448 252 -T	PT 448 252 -T
Sensor cable, 15 m	PT 448 253 -T	PT 448 253 -T
Sensor cable, 20 m	PT 448 254 -T	PT 448 254 -T
Sensor cable, 25 m	PT 448 255 -T	PT 448 255 -T
Sensor cable, 30 m	PT 448 256 -T	PT 448 256 -T
Sensor cable, 35 m	PT 448 257 -T	PT 448 257 -T
Sensor cable, 40 m	PT 448 258 -T	PT 448 258 -T
Sensor cable, 45 m	PT 448 259 -T	PT 448 259 -T
Sensor cable, 50 m	PT 448 260 -T	PT 448 260 -T

Software for display and data logging for Active Line



- For the following controller: TPG 261, TPG 262, TPG 265 A and TPG 300
- Simple to operate
- Up to 6 channels simultaneous presentable
- Data is convertible in Excel
- System requirements:
- Software: Windows 7, Windows XP, Windows Vista
(administrator authorisation is required)
- Hardware: Pentium-PC (1000 MHz or higher recommended), 256 MB RAM
(512 MB recommended), 150 MB free hard disc storage unit, Super VGA-Monitor
(with 1024 x 768 screen definition, small font adjustment), 24 Bit True Color, Free COM Port

Order number	
Software for display and data logging for Active Line	PT 882 550 -T

ModuLine

For challenging applications in research and development



ModuLine

The ModuLine series includes three Pirani TPR vacuum gauges with a measuring range of 1,000 to $8 \cdot 10^{-4}$ hPa and three IKR cold cathode vacuum gauges with a measuring range of $5 \cdot 10^{-3}$ to 10^{-11} hPa. Since these vacuum gauges do not contain any electronics, they are suitable for use in high-radiation environments. An extensive range of cables, including high-temperature cables and cables with double shielding, as well as a controller complete this measurement equipment line. The individually configurable controller can have two measuring boards for up to four vacuum gauges. Another socket is for an interface board for serial interfaces RS-232/RS-485 and relay contacts; connection to fieldbuses is possible as well.

Customer benefits

- Proven long life
- Allows for challenging applications
- Sensors and electronics can be located separately

Typical applications

- Accelerators
- UHV applications
- Applications with exposure to radiation



Accelerators



Applications with exposure to radiation

Pirani gauge heads



TPR 010

- For general applications

TPR 017

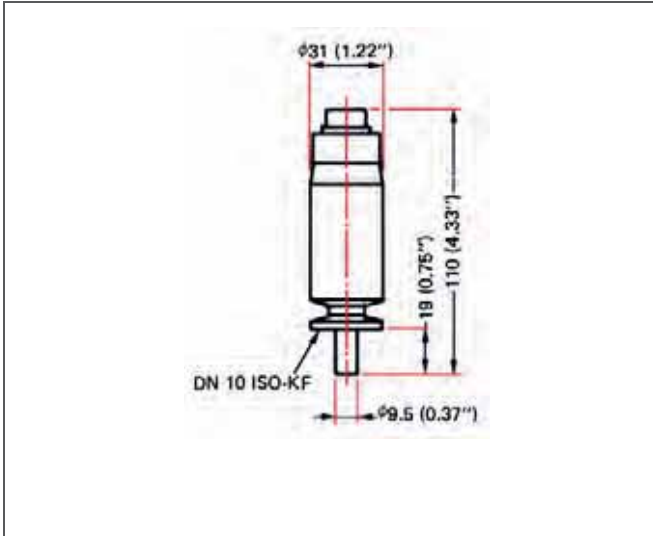
- For corrosive media

TPR 018

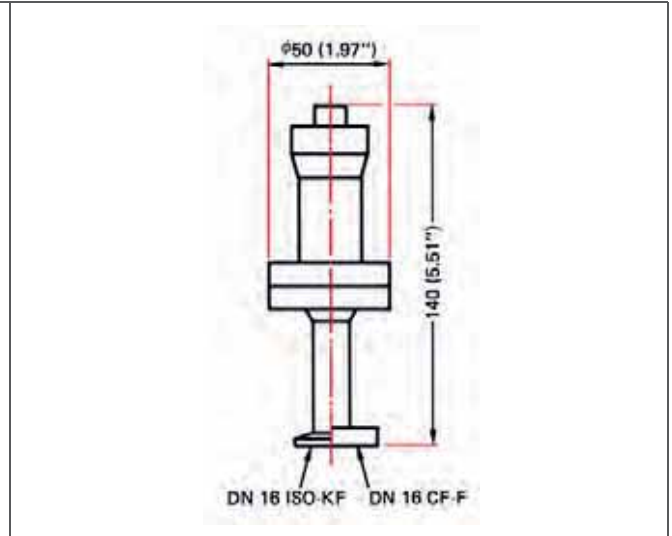
- For UHV

Limited measurement and switching accuracy above 100 and below 10^{-3} hPa

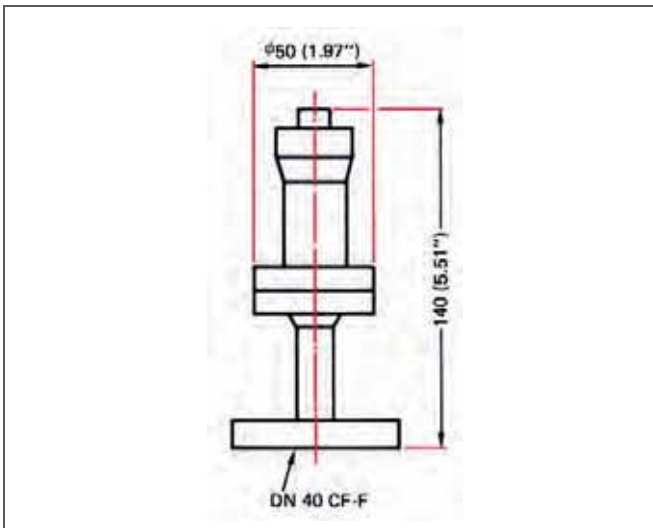
Dimensions (in mm)



TPR 010



TPR 017
TPR 018



TPR 018, UHV

Technical data	Pirani gauge head TPR 010	Pirani gauge head TPR 017, corrosion resistant	Pirani gauge head TPR 018
Bakeout temperature	100 °C	250 °C	250 °C
Operating temperature: high temperature sensor cable		0-120 °C	0-120 °C
Operating temperature: standard sensor cable	0-70 °C	0-80 °C	0-80 °C
Weight	0.14 kg	0.6 kg	0.6 kg
Isolator	FPM	Al ₂ O ₃	Al ₂ O ₃
Measurement range max.	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	8 · 10 ⁻⁴ hPa	8 · 10 ⁻⁴ hPa	8 · 10 ⁻⁴ hPa
Filament/holder	T/Ni	Ni/Ni	T/Ni
Chamber wall, inside	AlSiMg	Stainless steel	Stainless steel
Protective filter	Sintered bronze		
Radiation resistance		1 · 10 ⁴ Gy	1 · 10 ⁴ Gy

	Pirani gauge head TPR 010	Pirani gauge head TPR 017, corrosion resistant	Pirani gauge head TPR 018
Flange (in)	DN 10 ISO-KF		
Order number	PT R02 270		
Flange (in)		DN 16 ISO-KF	DN 16 ISO-KF
Order number		PT R13 270	PT R15 010
Flange (in)		DN 16 CF-F	DN 16 CF-F
Order number		PT R13 271	PT R15 011
Flange (in)			DN 40 CF-F
Order number			PT R15 014

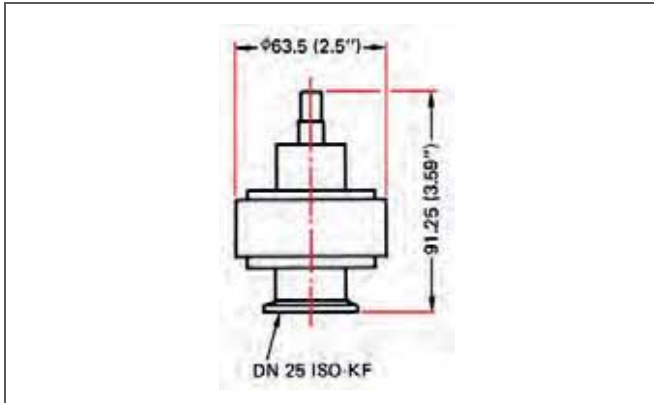
Accessories			
Sensor cable, TPR 010, 3.0 m, 80 °C	PT 548 402-T		
Sensor cable, TPR 010, 6.0 m, 80 °C	PT 548 403-T		
Sensor cable, TPR 017/018, 3.0 m, 80 °C		PT 548 308-T	PT 548 308-T
Sensor cable, TPR 017/018, 6.0 m, 80 °C		PT 548 309-T	PT 548 309-T
Extension for sensor cable, TPR 010/017/018, 30 m, 80 °C			PT 548 470-T

Cold cathode gauge heads

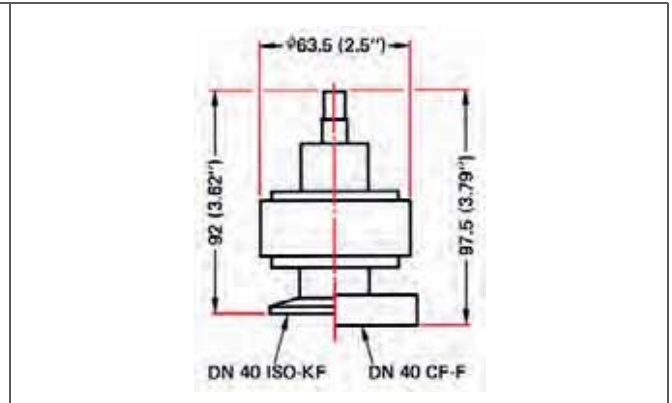


- IKR 050 coaxial**
 - For general applications
- IKR 060 coaxial**
 - For UHV
 - Radiation-resistant
- IKR 070 coaxial**
 - For UHV
 - Radiation-resistant

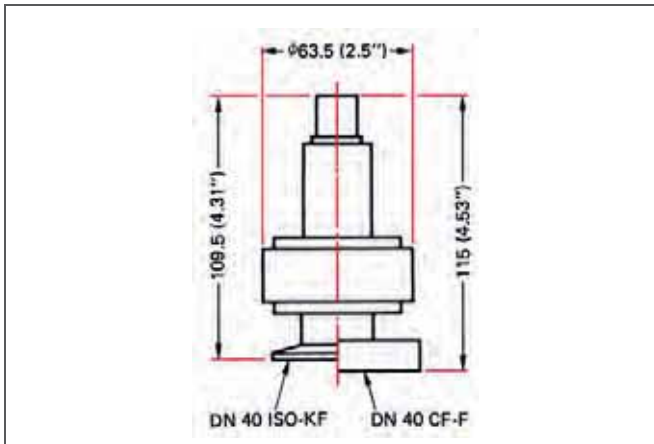
Dimensions (in mm)



IKR 050 coaxial



IKR 050, coaxial
IKR 060



IKR 070 coaxial

Technical data	Cold cathode gauge head IKR 050, coaxial, FPM seal	Cold cathode gauge head IKR 060, coaxial, metal seal	Cold cathode gauge head IKR 070, triaxial, metal seal
Bakeout temperature	150 °C	250 °C	250 °C
Operating temperature: high temperature sensor cable	5-150 °C	5-250 °C	
Operating temperature: standard sensor cable	5-80 °C	5-80 °C	5-80 °C
Internal seal	FPM	Silver	Silver
Flange	Stainless steel	Stainless steel	Stainless steel
Isolator	Al ₂ O ₃	Al ₂ O ₃	Al ₂ O ₃
Measurement range max.	5 · 10 ⁻³ hPa	5 · 10 ⁻³ hPa	5 · 10 ⁻³ hPa
Measurement range min.	2 · 10 ⁻⁹ hPa	1 · 10 ⁻¹⁰ hPa	1 · 10 ⁻¹¹ hPa
Radiation resistance		1 · 10 ⁷ Gy	1 · 10 ⁷ Gy

	Cold cathode gauge head IKR 050, coaxial, FPM seal	Cold cathode gauge head IKR 060, coaxial, metal seal	Cold cathode gauge head IKR 070, triaxial, metal seal
Flange (in)	DN 25 ISO-KF		
Weight	0.6 kg		
Order number	PT R18 500		
Flange (in)	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Weight	0.6 kg	0.6 kg	0.6 kg
Order number	PT R18 501	PT R18 753	PT R20 501
Flange (in)	DN 40 CF-F	DN 40 CF-F	DN 40 CF-F
Weight	0.85 kg	0.85 kg	0.85 kg
Order number	PT R18 502	PT R18 751	PT R20 502

Accessories			
Sensor cable, IKR 050/060, 3.0 m, 80 °C	PT 548 406-T	PT 548 406-T	
Sensor cable, IKR 050/060, 6.0 m, 80 °C	PT 548 407-T	PT 548 407-T	
Sensor cable, IKR 070, 3.0 m, 80 °C			PT 548 306-T
Sensor cable, IKR 070, 6.0 m, 80 °C			PT 548 317-T

Gauge head accessories

Sensor cables	Order number
Sensor cable, TPR 017/018, 3.0 m, 80 °C	PT 548 308-T
Sensor cable, TPR 017/018, 6.0 m, 80 °C	PT 548 309-T
Sensor cable, TPR 017/018, 10 m, 80 °C	PT 548 456-T
Sensor cable, TPR 017/018, 15 m, 80 °C	PT 548 457-T
Sensor cable, TPR 017/018, 20 m, 80 °C	PT 548 458-T
Sensor cable, TPR 017/018, 25 m, 80 °C	PT 548 459-T
Sensor cable, TPR 017/018, 30 m, 80 °C	PT 548 460-T
Sensor cable, TPR 017/018, 35 m, 80 °C	PT 548 461-T
Sensor cable, TPR 017/018, 40 m, 80 °C	PT 548 462-T
Sensor cable, TPR 017/018, 45 m, 80 °C	PT 548 463-T
Sensor cable, TPR 017/018, 50 m, 80 °C	PT 548 464-T
Sensor cable, TPR 010, 2.0 m, 80 °C	PT 548 401-T
Sensor cable, TPR 010, 3.0 m, 80 °C	PT 548 402-T
Sensor cable, TPR 010, 6.0 m, 80 °C	PT 548 403-T
Sensor cable, TPR 010, 30 m, 80 °C	PT 548 415-T
Sensor cable, TPR 010, 40 m, 80 °C	PT 548 416-T
Sensor cable, TPR 010, 50 m, 80 °C	PT 548 417-T
Sensor cable, TPR 010, 10 m, 80 °C	PT 548 450-T
Sensor cable, TPR 010, 15 m, 80 °C	PT 548 451-T
Sensor cable, TPR 010, 20 m, 80 °C	PT 548 452-T
Sensor cable, TPR 010, 25 m, 80 °C	PT 548 453-T
Sensor cable, TPR 010, 35 m, 80 °C	PT 548 454-T
Sensor cable, TPR 010, 45 m, 80 °C	PT 548 455-T
Sensor cable, IKR 050/060, 3.0 m, 80 °C	PT 548 406-T
Sensor cable, IKR 050/060, 6.0 m, 80 °C	PT 548 407-T
Sensor cable, IKR 050/060, 10 m, 80 °C	PT 548 419-T
Sensor cable, IKR 050/060, 30 m, 80 °C	PT 548 422-T
Sensor cable, IKR 050/060, 15 m, 80 °C	PT 548 483-T
Sensor cable, IKR 050/060, 20 m, 80 °C	PT 548 484-T
Sensor cable, IKR 050/060, 25 m, 80 °C	PT 548 485-T
Sensor cable, IKR 050/060, 35 m, 80 °C	PT 548 486-T
Sensor cable, IKR 050/060, 40 m, 80 °C	PT 548 487-T
Sensor cable, IKR 050/060, 45 m, 80 °C	PT 548 488-T
Sensor cable, IKR 050/060, 50 m, 80 °C	PT 548 489-T
Sensor cable, IKR 070, 3.0 m, 80 °C	PT 548 306-T
Sensor cable, IKR 070, 6.0 m, 80 °C	PT 548 317-T
Sensor cable, IKR 070, 10 m, 80 °C	PT 548 490-T
Sensor cable, IKR 070, 15 m, 80 °C	PT 548 491-T
Sensor cable, IKR 070, 20 m, 80 °C	PT 548 492-T
Sensor cable, IKR 070, 30 m, 80 °C	PT 548 493-T
Sensor cable, IKR 070, 40 m, 80 °C	PT 548 494-T
Sensor cable, IKR 070, 45 m, 80 °C	PT 548 495-T
Sensor cable, IKR 070, 50 m, 80 °C	BP 229 748-T

Extension for sensor cables	Order number
Extension for sensor cable, TPR 010/017/018, 10 m, 80 °C	PT 548 466-T
Extension for sensor cable, TPR 010/017/018, 20 m, 80 °C	PT 548 468-T
Extension for sensor cable, TPR 010/017/018, 30 m, 80 °C	PT 548 470-T
Extension for sensor cable, TPR 010/017/018, 40 m, 80 °C	PT 548 472-T
Extension for sensor cable, TPR 010/017/018, 50 m, 80 °C	PT 548 474-T

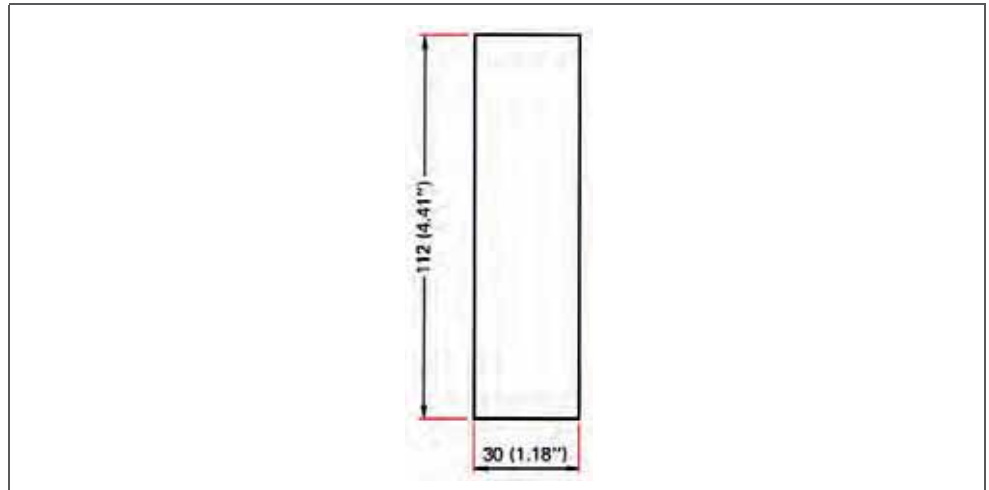
High-temperature sensor cables	Order number
High-temperature sensor cable, TPR 017/018, 3.0 m, 250 °C	PT 548 414-T
High-temperature sensor cable, TPR 017/018, 6.0 m, 250 °C	PT 548 465-T
High-temperature sensor cable, TPR 017/018, 10 m, 250 °C	PT 448 047-T
High-temperature sensor cable, TPR 017/018, 15 m, 250 °C	PT 448 043-T
High-temperature sensor cable, TPR 017/018, 20 m, 250 °C	PT 448 044-T
High-temperature sensor cable, IKR 050/060, 3.0 m, 250 °C	PT 548 542-T
High-temperature sensor cable, IKR 050/060, 6.0 m, 250 °C	PT 548 543-T
High-temperature sensor cable, IKR 050/060, 10 m, 250 °C	PT 448 045-T
High-temperature sensor cable, IKR 050/060, 15 m, 250 °C	PT 548 989-T
High-temperature sensor cable, IKR 050/060, 20 m, 250 °C	PT 448 046-T

Pirani measurement board

- For 2 TPR 010/018
- Measurement range from 1000 to $8 \cdot 10^{-4}$ hPa



Dimensions (in mm)



Technical data	Pirani measurement board PI 300 D, for 2 TPR 010/018	Pirani measurement board PI 300 DN, for 2 TPR 017s
Number of measuring circuits	2	2
For gauge	TPR 010, TPR 018	TPR 017
Weight	0.14 kg	0.14 kg
Measurement range max.	1000 hPa	1000 hPa
Measurement range min.	$8 \cdot 10^{-4}$ hPa	$8 \cdot 10^{-4}$ hPa
Sensor cable length	100 m	100 m
Measurement board	Pirani measurement board	Pirani Measurement board
Reaction time of the output signal: Decay	600 ms	600 ms
Reaction time of the output signal: Rise	50 ms	50 ms

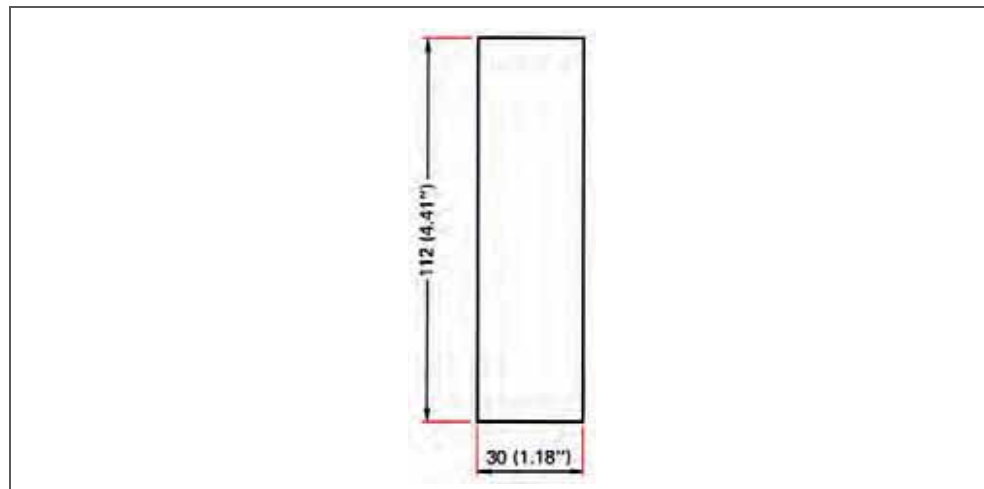
Order number		
Pirani measurement board	PT 546 920 -T	PT 549 214 -T

Cold cathode measurement board

- Measurement range from $1 \cdot 10^{-9}$ to $5 \cdot 10^{-3}$ hPa
- For 2 IKR 050



Dimensions (in mm)



Technical data	Cold cathode measurement board PE 300 DC9, for 2 IKR 050s
Number of measuring circuits	2
For gauge	IKR 050
Weight	0.26 kg
Measurement range max.	$5 \cdot 10^{-3}$ hPa
Measurement range min.	$1 \cdot 10^{-9}$ hPa
Sensor cable length	100 m
Measurement board	Cold cathode measurement board
Reaction time of the output signal: Rise	16 ms
Order number	
Cold cathode measurement board	PT 441 375 -T

Pirani/cold cathode measurement board



CP 300 T11L

- For 1 TPR 010/018 and 1 IKR 070
- Max. sensor cable length: 500 m
- Measurement range from 1000 to $1 \cdot 10^{-11}$ hPa

CP 300 C9

- For 1 TPR 010/018 and 1 IKR 050
- Measurement range from 1000 to $5 \cdot 10^{-9}$ hPa

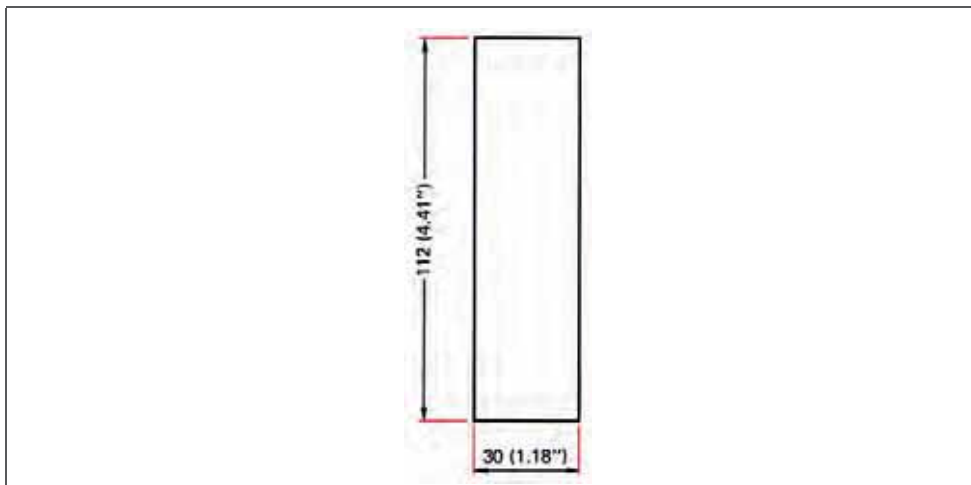
CP 300 T11

- For 1 TPR 010/018 and 1 IKR 070
- Measurement range from 1000 to $1 \cdot 10^{-11}$ hPa

CP 300 C10

- For 1 TPR 010/018 and 1 IKR 060
- Measurement range from 1000 to $1 \cdot 10^{-10}$ hPa

Dimensions (in mm)



Technical data	Pirani/cold cathode measurement board CP 300 T11L, for 1 TPR 010/018, 1 IKR 070	Pirani/cold cathode measurement board CP 300 C9, for 1 TPR 010/018, 1 IKR 050	Pirani/cold cathode measurement board CP 300 T11, for 1 TPR 010/018, 1 IKR 070	Pirani/cold cathode measurement board CP 300 C10, for 1 TPR 010/018, 1 IKR 060
Number of measuring circuits	2	1 each	1 each	1 each
For gauge	TPR 010, TPR 018, IKR 070	TPR 010, TPR 018, IKR 050	TPR 010, TPR 018, IKR 070	TPR 010, TPR 018, IKR 060
Weight	0.21 kg	0.21 kg	0.25 kg	0.23 kg
Measurement range max.	1000 hPa	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	$1 \cdot 10^{-11}$ hPa	$5 \cdot 10^{-9}$ hPa	$1 \cdot 10^{-11}$ hPa	$1 \cdot 10^{-10}$ hPa
Sensor cable length	500 m	100 m	100 m	100 m
Measurement board	Pirani/cold cathode measurement board	Pirani/cold cathode measurement board	Pirani/cold cathode measurement board	Pirani/Cold cathode measurement board
Reaction time of the output signal: Rise	< 50 ms	10 ms	50 ms	50 ms

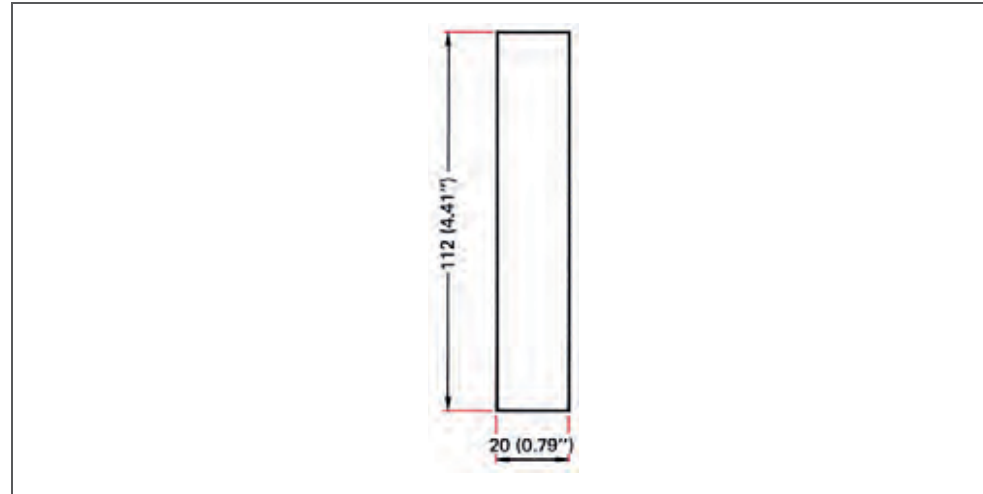
Order number				
Pirani/cold cathode measurement board	PT 441 122 -T	PT 441 000 -T	PT 441 080 -T	PT 441 114 -T

Interface and relay board



- With RS-232-C interface
 - 5 relays, maximum switching voltage 50 V AC
- AC = Alternating Current
DC = Direct Current

Dimensions (in mm)



Technical data	Interface and relay board IF 300 A, RS-232-C, 45 W, 75 VA	Interface and relay board IF 300 B, RS-232-C, 120 W, 1000 VA	Interface and relay board IF 300 C, RS-422, 50 V AC / DC	Interface and relay board IF 300 P, Profibus-DP, 45 W, 75 VA
Weight	0.14 kg	0.15 kg	0.14 kg	0.16 kg
Relay: Connector 15 pole (pins)	D-Sub	GdsA-H, DIN 41612	D-Sub	D-Sub
Relay: Number	5 pieces	5 pieces	5 pieces	5 pieces
Relay: Switching capacity	45 W, 75 VA	120 W, 1000 VA	45 W, 75 VA	45 W, 75 VA
Relay: Switching voltage	30 V DC / 50 V AC	30 V DC / 250 V AC	50 V AC / DC	50 V AC / DC
Relay: Switching current	1.5 A	4 A	1.5 A	1.5 A
Relay: Changeover contacts, potential-free, per relay	1 piece	1 piece	1 piece	1 piece
Relay: Resistance (with connector)	125 mΩ	70 mΩ	125 mΩ	125 mΩ
Interface	RS-232-C	RS-232-C	RS-422	Profibus-DP
Interface: Connection	D-sub connector, 9-pole, pins	Cable with D-sub connector, 9-pole, pins	D-sub connector, 9-pole, sockets	D-sub connector, 9-pole, pins
Interface: Baud rates	300, 1200, 2400, 4800, 9600	300, 1200, 2400, 4800, 9600	300, 1200, 2400, 4800, 9600	12 Mbaud
Interface: 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	ASCII, 1 start bit, 8 data bits, 1 stop bit, no parity bit	
Interface: Cable length max.	30 m	30 m	1200 m	1200 m
Interface: Type	RS-232-C asynchronous	RS-232-C asynchronous	RS-422 asynchronous	Profibus-DP

Order number				
Interface and relay board	PT 441 130-T	PT 441 250-T	PT 441 390-T	PT 441 395-T

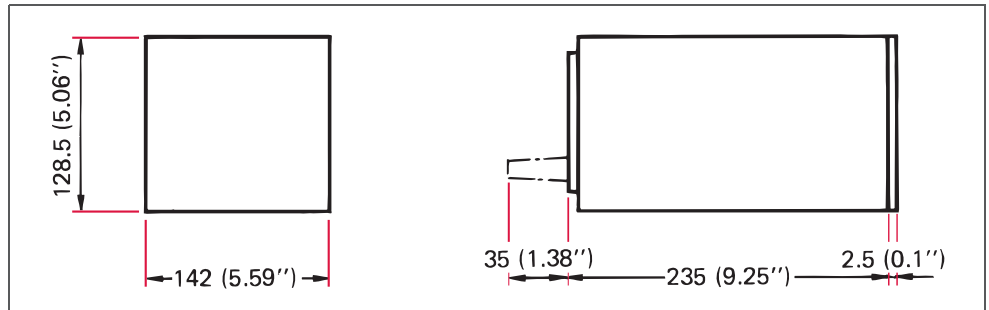
Accessories				
D-Sub mating connector, female, 15-pin, for IF 300 A/C, relay output	PT 441 129-T		PT 441 129-T	
D-Sub mating connector, female, for IF 300 A, RS-232-C	PT 441 128-T			
Interface cable, for IF 300 B, RS-232-C, 0.4 m		PT 548 932-T		
Relay connector, complete, for IF 300 B		PT 546 999-T		

TPG 300, basic unit

- Basic unit with power supply and 3 free slots for measurement, interface and relay boards



Dimensions (in mm)



Technical data	TPG 300, basic unit
Display rate	5 s
Error display	1 LED, red
Filter time constant	16 ms, 160 ms (standard), 1.6 s
Weight: without boards	1.4 kg
Limit frequency	10 Hz, 1 Hz (standard), 0.1 Hz
Unit of measure	mbar, Torr, Pa
Measurement range max.	1000 hPa
Measurement range min.	$1 \cdot 10^{-11}$ hPa
Measurement rate	100 1/s
Measured value display	15 mm high numbers
Mains requirement: frequency (range)	50/60 Hz
Mains requirement: power consumption	55 VA
Mains requirement: voltage (range)	90-264 V AC
Safety	IEC 384, class 1, VDE 0411, part 2.80
Temperature: Operating	5-50 °C
Temperature: Storage	-40-+65 °C

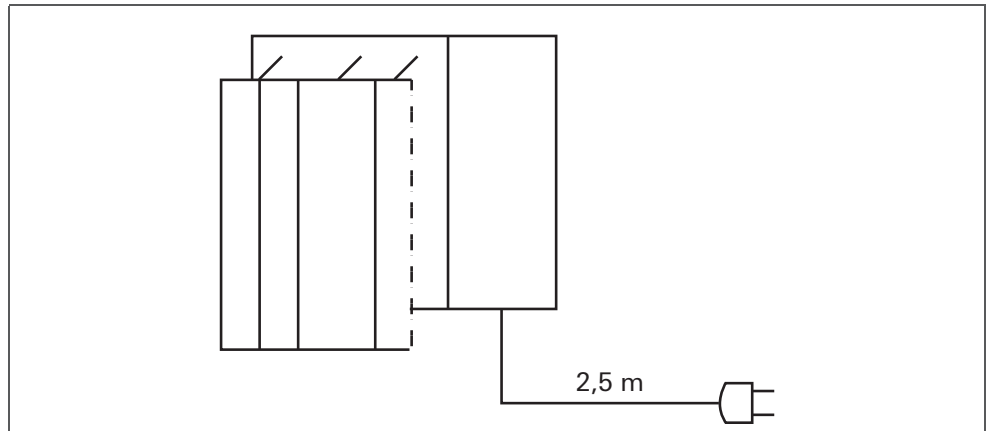
Order number	
TPG 300, basic unit	PT 546 900 -T

Accessories	
Blank panel, for measurement board	PT 441 259
Blank panel, for IF 300	PT 441 017

TPG 300, complete units with measurement boards and power cords



Dimensions (in mm)



Technical data	TPG 300, complete units with measurement boards and power cords
Display rate	5 1/s
Error display	1 LED, red
Filter time constant	16 ms, 160 ms (standard), 1.6 s
Weight: without boards	1.4 kg
Limit frequency	10 Hz, 1 Hz (standard), 0.1 Hz
Unit of measure	mbar, Torr, Pa
Measurement rate	100 s
Measured value display	15 mm high numbers
Mains requirement: frequency (range)	50-60 Hz
Mains requirement: power consumption	55 VA
Mains requirement: voltage (range)	90-264 V AC
Safety	IEC 384, class 1, VDE 0411, part 2.80
Temperature: Operating	5-50 °C
Temperature: Storage	-40-+65 °C

Technical data	TPG 300, complete measurement unit, incl. PI 300 D	TPG 300, complete measurement unit, incl. PI 300 D, IF 300 B	TPG 300, complete measurement unit, incl. 2 PI 300 D	TPG 300, complete measurement unit, incl. 2 PI 300 D, IF 300 B
Measurement range max.	1000 hPa	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	$8 \cdot 10^{-4}$ hPa	$8 \cdot 10^{-4}$ hPa	$8 \cdot 10^{-4}$ hPa	$8 \cdot 10^{-4}$ hPa
Measurement board	PI 300 D for 2 Pirani Gauge TPR 010/018	PI 300 D for 2 Pirani Gauge TPR 010/018	2 PI 300 D for 4 Pirani Gauge TPR 010/018	2 PI 300 D for 4 Pirani Gauge TPR 010/018
Relay: Switching voltage		30 V DC / 250 V AC		30 V DC / 250 V AC
Set point		5 pieces		5 pieces
Interface		RS-232-C, IF 300 B		RS-232-C, IF 300 B

Order number				
TPG 300, complete units with measurement boards and power cords	PT G25 250	PT G25 251	PT G25 252	PT G25 253

Technical data	TPG 300, complete measurement unit, incl. CP 300 C10	TPG 300, complete measurement unit, incl. CP 300 C10, IF 300 B	TPG 300, complete measurement unit, incl. PI 300 D, CP 300 C10	TPG 300, complete measurement unit, incl. PI 300 D, CP 300 C10, IF 300 B
Measurement range max.	1000 hPa	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	$1 \cdot 10^{-10}$ hPa	$1 \cdot 10^{-10}$ hPa	$1 \cdot 10^{-10}$ hPa	$1 \cdot 10^{-10}$ hPa
Measurement board	CP 300 C10 for 1 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 060	CP 300 C10 for 1 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 060	PI 300 D, CP 300 C10 for 3 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 060	PI 300 D, CP 300 C10 for 3 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 060
Relay: Switching voltage		30 V DC / 250 V AC		30 V DC / 250 V AC
Set point		5 pieces		5 pieces
Interface		RS-232-C, IF 300 B		RS-232-C, IF 300 B

Order number				
TPG 300, complete units with measurement boards and power cords	PT G25 256	PT G25 257	PT G25 262	PT G25 263

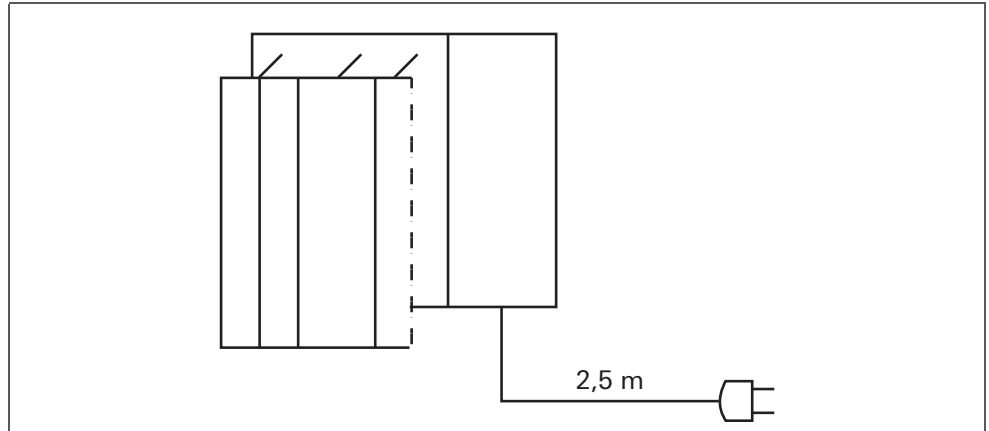
Technical data	TPG 300, complete measurement unit, incl. CP 300 C9	TPG 300, complete measurement unit, incl. CP 300 C9, IF 300 B	TPG 300, complete measurement unit, incl. PI 300 D, CP 300 C9	TPG 300, complete measurement unit, incl. PI 300 D, CP 300 C9, IF 300 B
Measurement range max.	1000 hPa	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	$5 \cdot 10^{-9}$ hPa	$5 \cdot 10^{-9}$ hPa	$5 \cdot 10^{-9}$ hPa	$5 \cdot 10^{-9}$ hPa
Measurement board	CP 300 C9 for 1 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 050	CP 300 C9 for 1 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 050	PI 300 D, CP 300 C9 for 3 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 050	PI 300 D, CP 300 C9 for 3 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 050
Relay: Switching voltage		30 V DC / 250 V AC		30 V DC / 250 V AC
Set point		5 pieces		5 pieces
Interface		RS-232-C, IF 300 B		RS-232-C, IF 300 B

Order number				
TPG 300, complete units with measurement boards and power cords	PT G25 290	PT G25 291	PT G25 292	PT G25 293

TPG 300, complete units with measurement boards and power cords



Dimensions (in mm)



Technical data	TPG 300, complete units with measurement boards and power cords
Display rate	5 1/s
Error display	1 LED, red
Filter time constant	16 ms, 160 ms (standard), 1.6 s
Weight: without boards	1.4 kg
Limit frequency	10 Hz, 1 Hz (standard), 0.1 Hz
Unit of measure	mbar, Torr, Pa
Measurement rate	100 s
Measured value display	15 mm high numbers
Mains requirement: frequency (range)	50-60 Hz
Mains requirement: power consumption	55 VA
Mains requirement: voltage (range)	90-264 V AC
Safety	IEC 384, class 1, VDE 0411, part 2.80
Temperature: Operating	5-50 °C
Temperature: Storage	-40-+65 °C

Technical data	TPG 300, complete measurement unit, incl. 2 CP 300 C9	TPG 300, complete measurement unit, incl. 2 CP 300 C9, IF 300 B	TPG 300, complete measurement unit, incl. PI 300 D, CP 300 C9, IF 300 A
Measurement range max.	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	$5 \cdot 10^{-9}$ hPa	$5 \cdot 10^{-9}$ hPa	$5 \cdot 10^{-9}$ hPa
Measurement board	2 CP 300 C9 for 2 Pirani- and 2 Cold Cathode Gauge TPR 010/018, IKR 050	2 CP 300 C9 for 2 Pirani- and 2 Cold Cathode Gauge TPR 010/018, IKR 050	PI 300 D, CP 300 C9 for 3 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 050
Relay: Switching voltage		30 V DC / 250 V AC	30 V DC / 50 V AC
Set point		5 pieces	5 pieces
Interface		RS-232-C, IF 300 B	RS-232-C, IF 300 A

Order number			
TPG 300, complete units with measurement boards and power cords	PT G25 294	PT G25 295	PT G25 302

Technical data	TPG 300, complete measurement unit, incl. PI 300 D, IF 300 A	TPG 300, complete measurement unit, incl. CP 300 C9, IF 300 A	TPG 300, complete measurement unit, incl. 2 PI 300 D, IF 300 A
Measurement range max.	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	$8 \cdot 10^{-4}$ hPa	$5 \cdot 10^{-9}$ hPa	$8 \cdot 10^{-4}$ hPa
Measurement board	PI 300 D for 2 Pirani Gauge TPR 010/018	CP 300 C9 for 1 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 050	2 PI 300 D for 4 Pirani Gauge TPR 010/018
Relay: Switching voltage	30 V DC / 50 V AC	30 V DC / 50 V AC	30 V DC / 50 V AC
Set point	5 pieces	5 pieces	5 pieces
Interface	RS-232-C, IF 300 A	RS-232-C, IF 300 A	RS-232-C, IF 300 A

Order number			
TPG 300, complete units with measurement boards and power cords	PT G25 306	PT G25 307	PT G25 310

Technical data	TPG 300, complete measurement unit, incl. 2 CP 300 C9, IF 300 A	TPG 300, complete measurement unit, incl. CP 300 C10, IF 300 A	TPG 300, complete measurement unit, incl. PI 300 D, CP 300 C10, IF 300 A
Measurement range max.	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	$5 \cdot 10^{-9}$ hPa	$1 \cdot 10^{-10}$ hPa	$1 \cdot 10^{-10}$ hPa
Measurement board	2 CP 300 C9 for 2 Pirani- and 2 Cold Cathode Gauge TPR 010/018, IKR 050	CP 300 C10 for 1 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 060	PI 300 D, CP 300 C10 for 3 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 060
Relay: Switching voltage	30 V DC / 50 V AC	30 V DC / 50 V AC	30 V DC / 50 V AC
Set point	5 pieces	5 pieces	5 pieces
Interface	RS-232-C, IF 300 A	RS-232-C, IF 300 A	RS-232-C, IF 300 A

Order number			
TPG 300, complete units with measurement boards and power cords	PT G25 311	PT G25 312	PT G25 313

Analytical equipment

Mass spectrometers for vacuum and gas analysis



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Analytical equipment

Mass spectrometers for vacuum and gas analysis

Knowing the gas composition is the key to understanding and controlling many vacuum processes. Pfeiffer Vacuum offers an extensive range of analyzers for gas determination in a vacuum process. From residual gas analyzers to complex analysis systems, Pfeiffer Vacuum will work with you to find the right solution for gas analysis in the ultra-high vacuum range right up to atmospheric pressure.

The criteria for selecting an analytical system are based upon application requirements:

- Pressure range of gas to be analyzed
- Mass range of the gases to be detected
- Minimum concentration to be detected
- Speed at which changes in the gas composition must be detected

The analytical equipment is based on quadrupole mass spectrometers; the PrismaPlus® series (QMG 220) for most analytical tasks and HiQuad® (QMG 700) for the highest requirements.



Overview of series and applications

	Analytics	Semiconductors	Coating	Industry	R & D	Page
■ = recommended	Electron microscopy Leak detection Mass spectrometry Surface analysis Plasma monitoring Residual gas analysis Lithography PVD (Physical Vapor Deposition) CVD (Chemical Vapor Deposition) Plasma etching Implantation – source Implantation – beamline Inspection Bonding MBE (Molecular Beam Epitaxy) Load locks, transfer chambers, handling systems Flat panel displays (FPD) LED / OLED Hard disk coating Photovoltaics Glass coating (PVD) CD, DVD, Blu-ray production (PVD) Optical coating (PVD) Wear protection (PVD, CVD) Hard coating Medical technology Industrial leak detection Electron beam welding Insulation vacuums Bulb and tube manufacturing Heat treatment Vacuum drying Vacuum furnaces Nuclear research Fusion technology Plasma research Particle accelerators Space simulation Low temperature research Elementary particle physics Nanotechnology Biotechnology					
Residual gas analysis						
Residual gas analysis in high vacuum						
PrismaPlus® with Faraday detector	■	■	■	■	■	100
Residual gas analysis in ultra-high vacuum						
PrismaPlus® with C-SEM-detector	■	■	■	■	■	100
Residual gas analysis						
Gas analysis in the pressure range of up to 1,000 hPa						
OmniStar	■	■	■	■	■	106
ThermoStar	■	■	■	■	■	106
Gas analysis in the pressure range of up to 50 hPa						
HPA 220	■	■	■	■	■	110
Gas analysis in the pressure range of up to 10⁻² hPa						
SPM 220	■	■	■	■	■	112
Gas analysis in the pressure range of up to 10⁻⁴ hPa						
HiQuad®	■	■	■	■	■	116

Features at a glance

	Inlet	Mass range						Maximum inlet pressure	Ionic source / optics				Detector	Detection limit						Page																					
	Flange (CF-F) Capillary	1-100 u	1-128 u	1-200 u	1-340 u	1-300 u	1-512 u	1-1,024 u	1 · 10 ⁻⁵ hPa (C-SEM)	1 · 10 ⁻⁴ hPa (Faraday)	10 hPa	50 hPa	1,000 hPa	Axial	Cross-beam	Cross beam, gas tight	Open ion source	Gas tight ion source	Grid ion source		Ion optics	Faraday	Electron multiplier + Faraday	5 · 10 ⁻¹⁶ (SEM 217/Faraday)	1 · 10 ⁻¹⁵ (SEM 217/Faraday)	2 · 10 ⁻¹⁵ (SEM 217/Faraday)	1 · 10 ⁻¹⁴ (C-SEM)	2 · 10 ⁻¹⁴ (C-SEM)	4 · 10 ⁻¹⁴ (C-SEM)	1 · 10 ⁻¹² (Faraday)	2 · 10 ⁻¹² (Faraday)	4 · 10 ⁻¹² (Faraday)	5 · 10 ⁻¹² (Faraday)	1 · 10 ⁻¹¹ (Faraday)	2 · 10 ⁻¹¹ (Faraday)	0.1 ppm (C-SEM)	1 ppm (C-SEM)	20 ppm (Faraday)	40 ppm (Faraday)	100 ppm (Faraday)	
Residual gas analysis																																									
Residual gas analysis in high vacuum																																									
PrismaPlus® QMG 220 F1	■	■						■									■				■																			100	
PrismaPlus® QMG 220 F2	■		■					■									■				■																			100	
PrismaPlus® QMG 220 F3	■							■									■				■																			100	
Residual gas analysis in ultra high vacuum																																									
PrismaPlus® QMG 220 M1	■	■						■	■								■				■																			100	
PrismaPlus® QMG 220 M2	■			■				■	■								■				■																			100	
PrismaPlus® QMG 220 M3	■							■	■								■																							100	
Residual gas analysis																																									
Gas analysis in the pressure range of up to 1,000 hPa																																									
OmniStar GSD 320 O1, 1-100 u	■	■																			■																			106	
OmniStar GSD 320 O2, 1-200 u	■			■																	■																			106	
OmniStar GSD 320 O3, 1-300 u	■					■															■																			106	
ThermoStar GSD 320 T1, 1-100 u	■	■																			■																		106		
ThermoStar GSD 320 T2, 1-200 u	■				■																■																			106	
ThermoStar GSD 320 T3, 1-300 u	■					■															■																			106	
Gas analysis in the pressure range of up to 50 hPa																																									
HPA 220, 1-100 u	■	■																			■																			110	
HPA 220, 1-200 u	■				■																■																			110	
HPA 220, 1-300 u	■						■														■																			110	
Gas analysis in the pressure range of up to 10⁻² hPa																																									
SPM 220, 1-100 u	■	■																																						112	
SPM 220, 1-200 u	■				■																																			112	
Gas analysis in the pressure range of up to 10⁻⁴ hPa																																									
HiQuad®, QMG 700, with QMA 410, 16 mm Mo-rod system, 1-128 u	■	■																																							116
HiQuad®, QMG 700, with QMA 410, 16 mm Mo-rod system, 1-340 u	■				■																																				116
HiQuad®, QMG 700, with QMA 430, 8 mm stainless steel rod system	■					■																																		116	
HiQuad®, QMG 700, with QMA 400, 8 mm Mo-rod system	■							■	■	■	■	■	■	■	■	■	■	■	■	■																				116	

The HiQuad® series is a modular system that can be very flexibly adapted to any given application. PPM plasma monitors are also available on request for energy analysis as are EPD end point detectors for etching processes.

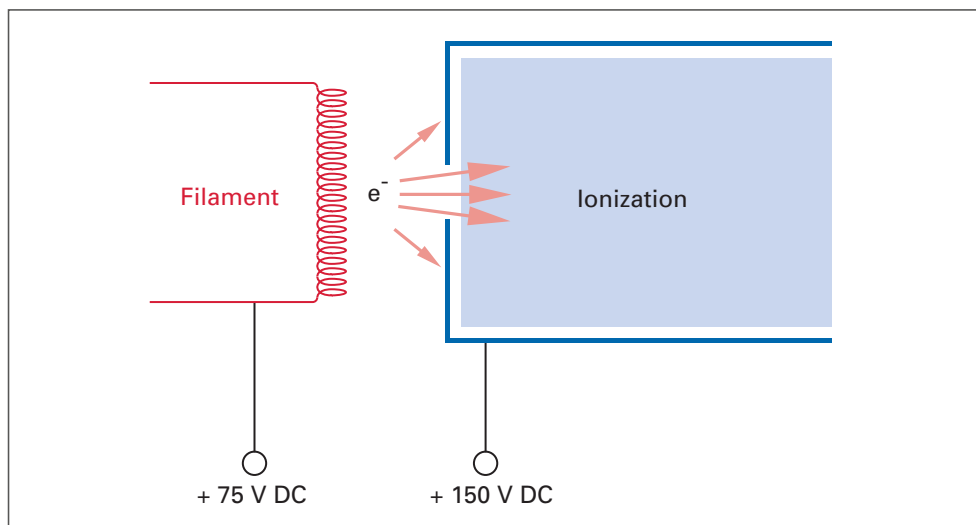


Customer benefits

- Easily adapted to meet a variety of measurement tasks
- Easy to operate even during quantitative gas analysis
- Easy, flexible system integration
- Highly sensitive, quick measurements
- Precise process monitoring

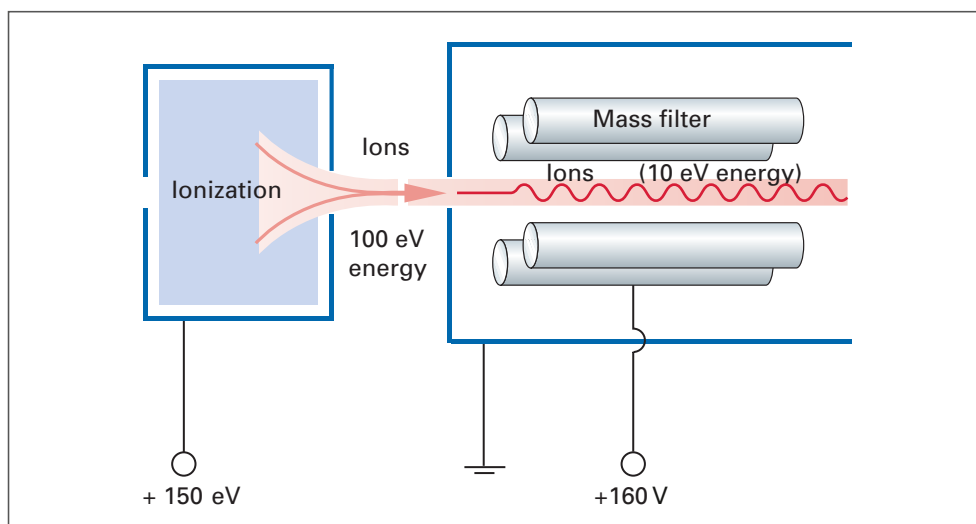
Overview of technologies

With the compact PrismaPlus® and the high-resolution HiQuad®, Pfeiffer Vacuum offers two basic models of quadrupole mass spectrometers, which have excellent technological advantages.



Biased ionization chamber

The high electrical potential of the ionization chamber results in an extremely low background signal. The electron-emitting filament is positively biased relative to ground. This design prevents desorption of gas particles from the chamber walls, and thus the generation of an undesired background signal by electron stimulated desorption.



Field-axis technology

One of the most important factors for the performance of a mass spectrometer is the transfer of ions from the ion source to the mass filter. With the aid of field-axis technology, the ions are able to cross the peripheral fields of the separating system without any noteworthy interaction. It is thus possible to achieve higher sensitivities (A/hPa) without pre and post filters.

QUADERA® mass spectrometer software



Operation of quadrupole mass spectrometers including the display, evaluation and saving of data is carried out on a PC. The QUADERA® software with its modular structure offers a clear and user-friendly platform and pre-configured measuring procedures allowing for the presentation of measured data as well as the handling of parameter settings with a few mouse clicks. Complete measuring procedures can be generated with no programming skills.

QUADERA® can be used with PrismaPlus® and HiQuad® as well as any mass spectrometer systems based on these devices. The PC is connected via Ethernet to the mass spectrometer. It provides networking capacity, freely adjustable line length and the opportunity to operate the mass spectrometer from various PC work stations. The software generates the interface between the mass spectrometer and the user for settings and measurements. The simple, clear controls and ability to display external signals together with mass spectrometer data are what really matters to the user.

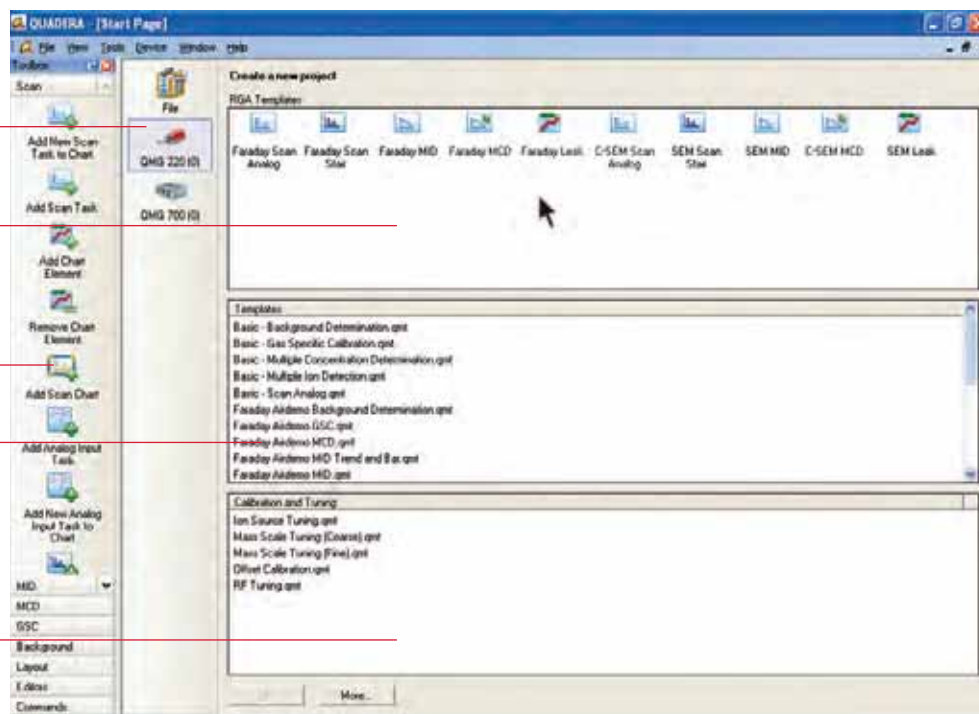
Unit selection

Selection window

Tools, aids

Templates

Calibration and tuning

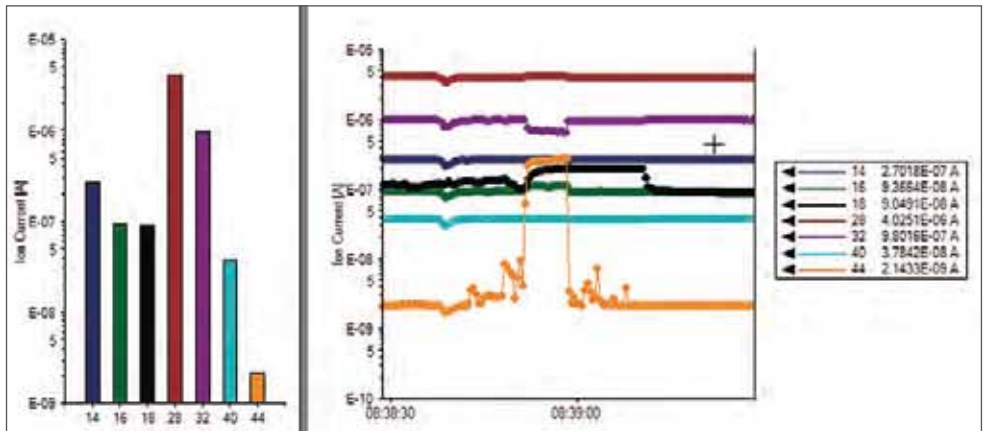


Measurement modes

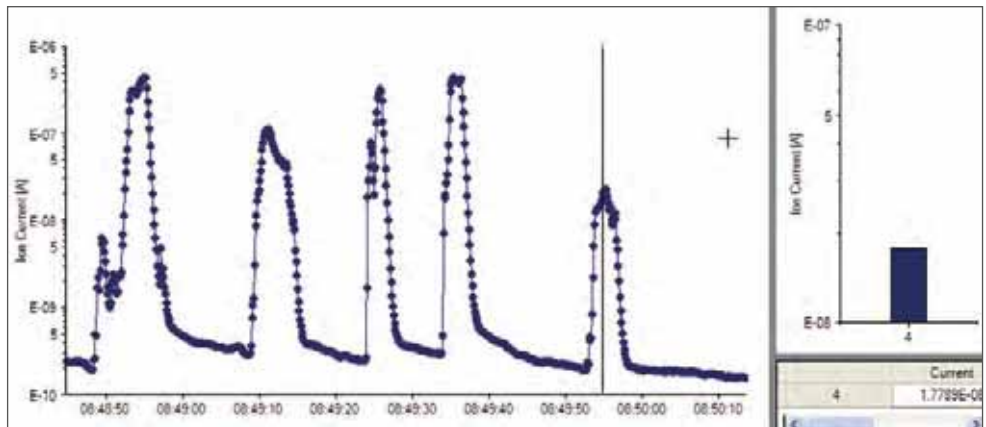
The window interface of the Quadera® software may be freely configured. Different user-defined views of a measurement can be displayed simultaneously. Prepared templates are available at a mouse click for typical measurement tasks such as the scan of a mass range as analog or bar graph, scan of certain masses, residual gas analysis or leak detection.

The mass spectrometer must be calibrated before quantitative analysis can be performed. If this involves recurring processes, such as calibration with subsequent quantitative analysis, these processes can be automated using a scripting language (VSTA = Visual Studio for Applications)*. Since pre-configured modules may be used to do so, an extensive measurement project can be generated quickly.

* Microsoft Copyright



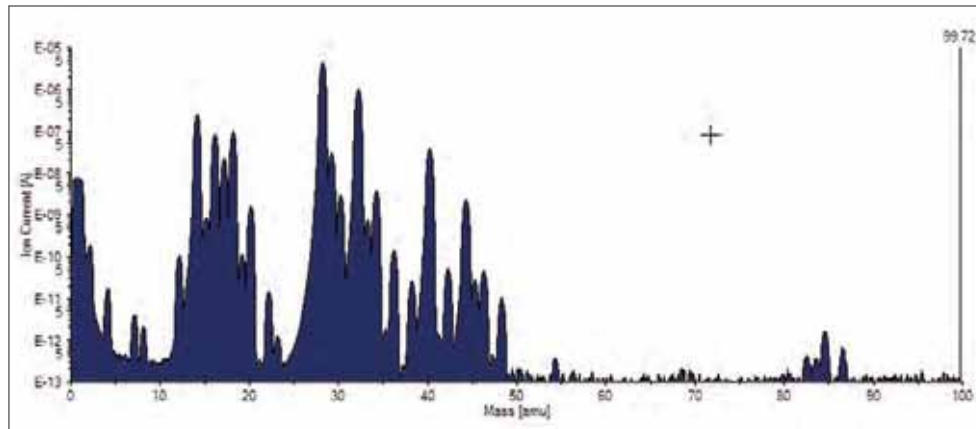
Bargraph portrayal of the ion current and its curve as a function of time



Leak detection with helium – Visualization as a function of time

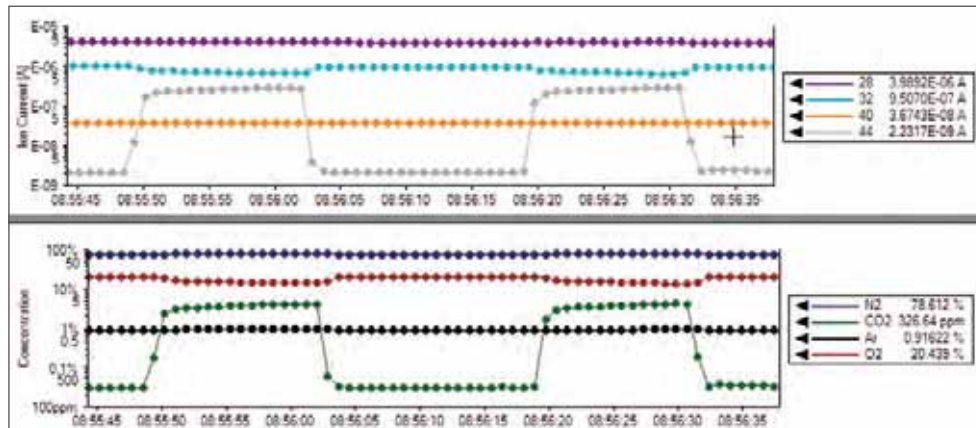


C-SEM Scan Analog



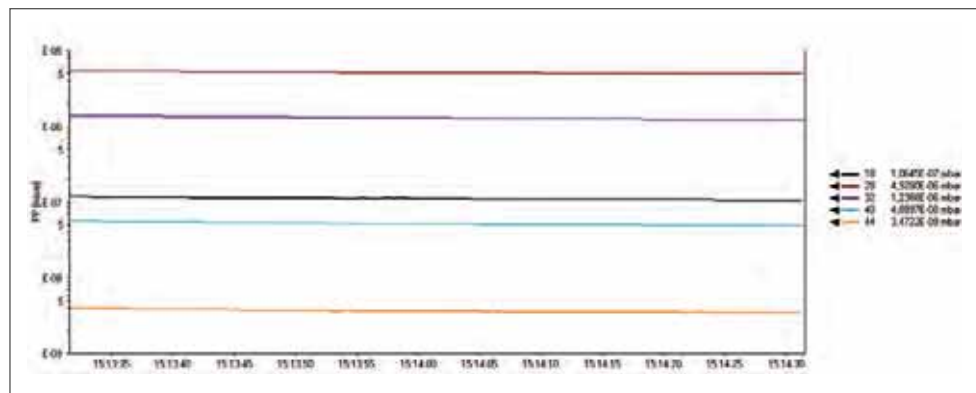
Analog spectrum of air

C-SEM MCD



Analysis of air as ion current and concentration as a function of time

SEM MID

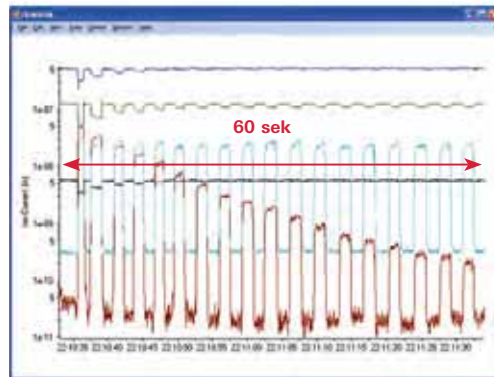


Measurement of different masses vs. time
Display as partial pressure in hPa

Gas analysis

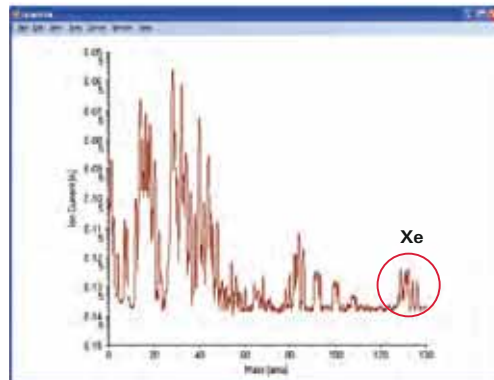
Quadrupole mass spectrometers require a working pressure of less than $1 \cdot 10^{-4}$ hPa under high vacuum. To analyze gases at higher pressures, as are encountered in many vacuum processes, a perfectly coordinated system is required, consisting of a mass spectrometer, a gas inlet with a separation-free pressure reducing valve, vacuum pumping stations and total pressure measurement. With its quadrupole mass spectrometer-based products, Pfeiffer Vacuum provides the perfect solution for analyzing every gas in the ultra-high vacuum range right up to atmospheric pressure.

Owing to the modular design and the use of high-quality, proven components, these instruments can be ideally adapted to cope with practically every measuring task. Our experienced product and applications specialist are available to assist you in selecting a suitable analytical system for your particular application.



High measurement speed – up to 125 $\mu\text{s}/\text{u}$

With the HiQuad[®] mass spectrometer very fast measurements can be made. This example shows the mass spectrometer response during respiration analysis. N_2 , O_2 and CO_2 were detected with a very fast cycle time.

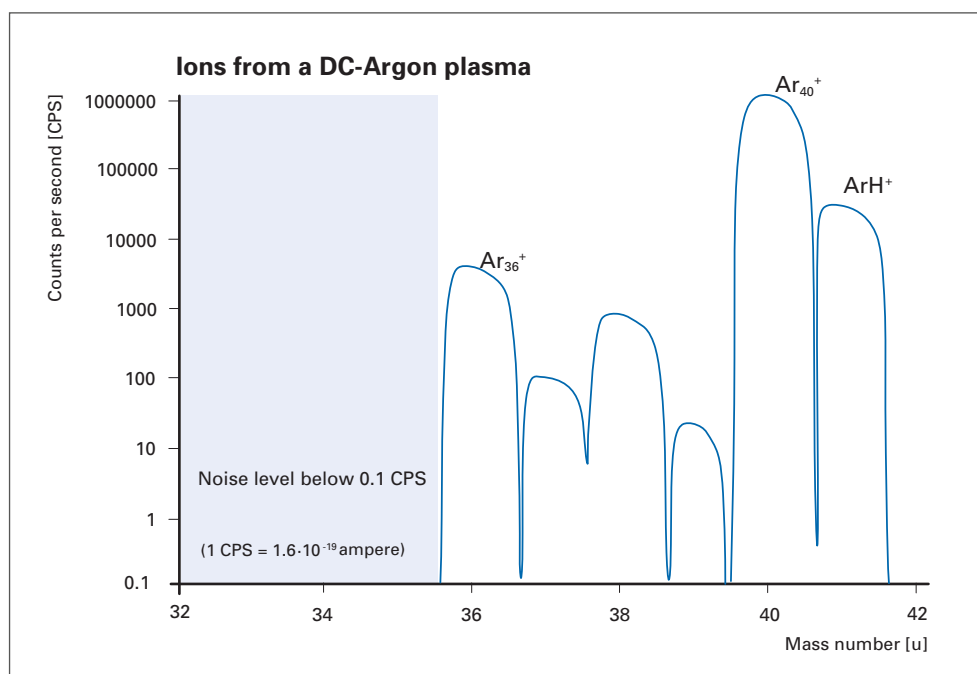
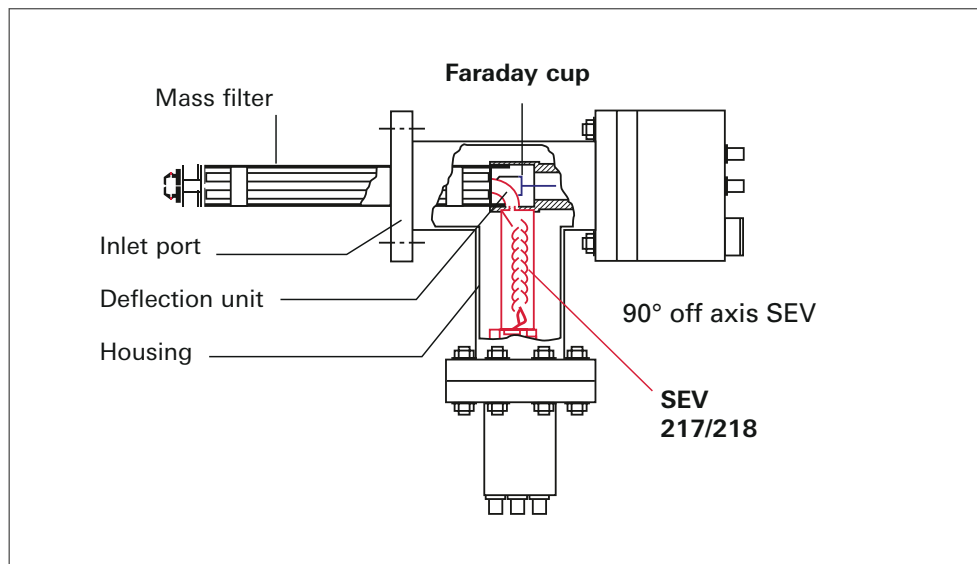


Wide dynamic range

The figure shows a spectrum for air. In addition to the primary components of N_2 , O_2 , Ar and CO_2 even the smallest concentrations of Xe are detected. The ion current at mass 136 is equivalent to a concentration of 7.8 ppb Xe in the air. However, the ion current is several decades above the background noise level, allowing large dynamic range of 10 decades to be achieved.

90° off-axis secondary electron multiplier (SEM)

The task of the secondary electron multiplier is to increase the sensitivity of the mass spectrometer. In the HiQuad®, the multiplier is attached in the vacuum at a right angle to the rod system. This prevents weak X-rays and photons from reaching the detector and generating background noise. In combination with an ion-counting arrangement, it is possible to generate very low background noise level and a wide dynamic range. The spectrum shown displays a very low count of ArH^+ -Ions, which were generated in a plasma.



The perfect solution for mass spectrometry



PrismaPlus®

The combination of high sensitivity, stability and intelligent controls make the PrismaPlus® the perfect solution for mass spectrometry.

Its modular design offers you a variety of application options in industrial and analytical environments, in research & development, in leak detection and semiconductor production, as well as in coating technology.

The PrismaPlus® is the ideal solution for applications ranging from quality assurance and residual gas analysis right through to complex, quantitative tasks.

The wide selection of interfaces such as digital and analog inputs and outputs and the connection facility for DigiLine and ActiveLine transmitters allow for easy system integration.

Customer benefits

- Ideal adjustment capability for wide-ranging measurement tasks
- Easy installation due to its compact dimensions and 90 degree version
- Networkable through Ethernet
- Intuitive operation using QUADERA® software

Typical applications

- Qualification of vacuum systems
- Leak detection on vacuum chambers
- Determination of outgassing rates



Accelerators



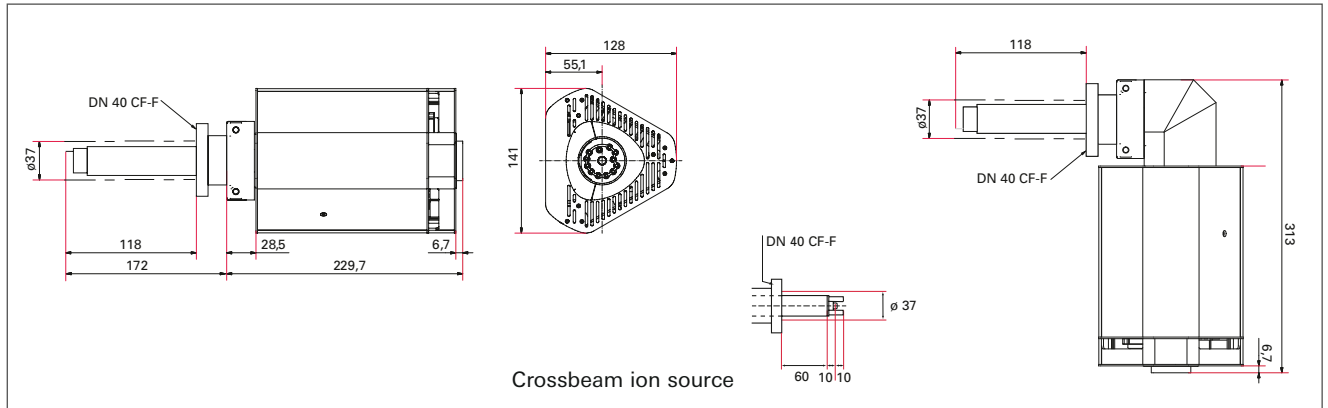
Research & Development



PrismaPlus® QMG 220

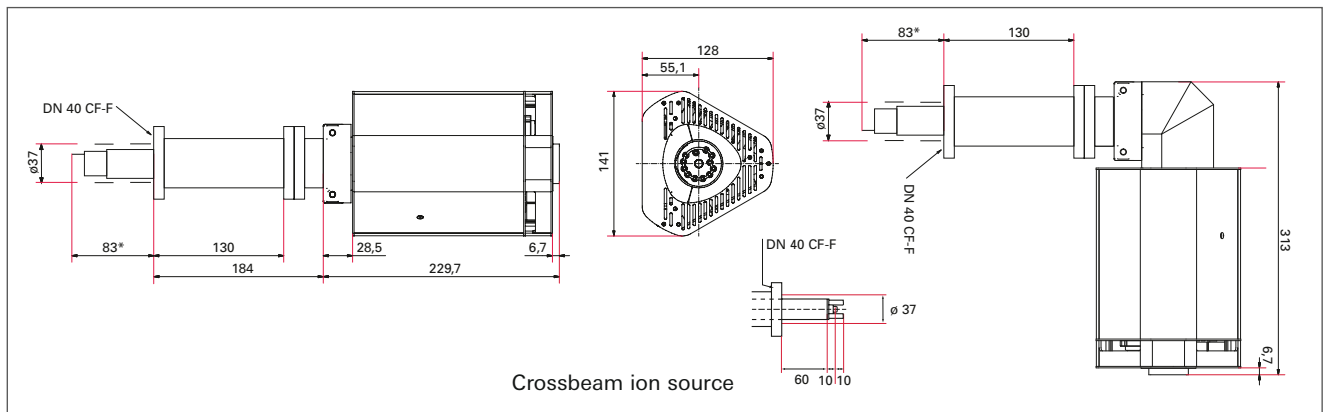
- Robust and economic residual gas analysis and vacuum process monitoring in the high vacuum range
- Interchangeability of analyzers and electronics
- Two filaments mean maximum up-time

Dimensions (in mm)



QMG 220 F 0°

QMG 220 F 90°



QMG 220 M 0°

QMG 220 M 90°

Scope of delivery

+
 +
 +
 +

I/O-Module 220 (optional) Electronics unit QME 220 0° or 90° connection Analyzer QMA 200 Faraday or C-SEM/Faraday SP 220 power supply including mains cable Software

Technical data	PrismaPlus® QMG220 F1	PrismaPlus® QMG220 F2	PrismaPlus® QMG220 F3
Detector	Faraday	Faraday	Faraday
Mass range	1–100 u	1–200 u	1–300 u
Rod system, diameter/length	6 mm / 100 mm	6 mm / 100 mm	6 mm / 100 mm
Min. detection limit, Faraday ¹⁾	$1 \cdot 10^{-12}$ hPa	$2 \cdot 10^{-12}$ hPa	$4 \cdot 10^{-12}$ hPa
Ar sensitivity, Faraday ¹⁾	$1 \cdot 10^{-3}$ A/hPa	$6 \cdot 10^{-4}$ A/hPa	$3 \cdot 10^{-4}$ A/hPa
Operating pressure, max. ²⁾ , Faraday operation	$1 \cdot 10^{-4}$ hPa	$1 \cdot 10^{-4}$ hPa	$1 \cdot 10^{-4}$ hPa
Contribution to adjacent mass (40/41) ¹⁾	< 10 ppm	< 30 ppm	< 50 ppm
Operating temperature, analyzer	150 °C	150 °C	150 °C
Operating temperature, electronics	0–40 °C	0–40 °C	0–40 °C
Bakeout temperature, analyzer ³⁾	200 °C/300 °C	200 °C/300 °C	200 °C/300 °C
Connection flange	DN 40 CF-F	DN 40 CF-F	DN 40 CF-F
Resolution at 10% peak height	0.5–2.5 u	0.5–2.5 u	0.5–2.5 u
Measuring speed, analog/bargraph scan	20 ms–60 s/u	20 ms–60 s/u	20 ms–60 s/u
Measuring speed, Stair	2 ms–60 s/u	2 ms–60 s/u	2 ms–60 s/u
Measuring speed, MID	2 ms–60 s/u	2 ms–60 s/u	2 ms–60 s/u
Number of measuring channels in MID	128 pieces	128 pieces	128 pieces
Reproducibility of peak ratio ³⁾	±0.5%	±0.5%	±0.5%
Interface	Ethernet	Ethernet	Ethernet
Input, digital	External protection, 24 V	External protection, 24 V	External protection, 24 V
Supply voltage	90–260 V AC, 50/60 Hz	90–260 V AC, 50/60 Hz	90–260 V AC, 50/60 Hz
Weight ⁴⁾	2.4 kg	2.4 kg	2.4 kg

Technical data	PrismaPlus® QMG220 M1	PrismaPlus® QMG220 M2	PrismaPlus® QMG220 M3
Detector	C-SEM/Faraday	C-SEM/Faraday	C-SEM/Faraday
Mass range	1–100 u	1–200 u	1–300 u
Rod system, diameter/length	6 mm / 100 mm	6 mm / 100 mm	6 mm / 100 mm
Min. detection limit, Faraday ¹⁾	$5 \cdot 10^{-12}$ hPa	$1 \cdot 10^{-11}$ hPa	$2 \cdot 10^{-11}$ hPa
Min. detection limit, C-SEM ¹⁾	$1 \cdot 10^{-14}$ hPa	$< 2 \cdot 10^{-14}$ hPa	$< 4 \cdot 10^{-14}$ hPa
Ar sensitivity, Faraday ¹⁾	$5 \cdot 10^{-4}$ A/hPa	$3 \cdot 10^{-4}$ A/hPa	$1,5 \cdot 10^{-4}$ A/hPa
Ar sensitivity, C-SEM ¹⁾	200 A/hPa	200 A/hPa	100 A/hPa
Operating pressure, max. ²⁾ , Faraday operation	$1 \cdot 10^{-4}$ hPa	$1 \cdot 10^{-4}$ hPa	$1 \cdot 10^{-4}$ hPa
Operating pressure, max, C-SEM operation	$1 \cdot 10^{-5}$ hPa	$1 \cdot 10^{-5}$ hPa	$1 \cdot 10^{-5}$ hPa
Contribution to adjacent mass (40/41) ¹⁾	< 10 ppm	< 20 ppm	< 50 ppm
Operating temperature, analyzer	150 °C	150 °C	150 °C
Operating temperature, electronics	0–40 °C	0–40 °C	0–40 °C
Bakeout temperature, analyzer ³⁾	200 °C/300 °C	200 °C/300 °C	200 °C/300 °C
Connection flange	DN 40 CF-F	DN 40 CF-F	DN 40 CF-F
Resolution at 10% peak height	0.5–2.5 u	0.5–2.5 u	0.5–2.5 u
Measuring speed, analog/bargraph scan	20 ms–60 s/u	20 ms–60 s/u	20 ms–60 s/u
Measuring speed, Stair	2 ms–60 s/u	2 ms–60 s/u	2 ms–60 s/u
Measuring speed, MID	2 ms–60 s/u	2 ms–60 s/u	2 ms–60 s/u
Number of measuring channels in MID	128 pieces	128 pieces	128 pieces
Reproducibility of peak ratio ³⁾	±0.5%	±0.5%	±0.5%
Interface	Ethernet	Ethernet	Ethernet
Input, digital	External protection, 24 V	External protection, 24 V	External protection, 24 V
Supply voltage	90–260 V AC, 50/60 Hz	90–260 V AC, 50/60 Hz	90–260 V AC, 50/60 Hz
Weight ⁴⁾	3.8 kg	3.8 kg	3.8 kg

1) For open ion sources

2) For ion currents reduced to 0.2 mA: $1 \cdot 10^3$ hPa

3) Defined by order number

4) For version with electronics and analyzer on one axis (0°)

I/O module - connection options

	Analog outputs	Analog input	Digital outputs	Digital inputs
Number	4	5	16	5
Specification	0–10 V	-10–+10 V	$V_{out} = 24 V$	$V_{in} = 24 V$
Resolution	12 bit	14 bit	–	–
Application examples	<ul style="list-style-type: none"> ■ Measured values, e. g. ion currents ■ Ratios (concentrations) ■ Data transfer to higher-level systems 	Reading in external values, e. g. pressure, temperature, gas flow	<ul style="list-style-type: none"> ■ Free assignment of switchpoints ■ Valve actuation 	Starting or stopping of measurement tasks by means of external signal

Total pressure measurement with ActiveLine



Total pressure measurement with DigiLine



Ethernet

SP 220 power supply

L x W x H:
145 x 75 x 40 mm

Cable length: 3 m

Weight: 0.7 kg



24 V DC

Voltage: 90–260 V AC
Frequency: 50–60 Hz

Order number matrix
PrismaPlus®
Order number
PT M0 a b c d e f g

Detector version¹⁾	a
Faraday ¹⁾ only for leak detection and high-vacuum residual gas analysis	5
C-SEM/Faraday; C-SEM = Continuous secondary electron multiplier for fast and sensitive residual analysis in the UHV, analytical tasks and leak detection	6
Mass range	b
1–100 u	1
1–200 u	2
1–300 u	3
Ion source	c
Open ion source for high-vacuum residual gas analysis; high sensitivity and good linearity	1
Gas-tight ion source for combination with gas inlet systems; low gas consumption, high signal-to-noise ratio	2
Crossbeam ion source for direct gas beam inlet without interaction with the walls of the ion sources; electron energy adjustable from 0 to 100 eV	3
Grid ion source ²⁾ for UHV residual gas analysis; minimum outgassing and desorption rates	4
Open ion sources for high-vacuum residual gas analysis; high sensitivity and good linearity; electron energy adjustable from 0 to 100 eV	5
Filament	d
Tungsten; for UHV applications	1
Yttriated iridium: low filament temperature; high resistance to air inrushes	2
Bakeout temperature³⁾	e
to 200 °C	1
to 300 °C	2
Connection⁴⁾	f
0° (on one axis)	1
90° off axis	2
I/O interface⁵⁾ and VSTA software extension	g
Without option	0
With I/O module – for control and signal interchange via analog and digital inputs/outputs	1
With VSTA software extension – for programming program sequences and for exchanging commands and data with other programs	2
with I/O module and VSTA software extension	3

¹⁾ Only with open ion source

²⁾ Grid ion source with tungsten filament only

³⁾ Electronics removed

⁴⁾ See dimensions page 100

⁵⁾ See page 102

OmniStar/ThermoStar

Gas analysis at atmospheric pressure



OmniStar/ThermoStar

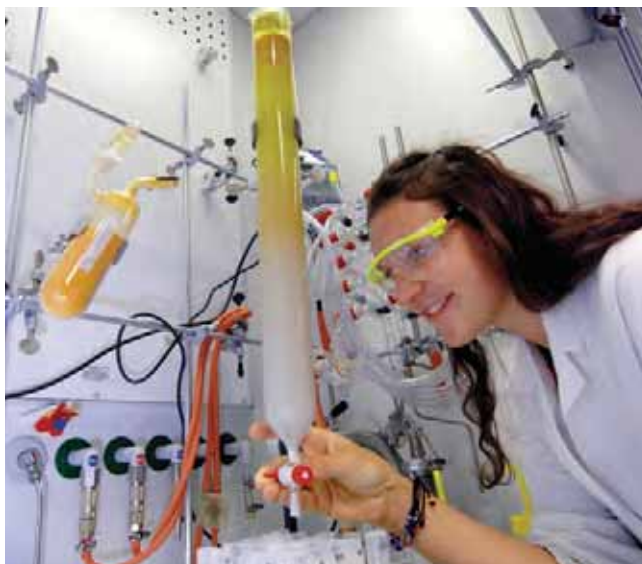
OmniStar and ThermoStar, compact bench top analyzers are two ideal complete solutions for sample gases present at atmospheric pressure. They are based on the PrismaPlus® quadrupole mass spectrometer and a dry pumping station, composed of a diaphragm vacuum pump MVP and a HiPace turbopump. They have a heated and temperature controlled gas inlet system and are suitable for the qualitative and quantitative analysis of gases.

Customer benefits

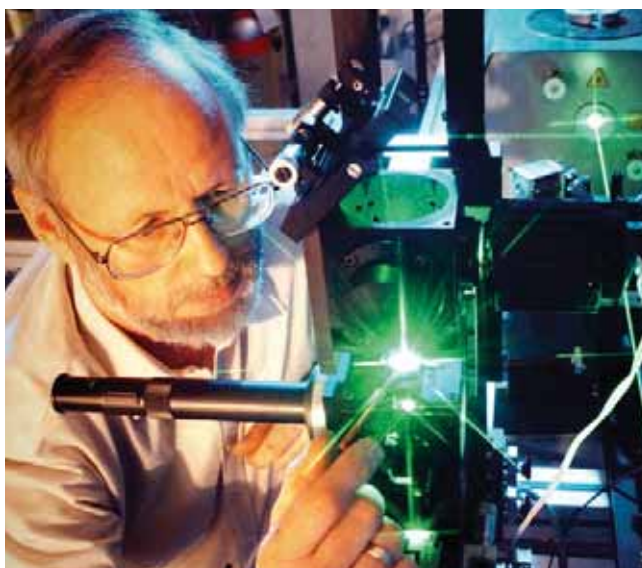
- Qualitative and quantitative gas analysis, connection for calibrating gas inlet
- Low detection limit (< 1 ppm) even for condensable gases
- Compact, easy-to-operate analysis unit
- Heated capillary inlet up to $350\text{ }^{\circ}\text{C}$
- Small footprint
- Easy to use even for quantitative gas analysis
- Gas analysis under varying sample pressures – pressure-regulated gas inlet (optional)

Typical applications

- Chemical analysis
- Fermentation
- Catalysis
- Laser technology
- Environmental analysis
- Fuel cells



Chemical applications



Laser



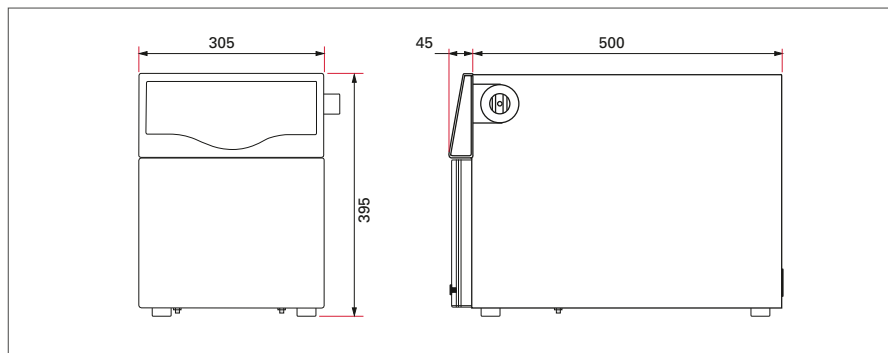
Thermo balances



OmniStar/ThermoStar

- Qualitative and quantitative gas analysis, connection port for calibrating gas inlet systems
- Low detection limit (< 1 ppm) even for condensable gases
- Compact, easy-to-operate analysis unit
- Heated capillary inlet up to $350\text{ }^{\circ}\text{C}$
- Bakeable all-metal sealed high vacuum chamber for low backgrounds

Dimensions (in mm)



Technical data	OmniStar	ThermoStar
Mass ranges	1–100 u 1–200 u 1–300 u	1–100 u 1–200 u 1–300 u
Gas connection	Stainless steel capillary	Quartz glass capillaries
Gas inlet	via software or user interface-controlled inlet valve	continuously open
Pressure reduction	2-stage, segregation-free	2-stage, segregation-free
Gas flow rate	1–2 sccm	1–2 sccm
Sample gas pressure	Up to 1,000 hPa	Up to 1,000 hPa
Capillary operating temperature	Up to $350\text{ }^{\circ}\text{C}$	Up to $350\text{ }^{\circ}\text{C}$
Analyzer	QMA 200 M	QMA 200 M
Rod system, material/diameter/length	Stainless steel/6/100 mm	Stainless steel/6/100 mm
Detector	C-SEM/Faraday	C-SEM/Faraday
Mass spectrometer electronics	QME 220 M	QME 220 M
Software	Quadera®	Quadera®
Contribution to neighboring mass: 40 – 41 1 – 100 / 200 / 300 U	< 10 ppm / < 20 ppm / < 50 ppm	< 10 ppm / < 20 ppm / < 50 ppm
Min. detection limit, C-SEM 1 – 100 / 200 / 300 U	< 1 ppm / < 1 ppm / < 1 ppm	< 1 ppm / < 1 ppm / < 1 ppm
Min. detection limit, Faraday 1 – 100 / 200 / 300 U	< 20 ppm / < 40 ppm / < 100 ppm	< 20 ppm / < 40 ppm / < 100 ppm
Resolution, settable at 10% peak height	0.5–2.5 u	0.5–2.5 u
Dimensions (L x W x H)	545 x 305 x 395 mm	545 x 305 x 395 mm
Weight	35 kg	35 kg
Mains requirement: voltage (range)	100 – 230 VAC	100 – 230 VAC
Interface	Ethernet Analog input: 5x ± 10 V / 12 bit Analog output: 4x 0...10 V / 12 bit Digital input: 4x Digital output: 7x optical insulated, 24 V	Ethernet Analog input: 5x ± 10 V / 12 bit Analog output: 4x 0...10 V / 12 bit Digital input: 4x Digital output: 7x optical insulated, 24 V

**Order number matrix
OmniStar/ThermoStar**

Order number

PT M a bc def g h

System	a
OmniStar	8
ThermoStar	9

Analyzer/Filament	bc
Filament: Yttriated iridium, integrated option for mass calibration	01
Filament: Yttriated iridium	02
Filament: Tungsten, integrated option for mass calibration	05
Filament: Tungsten	06
Filament: Yttriated iridium, integrated option for mass calibration, corrosive gas version with inert gas inlet	11
Filament: Yttriated iridium, corrosive gas version with inert gas inlet	12
Filament: Tungsten, integrated option for mass calibration, corrosive gas version with inert gas inlet	15
Filament: Tungsten, corrosive gas version with inert gas inlet	16

Gas inlet system	def
ThermoStar, Quartz, 1 m temperature-regulated gas sampling line, 200 °C	111
ThermoStar, Quartz, 2 m temperature-regulated gas sampling line, 200 °C	112
ThermoStar, Quartz, 1 m temperature-regulated gas sampling line, 350 °C	113
OmniStar, quartz (special), 1 m temperature-regulated gas sampling line, 200 °C	151
OmniStar, quartz (special), 2 m temperature-regulated gas sampling line, 200 °C	152
OmniStar, stainless steel, 1 m temperature-regulated gas sampling line, 200 °C	171
OmniStar, stainless steel, 2 m temperature-regulated gas sampling line, 200 °C	172
OmniStar, stainless steel, 1 m temperature-regulated gas sampling line, 350 °C	173
Pressure-regulated gas inlet, 5 decades, $5 \cdot 10^{-3}$ hPa up to atmospheric pressure	555

Mass range	g
1–100 u	1
1–200 u	2
1–300 u	3

Front panel	h
OmniStar	1
ThermoStar	2



HPA 220 and SPM 220

Gas analysis for vacuum processes



HPA 220 and SPM 220

Many vacuum processes take place in the medium vacuum range. To analyze these processes, Pfeiffer Vacuum offers two compact systems based on the quadrupole mass spectrometer PrismaPlus® and a HiPace® turbopumping station.

Gas analysis up to low vacuum range

The High Pressure Analyzer HPA 220 is a modular and flexible mass spectrometer system with a dry turbopumping station for gas analysis in a vacuum up to pressures of 50 hPa. Depending on its use, with the HPA 220, five different electropneumatic as well as manually operated gas inlet valves can be selected.

Realtime sputter process gas analysis

The Sputter Process Monitor SPM 220 provides the perfect solution for qualitative and quantitative gas analyses of sputter processes. The specially developed SPM ion source enables precise up-to-the-minute process gas analysis up to a pressure of 10^{-2} hPa. An optional version with differentially pumped orifice flange for pressures of up to 10 hPa is available.

Customer benefits

- Exact real time process monitoring
- Easy, flexible system integration
- Excellent detection limits for H_2 , O_2 , H_2O as well as CO_2
- Optimal adaptation to numerous measurement tasks
- Easy, flexible system integration
- Control of several devices via a single PC

Typical applications

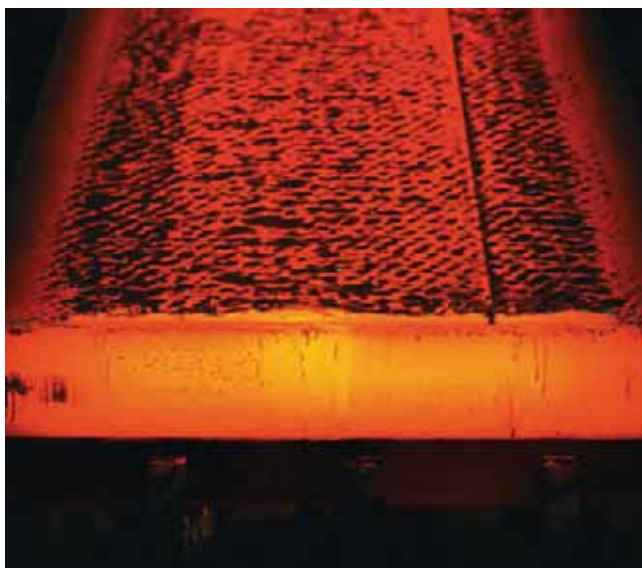
- Architecture and optical glass coating
- Thin-film solar cell production
- Semiconductor production
- Hard coatings
- Metallurgy
- Vacuum furnaces
- Research & development



Glass coating



Semiconductors



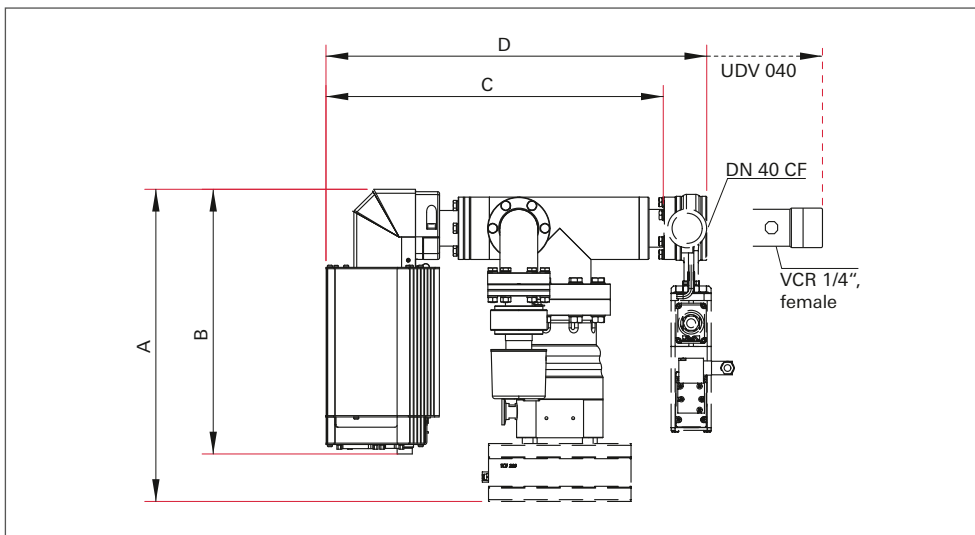
Metallurgy

HPA 220



- Provides great flexibility due to its 5 manually or electropneumatically operated gas inlet options for analyzing, monitoring and controlling processes up to a pressure of 50 hPa
- Easy and flexible system integration through a variety of digital and analog inputs and outputs
- Multiplex operation allows data evaluation of several mass spectrometer software systems with a single PC
- Compact dimensions for flexible integration

Dimensions (in mm)



Version	A	B	C	D
HPI 040 H	–	290 mm	380 mm	415 mm
HPI 040, P	350 mm	290 mm	380 mm	415 mm
Double gate valve, manual	–	290 mm	380 mm	446 mm
Double gate valve, pneumatic	350 mm	290 mm	380 mm	446 mm
UDV 040	–	290 mm	380 mm	479 mm

System overview

Mass spectrometer PrismaPlus

- 1–100 u
- 1–200 u
- 1–300 u

Gas inlet system

- 1,2) Valve interface HPI 040
- 3,4) Double gate valve
- 5) Gas dosing valve UDV 040



Vacuum gauge ActiveLine PKR 251
for monitoring the pressure and protecting the filaments

Valve control unit VCU 220
for electropneumatic gas inlet systems

Turbopump HiPace® 80 with TC 110 RS
with 4 accessory ports + backing pump MVP 030-3 (not shown)

19" rack unit BRU 220
Integrated power supply pack TPS 311. Additional options: Heating control, display and control units (DCU for turbopumps and TPG for vacuum gauges)

Order number matrix

HPA 220

Order number

PT M 5 a b c d

Mass range	a
1–100 u	1
1–200 u	2
1–300 u	3
Ion source and filament	b
Open ion source, filament: yttriated iridium	1
Open ion source, filament: tungsten	2
Gas inlet system	c
HPI 040 P, bellows-sealed gate valve, DN 40 CF, electropneumatically operated, two bypass valves with 0.1 mm and 0.3 mm orifices, 0.03 mm third orifice included	1
HPI 040 P, bellows-sealed gate valve, DN 40 CF, electropneumatically operated, two bypass valves with 0.1 mm and 0.3 mm orifices, 0.03 mm third orifice included	2
Double gate valve, DN 40 CF, manually operated, one gate opens to release full cross-section, one gate with 0.1 mm orifice	3
Double gate valve, DN 40 CF, electropneumatically operated, one gate opens to release full cross-section, one gate with 0.1 mm orifice	4
UDV 040, gas dosing valve, manually operated, VCR 1/4"	5
Cable length and accessory option	d
3 m, without option	0
3 m, with TPG display and control unit	1
3 m, with DCU display and control unit	2
3 m, with TPG and DCU display and control units	3
10 m, without option	4
10 m, with TPG display and control unit	5
10 m, with DCU display and control unit	6
10 m, with TPG and DCU display and control units	7

1, 2) Valve interface HPI 040

Manually or electropneumatically operated. Consists of three valves, a bellows-sealed gate valve with a nominal diameter of DN 40 CF for residual gas analysis or leak detection up to $< 1 \cdot 10^{-4}$ hPa and two valves with exchangeable orifices in the bypass. One 0.03 mm orifice for extending the range to 8 hPa (N_2) is enclosed.

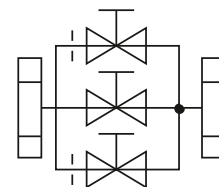
3, 4) Double gate valve

Manually or electropneumatically operated. Consists of two bellows-sealed gate valves which are welded together. One gate with a nominal diameter of DN 40 CF for residual gas analysis or leak detection up to $< 1 \cdot 10^{-4}$ hPa and a second gate with an exchangeable orifice. Delivered ready fitted with a 0.1 mm orifice for the pressure range 0.1 to 1 hPa (N_2).

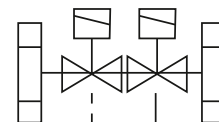
5) Gas dosing valve UDV 040

Manually adjustable gas dosing valve for pressure adjustment up to 50 hPa. The maximum possible and reasonable pressure range is determined particularly by the increasing gas segregation which occurs at progressively high pressures.

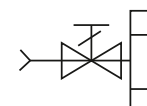
1,2)



3,4)



5)

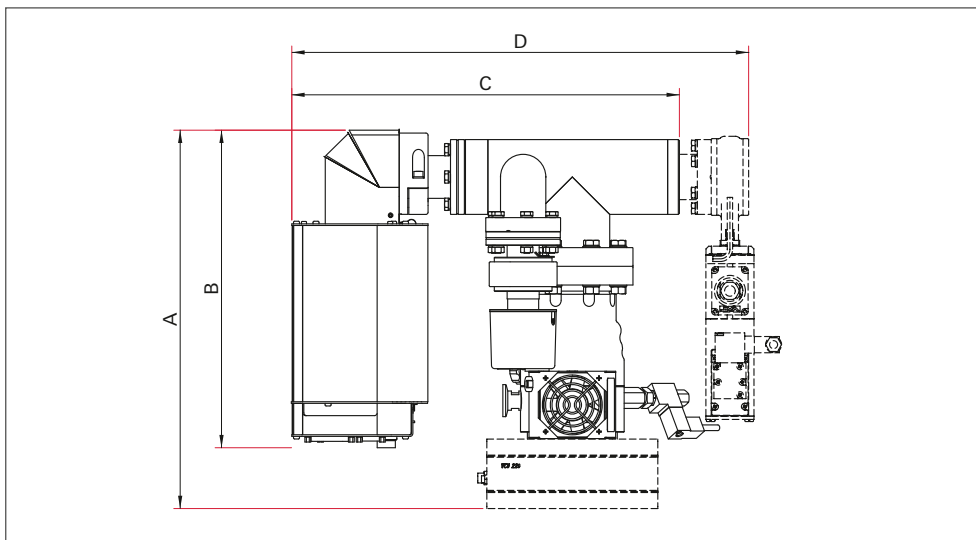


SPM 220



- SPM ion source for instantaneous process monitoring
- Excellent detection limits for H₂, O₂, H₂O and CO₂
- Minimized background influence on the measurement result
- For directly analyzing, monitoring and controlling processes up to 10⁻² hPa
- Differentially pumped version for pressures of up to 10 hPa
- Multiplex operation allows data evaluation of several mass spectrometer software systems with a single PC
- Compact dimensions for flexible integration
- Easy and flexible system integration through a variety of digital and analog inputs and outputs

Dimensions (in mm)



Version	A	B	C	D
without addition	–	290 mm	380 mm	–
with SVV 040 safety valve	350 mm	290 mm	380 mm	416 mm
with a flange with orifice	–	290 mm	380 mm	395 mm

System overview

**Mass spectrometer
PrismaPlus**
1–100 u
1–200 u



**Vacuum gauge
ActiveLine PKR 251**
for monitoring the pressure
and protecting the filaments

**Valve control unit
VCU 220**
for electropneumatic safety
valve SVV 040

**Turbopump
HiPace® 80 with
TC 110 RS**
with 4 accessory ports +
backing pump MVP 030-3
(not shown)

**19" rack unit
BRU 220**
Integrated power supply pack
TPS 311. Additional options:
Heating control, display and
control unit (DCU for turbo-
pumps and TPG for vacuum
gauges)

Order number matrix
SPM 220
Order number
PT M 5 a b c d

Mass range	a
1–100 u	1
1–200 u	2
Ion source and filament	b
SPM ion source, filament: yttriated iridium	3
SPM ion source, filament: tungsten	4
Gas inlet system	c
Without	5
Safety valve SVV 040 PM, electropneumatically operated	6
Differentially pumped DN 40 CF flange with orifice for a pressure range of up to 10 hPa	7
Cable length and accessory option	d
3 m, without option	0
3 m, with TPG display and control unit	1
3 m, with DCU display and control unit	2
3 m, with TPG and DCU display and control units	3
10 m, without option	4
10 m, with TPG display and control unit	5
10 m, with DCU display and control unit	6
10 m, with TPG and DCU display and control units	7

High end mass spectrometer for gas and ion analysis



HiQuad®

HiQuad® is a modular system whose highly precise components can be optimally selected to build a system for gas and ion analysis in many applications. HiQuad® offers the highest sensitivity and a dynamic range of 10 decades allowing simultaneous measurement of ppb 100 x and impressive measurement speeds of up to 125 $\mu\text{s}/\text{mass}$. The QUADERA® software makes it particularly easy to operate the mass spectrometer.

The HiQuad® can be flexibly configured:

- Mass ranges of 1–128 u to 1–2048 u
- Rod systems of various lengths and diameters
- Ion source for UHV, high pressure and beam analysis
- Ion optics for plasma processes
- Secondary electron multiplier and ion counter
- Various interface options

Pfeiffer Vacuum application specialists are happy to put together the best solution for your application.

Customer benefits

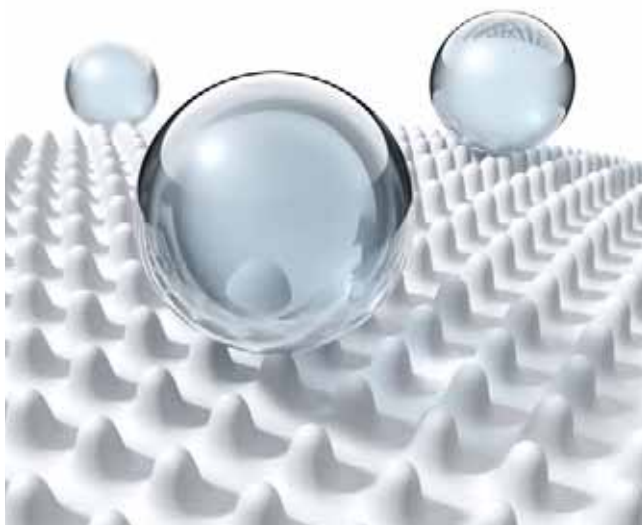
- Highly sensitive measurements
- Wide dynamic range
- High measuring speed
- Excellent long-term stability

Typical applications

- Residual gas analysis in ultra-high vacuum
- Environmental trace analysis
- Pharmaceutical research
- Analysis of plasma processes



Accelerators



Nanotechnology



Pharmaceutics

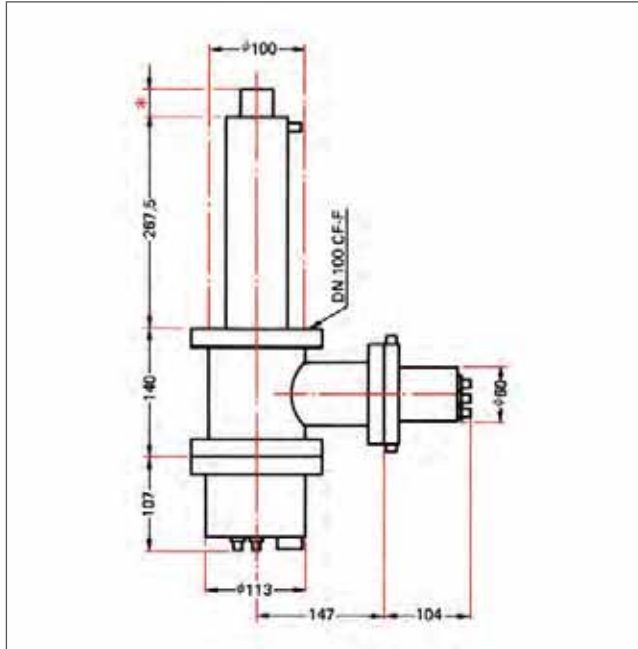
HiQuad® OMG 700



The modular solution for mass spectrometry

- Modular, flexible design
- Simple operation with Quadara® software
- Extremely high measurement speed
- Maximum sensitivity and wide dynamic range
- Outstanding long-term stability
- Ethernet interface
- Integrated internet browser and OPC server for communication with PC-based programs

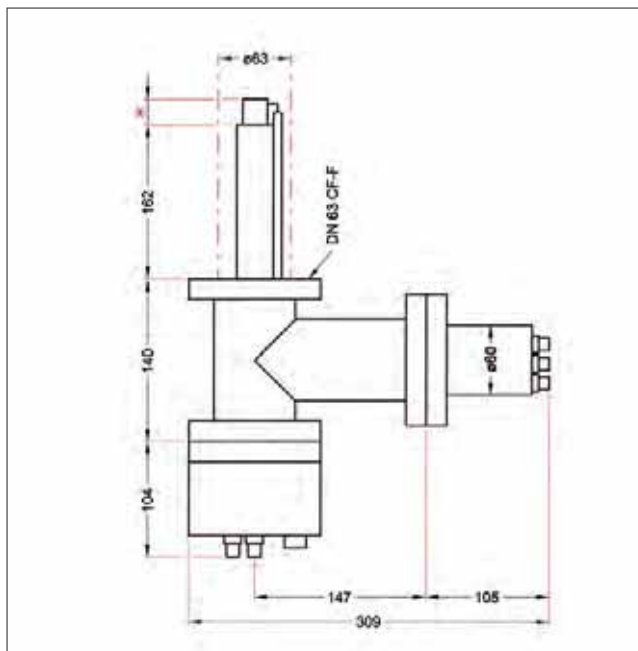
Dimensions (in mm)



Analyzer QMA 410 with 90° off axis SEM

*

- Axial ion source = 26 mm
- Grid ion source = 27 mm
- Cross beam ion source = 35.5 mm (23.55 to the center of the sensitive volume)
- Gas tight cross beam ion source = 48 mm (axial gas connection)
- Three-lens ion optics = 129 mm
- Cross beam ion source with axial ion optics = 43.5 mm
- Cross beam ion source with three-lens ion optics = 171 mm



Analyzer QMA 400, QMA 430 with 90° off axis SEM

*

- Axial ion source = 26 mm
- Grid ion source = 27 mm
- Cross beam ion source = 35.5 mm (23.55 to the center of the sensitive volume)
- Gas tight cross beam ion source = 48 mm (axial gas connection)
- Three-lens ion optics = 129 mm
- Cross beam ion source with axial ion optics = 43.5 mm
- Cross beam ion source with three-lens ion optics = 171 mm

Technical data	HiQuad® OMG 700 1–128 u	HiQuad® OMG 700 1–340 u	HiQuad® OMG 700 1–300 u
Mass range	1–128 u	1–340 u	1–300 u
Min. detection limit	$5 \cdot 10^{-16}$ hPa	$1 \cdot 10^{-15}$ hPa	$2 \cdot 10^{-15}$ hPa
Ar sensitivity, min ¹⁾	$1 \cdot 10^{-3}$ A/hPa	$5 \cdot 10^{-4}$ A/hPa	$2 \cdot 10^{-4}$ A/hPa
Operating pressure, max. Faraday, max. SEM, max.	$1 \cdot 10^{-4}$ hPa $1 \cdot 10^{-5}$ hPa	$1 \cdot 10^{-4}$ hPa $1 \cdot 10^{-5}$ hPa	$1 \cdot 10^{-4}$ hPa $1 \cdot 10^{-5}$ hPa
Partial pressure ratio with SEM	< 0.3 ppb	< 0.5 ppb	< 1 ppb
Analyzer	QMA 410	QMA 410	QMA 430
Rod system, material/diameter	Mo/16 mm	Mo/16 mm	Stainless steel/8 mm
Radio frequency generator (RF)	QMH 400-1	QMH 410-3	QMH 400-5
Electrometer preamplifier	EP 422	EP 422	EP 422
Operating temperature/analyzer	150 °C	150 °C	150 °C
Bakeout temperature/analyzer	400 ²⁾ °C	400 ²⁾ °C	400 ²⁾ °C
Connection flange	DN 100 CF-F	DN 100 CF-F	DN 63 CF-F

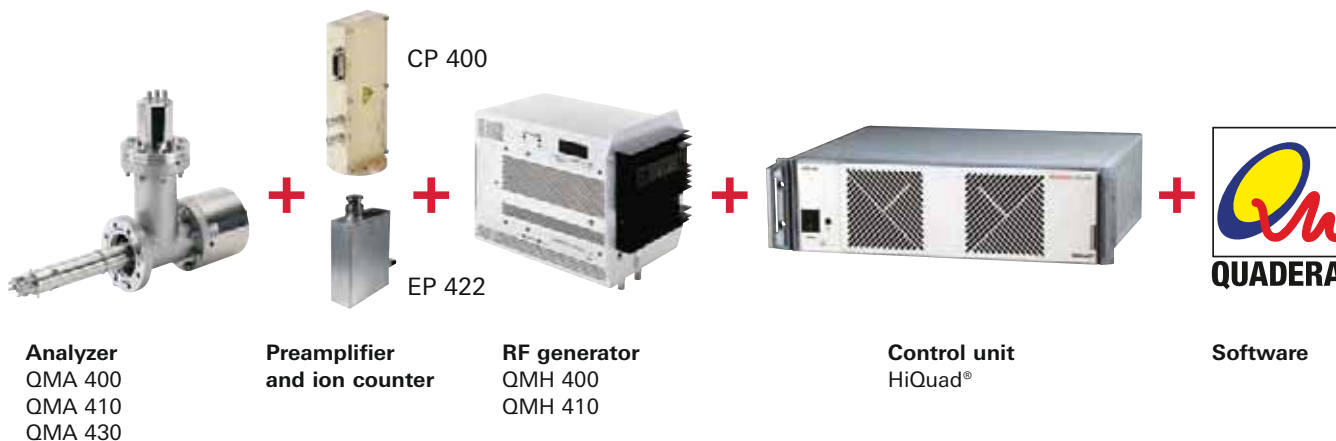
Technical data	HiQuad® OMG 700 1–512 ³⁾ u	HiQuad® OMG 700 1–1,024 u	HiQuad® OMG 700 1–2,048 u
Mass range	1–512 u	1–1,024 u	1–2,048 u
Min. detection limit	$1 \cdot 10^{-15}$ hPa	–	–
Ar sensitivity, min ¹⁾	$5 \cdot 10^{-4}$ A/hPa	$2 \cdot 10^{-4}$ A/hPa	$1 \cdot 10^{-4}$ A/hPa
Operating pressure, max. Faraday, max. SEM, max.	$1 \cdot 10^{-4}$ hPa $1 \cdot 10^{-5}$ hPa	$1 \cdot 10^{-4}$ hPa $1 \cdot 10^{-5}$ hPa	$1 \cdot 10^{-4}$ hPa $1 \cdot 10^{-5}$ hPa
Partial pressure ratio with SEM	< 0.5 ppb	< 5 ppb	< 20 ppb
Analyzer	QMA 400	QMA 400	QMA 400
Rod system, material/diameter	Mo/8 mm	Mo/8 mm	Mo/8 mm
Radio frequency generator (RF)	QMH 400-5	QMH 410-1	QMH 410-2
Electrometer preamplifier	EP 422	EP 422	EP 422
Operating temperature/analyzer	150 °C	150 °C	150 °C
Bakeout temperature/analyzer	400 ²⁾ °C	400 ²⁾ °C	400 ²⁾ °C
Connection flange	DN 63 CF-F	DN 63 CF-F	DN 63 CF-F

¹⁾ Faraday in the deflection unit, standard resolution, cross beam ion source with magnet, emission 1 mA

²⁾ With magnet, max. 300 °C

³⁾ Excellent performance data: Stability < 0.1 % over eight hours, contribution to adjacent mass < 0.1 ppm for the mass 40 and 41 u

System overview



Selection aid – typical applications and solutions

PTQ1	a	bc	d	e	f	g
Applications	Analyzer/mass range	Ion source/ion optics	Filament	Detector and high-voltage power supply	Preamplifier and ion counter	Interface options
General gas analysis	3, 5	01	1, 2, 3	1	1, 4	1, 2, 3
Particle-beam and general gas analysis	2, 3, 4, 5, 6, 7 ¹⁾	02, 03	1, 2	1, 3	1, 4	1, 2, 3
Analysis of gases or gas mixtures; for trace analysis; less residual gas influence than with open ion sources	2, 3, 5	04, 05	1, 2	1, 2	1, 4	1, 2, 3
Plasma technology, SIMS, photoionization	5	11	1, 2	1, 2	1, 2, 3, 4	1, 2, 3
UHV residual gas analysis, desorption measurements	4, 5, 6 ¹⁾	06 ²⁾	1, 2	1	1, 2	1, 2, 3
Thermally desorbed ions, electron-induced desorption, SIMS, photoionization, plasma ions	3, 5, 6	10, 11	0	2	2	1, 2, 3

¹⁾ For the mass range 1 to 2,048 u, analyzer QMA 400 with SEM 218 and HV 702 and EP 422.

²⁾ With tungsten filament only

a – Analyzer/ Mass range

The combination of analyzer and RF generator defines the mass range. The smallest suitable mass range for the application should be selected. The larger-diameter, precision-manufactured rod system affords improved transmission and higher sensitivity.

- **QMA 410:** Molybdenum, ø 16 mm rod system
- **QMA 430:** Stainless steel, ø 8 mm rod system for mass range of up to 300 u
- **QMA 400:** Molybdenum, ø 8 mm rod system

bc – Ion source /ion optics

Selection of the correct ion source is a crucial factor in the measurements.

- **Axial ion source:** High sensitivity and good linearity
- **Cross beam ion source:** For a direct gas beam inlet without wall interaction
- **Cross beam with magnet:** High sensitivity
- **Cross beam gas tight:** Low gas consumption, high signal-to-noise ratio
- **Grid ion source:** Low outgassing and desorption rate
- **Three-lens ion optics with beam stop:** For detection of positive and negative ions
- **Ion optics with cross beam ion source:** For detecting of neutrals and ions

d – Filament

- **Tungsten:** For UHV applications
- **Yttriated iridium:** Low temperatures, high resistance to air inrushes
- **Rhenium:** For residual gas analysis

e – Detector and high-voltage power supply

- **SEM 217 + HV 701:** Secondary electron multiplier in combination with a high-voltage power supply for detecting positive ions
- **SEM 217 + HV 702:** For measuring positive and negative ions
- **SEM 218 + HV 702:** Secondary electron multiplier with conversion dynode to detect high masses

f – Preamplifier and ion counter

- **EP 422:** Fast and sensitive preamplifier
- **CP 400:** Ion counting down to 1 count per 10 seconds, wide dynamic range

g – Interface options

- **IO 700 module** with 8 analog inputs and 8 analog outputs; 0 to 10 V, 12-bit resolution, 32 digital inputs and 32 digital outputs
- **CAN Open Fieldbus**
- **IO 720 module** with 16 digital outputs and 4 digital inputs; 4 analog outputs and 5 analog inputs and 1 connection for ActiveLine transmitter or connection for DigilLine transmitter.

Order number matrix
HiQuad®
Order number
PT Q1 a bc d e f g

Analyzer/mass range	a
QMA 410 / 1–128 u / QMH 400-1	2
QMA 410 / 1–340 u / QMH 410-3	3
QMA 430 / 1–300 u / QMH 400-5	4
QMA 400 / 1–512 u / QMH 400-5	5
QMA 400 / 1–1,024 u / QMH 410-1	6
QMA 400 / 1–2,048 u / QMH 410-2	7

Ion source/ ion optics	bc
Axial ion source	01
Cross beam ion source	02
Cross beam ion source with magnet	03
Gas tight cross beam ion source	04
Gas tight cross beam ion source with magnet	05
Grid ion source	06
Two-lens ion optics	10
Three-lens ion optics	11
Two-lens ion optics with cross beam ion source	12
Three-lens ion optics with cross beam ion source	13

Filament	d
Without	0
Tungsten	1
Yttriated iridium	2
Rhenium	3

Detector and high-voltage power supply	e
SEM 217 + HV 701	1
SEM 217 + HV 702	2
SEM 218 + HV 702	3

Preamplifier and ion counter	f
None	0
EP 422	1
CP 400	2
EP 422 + CP 400	3
2 x EP 422	4

Interface options	g
None	0
IO 700	1
CAN Open	2
IO 720	3



Leak detectors

The widest offer of leak testing solutions,
using helium and hydrogen



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Leak detectors

**The widest offer of leak testing solutions,
using helium and hydrogen**

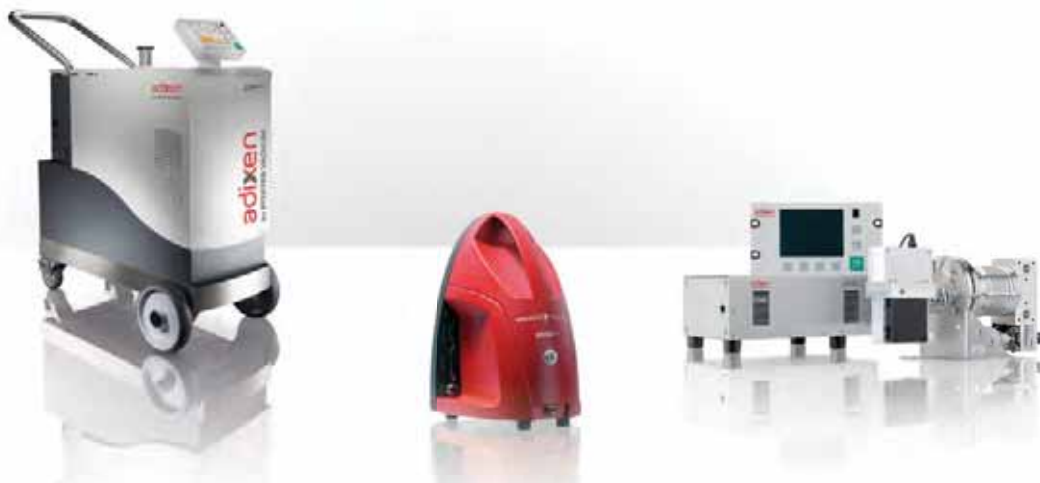
Pfeiffer Vacuum leak detectors find any leaks. No leak is too small or too large to escape from our leak detectors. It doesn't matter whether you are looking for water, oil, fuel, gas or vacuum leaks. From miniature electronic units right up to large-volume vessels, from media escaping from vacuum systems to gases entering them – the requirements for leak detection are as wide as the range of industrial products.

Leak detectors for various demands:

Our portable leak detectors are used both for mobile leak detection "on site", as well as for worldwide service jobs in a variety of different locations. They stand out above all due to their high performance combined with low weight.

Multipurpose leak detectors are used mainly for stationary applications to localize leaks and to check leak tightness. They are also movable thanks to a dedicated cart. These compact leak detectors are used in wide range of industries, from heavy industry right up to cleanroom applications. In this latter case, the dry version of the leak detectors is used.

High-performance leak detectors are used where extremely short cycle times and fast reduction of helium background are required. From testing of industrial components in high throughput production up to highly sensitive applications in vacuum and medical technology or in research and development.



Overview of series and applications

	Analytics				Semiconductors						Coating				Industry				R&D																																		
	Electron microscopy	Leak detection	Mass spectrometry	Surface analysis	Plasma monitoring	Residual gas analysis	Lithography	PVD (Physical Vapor Deposition)	CVD (Chemical Vapor Deposition)	Plasma etching	Implantation – source	Implantation – beamline	Inspection	Bonding	MBE (Molecular Beam Epitaxy)	Load locks, transfer chambers, handling systems	Flat Panel Display (FPD)	LED / OLED	Hard disk coating	Photovoltaics	Glass coating (PVD)	CD / DVD / Blu-ray production (PVD)	Optical coating (PVD)	Wear protection (PVD, CVD)	Hard coating	Medical technology	Industrial leak detection	Electron beam welding	Insulation vacuums	Bulb and tube manufacturing	Heat treatment	Vacuum drying	Vacuum furnaces	Nuclear research	Fusion technology	Plasma research	Particle accelerators	Space simulation	Low temperature research	Elementary particle physics	Nanotechnology	Biotechnology	Page										
recommended																																																					
Portable																																																					
MiniTest 300																																															130						
ASM 310	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	134				
Multipurpose																																																					
ASM 340	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	138				
ASM 340 D	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	138			
High performance – Mobile																																																					
ASM 380	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	142			
High performance – Compact																																																					
ASM 182 T	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	146			
ASM 182 TD+	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	146			
High performance – Console																																																					
ASM 192 T																																																			150		
ASM 192 T2D+																																																			150		
Workstation																																																					
ASM 1002																																																			154		
Modular																																																					
ASI 30																																																				158	
Sniffing																																																					
ASM 102 S																																																					162

Features at a glance

	Test method			Connection flange (inlet)				Minimum detectable leak rate for helium (sniffing leak detection)			Minimum detectable leak rate for helium (vacuum leak detection)		Detectable gases		Backing pump			Backing capacity						Page			
	Vacuum and sniffing leak detection	Vacuum leak detection	Sniffing	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF	DN 50 ISO-KF	$1 \cdot 10^{-8}$ Pa m ³ /s	$5 \cdot 10^{-9}$ Pa m ³ /s	$5 \cdot 10^{-10}$ Pa m ³ /s	$1 \cdot 10^{-12}$ Pa m ³ /s	$5 \cdot 10^{-13}$ Pa m ³ /s	⁴ He, ³ He, H ₂	⁴ He	without	dry	oil-sealed	1.7 m ³ /h	3.4 m ³ /h	15 m ³ /h	20 m ³ /h	25 m ³ /h	35 m ³ /h		40 m ³ /h	50 m ³ /h	
Portable																											
MiniTest 300		■		■									■	■													130
ASM 310	■			■			■					■	■		■	■											134
Multipurpose																											
ASM 340	■			■					■			■	■			■			■								138
ASM 340 D	■			■					■			■	■		■			■									138
High performance – Mobile																											
ASM 380	■			■			■					■	■		■									■			142
High performance – Compact																											
ASM 182 T	■			■			■					■	■			■				■							146
ASM 182 TD+	■			■			■					■	■		■								■				146
High performance – Console																											
ASM 192 T	■			■			■					■	■			■				■				■			150
ASM 192 T2D+	■					■	■					■	■		■								■		■		150
Workstation																											
ASM 1002	■			■			■					■	■			■								■	■		154
Modular																											
ASI 30	■			■					■			■	■		■												158
Sniffing																											
ASM 102 S		■					■						■		■												162



Customer benefits

Portable:

- Ultralight and easy to operate
- Ideal for global servicing work
- Remote controlled for comfortable operation

Multipurpose:

- Suitable for a large variety of leak detection applications
- Powerful and dependable
- Simple design for easy operation

High-performance:

- Extremely short pump down times even on large volumes
- Designed for ultra sensitive leak detection limits whatever size and volume of the test parts
- High reliability in clean processes as well as rough environments

Workstation:

- Ideal for testing in mass production with short cycle times
- Fully automatic leak detection on seated components
- Ergonomic design and operation, for seated operators

Modular:

- Easy and flexible integration into leak detection systems
- Low maintenance for continuous operation
- Broad selection of interfaces to answer all common industry standards

Sniffing:

- Ideal solution for accurately coating mirror leaks
- Status messages by voice synthesizer for the user's convenience
- Remote controlled for comfortable operation

Series at a glance

Portable



MiniTest 300



ASM 310



ASM 340
ASM 340 D

High performance – Mobile



ASM 380

High performance – Compact



ASM 182 T
ASM 182 TD+

High performance – Console



ASM 192 T
ASM 192 T2D+

Workstation



ASM 1002

Modular



ASI 30

Sniffing



ASM 102 S

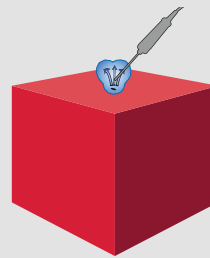
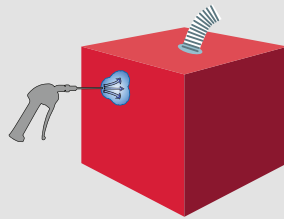




Six test methods for leak detection

Leak localization

Applications in production and maintenance as well as quality control



Method

Vacuum test: Spraying test

Sniffing test

For leak localization on parts under vacuum

For leak localization on pressurized parts

Description

The leak detector evacuates the air inside the test part. After that, the tracer gas is sprayed on the external surface of the part. The detector measures the gas flow through the leak channel in the wall of the test part. The leak can be localized.

The test part is pressurized with tracer gas. After that, the sniffer probe is moved around the part. If a leak is present, the leak detector will detect the escaping tracer gas, allowing to locate the leak.

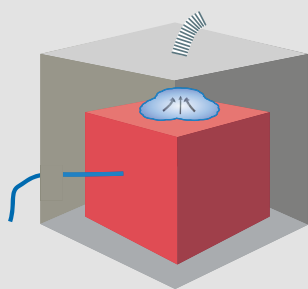
Customer benefits

- Localization of the leak
 - Very high sensitivity
 - Easy to perform
 - Local or integral test
- Localization of the leak
 - Not necessary to put the test part under vacuum
 - Easy to perform

	Vacuum test: Spraying test	Sniffing test	Integral vacuum test	Vacuum test: Bombing test	Integral test of enclosed parts under vacuum	Sniffing test: Integral test at atmospheric pressure
MiniTest	■					
ASM 310	■	■				
ASM 340/340 D	■	■	■		■	■
ASM Graph / GraphD	■	■	■		■	■
ASM 380	■	■	■		■	■
ASM 182 T / TD+	■	■	■	■	■	■
ASM 192 T / T2D+	■	■	■	■	■	■
ASM 1002	■	■	■	■	■	■
ASI 30		■	■		■	■
ASM 102 S		■				

Integral test

Industrial applications and quality control

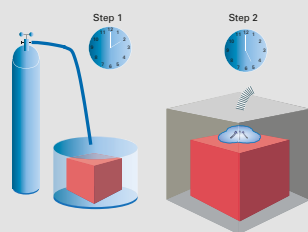


Integral vacuum test

Used in production environments

The test part is placed in a vacuum test chamber and filled with tracer gas. Should a leak be present, the tracer gas will escape from the part into the test chamber and will be measured by the leak detector.

- Very high sensitivity
- High throughput
- Easy to integrate into a production line
- Easy calibration
- High repeatability

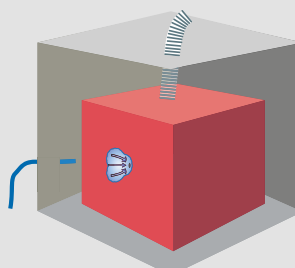


Vacuum test: Bombing test

The test part is sealed and cannot be evacuated or pressurized.

Place the test part in a specific chamber and pressurize it with tracer gas (bombing chamber). Should a leak be present, the tracer gas is forced into the part due to the gas pressure. After that, the part is placed in a vacuum chamber which is evacuated. Any tracer gas that was forced inside the part will now escape and be measured by the leak detector.

- The only solution to test sealed components with high sensitivity
- High repeatability

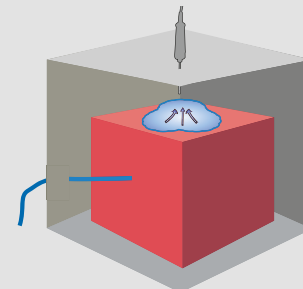


Integral test of enclosed parts under vacuum

It needs to be tested whether tracer gas can enter into the part.

Inside a test chamber, the part is connected to a leak detector and evacuated. The chamber is filled with tracer gas. Should a leak be present, the tracer gas will penetrate the part and be measured by the leak detector.

- High automation level possible
- Very high sensitivity
- High throughput
- High repeatability



Sniffing test: Integral test at atmospheric pressure

The test part can withstand overpressure and needs to be tested as a complete product.

The test part is pressurized with tracer gas in a simple accumulation chamber which is under atmospheric pressure. After an accumulation time, the detector analyzes the air inside the chamber and determines if an increase in the tracer gas concentration can be measured.

- Easy to integrate into a production line



MiniTest 300

Portable helium leak detector for industrial use



MiniTest 300

The MiniTest 300 helium leak detector weighs only a sensational 5 kg. It is the first vacuum leak detector on the market which works with a quartz window sensor. Thanks to this innovative technology, it stands out due to its lightweight design and small footprint.

The MiniTest 300 can work at a high inlet pressure of up to 200 hPa and is not sensitive to water vapor. This makes it the ideal solution for leak detection in power plants, vacuum furnaces and vacuum systems as well as in heat exchangers.

The uncomplicated operation and optional wireless remote control, with a range of up to 100 meters, enable helium leak detection to be carried out even in large systems by only one person. The data measured can be easily read out on a 3.5 inch touchscreen and saved on the remote control.

Since it is practically maintenance-free, the MiniTest 300 is also cost-efficient both in operation and in long-term use.

Customer benefits

- Vacuum leak detection with a quartz window sensor for localizing and quantifying even the smallest of leaks
- Ideal for servicing work due to compact size and light weight (5 kg)
- Wireless remote control with extensive range and memory
- Easy touchscreen operation with intuitive menu navigation
- Graphic display
- Direct connection possible to systems with a maximum working pressure of up to 200 hPa
- Leaks of up to $5 \cdot 10^{-8}$ Pa m³/s detectable with a pumping speed of 1 l/s
- Low maintenance costs

Typical applications

- Vacuum furnaces
- Lamp manufacturing
- Vacuum coating systems
- Air conditioning and refrigeration
- Pharmaceuticals
- Power engineering
- Chemistry



Pharmaceutics



Air conditioning and refrigeration



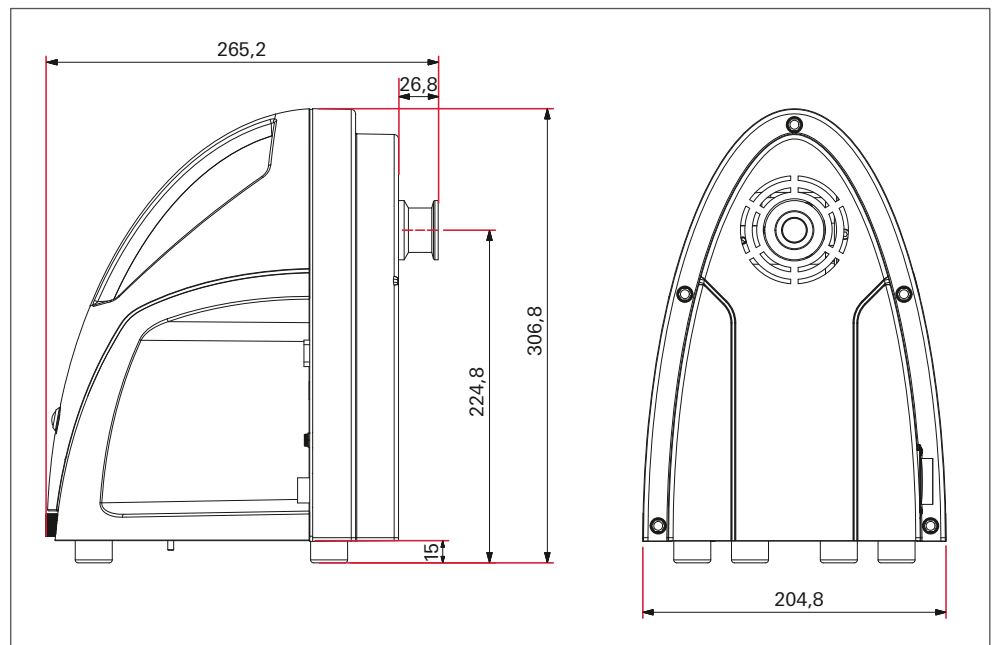
Vacuum furnaces

MiniTest 300



- Compact size and light weight (approx.5 kg)
- Detection limit of $5 \cdot 10^{-8}$ Pa m³/s (S = 1 l/s)
- Good water vapor tolerance
- Inlet pressure up to 200 hPa abs.
- Remote control, wireless or with cable, with data logging and USB port
- Connection of an external Compact gauge
- Low maintenance costs

Dimensions (in mm)



Technical data	MiniTest 300
Flange (in)	DN 25 KF
Noise level	< 70 dB (A)
Power consumption	max. 30 VA
Power input	max. 2 A
Installation altitude, max.	2,000 m
Ready for operation after	30 min
Maximum inlet test pressure	200 hPa absolute
Weight	5 kg
Minimum detectable leak rate for ⁴ He (to AVS 2.1)	$5 \cdot 10^{-8}$ Pa m ³ /s ¹⁾
Interfaces	RS-485, gauge, remote control, radio transmitter, I/O D-Sub 9
Operating temperature	+10 to +35 °C
Storage temperature	-10 to +55 °C
Power supply	100-240 V, 50/60 Hz
Backing pump	without

¹⁾ at a pumping speed of the system pump of S = 1 l/s

Order number	
MiniTest 300	PT L03 000

Accessories	
Remote control RC 500 WL, wireless	PT 445 420-T
Remote control RC 500	PT 445 421-T
Test leak in pin-type casing with adapter DN 16 ISO-KF	
Leak rate $3 \cdot 10^{-4}$ Pa m ³ /s	PT 445 425
Leak rate $3 \cdot 10^{-5}$ Pa m ³ /s	PT 445 426
Leak rate $3 \cdot 10^{-6}$ Pa m ³ /s	PT 445 427
Transport case	PT 445 428
Extension cable	PT 445 402
Helium spray gun	BG 512 125 -T
Centering ring with poral filter	PF 117 225 -T



ASM 310

Combining light weight with superior performance



ASM 310

The portable ASM 310 provides high performance wherever it is needed at only half the weight, half the footprint and half the size of standard desktop leak detectors. At only 21 kg it is still a complete vacuum system incorporating the same detector technology as larger models.

Thanks to its clean, oil-free pumping system, the ASM 310 is the right choice for leak-test maintenance of systems which do not tolerate any contamination.

Light weight and universal voltage enable the ASM 310 to be easily operated anywhere in the world. A transport case to safeguard against shipping damage as well as a cart are available as accessories.

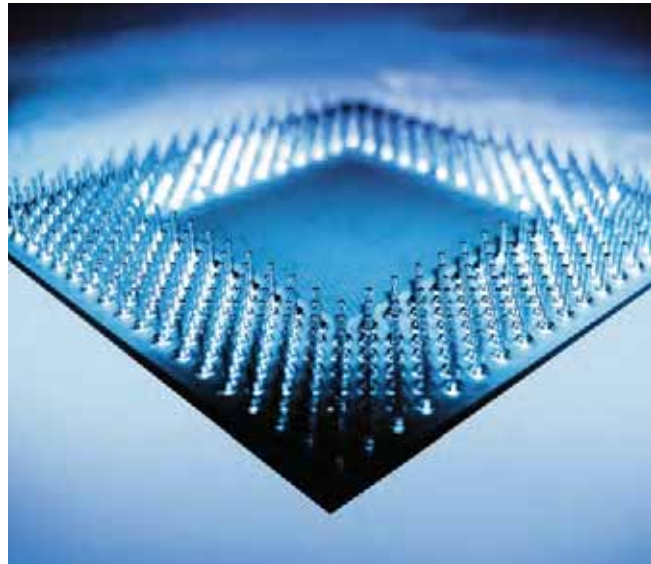
The ASM 310 can also be operated with the wireless remote control RC 500 WL. This allows remote operation at a distance of up to 100 meters.

Customer benefits

- Lightweight and portable, only 21 kg
- Smart design with retractable handle
- Easy to move
- Detachable control panel
- On-demand operating interface
- Intuitive and customizable menu
- Small footprint, small size
- Can be operated in any position
- Large bright color touchscreen
- Color graphics functionality
- Password-protected display
- Integrated SD memory card for data recording, downloading and parameter setting
- Voice synthesizer

Typical applications

- Semiconductors
- Analytics and research
- Industrial applications
- Power plants



Semiconductor industry



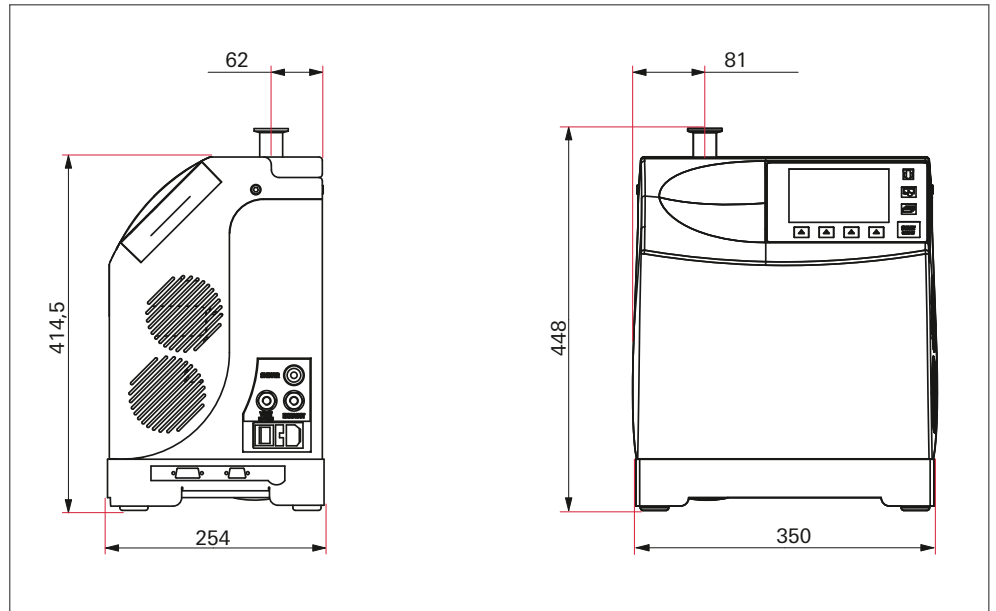
Industrial applications



ASM 310

- Oil-free pumping system, backing capacity 1.7 m³/h
- Ultralight, only 21 kg and portable
- Large bright color touchscreen
- Intuitive and customizable menu
- Integrated SD memory card for data recording and downloading capabilities

Dimensions (in mm)



Technical data:	ASM 310
Test methods	Vacuum and sniffing leak detection
Minimum detectable leak rate for helium (vacuum leak detection)	$5 \cdot 10^{-13}$ Pa m ³ /s
Minimum detectable leak rate for helium (sniffing leak detection)	$1 \cdot 10^{-8}$ Pa m ³ /s
Detectable gases	⁴ He, ³ He, H ₂
Maximum inlet test pressure	15 hPa
Backing pump capacity	1.7 m ³ /h
Pumping speed for He	1.1 l/s
Flange (in)	DN 25 ISO-KF
Start-up time (20°C)	< 2 min. (< 3.5 min. with autocalibration)
Response time (sniffing leak detection)	< 1 s
Interface	RS-232, analog
I/O interfaces	Digital input Analog output (mantissa) Analog output (exponent)
Dimensions (L x W x H)	350 x 245 x 414 mm
Weight:	21 kg
Universal voltage	100-240 V AC – 50/60 Hz
Maximum power consumption	300 W
Helium background suppression	Auto / manual
Operator interface	Color touchscreen
Selectable languages	English, French, German, Italian, Spanish, Russian, Japanese, Chinese, Korean

Order number	
ASM 310	BSAA0000MM9A

Accessories	
Country-specific power cables	
UK	104411
Italy	104758
Switzerland	103718
Remote control RC 500 WL, wireless	PT 445 420-T
Trolley	114820
Transportation case	119594



ASM 340

Best in class compact multipurpose leak detectors for any application in maintenance or production environments



ASM 340

For maintenance applications as well as small production environments, our ASM 340 offers top performance in vacuum or sniffing leak detection. This dependable leak detector can be used both for qualitative localization of leaks as well as for quantitative integral or local testing. The ASM 340 is distinguished by its powerful backing pump which is available in oil-sealed and dry versions. Easy operation, ultra-fast response times and a short recovery time are among the outstanding features of this compact multipurpose unit.

The ASM 340 can be adapted to specific applications with the aid of extensive accessories. Existing accessories for leak detectors in our ASM and HLT series are also compatible with the ASM 340.

Customer benefits

- Suitable for maintenance and small production applications for example in Industry, R&D and Analytics
- High backing capacity for versatile use (in oil-sealed or dry version)
- Fast response time
- 25 hPa inlet test pressure and capability to locate leaks from ~100 hPa
- Intuitive menu easy to navigate
- SD memory card for storage capabilities and easy post-processing of leak test results
- Rugged design and low maintenance

Typical applications

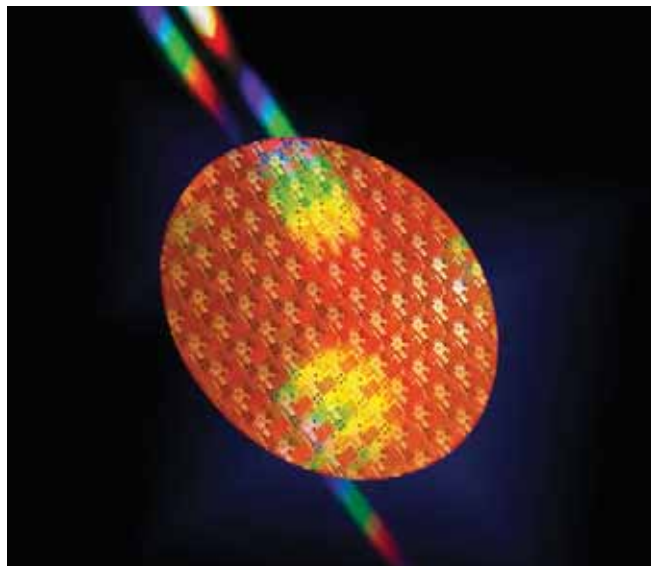
- Research and development
- Aeronautic industry
- Mechanical engineering
- Measuring technology
- Refrigeration
- Air conditioning
- Semiconductor technologie



Refrigeration and air conditioning



Research and development



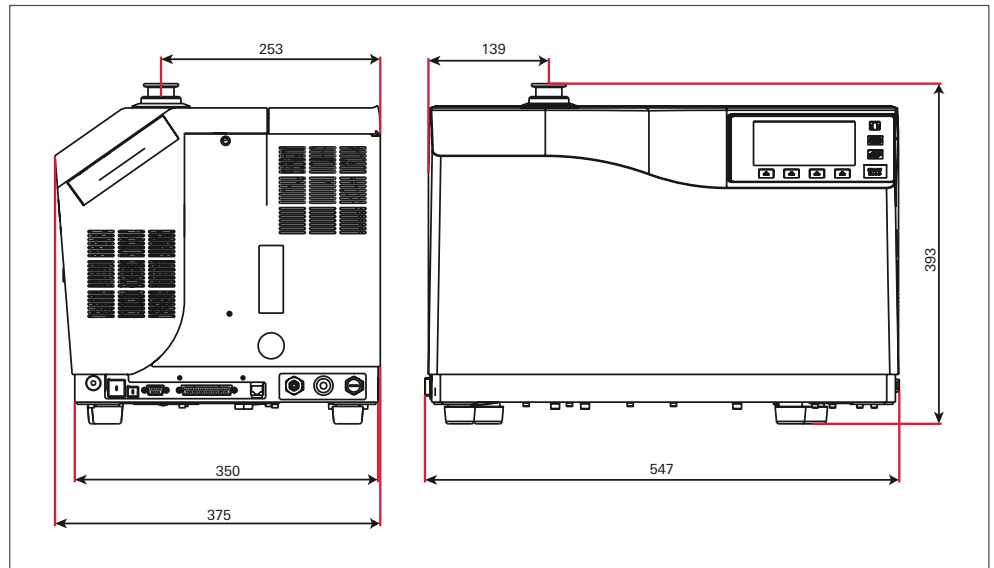
Semiconductor technology



ASM 340

- The fastest Time to Test in its class
- Powerful backing capacity for versatile use, valid for oil-sealed version as well as for dry version
- Effective 2.5 l/s helium pumping speed for a rapid response time
- Unique leak detector with the capability to locate big leaks from 100 hPa
- Detachable control panel for the best ergonomics
- Wireless remote control for operating range of up to 100 meters
- Basic or Smart sniffer probes available with various nozzle types and hose lengths
- SD memory card storage capabilities
- Low maintenance and rugged design

Dimensions (in mm)



Technical data	ASM 340	ASM 340 D
Test methods	Vacuum and sniffing leak detection	Vacuum and sniffing leak detection
Minimum detectable leak rate for helium (vacuum leak detection)	$< 5 \cdot 10^{-13}$ Pa m ³ /s	$< 5 \cdot 10^{-13}$ Pa m ³ /s
Minimum detectable leak rate for helium (sniffing leak detection)	$5 \cdot 10^{-10}$ Pa m ³ /s	$5 \cdot 10^{-10}$ Pa m ³ /s
Detectable gases	⁴ He, ³ He, H ₂	⁴ He, ³ He, H ₂
Backing pump capacity	Oil-sealed or dry	Diaphragm pump
Maximum inlet test pressure	25 hPa	25 hPa
Pumping speed for He	2.5 l/s	2.5 l/s
Flange (in)	DN 25 ISO-KF	DN 25 ISO-KF
Interface	RS-232 and other optional interfaces (Ethernet, USB, Bluetooth, WiFi)	RS-232 and other optional interfaces (Ethernet, USB, Bluetooth, WiFi)
I/O interfaces	Digital inputs and outputs, analog outputs	Digital inputs and outputs, analog outputs
Dimensions (L x W x H)	390 x 546 x 375 mm	390 x 546 x 375 mm
Weight	56 kg	45 kg
Supply	110–130 V, 50/60 Hz 200–240 V, 50/60 Hz	Universal 200–240 V, 50/60 Hz
Power consumption, max.	850 W	600 W
Temperature: Operating	0–45°C (Vacuum) 0–40°C (Sniffing)	0–35°C
User interface	Color touchscreen	Color touchscreen
Selectable languages	English, French, German, Italian, Spanish, Russian, Japanese, Chinese, Korean	English, French, German, Italian, Spanish, Russian, Japanese, Chinese, Korean

Zubehör		
Country-specific power cord		
Great Britain	104411	104411
Italy	104758	104758
Switzerland	103718	103718
Remote control, leak rate in mbar l/s, legend in English, 5 m cable	106688	106688
Remote control, leak rate in Pa m ³ /s legend in English, 5 m cable	108880	108880
Remote control RC 500 WL	PT 445 420 -T	PT 445 420 -T
Spray gun, standard	112535	112535
Spray gun "Elite-Kit", spray gun with additional accessories in a compact case	109951	109951
Sniffer probe, 5 m hose length, rigid 9 cm nozzle	SNC1E1T1	SNC1E1T1
LP 505, sniffer probe with standard tip, 5 m	BG449208 -T	BG449208 -T
Profibus interface	121645	121645
Bypass option with EU cable	PT 445 411 -T	PT 445 411 -T
Bypass option with US cable	PT 445 413 -T	PT 445 413 -T

ASM 380

Mobile high performance leak detector for rapid pumpdown
and short response times



ASM 380

The ASM 380 mobile high-performance leak detector from Pfeiffer Vacuum is optimized for rapid pumpdown and short response times on large test objects. Equipped with a dry ACP 40 backing pump in combination with a powerful high vacuum pump, it provides you with the ideal solution for maximum testing sensitivity in analytics, laboratories, solar panel and semiconductor industry.

The slim design and compact size set up on a cart with large wheels and a low center of gravity make the ASM 380 mobile and safe to handle.

The ASM 380 with its low noise level of only 53 dB(A) is unusually quiet for a leak detector of its class. The color display panel with full 360° viewing can be read from any position. An integrated SD memory card makes it easy to save test data and settings parameters. The ASM 380 has an integrated lockable storage compartment for tools, spare parts and accessories. Thanks to its convenient bottle-holder, it is even possible to attach and safely transport a tracer gas bottle.

Customer benefits

- High performance, sensitivity and mobility in the smallest footprint
- High roughing capacity using clean, particle free and dry ACP pump
- Suitable for use in cleanrooms
- High crossover pressure for a rapid entry into measurement mode
- Optional communication interfaces
- Color touchscreen with full 360° viewing offering excellent visibility
- Intuitive menu easy to navigate, available in 9 languages

Typical applications

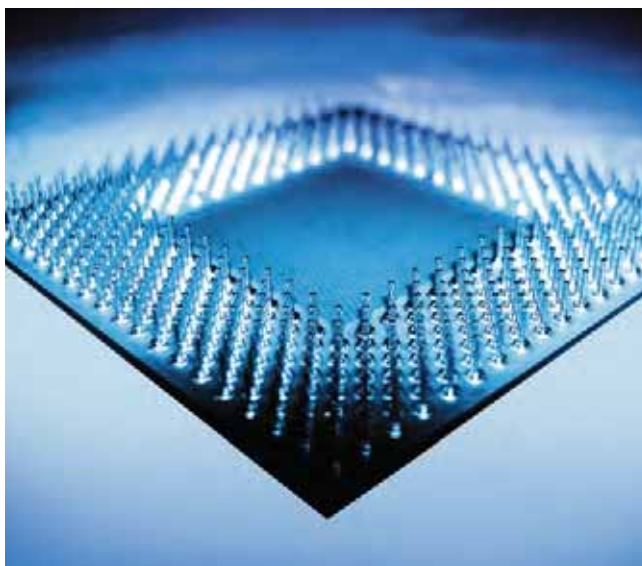
- Semiconductor industry
- Large area coating
- Solar industry
- Accelerators
- Vacuum components, feedthroughs, valves, bellows, expansion joints
- Laser technology
- High purity media supply systems
- Electronics
- Aeronautic and aerospace industry
- Medical technology



Solar industry



Accelerators



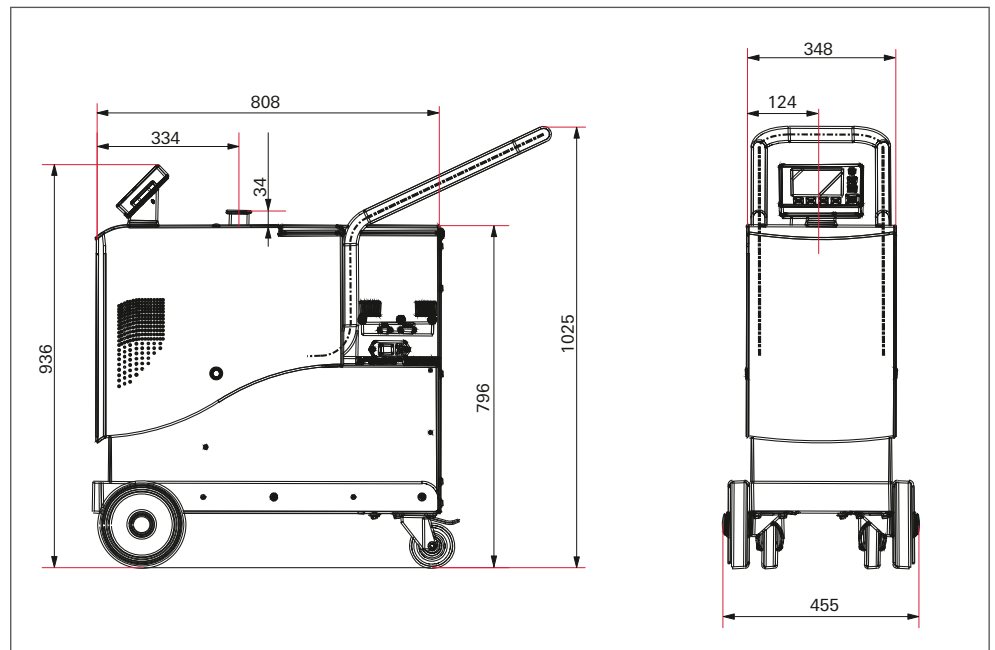
Semiconductor industry



ASM 380

- High backing capacity (35 m³/h) and high helium pumping speed
- Fast time to test: unrivaled performances from small to large volumes
- Narrow design and highly maneuverable
- Customizable operator interface with 360° viewing
- Integrated SD memory card for data processing

Dimensions (mm)



Technical data:	ASM 380
Flange (in)	DN 40 ISO-KF
Test method	Vacuum and sniffing leak detection
Detectable gases	^4He , ^3He , H_2
Minimum detectable leak rate for helium (sniffing leak detection)	$1 \cdot 10^{-8} \text{ Pa m}^3/\text{s}$
Minimum detectable leak rate for helium (vacuum leak detection)	$5 \cdot 10^{-13} \text{ Pa m}^3/\text{s}$
Pumping speed for He	7 l/s
Noise level	< 53 dB (A)
Power supply	90–240 V, 50/60 Hz
Power consumption max.	1,500 W
Power consumption	700 W
Maximum inlet test pressure	15 hPa
Start-up time (20°C) without calibration	< 4.5 min
Start-up time (20°C) with calibration	< 5.5 min
I/O interfaces	1 Digital input (Start cycle); 2 Digital outputs (Test mode ok, Helium signal above reject set point); 3 Analog outputs (Configurable: Helium signal log, Mantissa, Exponent, Inlet pressure)
Interface	RS-232
Operating temperature	10 to 35 °C
Roughing capacity	35 m ³ /h
Weight	110 kg
Selectable languages	English, French, German, Italian, Spanish, Russian, Japanese, Chinese, Korean

Order number	
ASM 380, universal voltage	PSGB00E0MM9A
ASM 380, universal voltage, integrated Bluetooth	PSGB00E1MM9A
ASM 380, universal voltage, configurable I/O interface board	PSGB00E2MM9A
ASM 380, universal voltage, configurable I/O interface board, integrated WiFi	PSGB00E3MM9A
ASM 380, universal voltage, configurable I/O interface board, Ethernet	PSGB00E4MM9A

Accessories	
Bottle holder for ASM 380	118444
Inlet filter, 20 µm, DN 40/40 ISO-KF	105842
Remote control RC 500 WL, wireless	PT445420-T
Locking clamp, DN 40 KF	118801



ASM 182 T, ASM 182 TD+

The perfect combination of high performance and easy operation
for exceptional reliability even in the harshest industrial applications



ASM 182 T, ASM 182 TD+

The high-performance leak detectors in the ASM 182 series are available in oil-lubricated and dry versions. Both versions are equipped with a high backing capacity.

The small footprint of these leak detectors enables them to be easily integrated into production lines. Our powerful ASM 182 can be used for leak detection on parts of varied sizes and volumes. Whether used in the automotive industry, the aeronautic and aerospace or in semiconductor industry, these leak detectors fit the bill with their high performance and reliability.

Customer benefits

ASM 182 T

- Extremely short cycle times due to largest backing pump in its class
- Important status messages delivered by voice synthesizer
- Low helium background even with large test parts
- Easy maintenance due to the fold-out feature of its front and rear housing

Customer benefits

ASM 182 TD+

- The test pressure is attained rapidly even with large or strongly outgassing test parts
- Fast response time and short test cycles thanks to high helium pumping speed
- Ultra-small background signals and rapid signal reduction, for the most demanding tests

Typical applications

- Leak detection systems
- Automotive industry
- Aeronautic and aerospace industry
- Laser technology
- Sensors
- Vacuum components, feedthroughs, valves, bellows, expansion joints
- Electronics
- Mechanical components
- Heat exchangers



Aeronautic and aerospace industry



Automotive industry



Leak detection system



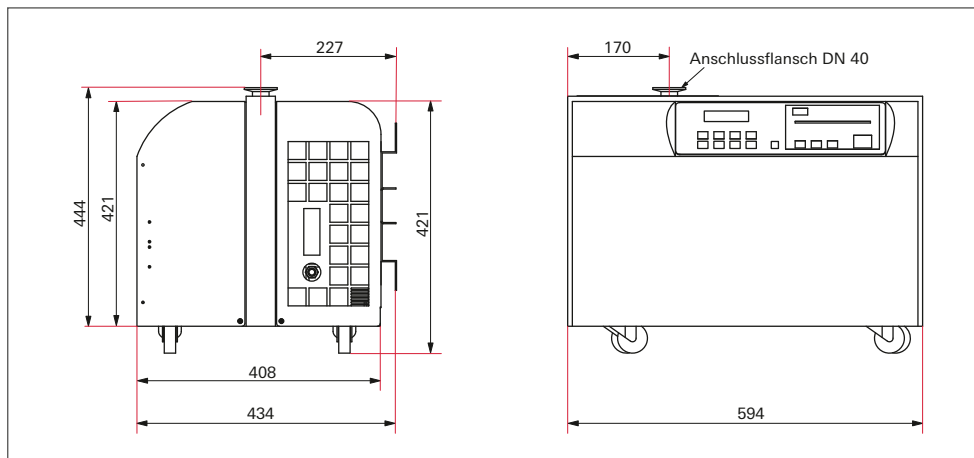
ASM 182 T

- Powerful rotary vane pump with 20 m³/h roughing capacity
- 4.4 l/s helium pumping speed

ASM 182 TD+

- Frictionless ACP dry pump with 25 m³/h roughing capacity
- 4.4 l/s helium pumping speed

Dimensions (mm)



Technical data:	ASM 182 T Standard	ASM 182 TD+ Standard
Flange (in)	DN 40 ISO-KF	DN 40 ISO-KF
Test methods	Vacuum and sniffing leak detection	Vacuum and sniffing leak detection
Detectable gases	⁴ He	⁴ He
Minimum detectable leak rate for helium (sniffing leak detection)	1 · 10 ⁻⁸ Pa m ³ /s	1 · 10 ⁻⁸ Pa m ³ /s
Minimum detectable leak rate for helium (vacuum leak detection)	5 · 10 ⁻¹³ Pa m ³ /s	5 · 10 ⁻¹³ Pa m ³ /s
Pumping speed for He	4.4 l/s	4.4 l/s
Noise level	< 54 dB (A)	< 65 dB (A)
Supply	200–240 V, 50/60 Hz	200–240 V, 50/60 Hz
Power consumption max.	1,000 W	1,500 W
Maximum inlet test pressure	6 hPa	6 hPa
Backing pump capacity	20 m ³ /h	25 m ³ /h
Start-up time (20°C) without calibration	3 min	< 4 min.
Start-up time (20°C) with calibration	4.5 min	< 5.5 min.
I/O interfaces	Digital inputs (Start, Vent, Calibration...); Digital outputs (Test modes, Cycle in progress, Helium signal above reject set point...); Analog outputs (Helium signal log, Inlet pressure)	Digital inputs (Start, Vent, Calibration...); Digital outputs (Test modes, Cycle in progress, Helium signal above reject set point...); Analog outputs (Helium signal log, Inlet pressure)
Interface	RS-232	RS-232
Operating temperature	10 to 40 °C	10 to 40 °C
Weight	76 kg	88 kg

Order number matrix
ASM 182 T, ASM 182 TD+
Order number

a	b	c	d	e	f	g	h	i	j	0
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Leak detectors	a
ASM 182 T	D2
ASM 182 TD+ without cart	D1
ASM 182 TD+ with cart	D7
Detectable gases	b
Helium (⁴ He)	0
3 masses (⁴ He, ³ He, H ₂)	3
Seals for vacuum module and analyzer cell	c
Elastomer	R
Metal	M
Control panel	d
Standard	S
Graphic color touchscreen	T
Detection option	e
ASM 182 T (not available)	0
ASM 182 TD+ Standard	S
ASM 182 TD+ with gas line option	G
Test chamber	f
without	0
Small test chamber	1
Medium test chamber	2
Large test chamber	3
Cover	g
Painted	P
UCT (stainless steel housing and frame), ASM 182 TD+ only	C
Language	e
French	A
English	B
German	C
Japanese	E
Supply	f
100–130 V, 50/60 Hz	7
220–240 V, 50/60 Hz	8
Cable and plug type	g
USA	1
France/Germany	2
UK	3
Italy	4
Switzerland	5
Without plug	7



ASM 192 T, ASM 192 T2D+

Ultra sensitive detection limits on large-volume components,
ergonomic unit for standing operators



ASM 192 T, ASM 192 T2D+

High-performance leak detectors in the ASM 192 series provide high reliability even in harsh applications. Extremely short pumpdown times even on large chambers as well as ultra short cycle times are the outstanding features of these console units. The vacuum system incorporating a powerful high vacuum pump reduces helium background fast and makes for short recovery times even after big leaks.

With one or two backing pumps operating in parallel, system configurations can be ideally adapted to meet any production throughput requirements. Oil-lubricated rotary vane pumps as well as dry ACP pumps are available for use as backing pumps for the ASM 192 series.

The console units have an ergonomic working height designed for standing operators and the remote control is fixed on an articulated arm for the operator's convenience. The work surface is grounded and provides generous space for putting on large test objects, useful small parts and installation components.

Customer benefits

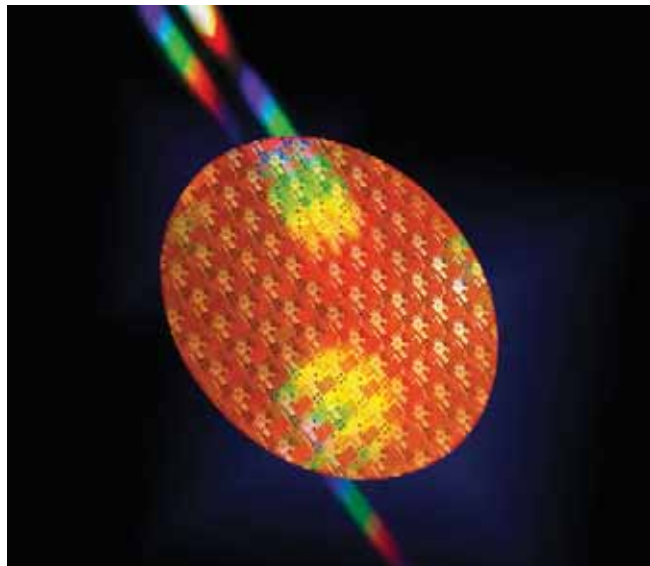
- Ideal for industrial applications
- Robust and reliable in the harshest environments
- Fast response time thanks to very high helium pumping speed
- Various languages and operating voltages available for worldwide use
- Graphic color touchscreen
- Test chambers can be mounted on the inlet flange

Typical applications

- Laser technology
- Aeronautics and aerospace
- Space simulation
- Electronics
- Nuclear technology
- Medical technology
- Accelerators
- Semiconductor technology
- Research and development
- Coating
- Vacuum technology, large chambers



Accelerators



Semiconductor technology



Aeronautics and aerospace



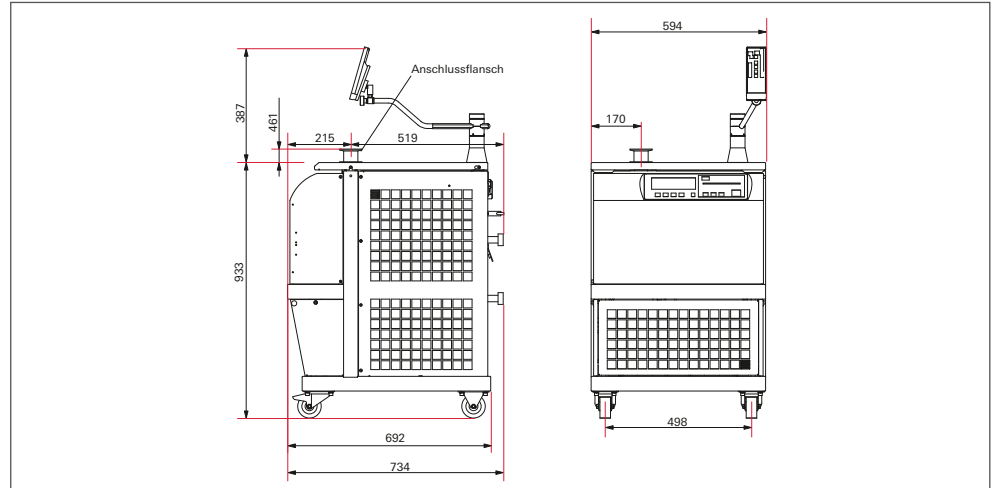
ASM 192 T

- Powerful rotary vane pump(s) with 20 m³/h (40 m³/h) backing capacity
- 4.4 l/s helium pumping speed

ASM 192 T2D+

- Frictionless ACP dry pump(s) with 25 m³/h (50 m³/h) backing capacity
- 20 l/s helium pumping speed

Dimensions (mm)



Technical data:	ASM 192 T Standard	ASM 192 T2D+ Standard
Flange (in)	DN 40 ISO-KF	DN 50 ISO-KF
Test methods	Vacuum and sniffing leak detection	Vacuum and sniffing leak detection
Detectable gases	⁴ He	⁴ He
Minimum detectable leak rate for helium (sniffing leak detection)	1 · 10 ⁻⁸ Pa m ³ /s	1 · 10 ⁻⁸ Pa m ³ /s
Minimum detectable leak rate for helium (vacuum leak detection)	5 · 10 ⁻¹³ Pa m ³ /s	5 · 10 ⁻¹³ Pa m ³ /s
Pumping speed for He	4.4 l/s	20 l/s
Noise level	< 54 dB (A)	< 66 dB (A)
Supply	200–240 V, 50/60 Hz	200–240 V, 50/60 Hz
Power consumption max.	1,300 W	1,000 W
Maximum inlet test pressure	6 hPa	30 hPa
Backing pump capacity	20 m ³ /h	25 m ³ /h
Start-up time (20°C) without calibration	3 min.	3.5 min.
Start-up time (20°C) with calibration	4.5 min.	5 min.
I/O interfaces	Digital inputs (Start, Vent, Calibration...); Digital outputs (Test modes, Cycle in progress, Helium signal above reject set point...); Analog outputs (Helium signal log, Inlet pressure)	Digital inputs (Start, Vent, Calibration...); Digital outputs (Test modes, Cycle in progress, Helium signal above reject set point...); Analog outputs (Helium signal log, Inlet pressure)
Interface	RS-232	RS-232
Operating temperature	10 to 40 °C	10 to 40 °C
Weight	125 kg	157 kg

Order number matrix
ASM 192 T, ASM 192 T2D+
Order number

a	b	c	0	d	e	f	g	h	i	0
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Leak detectors	a
ASM 192 T	D4
ASM 192 T2D+	D3

Detectable gases	b
Helium (⁴ He)	0
3 masses (⁴ He, ³ He, H ₂)	3

Seals for vacuum module and analyzer cell	c
Elastomer	R
Metal	M

Backing pump	d
One backing pump (ASM 192 T: 20 m ³ /h, ASM 192 T2D+: 25 m ³ /h)	S
ASM 192 T – Two backing pumps: 40 m ³ /h	R
ASM 192 T2D+ – Two backing pumps: 50 m ³ /h	T

Test chamber	e
Without	0
Small test chamber	1
Medium test chamber	2
Large test chamber	3

Measuring units	f
mbar l/s	M
Torr l/s	T
Pa m ³ /s	P

Language	g
French	A
English	B
German	C
Japanese	E

Supply	h
100–130 V, 50/60 Hz ¹⁾	7
220–240 V, 50/60 Hz	8

Cable and plug type	i
USA 15 A	1
France/Germany	2
UK	3
Italy	4
Switzerland	5
Without plug	7
USA 30 A ²⁾	8

¹⁾ Not under 110 V if operated with two backing pumps

²⁾ If the voltage is lower than 110 V, choose cable type 8 : USA 30A



ASM 1002

For leak testing of various objects where high production throughput is required



ASM 1002

The ASM 1002 leak detector combines high performance with user-friendliness. The powerful vacuum system provides a backing capacity of up to 50 m³/h and guarantees fast reduction of helium background between measurements. These performance characteristics along with its reliability and long-term stability make the ASM 1002 the ideal solution for even the most demanding applications such as leakage testing of pacemakers.

The ASM 1002 enables automatic leak detection to be carried out on sealed components. By closing the test chamber, the test procedure starts and a red / green light indicates the test result at the end. If necessary, the test chamber can simply be exchanged for a standard vacuum flange or a part-specific holding fixture. This allows the same leak detector to be used for testing open parts, too.

Customer benefits

- Short time to test thanks to a powerful pumping package: One or two rotary vane pumps (25 or 50 m³/h) to evacuate the test object and one rotary vane pump (20 m³/h) as fore pump for the high-vacuum pump
- The fastest unit of its category: less than 5 seconds to achieve $1 \cdot 10^{-10}$ Pa m³/s in a mass production
- Unique ergonomics for operator's comfort
- Two tests methods: Standard test or special Pass/Fail menu for semi-automatic testing with high throughput
- Rugged and highly reliable unit to meet high volume production needs
- Low maintenance

Typical applications

- Electronic components
- Medical technology
- Pharmaceuticals
- Food technology
- Lamp technology, large components



Lamp technology



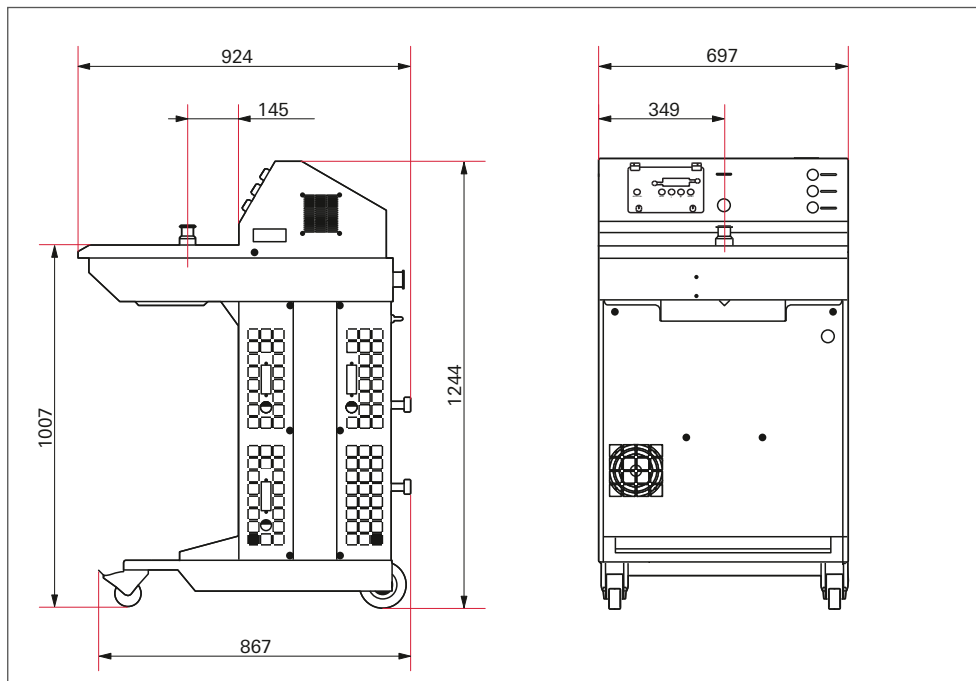
Food technology



ASM 1002

- Backing pump(s) with 25 m³/h (50 m³/h) capacity and high vacuum pump 200 l/s
- 4 l/s helium pumping speed

Dimensions (mm)



Technical data:	ASM 1002
Flange (in)	DN 25 ISO-KF
Test method	Vacuum and sniffing leak detection
Detectable gases	⁴ He
Minimum detectable leak rate for helium (sniffing leak detection)	1 · 10 ⁻⁸ Pa m ³ /s
Minimum detectable leak rate for helium (vacuum leak detection)	1 · 10 ⁻¹² Pa m ³ /s
Pumping speed for He	4 l/s
Noise level	< 55 dB (A)
Backing pump capacity	25 m ³ /h
Supply	110–130/200–240 V, 50/60 Hz
Power consumption	< 1,500 W
Power consumption max.	2,300 W
Maximum inlet test pressure	100 hPa
Start-up time (20°C) without calibration	< 3.5 min
Start-up time (20°C) with calibration	< 4.5 min
I/O interfaces	Analog outputs (Helium signal log, Inlet pressure); Specific analog outputs to recover the light status in Pass/Fail
Interface	RS-232
Operating temperature	10 to 40 °C
Weight	190 kg

Order number matrix
ASM 1002
Order number

a	b	c	0	d	e	0	f	g	h	i	0
---	---	---	---	---	---	---	---	---	---	---	---

Leak detectors	a
ASM 1002	Y

Detectable gases	b
Helium (⁴ He)	0
3 masses (⁴ He, ³ He, H ₂)	3

Seals for vacuum module and analyzer cell	c
Elastomer	R
Metal	M

Backing pump	d
One backing pump, 25 m ³ /h	S
Two backing pumps, 50 m ³ /h	T

Test chamber	e
Inlet flange DN 25	0
Small test chamber	1
Medium test chamber	2
Large test chamber	3

Remote control	f
Without	S
mbar l/s	M
Torr l/s	T
Pa m ³ /s	P
Pa m ³ /s, Japan	J

Language	g
French	A
English	B

Supply	h
100–130 V, 50/60 Hz ¹⁾	7
220–240 V, 50/60 Hz	8

Cable and plug type	i
USA/Japan	1
France/Germany	2
UK	3
Italy	4
Switzerland	5
Without plug	7

¹⁾ not below 110 V for operation with two backing pumps

ASI 30

Easy and quick integration into industrial leak detection systems



ASI 30

The ASI 30 modular leak detector combines high performance, reliability and repeatability with minimum maintenance and maximum up-time. It offers easy operation for accurate leak test results under all leak test conditions.

The ASI 30 is specially adapted to meet the requirements of machine builders and their end users. Thanks to its modular design the ASI 30 is optimized for minimum space requirements and maximum integration options. The vacuum module can be installed in any position and all the other modules are compatible with 1/2 19 inch rack format. The leak detector can be controlled without a control panel simply through a PC or PLC as it has a wide range of interfaces and complies with all industrial standards.

The components are specifically designed for ease of installation with just a 2 cables hookup (with adaptable lengths) between the vacuum module and the electronic module.

Customer benefits

- Easy integration
- Simple configuration
- Easy operation
- Small footprint
- Rugged design and maximized up-time
- Low maintenance requirements
- Interfacing to industrial standards
- Selectable I/O to meet any requirements
- Optional control panel
- 40 hPa gross leak crossover
- 4 hPa normal leak crossover

Typical applications

- Automotive industry
- Compressors
- Condensers
- Packaging industry
- Gas generators
- Fire extinguishers
- Refrigeration and air conditioning



Automotive



Refrigeration and air conditioning



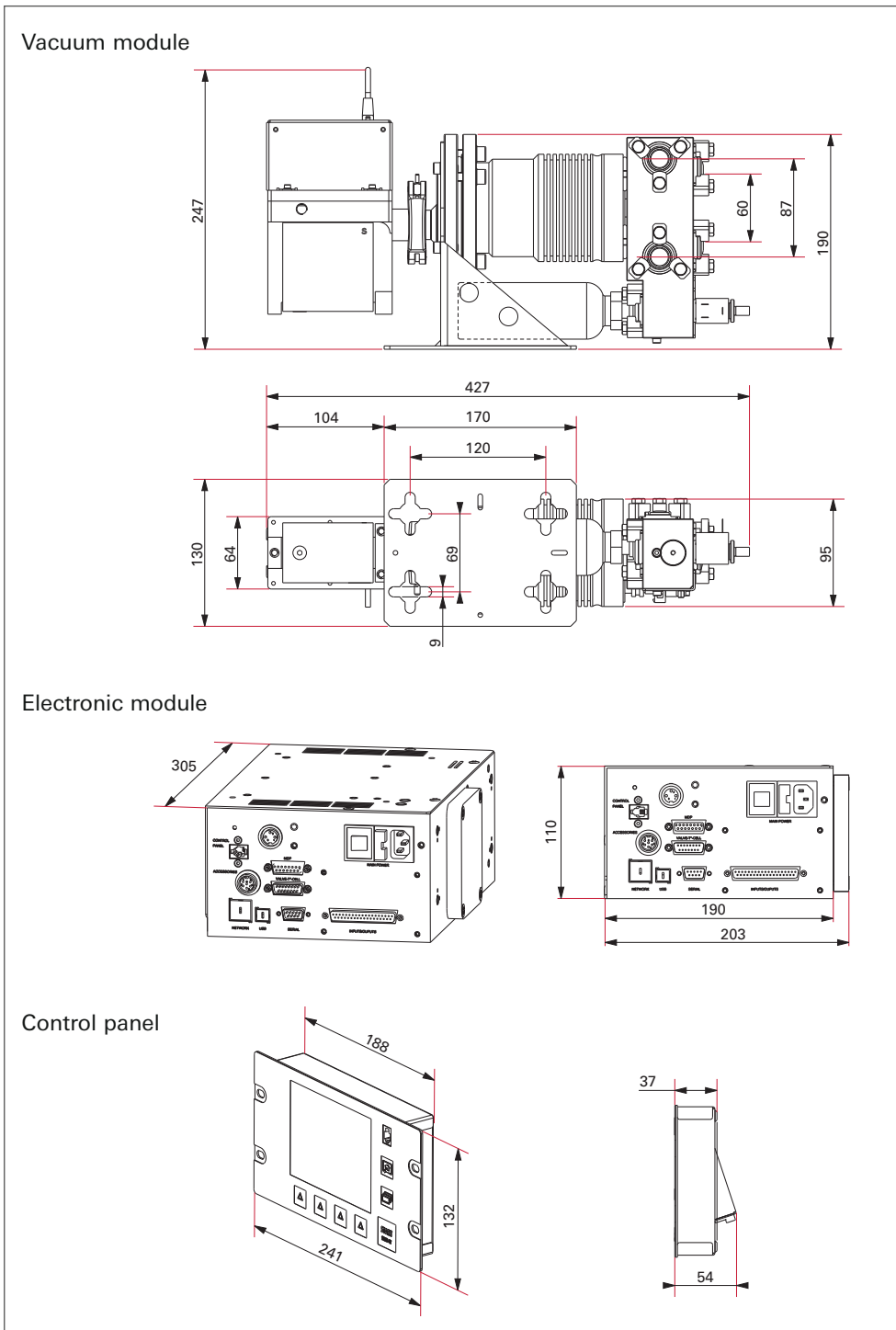
Packaging industry

ASI 30



- Easy installation and fast hookup
- Fully configurable I/O interface (37 pin D-Sub), with current status display on the control panel
- Profibus and RS-232 available as serial interfaces
- Limited access to the settings menu to prevent any inadvertent changes while system is in operation
- Universal voltage: no risk of mistake, no matter what country the leak detection system is prepared and installed in

Dimensions (in mm)



Technical data:	ASI 30
Test methods	Vacuum and sniffing leak detection
Minimum detectable leak rate for helium (vacuum leak detection)	$5 \cdot 10^{-8}$ Pa m ³ /s (Gross leak test mode) $5 \cdot 10^{-13}$ Pa m ³ /s (Normal leak test mode)
Minimum detectable leak rate for helium (sniffing leak detection)	$5 \cdot 10^{-9}$ Pa m ³ /s
Detectable gases	⁴ He, ³ He, H ₂
Maximum inlet test pressure	40 hPa (Gross leak test mode) 4 hPa (Normal leak test mode)
Start-up time	< 3 min
Response time (sniffing leak detection)	< 0.5 s
Flange (in)	DN 16 ISO-KF
Interface (see the order matrix for complete options configuration)	RS-232, Ethernet, Profibus, USB
I/O interfaces	Digital inputs, Analog outputs, Relay outputs, Transistor (open collector) outputs
Weight: Vacuum module:	8.5 kg
Electronic module:	4.5 kg
Control panel (optional):	1.3 kg
Supply	90–240 V AC, 50/60 Hz
Power consumption max.	150 W
Operating temperature	5–40 °C

Order number matrix ASI 30

Order number

L a b c 000 d MM9a

Industrial control panel and associated cable length	a
Without control panel	0
1.8 m	1
5 m	2
10 m	3

Cable length for electronic module	b
3.5 m	1
5 m	2
10 m	3
20 m	4

Sniffing option	c
With	S
Without	X

Interface board	d
Basic 15 pins I/O	0
Basic 15 pins I/O + Bluetooth	1
37 pins I/O	2
37 pins I/O + Wifi	3
37 pins I/O + Ethernet	4
37 pins I/O + Bluetooth	5
Profibus	6
Profibus + Bluetooth	7



ASM 102 S

Portable sniffing leak detectors locate even the smallest leaks accurately and fast



ASM 102 S

Our ASM 102 S sniffing leak detector is the ideal solution for accurately locating minor leaks. This unit has a wide measuring range from 0.1 ppm to up to 100% helium. With a detection limit of up to $1 \cdot 10^{-8}$ Pa m³/s, leaks are detected accurately and fast.

This leak detector is very easy to operate and even inexperienced users achieve reliable results. Delivery of important status messages by voice synthesizer and a remote control facility are additional features for the user's convenience.

The ASM 102 S sniffing leak detector with its 18 kg lightweight design and small footprint is ideally suited for maintenance applications in restricted spaces or outdoors. This leak detector works completely oil-free and can be operated in any position.

Besides its voice synthesizer and remote control features, this unit has a sniffer probe with a 5 m long tube. Longer tubes can also be supplied upon request. The leak detector has an interior storage box which can accommodate all the unit's accessories.

Customer benefits

- The perfect unit for maintenance of pressurized systems
- Portable sniffer leak detector, only 18 kg
- Easy operation
- Various languages and operating voltages available for worldwide use
- A specific hand held remote control is supplied with the leak detector, cable length to be selected in the order matrix
- A sniffer probe with 5 m hose length and rigid 9 cm nozzle (order number SNC1E1T1) is supplied with the leak detector

Typical applications

- Laser using helium as gas
- Aeronautic and aerospace industry (fuels)
- Underground cables and pipes
- Gas installations in semiconductor fabs



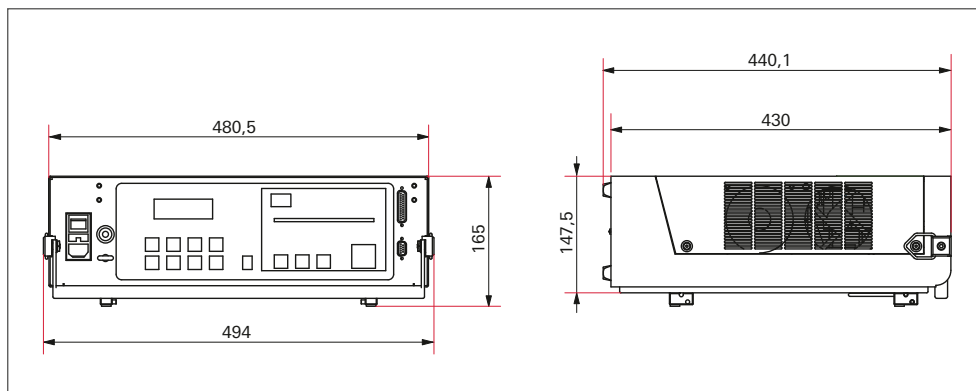
Underground cables and pipes

ASM 102 S



- Specific remote control for sniffing leak detectors supplied
- Sniffer probe, 5 m hose length and rigid 9 cm nozzle (order number SNC1E1T1) supplied

Dimensions (in mm)



Technical data:	ASM 102 S
Test method	Sniffing leak detection
Detectable gases	^4He , ^3He , H_2
Minimum detectable leak rate for helium (sniffing leak detection)	$1 \cdot 10^{-8} \text{ Pa m}^3/\text{s}$
Measurement range	$1 \cdot 10^{-8}$ to $1 \cdot 10^{-1} \text{ Pa m}^3/\text{s}$ helium (0.1 ppm to 100% helium)
Noise level	56 dB (A)
Supply	110–130 V, 50/60 Hz 200–240 V, 50/60 Hz
Power consumption max.	100 W
Start-up time (20°C) without calibration	1.5 min
I/O interfaces	Digital inputs (Start sniffer, Calibration (on external leak), Zero); Digital outputs (Sniffing test in progress, Helium signal above sniffer reject set point, Default...); Analog outputs (Mantissa, Exponent)
Interface	RS-232
Operating temperature	0 to 45 °C
Weight	18 kg

**Order number matrix
ASM 102 S**

Order number

a b 000 c d e f g 0

Leak Detector	a
ASM 102 S	Z

Detectable gases	b
Helium (⁴ He)	0
3 masses (⁴ He, ³ He, H ₂)	3

Remote control cable length	c
5 m	2
10 m	4
15 m	5

Measuring unit	d
mbar l/s	M
Torr l/s	T
Pa m ³ /s	P

Language	e
French	A
English	B
German	C
Spanish	F

Supply	f
100 – 130 V, 50/60 Hz	7
200 – 240 V, 50/60 Hz	8

Cable and plug type	g
USA/Japan	1
France/Germany	2
UK	3
Italy	4
Switzerland	5
Without plug	7



Accessories

Remote control

Standard remote control

The standard remote control allows to control and display values of the leak detector from a distance of up to 5 m.

Order number	
Remote control, leak rate in mbar l/s, legend in English	106688
Remote control, leak rate in Torr l/s, legend in English	108881
Remote control, leak rate in Pa m ³ /s legend in English	108880
Remote control, leak rate in Pa m ³ /s legend in Japanese	106690

Remote control for sniffer leak detectors

Remote control dedicated to sniffing applications, especially to the ASM 102 S. The value is displayed in the unit set on the leak detector.

Order number	
Remote control for sniffer leak detectors with 5 m cable	112747

Connection cable for remote control

Cables with more than 5 m length to connect the remote control to the leak detector. The remote control is not included.

Order number	
Connection cable for remote control, 10 m	110881
Connection cable for remote control, 15 m	110882

Other cable lengths are available upon request.

Sniffer probe

Sniffer probe for leak detection in sniffing mode. Easy connection to the leak detectors by external coupling.

Order number	
Sniffer probe, 5 m hose length, rigid 9 cm nozzle	SNC1E1T1
Sniffer probe, 10 m hose length, rigid 9 cm nozzle	SNC1E2T1
Sniffer probe, 5 m hose length, rigid 9 cm nozzle	SNC1E2T1
Sniffer probe, 5 m hose length, flexible 15 cm nozzle	SNC1E3T1
Sniffer probe, 5 m hose length, flexible 45 cm nozzle	SNC1E4T1
Sniffer probe, 10 m hose length, rigid 30 cm nozzle	SNC2E2T1
Sniffer probe, 10 m hose length, flexible 15 cm nozzle	SNC2E3T1
Sniffer probe, 10 m hose length, flexible 45 cm nozzle	SNC2E4T1

Other hose lengths are available upon request.

For ASM 310 only order number SNC1E1T1 is suitable.

Calibrated leak

- Helium calibrated leak from 10^{-10} Pa m³/s to 10^{-5} Pa m³/s, including gas reservoir.
- Supplied with certificate of calibration, ± 10 % accuracy on standard values
- Can be equipped with manually operated valve (mandatory for leak values greater than $8 \cdot 10^{-7}$ Pa m³/s)
- Possibility to deliver a specific value according to customer need

Calibrated leak

Order number

F a 4 b c d

Isolation valve	a
Without	0
With ¹⁾	V

Values	b
between 1 and $3 \cdot 10^{-10}$ Pa m ³ /s	9
between 1 and $3 \cdot 10^{-9}$ Pa m ³ /s	8
between 1 and $3 \cdot 10^{-8}$ Pa m ³ /s	7
between 3 and $6 \cdot 10^{-8}$ Pa m ³ /s	3
between 1 and $3 \cdot 10^{-7}$ Pa m ³ /s	6
between 5 and $8 \cdot 10^{-7}$ Pa m ³ /s	5
between 1 and $3 \cdot 10^{-6}$ Pa m ³ /s	4
between 5 and $8 \cdot 10^{-6}$ Pa m ³ /s	2
between 1 and $3 \cdot 10^{-5}$ Pa m ³ /s	1

Flange	c
DN 16	0
DN 25	1
DN 40	2
DN 50 ²⁾	3

Special value	d
Yes	1
No	0

¹⁾ The isolation valve is mandatory for values greater than $8 \cdot 10^{-7}$ Pa m³/s

²⁾ DN 50 not available for the decades 10^{-6} and 10^{-5} Pa m³/s

Notes:

- Temperature coefficient 3% per °C for any value $< 8 \cdot 10^{-7}$ Pa m³/s, 0,2% per °C for greater value
- Loss 2 % per year for any value $< 8 \cdot 10^{-7}$ Pa m³/s
- For specific values, due to the technology used, we can only guarantee an effective nominal value within ± 20 % of the requested nominal value.



Spray gun

To be connected to a gas bottle or gas line for spraying tracer gas easily.

Order number	
Spray gun, standard	112535
Spray gun "Elite-Kit", spray gun with additional accessories in a compact case	109951

Inlet filters

Connected to the inlet flange, these dust filters prevent large quantities of dust from getting into the leak detector

Order number	
Inlet filter, 20 µm, DN 25/25 ISO-KF	105841
Inlet filter, 20 µm, DN 40/40 ISO-KF	105842
Inlet filter, 20 µm, DN 40/25 ISO-KF	105843
Inlet filter, 5 µm, DN 40/40 ISO-KF	105845
Inlet filter, 5 µm, DN 40/25 ISO-KF	105846

Bombing chambers

Chambers equipped with valve and manometers for bombing test on sealed components

Order number	
Bombing chamber, volume 3.5 liters (150 mm diameter, 200 mm height), 10 bars max.	786396
Bombing chamber, volume 6.4 liters (100 mm diameter, 800 mm height), 25 bars max.	786397

Sniffing calibration accessory

To be used to connect the calibrated test leak to the sniffer probe for a more accurate calibration for sniffing applications

Order number	
Sniffing calibration accessory, DN 16 ISO-KF	110715
Sniffing calibration accessory, DN 25 ISO-KF	110716

Gas line type calibrated leak

Permeation membrane for calibration in gas lines,
DN16, VCR 1/4 inch

Order number	
Gas line type calibrated leak, value between 1 and $5 \cdot 10^{-10}$ Pa m ³ /s	803922
Gas line type calibrated leak, value around $1 \cdot 10^{-9}$ Pa m ³ /s	103372
Gas line type calibrated leak, value around $1 \cdot 10^{-8}$ Pa m ³ /s	103373
Gas line type calibrated leak, value around $1 \cdot 10^{-6}$ Pa m ³ /s	103374

Sniffer probe for liquids

Sniffer probe to connect to the inlet of the leak detector
to measure the helium concentration in water or other
liquids. Leak rate for 100% helium: $2 \cdot 10^{-5}$ Pa m³/s

Order number	
Sniffer probe for liquids, DN 40 ISO-KF, 1.5 m tube length	67683

Locking clamp

Clamp with specific tool for locking any accessory on a
DN 40 flange

Order number	
Locking clamp, DN 40 KF	118801



Contamination management solutions

Perfect vacuum solutions for molecular contamination monitoring and management

Contamination management solutions



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Contamination management solutions

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Contamination management solutions

Solutions for contamination management from Pfeiffer Vacuum improve the yield of semiconductor manufacturing

Systems for contamination management are the newest developments specifically for the semiconductor industry. Pfeiffer Vacuum's many years of experience as a provider of vacuum technology have shaped our know-how and understanding of the processes, equipment and environment of semiconductor production systems. Based on this knowledge, we have developed solutions to minimize contamination and increase yield.

How does contamination occur?

Wafers emit reaction by-products during transport and waiting times. Airborne Molecular Contamination, (in short AMC), such as evaporated fluorine, react in the tight interstices of the transport boxes (POD systems) with oxidants from the ambient air (H_2O and O_2). During these reactions, undesired crystal growth on structured wafers is triggered, which leads to a decline in quality and a decreased production yield.





Customer benefits

- Specially developed for the semiconductor industry
- In-Line Monitoring
- Significantly improved yield learning
- Delivery possible using overhead hoist transportation (OHT) systems commonly used in semiconductor fabs



APA 302

Solutions for contamination management from Pfeiffer Vacuum improve the yield of semiconductor manufacturing

The APA 302 is a unique in-line monitoring tool for advanced chip manufacturing in a cleanroom environment. This innovative equipment measures the airborne molecular contamination (in short AMC) in a FOUP and in the surrounding environment.

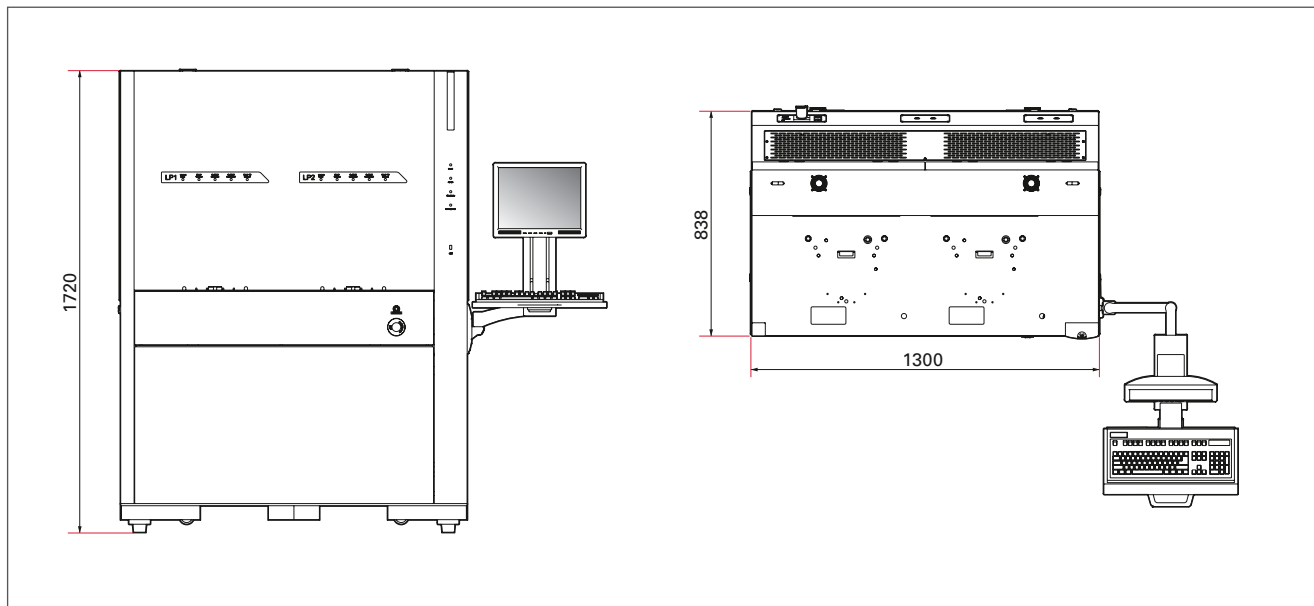
Moisture and airborne molecular contamination such as elemental desorbing fluorine are released inside the FOUP space during queue times between the individual process steps. These elements can generate crystal growth on patterned wafers which leads to yield loss and performance degradation.

The FOUP can be delivered either manually or through overhead hoist transportation (OHT) to the two load ports. The APA 302 takes gas samples through the FOUP filters. The high sensitivity measurement with detection limits in the ppbv-range takes only 2 minutes. When there is no FOUP on the load ports, the APA 302 monitors the surrounding cleanroom environment.

Thus, the queue times between the individual process steps can be optimized, increased contamination values immediately recognized and yields increased.



Dimensions (in mm)



Technical data

Analyzer	Scale	Limit of detection	Response time within 2 min.
NH ₃ ¹⁾	0 – 200 ppbv	< 0.2 ppbv	> 80 %
Total amines ¹⁾	0 – 200 ppbv	< 0.2 ppbv	> 80 %
Total acids ¹⁾	0 – 200 ppbv	< 0.2 ppbv	> 90 %
SO ₂	0 – 500 ppbv	< 0.5 ppbv	> 85 %
H ₂ O	0 – 100 % RH	5 %	> 90 %
Total Volatile Organics	0 – 99 ppmv	< 25 ppbv	> 90 %

¹⁾ Based on IMS technology, includes Ni63 source (< 0.005 microcuries)
Other options available: please contact us.

Customer value

- No FOUP modification needed
- Throughput > 16 FOUP/h (with OHT)
- Real time measurement
- High sensitivity



APR 4300

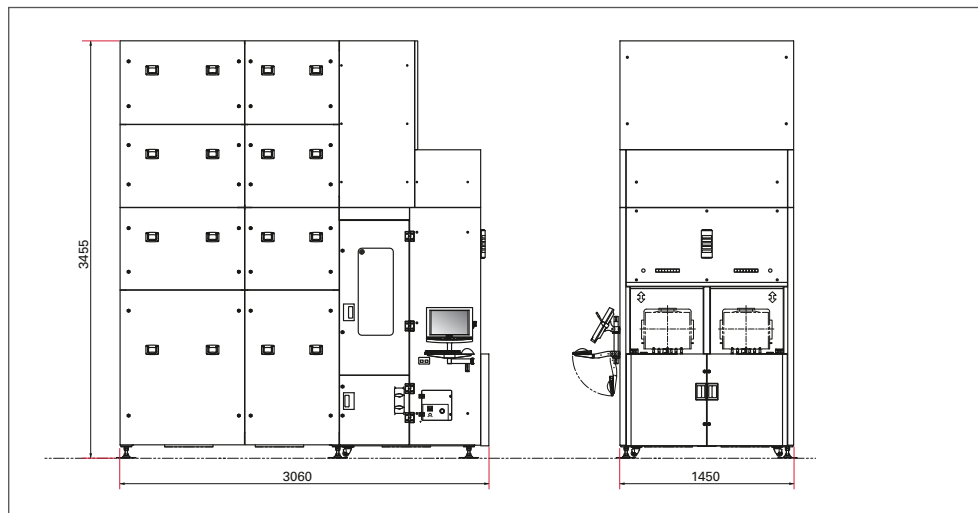
The Pod Regenerator for yield enhancement and airborne molecular contamination management

The APR 4300 is a system for the decontamination of wafers and for the protection from contamination during queue time. Airborne Molecular Contamination (in short AMC) lowers the yield and quality in semiconductor production.

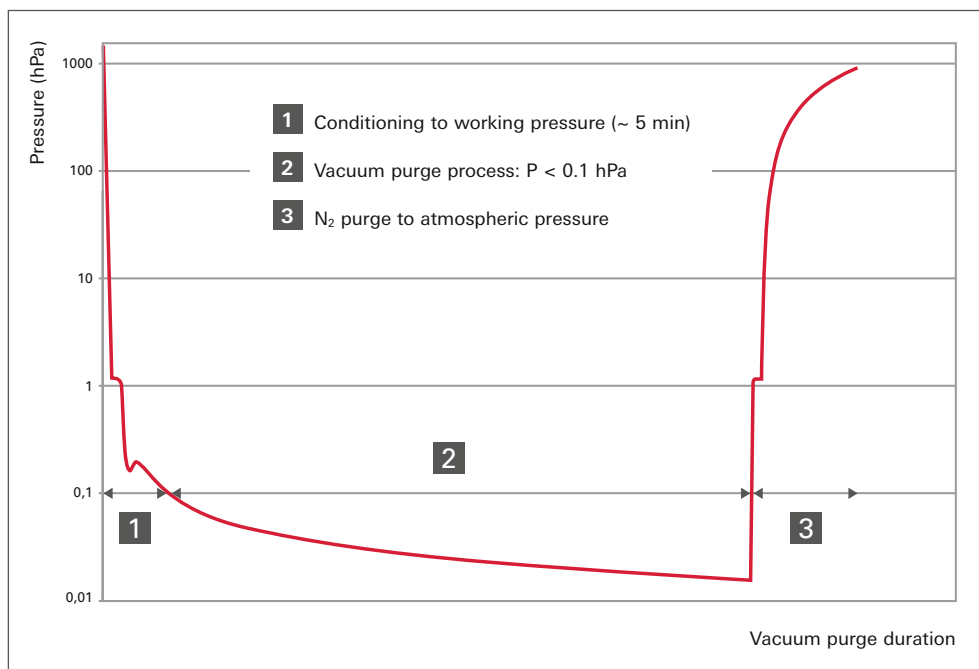
The APR 4300 effectively prevents the adsorption of contaminated organic or inorganic molecules on the surface of a wafer and the transport box. Through the evacuation of chambers in the APR 4300, the adsorption probability is massively reduced. The yield of a fab can be increased significantly in this way and the queue times between the individual process steps can be optimized.



Dimensions (in mm)



Technical data



Customer value

- Flexible configuration
- SEMI S2/S8 compliance
- 4 FOUPs/cycle
- Yield enhancement of up to 7 %

System technology

Vacuum systems from Pfeiffer Vacuum



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Vacuum systems from Pfeiffer Vacuum. Customized. Powerful. Innovative.

Even back in 1890 when our company was founded, forward-thinking products in the field of vacuum technology were at the heart of our engineering and entrepreneurial activities. Always aligned toward the forward-thinking ideas of our partners and customers, Pfeiffer Vacuum manufactures vacuum solutions that satisfy even the most challenging demands. These solutions range from the production of individual components and products right through to complete vacuum systems. In doing so, we always strive for complete customer satisfaction. Our vacuum systems support both everyday products as well as high quality, complex high-tech products. Reliability and competence in our advice, planning, design, manufacturing, implementation and service are what customers can naturally expect from Pfeiffer Vacuum.

We develop the matching vacuum solutions for a wide variety of market segments, designed to satisfy our customers' high demands. In this connection, the potential applications for our vacuum systems and technologies range from coating high-stress tools and eyeglasses right through to the production of solar cells, thermal insulation glass and DVDs. Custom pumping stations and leak detection systems, are also among our spectrum of products and services. Our vacuum systems are employed, in particular, in high vacuum, sputtering and plasma processes, where they are used in the following fields of application: Optics, microelectronics, display manufacturing, photovoltaics and medical technology.

Pfeiffer Vacuum offers state-of-the-art engineering and vacuum knowledge when it comes to developing and implementing customized solutions and vacuum systems. With our engineering expertise, Pfeiffer Vacuum can create vacuum systems and products that serve as the foundation for your forward-thinking ideas. High quality manufactured components with high functionality is what we can offer for your system.



Customer benefits

- Reduced operating costs
- Optimized processes
- Improved quality
- High uptime



Helium leak detection systems

The best-in-class technology for your quality assurance



Helium leak detection systems

Are you looking for the ideal system for your application? Whether integrated in a production line or as stand-alone testing station, we develop and construct helium leak detection systems that are tailored to your needs. The numerous systems sold for the automotive industry, refrigeration/air conditioning and packaging technology are indicative of our know-how.

We build complete systems for you, with our vacuum components such as a helium leak detector as the centerpiece. With pumping unit, test chamber, control technology, including all handling systems and full documentation.

In terms of environmental certification in compliance with DIN EN ISO 14001, we are happy to quote the appropriate helium recovery system in the package.

Customer benefits

- High sensitivity in detecting the smallest leaks
- Dry testing instead of bubble testing
- Automated measurement method
- Minimizes testing times and operating costs
- Compliance with quality and environmental requirements
- Fully automated test procedure

Typical applications

- Automotive industry
(e.g. airbags, aluminum rims, fuel system components, components for air conditioning and air suspension system components)
- Refrigeration/air conditioning
(e.g. evaporators, compressors)
- Vacuum and pressurization technology
(e.g. valves, fittings)
- Packaging technology
(e.g. for pharmaceutical products, foods)



Automotive industry



Packaging technology



Refrigeration/air conditioning



Helium recovery units (HRU)

Perfect Pfeiffer Vacuum technology for reducing helium costs



Helium recovery units (HRU)

Helium as test gas for destruction-free testing is an increasingly rare resource and is thus becoming more expensive. The recovery of used helium will become even more important in the future.

Particularly in terms of environmental certification in accordance with DIN EN ISO 14001 and required resource conservation, the recovery of previously expended helium makes sense. The systems are designed to be stand-alone and can recover the helium regardless of the leak detection system used.

Customer benefits

- Minimized operating costs
- Reduced dependency on fluctuations in supply on the world market
- Stand-alone system, independent of the attached test systems
- Compliance with environmental regulations such as DIN EN ISO 14001
- Fully automated
- High recovery rate through automatic evacuation of the test specimens by the attached testing system

Typical applications

- Automotive industry
(e.g. airbags, aluminum rims, fuel system components, components for air conditioning and air suspension system components)
- Refrigeration/air conditioning
(e.g. evaporators, compressors)
- Vacuum and pressurization technology
(e.g. valves, fittings)
- Packaging technology
(e.g. for pharmaceutical products, foods)
- Power technology
(e.g. for medium voltage switch gear, surge absorbers)
- Research facilities and labs
- Accelerators



Airbags



Pharmaceutical products



Pressurization technology



Container, small system



Balloon system



Container, large system

Operating principle

The helium returned from the leak detection system is initially collected within the system. At the same time or subsequently, the concentration is tested and mixed to meet the preset concentration. The gas mixture is then compressed to the required process pressure and fed back to the test equipment.

Depending on the process conditions, the recovery rate can be up to 98% for helium concentrations of 10–95%. The actual figure depends on the type or version of helium recovery system, as well as the parameter settings and helium leak tightness of the attached test systems. The possible maximum operating pressures in the system are 10 bar, 35 bar, 55 bar and 200 bar. The maximum helium throughput is 170 – 550 NI per minute depending on the pressure level and version.

Two fundamental principles of helium recovery are available: "balloon recovery" and "container recovery". Balloon recovery has a very good cost-performance ratio, while container recovery is characterized by very high tightness requirements and works on a dry compression principle. In addition customer specific solutions can be generated upon request.

Technical data

Feature	Balloon HRU		
Type	CB13-35	CB11-55	CB10-200
Max. throughput	210 NI/min	180 NI/min	170 NI/min
Max. working pressure	35 bar	55 bar	200 bar
Compression	Oil lubricated	Oil lubricated	Oil lubricated
Recovery rate	Up to 95 %	up to 95 %	up to 95 %

Feature	Container HRU		
Type	CV12-10	CV16-55	CV33-55
Max. throughput	200 NI/min	260 NI/min	550 NI/min
Max. working pressure	10 bar	55 bar	55 bar
Compression	Oil lubricated	Dry	Dry
Recovery rate	Up to 98 %	Up to 98 %	up to 98 %



Multi-stage vacuum process. The revolution in die casting!



Vacu²

In our Vacu² multi-stage vacuum process the shot sleeve and mold cavities are evacuated in two stages. During the first phase, the air is discharged directly from the shot sleeve via a wide cross-section line. This enables the desired pressure to be quickly achieved in the shot sleeve and mold. In the second evacuation phase, air is evacuated from the mold as in conventional methods.

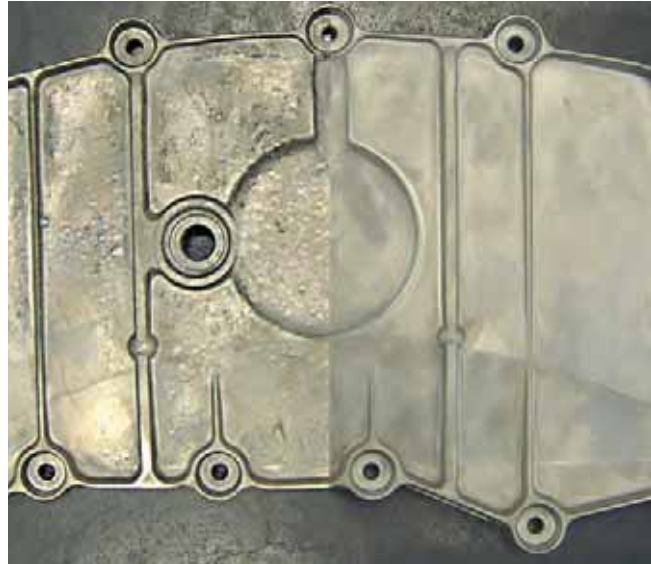
Since the desired pressure was achieved in the first stage, the second stage merely serves to maintain the pressure by pumping down air that leaks into the mold. Pressure is measured in four locations at different times during the casting process and turned into process relevant data by the control unit. This affords precise information about the current status of the system. Should any limits, some of them can be defined by the user, be exceeded or not reached, the system responds with warning signals. This avoids unnecessary rejects.

Customer benefits

- High uptime
- Quality enhanced die cast products
- Cost savings through reliable process monitoring
- Savings in mold design and vent valves

Typical applications

- Automotive industry (structural components, motor blocks, gearboxes)



Die cast parts



Motor blocks

A

- A 100 L / A 100 L ES,
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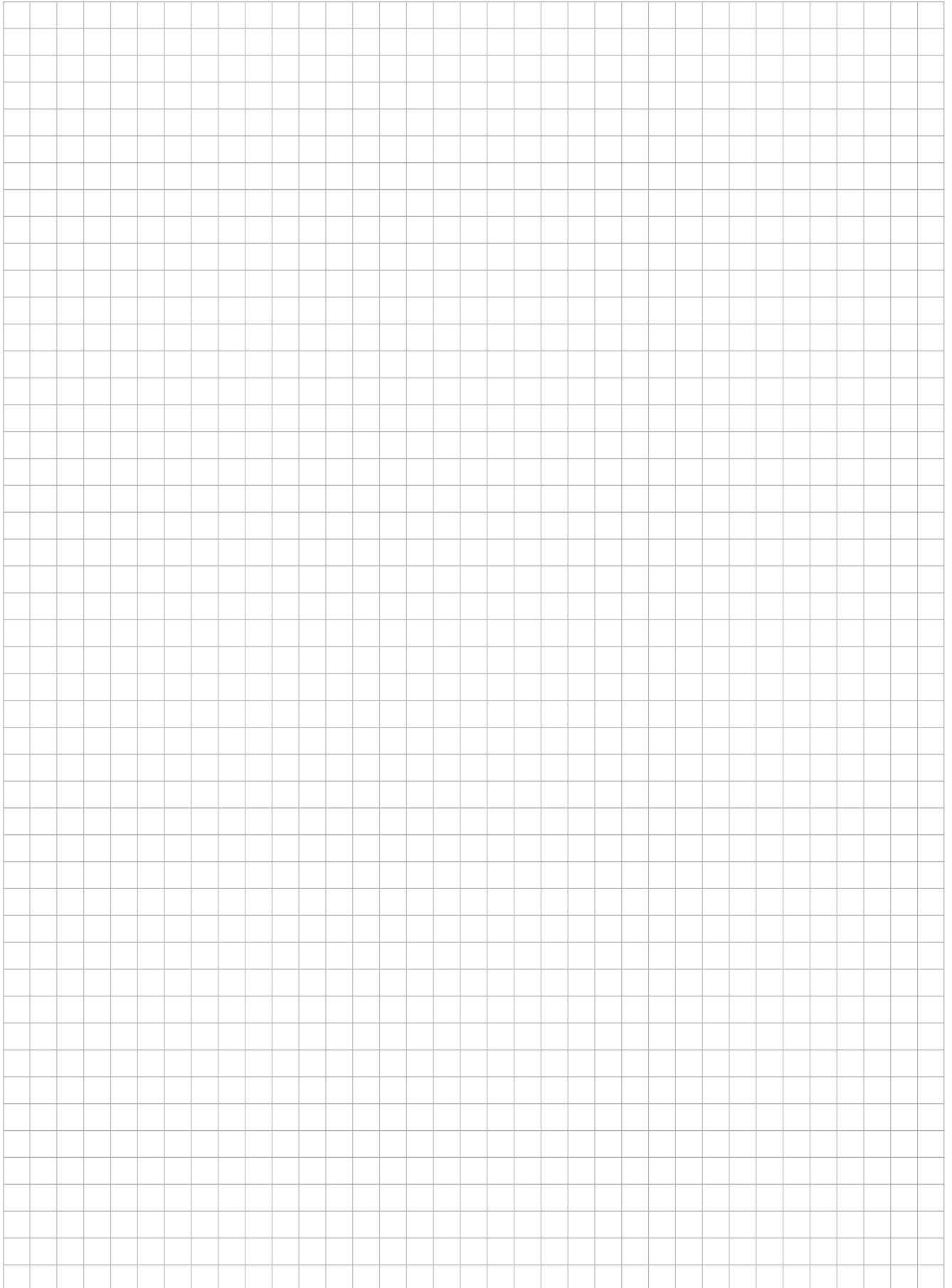
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Masthead

Pfeiffer Vacuum GmbH

April 2013

Subject to change without notice

Price: Euro 60,-

Vacuum Technology Book Volume II: PI 0355 PEN

Part 3.2 – Vacuum measurement, analysis, leak detection:

PI 0355_3_2 PEN

Picture credits

Pfeiffer Vacuum GmbH: Product pictures and drawings

ESO/S. Brunier

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Product pictures

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Design

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Composing

LOTS OF DOTS MediaGroup. AG, 55129 Mainz, Germany

TANNER AG, 88131 Lindau, Germany

Printing

mSP druck und medien gmbh, 57555 Mundersbach, Germany

Note

The Vacuum Technology Book Volume II, effective April 1, 2013

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