

In den vergangenen Jahrzehnten haben sich mit der Vervollkommnung der Halbleitertechnologie auch die Vielfalt und die Reinheitsanforderungen an technische Spezialgase erhöht.

Auch andere Branchen wie die Analytik (ECD¹⁾, die Umwelttechnologie und die Kommunikationstechnologie benötigen zunehmend Reinstgase höchster Qualität, um neue Ziele zu erreichen. Typische Anwendungen sind dabei die Gaschromatographie, die Spektroskopie, die Brennstoffzellenentwicklung und die Herstellung von Glasfasern. Die zulässigen Verschmutzungsgrade des technischen Gases mit Fremdatomen reichen dabei aktuell von einigen 100 ppm bis hinab zu unter 10 ppb.

technisches Gas (VDMA 4390-2)	Reinheit (%)	max. zul. Restgehalt an Kohlenwasserstoffen (mg/dm ³)	Dichtheitsanforderung max. zul. Leckrate (mbar · l/s)
technisches Standardgas (< 4.5)	< 99,995	0,2 – 0,4	≤ 10 ⁻⁴
Reingas (4.5...5.0)	99,995...99,999	≤ 0,2	≤ 10 ⁻⁵
Reinstgas (> 5.0...6.0; ECD(1): > 5.5)	99,999...99,9999	≤ 0,1	≤ 10 ⁻⁸
Ultra-Reinstgas (> 6.0; UHP ²⁾)	> 99,9999	< 0,1	≤ 10 ⁻⁹

Für die Sicherstellung derartig hoher Reinheit müssen auch das Rohrleitungssystem, die Armaturen und die Verbindungen den neuen Anforderungen gerecht werden. Zum Einsatz kommen vor allem austenitischer Edelstahl bzw. bei korrosiven Gasen beständige Sonderwerkstoffe wie Hastelloy. Die Verbindungen in Reinstgas-Leitungsnetzen werden typischerweise mit Orbital-schweißung oder VCR-Verschraubungen realisiert.

Rohr-Ø	max. zul. Betriebsdruck (nach ASME B31.1; S=4)	
1/8"	590 bar	8550 psi
1/4"	359 bar	5200 psi
3/8"	231 bar	3350 psi
1/2"	259 bar	3750 psi

ARMANO-Komponenten für Gasversorgungssysteme in ECD¹⁾- oder UHP²⁾-Qualität sind auf Basis der jeweiligen Standards im Wesentlichen durch folgende Merkmale charakterisiert:

Werkstoff korrosionsbeständig

- austenitischer Edelstahl 316L

Sicherstellung der Gasdichtheit

- 100 % He-Lecktest auf Leckrate ≤ 10⁻⁹ mbar · l/s,
- polierte Dichtflächen mit Rz < 1 µm

Sauberkeit

- elektrochemisch polierte Oberflächen Ra < 0,4 µm (messstoffberührte Innenoberflächen)
- Schweißungen mit Wurzelschutz (Spülgas)
- öl- und fettfrei, gereinigt
- vakuumverpackt
- tottraumfreies Design

lieferbare ARMANO-Manometer für Reinstgase

- RChg 40 – 3v, RChg 40 – 3vrm (Datenblatt 1221) Sicherheitskategorie nach DIN EN 837-1: S2
- RChg 50 – 3, RChg 50 – 3rm (Datenblatt 1232) Sicherheitskategorie nach DIN EN 837-1: S2
- RCh 63 – 3, RCh 63 – 3r, RCh 63 – 3rm (Datenblatt 1211) Sicherheitskategorie nach DIN EN 837-1: S2
- RCh 63 – 3v, RCh 63 – 3vr, RCh 63 – 3vrm (Datenblatt 1211) Sicherheitskategorie nach DIN EN 837-1: S2
- RSCh 63 – 3, RSCh 63 – 3r (Datenblatt 1610) Sicherheitskategorie nach DIN EN 837-1: S3

optional

- NG 63 auch mit Grenzsignalgeber möglich³⁾

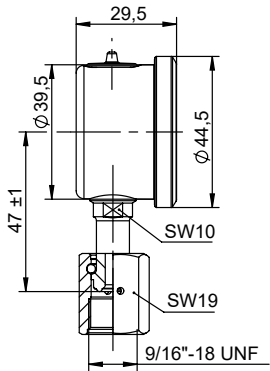
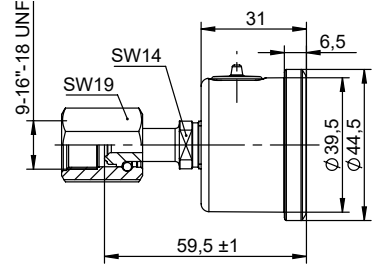
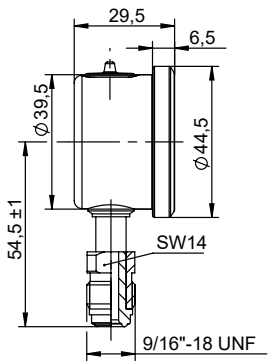
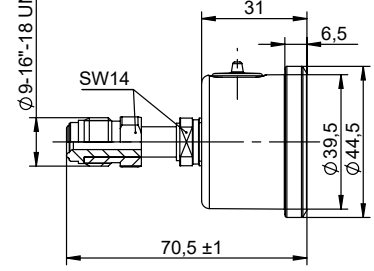
¹⁾ ECD – Electron Capture Detector (ECD) = Elektroneneinfangdetektor: ist ein Gerät zur Gaschromatographie

²⁾ UHP – Ultra High Purity = Ultra-Reinstgas (siehe Tabelle): Maximalanforderungen für Halbleiterindustrie

³⁾ in Maßbildern nicht dargestellt

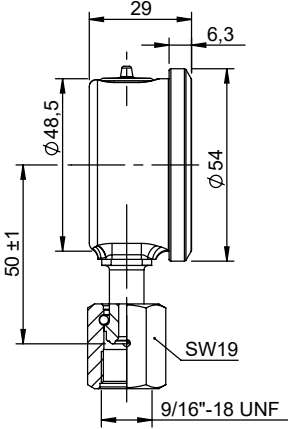
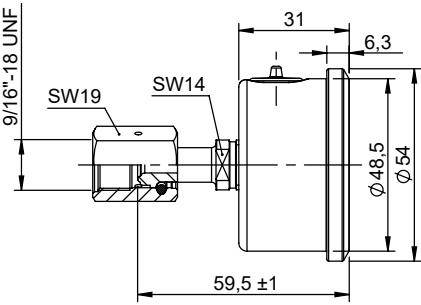
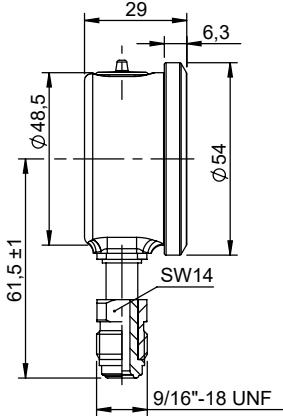
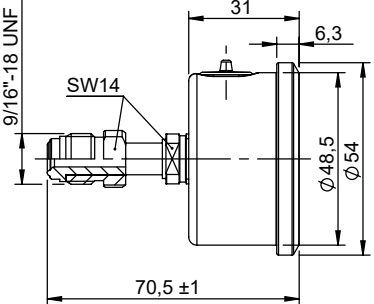
Reinstgasausführung

Übersicht VCR-Anschlüsse zu Manometer in NG 40, 50, 63

NG 40 Bördelring	Anschluss unten	Anschluss rückseitig mittig
VCR-F	 <p>Technical drawing showing the bottom connection of a VCR-F manometer. The main body has a diameter of $\varnothing 39,5$ and a length of 47 ± 1. The connection part has a diameter of $\varnothing 44,5$ and a length of $29,5$. The connection is made using a 9/16"-18 UNF thread. Two wrenches, SW10 and SW19, are indicated for adjustment.</p>	 <p>Technical drawing showing the rear connection of a VCR-F manometer. The main body has a diameter of $\varnothing 39,5$ and a length of $44,5$. The connection part has a diameter of $\varnothing 44,5$ and a length of 31. The connection is made using a 9-16"-18 UNF thread. Two wrenches, SW14 and SW19, are indicated for adjustment. The total length of the connection part is $59,5 \pm 1$.</p>
VCR-M	 <p>Technical drawing showing the bottom connection of a VCR-M manometer. The main body has a diameter of $\varnothing 39,5$ and a length of $54,5 \pm 1$. The connection part has a diameter of $\varnothing 44,5$ and a length of $29,5$. The connection is made using a 9/16"-18 UNF thread. A wrench, SW14, is indicated for adjustment.</p>	 <p>Technical drawing showing the rear connection of a VCR-M manometer. The main body has a diameter of $\varnothing 39,5$ and a length of $44,5$. The connection part has a diameter of $\varnothing 44,5$ and a length of 31. The connection is made using a $\varnothing 9-16"-18$ UI thread. A wrench, SW14, is indicated for adjustment. The total length of the connection part is $70,5 \pm 1$.</p>

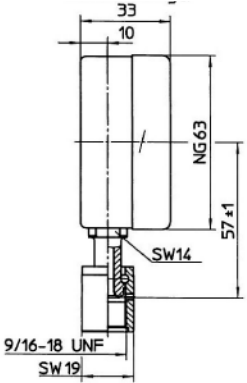
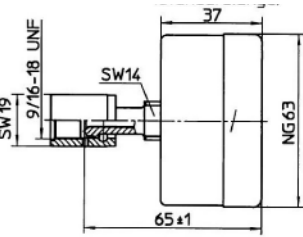
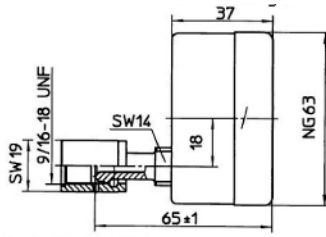
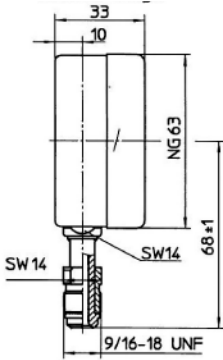
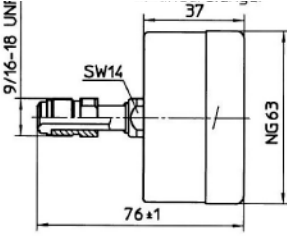
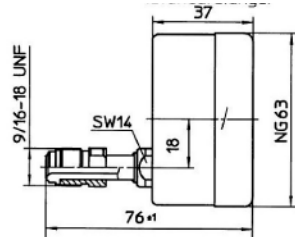
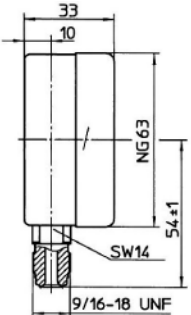
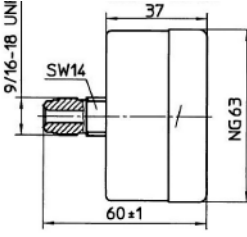
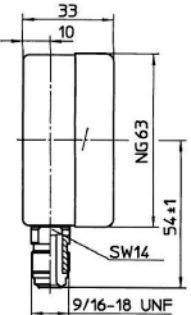
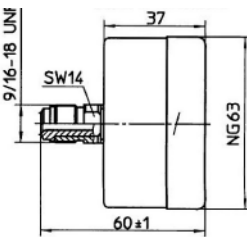
Reinstgasausführung

Übersicht VCR-Anschlüsse zu Manometer in NG 40, 50, 63

NG 50 Bördelring	Anschluss unten	Anschluss rückseitig mittig
VCR-F		
VCR-M		

Reinstgasausführung

Übersicht VCR-Anschlüsse zu Manometer in NG 40, 50, 63

NG 63 Bajonettring	Anschluss unten	Anschluss rückseitig mittig	Anschluss rückseitig ausmittigt
VCR-F	 <p>Technical drawing showing the front view of the VCR-F connection. The main body has a diameter of 33 mm and a length of 57 ± 1 mm. The connection point at the bottom has a diameter of 10 mm and a height of 9/16-18 UNF. A SW14 hex key is used for adjustment.</p>	 <p>Technical drawing showing the rear view of the VCR-F connection with a centered back connection. The main body has a diameter of 37 mm and a length of 65 ± 1 mm. The back connection has a diameter of 9/16-18 UNF and a height of SW14.</p>	 <p>Technical drawing showing the rear view of the VCR-F connection with an eccentric back connection. The main body has a diameter of 37 mm and a length of 65 ± 1 mm. The back connection has a diameter of 9/16-18 UNF and a height of SW14. The eccentric offset is 18 mm.</p>
VCR-M	 <p>Technical drawing showing the front view of the VCR-M connection. The main body has a diameter of 33 mm and a length of 68 ± 1 mm. The connection point at the bottom has a diameter of 10 mm and a height of 9/16-18 UNF. A SW14 hex key is used for adjustment.</p>	 <p>Technical drawing showing the rear view of the VCR-M connection with a centered back connection. The main body has a diameter of 37 mm and a length of 76 ± 1 mm. The back connection has a diameter of 9/16-18 UNF and a height of SW14.</p>	 <p>Technical drawing showing the rear view of the VCR-M connection with an eccentric back connection. The main body has a diameter of 37 mm and a length of 76 ± 1 mm. The back connection has a diameter of 9/16-18 UNF and a height of SW14. The eccentric offset is 18 mm.</p>
VCR-M kurz starr	 <p>Technical drawing showing the front view of the VCR-M kurz starr connection. The main body has a diameter of 33 mm and a length of 54 ± 1 mm. The connection point at the bottom has a diameter of 10 mm and a height of 9/16-18 UNF. A SW14 hex key is used for adjustment.</p>	 <p>Technical drawing showing the rear view of the VCR-M kurz starr connection with a centered back connection. The main body has a diameter of 37 mm and a length of 60 ± 1 mm. The back connection has a diameter of 9/16-18 UNF and a height of SW14.</p>	
VCR-M kurz drehbar	 <p>Technical drawing showing the front view of the VCR-M kurz drehbar connection. The main body has a diameter of 33 mm and a length of 54 ± 1 mm. The connection point at the bottom has a diameter of 10 mm and a height of 9/16-18 UNF. A SW14 hex key is used for adjustment.</p>	 <p>Technical drawing showing the rear view of the VCR-M kurz drehbar connection with a centered back connection. The main body has a diameter of 37 mm and a length of 60 ± 1 mm. The back connection has a diameter of 9/16-18 UNF and a height of SW14.</p>	

Reinstgasausführung

Übersicht VCR-Anschlüsse zu Manometer in NG 40, 50, 63

NG 63 Bajonettring	Anschluss unten	Anschluss rückseitig ausmittig
<p>Ⓢ</p> <p>VCR-F</p>		
<p>Ⓢ</p> <p>VCR-M</p>		
<p>Ⓢ</p> <p>VCR-M kurz starr</p>		
<p>Ⓢ</p> <p>VCR-M kurz drehbar</p>		