



CC605/CC606 Cold Cathode Ionization Vacuum Gauge



User Manual

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Important User Information

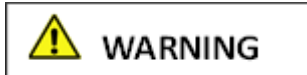
There are operational characteristic differences between solid state equipment and electromechanical equipment. Because of these differences, and because there are a variety of uses for solid state equipment, all persons that apply this equipment must take every precaution and satisfy themselves that the intended application of this equipment is safe and used in an acceptable manner.

In no event will InstruTech be responsible or liable for indirect or consequential damages that result from the use or application of this equipment.

Any examples or diagrams included in this manual are provided solely for illustrative purposes. Because of the many variables and requirements imposed on any particular installation, InstruTech cannot assume responsibility or liability for any actual use based on the examples and diagrams.

No patent liability is assumed by InstruTech with respect to use of information circuits, equipment, or software described in this manual.

Throughout this manual we use notes, notices and apply internationally recognized symbols and safety messages to make you aware of safety considerations.



Identifies information about practices or circumstances that can cause electrical or physical hazards which, if precautions are not taken, could result in death or serious injury, property damage, or economic loss.



Identifies information about practices or circumstances that can cause electrical or physical hazards which, if precautions are not taken, could result in minor or moderate injury, property damage, or economic loss.



Identifies information that is critical for successful application and understanding of the product.



Labels may be located on or inside the device to alert people that dangerous voltages may be present.

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1 Introduction / General Information

1.1 Description

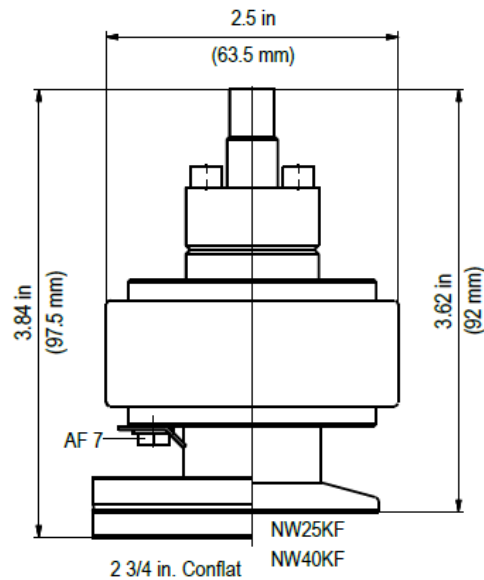
A cold cathode ionization gauge measures vacuum pressure by first ionizing gas molecules inside the vacuum gauge and then measuring the resulting ion current. A large potential between the gauge anode and cathode will cause ionization to occur. The amount of ion current generated from the ionized gas is proportional to the pressure in the vacuum system and is dependent on the type of gas used. As the pressure inside the vacuum system drops, the measured ion current drops. Two different gauge configurations are available. Model CC605 utilizes an elastomer internal seal while the CC606 uses a metal seal allowing pressure measurements in the UHV range. A gauge ignition aid mounted on the anode improves the time it takes to activate the cold cathode gauge. The gauge assembly can be easily disassembled and cleaned allowing long term use with minimal down time.

The series 600 Cold Cathode gauge requires the InstruTech B-RAX 3500 Controller to operate. When used with the B-RAX 3500 Controller, the combination of superior gauge design and enhanced signal processing provides optimal and stable pressure readings from low to high vacuum.

1.2 Specifications

measurement range	CC605	1.5×10^{-9} to 3.75×10^{-3} Torr / 2×10^{-9} to 5×10^{-3} mbar / 2×10^{-7} to 5×10^{-1} Pa		
	CC606	7.5×10^{-11} to 3.75×10^{-3} Torr / 1×10^{-10} to 5×10^{-3} mbar / 1×10^{-8} to 5×10^{-1} Pa		
accuracy - N ₂ (typical)	CC605	1.5×10^{-8} to 3.75×10^{-3} Torr: ± 30% of reading when used with B-RAX 3500 Controller		
	CC606	7.5×10^{-10} to 3.75×10^{-3} Torr: ± 30% of reading when used with B-RAX 3500 Controller		
repeatability - (typical)	CC605	1.5×10^{-8} to 3.75×10^{-3} Torr: ± 30% of reading when used with B-RAX 3500 Controller		
	CC606	7.5×10^{-10} to 3.75×10^{-3} Torr: ± 30% of reading when used with B-RAX 3500 Controller		
materials exposed to gases	CC605	anode: molybdenum	internal seal: FPM	others: Al ₂ O ₃ , stainless steel
	CC606	anode: molybdenum	internal seal: Ag	others: Al ₂ O ₃ , stainless steel
internal gauge volume	1.22 in ³ (20 cm ³)			
admissible pressure	130 psi, 9 bar absolute (limited to inert gases < 55 °C)			
operating temperature				
	with standard cable	+ 5 to + 80 °C		
	with high temperature cable	+ 5 to + 150 °C		
storage temperature	- 40 to + 150 °C (without cable)			
bakeout temperature	150 °C			
humidity	max. 80% at temperatures up to +31 °C, decreasing to 50% at +40 °C			
weight	1.32 lb. (600 g) with NW25KF and NW40KF flange 1.87 lb. (850 g) with 2.75 in. Conflat flange			
mounting orientation	any			
high voltage in measuring chamber	≤3.3 KV			
current in measuring chamber	≤ 700 μA			
connector	SHV (coaxial cable)			
input power	provided from B-RAX 3500 Controller			
output signal	provided from B-RAX 3500 Controller			
CE compliance	when used with B-RAX 3500 Controller: EMC Directive 2014/30/EU, EN55011, EN61000-6-2, EN61000-6-4, EN61326-1, EN61010-1			
environmental	RoHS compliant			

1.3 Dimensions



1.4 Part Numbers

CC605 Cold Cathode Gauge		Part Number
NW25KF		CC605SC
NW40KF		CC605SD
2 3/4 in. CF / NW40CF Conflat®		CC605SF
Maintenance kit (FPM O-ring, inner ring, ignition aid)		002943
Repair kit (anode assembly, FPM O-ring, inner ring, ignition aid)		002944
Tool set for removing/installing ignition aid		002586
CC606 Cold Cathode Gauge - UHV		
NW40KF		CC606SD
2 3/4 in. CF / NW40CF Conflat®		CC606SF
Maintenance kit (Metal seal, centering ring, ignition aid, washer)		002945
Repair kit (anode assembly, metal seal, centering ring, ignition aid, washer)		002946
Tool set for removing/installing ignition aid		002586

2 Important Safety Information

InstruTech has designed and tested this product to provide safe and reliable service, provided it is installed and operated within the *strict safety guidelines provided in this manual*. **Please read and follow all warnings and instructions.**



To avoid serious injury or death, follow the safety information in this document. Failure to comply with these safety procedures could result in serious bodily harm, including death, and or property damage.

Failure to comply with these warnings violates the safety standards of installation and intended use of this instrument. InstruTech disclaims all liability for the customer's failure to comply with these instructions.

Although every attempt has been made to consider most possible installations, InstruTech cannot anticipate every contingency that arises from various installations, operation, or maintenance of the gauge. If you have any questions about the safe installation and use of this product, please contact InstruTech.

2.1 Safety Precautions - General

Hazardous voltages maybe present with this product during normal operation. The product should never be operated with cable connected while parts are unassembled.

 **WARNING!** Do not modify this product or substitute any parts without authorization of qualified InstruTech service trained personnel. Return the product to an InstruTech qualified service and repair center to ensure that all safety features are maintained. Do not use this product if unauthorized modifications have been made.

 **WARNING!** Disconnect cable from the product prior to performing any servicing.

After servicing this product, ensure that all safety checks are made by a qualified service person. When replacement parts are required, ensure that the parts are specified by InstruTech. Substitutions of non-qualified parts may result in fire, electric shock or other hazards. Use of unauthorized parts or modifications made to this product will void the warranty.

To reduce the risk of fire or electric shock, do not expose this product to rain or moisture. These products are not waterproof and careful attention must be paid to not spill any type of liquid onto these products. Do not use these products if they have been damaged. Immediately contact InstruTech to arrange return of the product if it is damaged.

Due to the possibility of corrosion when used in certain environmental conditions, it is possible that the product's safety could be compromised over time. It is important that the product be periodically inspected for

sound electrical connections and equipment grounding. Do not use if the equipment grounding or electrical insulation has been compromised.

 WARNING	 DANGER   DANGER: magnetic fields Strong magnetic fields can disturb electronic devices like heart pacemakers or impair their function. Maintain a safety distance of ≥ 10 cm between the magnet and the heart pacemaker or prevent the influence of strong magnetic fields by antimagnetic shielding.
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2.2 Safety Precautions - Service and operation

Ensure that the vacuum port on which the vacuum gauge is mounted is electrically grounded.

Do not turn on the anode voltage and try to activate the gauge when pressure exceeds 3.75×10^{-3} Torr.

Remove cable to the unit before attempting to service the gauge.

Remove cable to the unit if a cable or plug is damaged or the product is not operating normally according to this User Manual. Contact qualified InstruTech service personnel for any service or troubleshooting condition that may not be covered by this User Manual.

It is important that the product be periodically inspected for sound electrical connections and equipment grounding. Do not use if the equipment grounding or electrical insulation has been compromised.

Do not use if the unit has been dropped. Contact InstruTech for further instructions regarding evaluation of the damaged gauge. Contact InstruTech for return authorization and instructions for returning the product to InstruTech for evaluation.

The most common cause of all vacuum gauge failures is contamination of the gauge. Noisy, abnormally low, or erratic readings and total gauge failure are possible indications of gauge contamination.

2.3 Electrical Conditions

 **WARNING!** When high voltage is present in any vacuum system, a life threatening electrical shock hazard may exist unless all exposed electrical conductors are maintained at earth ground potential. This applies to all products that come in contact with the gas contained in vacuum chambers. An electrical discharge within a gaseous environment may couple dangerous high voltage directly to any ungrounded conductor of electricity. A

person could be seriously injured or killed by coming in contact with an exposed, ungrounded electrical conductor at high voltage potential. This condition applies to all products that may come in contact with the gas inside the vacuum chamber (vacuum/pressure containment vessel).

2.3.1 Proper Equipment Grounding

 **WARNING!** Hazardous voltages that could seriously injure or cause death are present in many vacuum processes. Verify that the vacuum port on which the vacuum gauge is mounted is electrically grounded. Consult a qualified Electrician if you are in doubt about your equipment grounding. Proper grounding of your equipment is essential for safety as well as intended operation of the equipment. The CC605/CC606 must be electrically connected to the grounded vacuum chamber. The connection must conform to the requirements of a protective connection according to EN 61010:

→ For gauges with a KF connection, use a conductive metallic clamping ring.

 **WARNING!** In order to protect personnel from electric shock and bodily harm, shield all conductors which are subject to potential high voltage electrical discharges in or around the vacuum system.

2.3.2 Electrical Interface and Control

It is the user's responsibility to ensure that the electrical signals from the B-RAX 3500 Controller connected to this device and any connections made to external devices, for example, relays and solenoids, are used in a safe manner. Always double check the system set-up before using any signals to automate your process. Perform a hazardous operation analysis of your system design and ensure safeguards and personnel safety measures are taken to prevent injury and property damage.

2.4 *Overpressure and use with hazardous gases*

 **WARNING!** Install suitable protective devices that will limit the level of pressure inside your vacuum chamber to less than what the vacuum chamber system components are capable of withstanding. For example, a quick-connect, O-ring compression fitting may forcibly release a mounted device from the vacuum chamber fitting with only a few psi over local uncorrected barometric (atmospheric) pressure.

In cases where an equipment failure could cause a hazardous condition, always implement fail-safe system operation. For example, use a pressure relief device in an automatic backfill operation where a malfunction could result in high internal pressures if the pressure relief device was not installed on the chamber.

 **WARNING!** Overpressure in the vacuum system > 14.5 psia (1 bar)
Injury caused by released parts and harm caused by escaping process gases can result if clamps are opened while the vacuum system is pressurized. Do not open any clamps while the vacuum system is pressurized. Use the type of clamps which are suited to overpressure.

 **WARNING!** Overpressure in the vacuum system > 29 psia (2.5 bar)
KF connections with elastomer seals (O-rings) cannot withstand such pressures. Process media can thus leak and possibly damage your health. Use O-rings provided with an outer centering ring.

 **CAUTION!** If the internal pressure of a vacuum measuring device is allowed to increase above local uncorrected barometric pressure (atmospheric pressure side), vacuum fittings may release and possible overpressure conditions may cause leaks that would allow the gas inside the tube to release into the atmosphere of the surrounding environment. Toxic, pyrophoric and flammable gases are examples of hazardous gases that if allowed to leak out of the vacuum/pressure containment vessel into the atmospheric environment, could cause bodily injury and possible damage to equipment. Never expose the vacuum measuring device internal volume to pressure above local atmospheric pressure when using hazardous gases.

2.5 *Gases other than Nitrogen / air*

 **WARNING!** Do not attempt to use with gases other than nitrogen (N₂) or air without referring to gas correction factor data.

InstruTech gauges are calibrated for direct readout of nitrogen or air. Do not attempt to use with other gases such as argon (Ar) or carbon dioxide (CO₂) unless accurate conversion data for N₂ to other gas is properly used. Refer to the correction factor data listed in section 5 as well as the B-RAX 3500 controller User Manual operating this device.

3 Installation

3.1 Mechanical Installation



CAUTION! Dirt and damage can impair the function of the vacuum component. Take appropriate measures to ensure cleanliness and prevent damage. Touching the product or parts with bare hands increases the desorption rate. Always use clean, lint free gloves as well as clean tools when working with this product.

Mount the gauge as close as possible to the pressure you want to measure. Long or restricted, small diameter tubing will create a pressure difference between your process chamber and the gauge. This may cause a delay in response to pressure changes. Mounting the gauge too close to a gas source inlet may also cause measurement and control instability.

The gauge can be mounted in any orientation, however, if possible, mount the gauge with port down to help minimize the effect of any particles or condensation collecting in the gauge.]

Do not mount the ionization gauge where it will be subjected to excessive vibration. Vibrations may cause unstable readings, measurement errors and possible mechanical stress to components in the ionization gauge.

For electrical safety purposes the housing of the gauge must be grounded to the vacuum chamber. When using KF flanges, metal clamps must be used to ensure proper grounding. If the gauge may come into contact with charged particles (plasma, ion beam etc.), make sure its vacuum connections is galvanically connected to the vacuum chamber and do always use conductive metallic centering rings and clamps. Do not attempt to modify your flange in order to use non-metallic-type flange clamps.

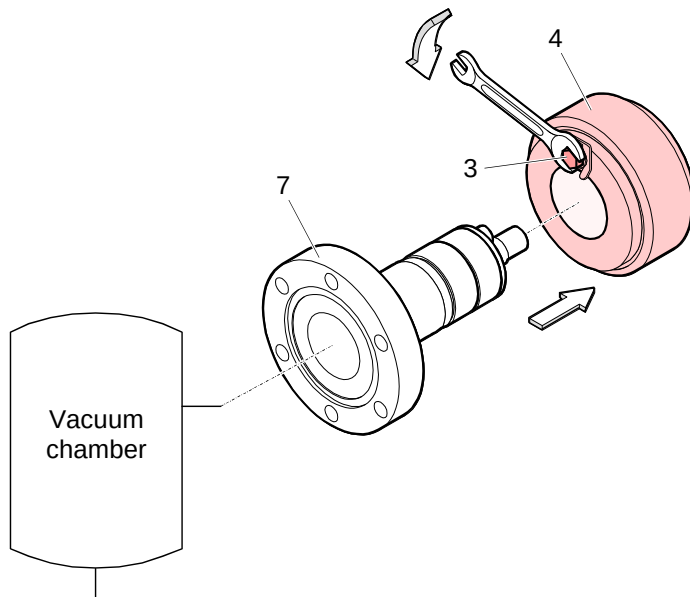
Use all metal vacuum fittings with metal seals when operating pressures are expected to be below 1.00×10^{-7} Torr (1.33×10^{-7} mbar, 1.33×10^{-5} Pa).

Remove the protective lid and install the product to the vacuum system following manufacturer's recommendations for different flanges and fittings. Keep the protective lid for future maintenance.

3.2 Removing the magnet unit

When using a Conflat flange connection, it may be advantageous to temporarily remove the magnet unit as described below. This should prevent interference between the mounting bolts and the magnet unit.

- ❶ Before removing the magnet unit (4) note or mark the location of the metal tab under the hex head screw (3) relative to the measuring chamber (7). This need not to be highly precise but maybe useful when reinstalling the magnet.
- ❷ Unfasten the hex head screw (3) on the magnet unit (4) and remove the magnet unit. The magnetic force and the tendency to tilt make it more difficult to separate the magnet unit and the measuring chamber (7).



- ❸ Make the vacuum connection between the gauge and the vacuum system.
- ❹ Mount the magnet unit and lock it with the hex head screw (3).

Note: The same magnet unit has to be used again when reassembling the gauge.

3.3 Electrical Installation

⚠ WARNING! Be sure the vacuum gauge and the rest of your vacuum system are properly grounded for safety as well as intended operation of the equipment. When using KF flanges, metal clamps must be used to ensure proper grounding.

Connect the gauge with its cable to the B-RAX 3500 Controller. Follow all instructions provided in this as well as the User Manual for the B-RAX 3500.

4 Operation

4.1 *Connecting the cable*

Connect the gauge to the B-RAX 3500 Controller using the cable provided by InstruTech. The gauge is ready for operation as soon as it has been connected. Before you turn on the anode high voltage (activate the gauge) from the B-RAX 3500 Controller, make sure you understand all instructions and information provided in this Manual and the Controller User Manual.

4.2 *Ignition delay*

An ignition delay occurs when the cold cathode gauges are turned on. The delay time increases at low pressures, and is typically:

7.5×10^{-8} Torr $\approx$ 0.1 minute

7.5×10^{-9} Torr $\approx$ 1 minute

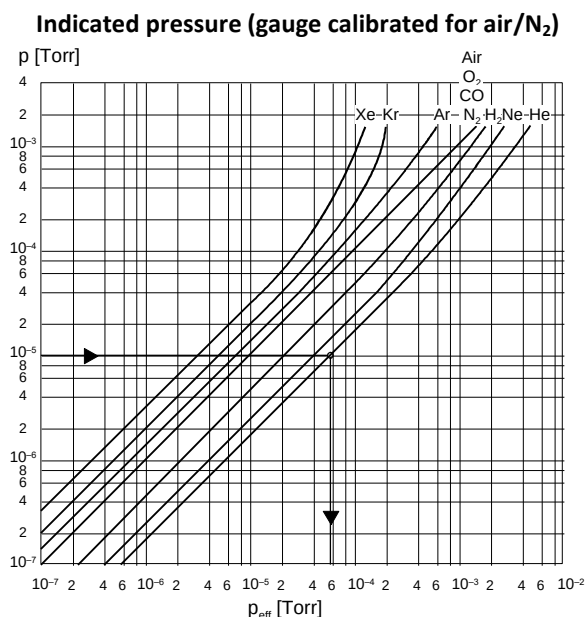
7.5×10^{-10} Torr $\approx$ 5 minutes

4.3 *Overpressure shut down*

The user must turn off the high voltage to the gauge from the B-RAX 3500 Controller before pressure rises above 3.75×10^{-3} Torr. See Instructions provided in the B-RAX 3500 User Manual.

5 Using the gauge with different gases

The measurement value is gas dependent. The pressure reading applies to dry air, O₂, CO and N₂. For other gases, the measurements have to be corrected.



Indication range below 1×10^{-5} Torr

In the range below 10^{-5} Torr the pressure indication is linear. For gases other than air, the pressure can be determined by means of the following conversion formula:

$$p_{\text{eff}} = K \times \text{indicated pressure}$$

where:	Gas type	K
	Air (N ₂ , O ₂ , CO)	1.0
	Xe	0.4
	Kr	0.5
	Ar	0.8
	H ₂	2.4
	Ne	4.1
	He	5.9

These conversion factors are average values.

Example: If the gas in use is argon (Ar) and the B-RAX 3500 Controller indicates a measured pressure of 7.6×10^{-6} Torr,

$$p_{\text{eff}} = 0.8 \times 7.60 \times 10^{-6} = 6 \times 10^{-7} \text{ Torr true pressure of argon gas}$$

A mixture of gases and vapors is often involved. In this case, accurate determination is only possible with a partial pressure measurement instrument, e.g. a quadrupole mass spectrometer.

6 Service

6.1 Calibration

The gauge is factory-calibrated and calibration applies to dry air, O₂, CO and N₂. For other gases, the readings have to be corrected as described in section 5 and the B-Rax 3500 Controller User Manual.

6.2 Maintenance

In general, under clean operating conditions, maintenance is not required for the cold cathode gauge. In case of a defect use InstruTech's repair kit to replace the anode assembly. InstruTech assumes no liability and the warranty becomes null and void if any cleaning, repair or service work other than what is described in this User Manual is carried out by the end-user or third parties.

6.3 Contamination

The most common cause of all vacuum gauge failures is contamination of the gauge. Noisy, low, erratic readings or gauge failures due to contamination or wear and tear, as well as expendable parts (e.g. anode assembly, ignition aid) are not covered by the warranty.

Gauge contamination is influenced by the process media used as well as any existing or new contaminants and their respective partial pressures.

Contamination of the gauge generally causes a deviation of the measured values. In the low pressure range ($p < 3.75 \times 10^{-4}$ Torr), the pressure indication is usually too low (as a consequence of the contamination of the cold cathode system). In case of severe contamination, instabilities can occur (layers of the measuring chamber peel off). Contamination due to isolating layers can even lead to a complete failure of the discharge. To reduce the risk of extensive contamination switch the gauge on only at pressures of $p < 3.75 \times 10^{-3}$ Torr.

Contamination can to a certain extent be reduced by:

- Geometric protection (e.g. screenings, elbows) against particles that spread rectilinearly.
- Mounting the flange of the gauge at a place where the partial pressure of the pollutants is particularly low.

Special precautions are required for vapors deposited under plasma (of the cold cathode measuring system). While vapors occur it may even be necessary to:

- Temporarily switch off the gauge.
- Temporarily seal off of the gauge from the vacuum chamber using a valve.

When using the gauge in gases containing contaminants, cleaning or in case of severe contamination where cleaning may not produce satisfactory results, periodic replacement of anode assembly or the entire gauge may be required. Refer to the following sections for cleaning procedure.

6.4 Removing the gauge from service

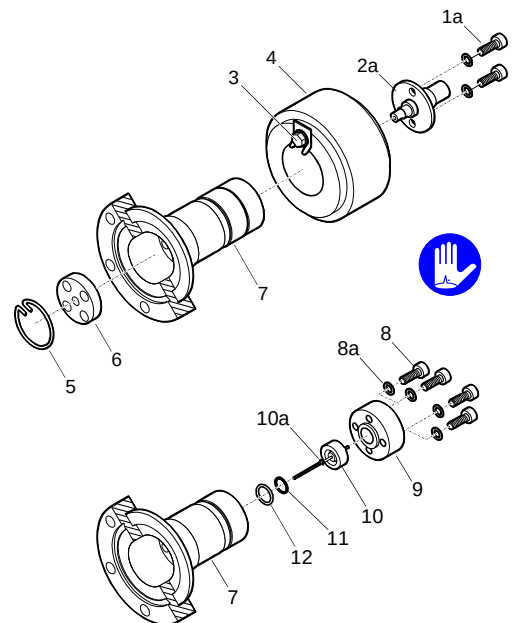
⚠ WARNING! Contaminated parts can be detrimental to health. Before beginning work, find out whether parts are contaminated and adhere to the relevant regulations and precautions for handling contaminated parts.

⚠ CAUTION! Dirt and damage impair the function of the vacuum component. Take appropriate measures to ensure cleanliness and prevent damage. Touching the product or parts with bare hands increases the desorption rate. Always use clean, lint free gloves as well as clean tools when working with this product.

- 1) Vent the vacuum system and turn off the gauge.
- 2) Unplug the cable and remove the gauge from the chamber.
- 3) Re-install the protective lid.

6.5 Disassembling the gauge - CC605

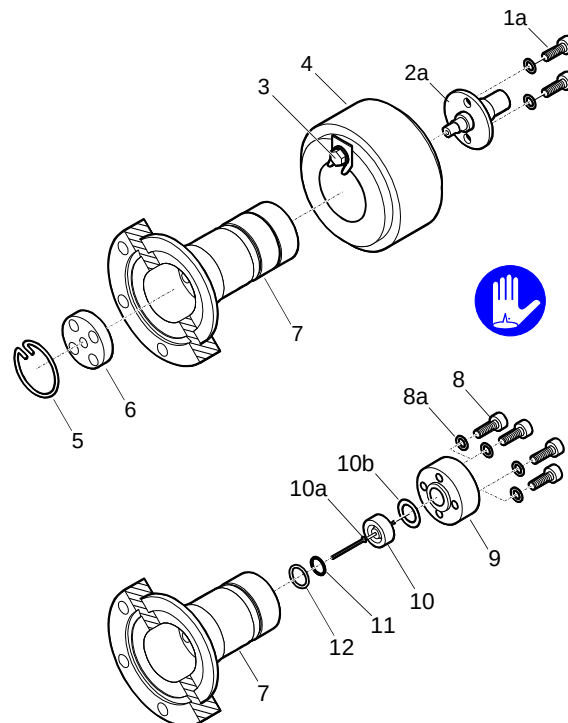
- ❶ Before removing the magnet unit (4) note or mark the location of the metal tab under the hex head screw (3) relative to the measuring chamber (7). This need not to be highly precise but maybe useful when reinstalling the magnet. Unfasten the hex head screw (3) on the magnet unit (4) and remove the magnet unit. The magnetic force and the tendency to tilt make it more difficult to separate the magnet unit and the measuring chamber (7). Note that the same magnet unit has to be used again when reassembling the gauge.
- ❷ Remove the circlip (5) and the pole insert (6) from the measuring chamber (7).
- ❸ Loosen the 2 hex socket screws (1a) and remove the coaxial connector (2a).
- ❹ Remove the 4 (or 2) hex socket screws (8) incl. the lock washers (8a) on the back of the measuring chamber (7).
- ❺ Carefully remove the following items in this order: pressure piece (9), complete anode (10), inner ring (11) and FPM seal (12).



The parts can now be cleaned or replaced individually as described in the section 6.7.

6.6 Disassembling the gauge - CC606

- ❶ Before removing the magnet unit (4) note or mark the location of the metal tab under the hex head screw (3) relative to the measuring chamber (7). This need not to be highly precise but maybe useful when reinstalling the magnet. Unfasten the hex head screw (3) on the magnet unit (4) and remove the magnet unit. The magnetic force and the tendency to tilt make it more difficult to separate the magnet unit and the measuring chamber (7). Note that the same magnet unit has to be used again when reassembling the gauge.
- ❷ Remove the circlip (5) and the pole insert (6) from the measuring chamber (7).
- ❸ Loosen the 2 hex socket screws (1a) and remove the coaxial connector (2a).
- ❹ Remove the 4 (or 2) hex socket screws (8) incl. the lock washers (8a) on the back of the measuring chamber (7).
- ❺ Carefully remove the following items in this order: pressure piece (9), washer (10b), complete anode (10), metal seal (11) and centering ring (12).



The parts can now be cleaned or replaced individually as described in the section 6.7.

6.7 Cleaning the gauge

⚠ WARNING! Adhere to the relevant regulations and take the necessary precautions when handling and disposing of cleaning agents.

Cleaning the measuring chamber and the pole insert:

Refer to the previous section(s) and locate the measuring chamber (7) and the pole insert (6).

- 1 Clean the inside walls of the measuring chamber and the pole insert to a bright finish. Use a polishing cloth.

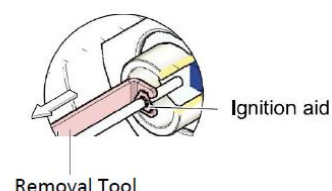
⚠ CAUTION! Sealing surfaces must only be worked concentrically.

- 2 Rinse the measuring chamber and the pole insert with alcohol.
- 3 Dry both.

Cleaning or replacing the anode (10):

Refer to the previous section(s) and locate the anode (10).

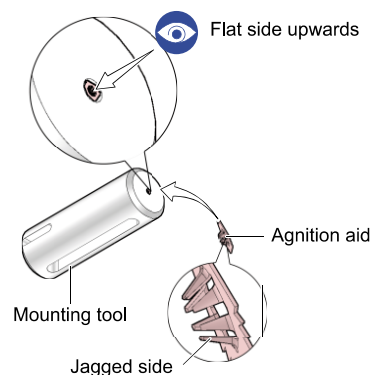
- 1 Remove the old ignition aid (10a) with a tweezer or the ignition removal tool. (See kit p/n 002586 for removal tool).



- 2 Rub the anode pin to a bright finish by means of a polishing cloth.

⚠ CAUTION! Do not bend the anode.
Do not carry out mechanical work on the ceramic part.

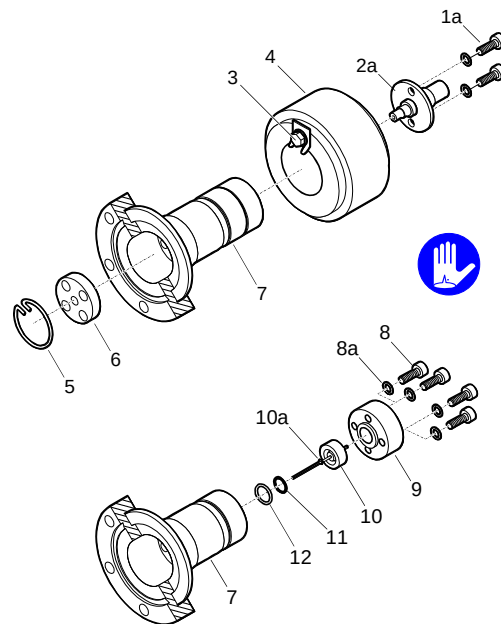
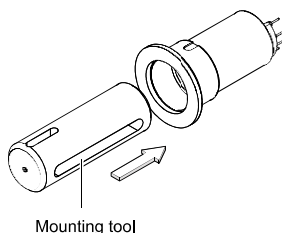
- 3 Rinse the anode with cleaning alcohol.
- 4 Dry the anode.
- 5 Insert the new ignition aid (10a) into the mounting tool (See kit p/n 002586 for mounting tool).



- 6 Carefully press the anode (cleaned or new) centered and parallel to the mounting tool axis into the ignition aid and insert it to a depth of ≈ 15 mm (0.6 in.). The final position is established only after the anode is installed.

6.8 Reassembling the gauge - CC605

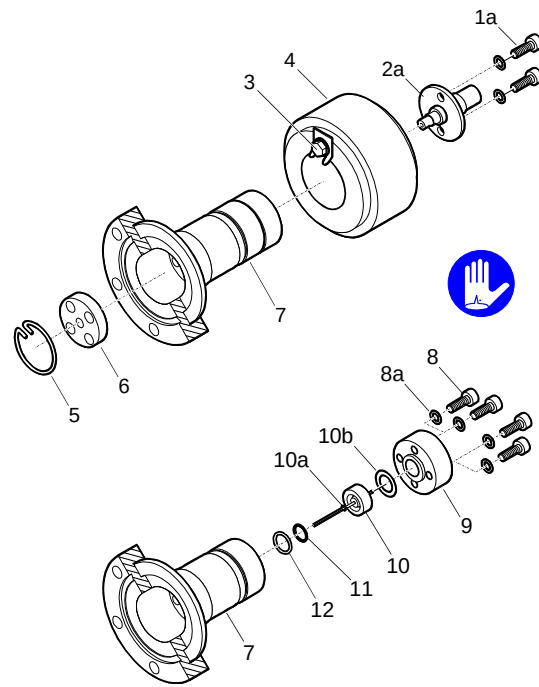
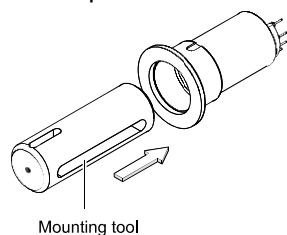
- ❶ Insert the FPM seal (12) with the inner ring (11) centered into the measuring chamber (7). Sealing surface, seal and ceramic part must be clean.
- ❷ Carefully insert the anode (10) incl. ignition aid (10a) into the measuring chamber.
- ❸ Place the pressure piece (9) on the measuring chamber (7) and tighten the screws (8) incl. lock washers (8a) uniformly until the stop position is reached.
- ❹ Position the mounting tool against the ignition aid (10a) which has already been installed on the anode (❶ and ❷ of section 6.7). Slide the mounting tool over the anode pin until the mechanical stop is reached.



- ❺ Remove particles in the measuring chamber (7) by blowing with dry nitrogen (while the flange of the measuring chamber is pointing downward).
- ❻ Slide the pole insert (6) into the measuring chamber up to the mechanical stop
- ❼ Place the circlip (5) snugly fitting on the pole insert.
Visually check that the anode pin is centered over the hole of the pole insert (tolerated eccentricity ≤ 0.5 mm).
- ❽ If possible perform a leak test (leak rate $< 10^{-9}$ mbar l/s).
- ❾ Place the coaxial connector (2a) on the measuring chamber (7) and tighten both hex socket screws (1a).
- ❿ Mount the magnet unit (4) and lock it with the screw (3).

6.9 Reassembling the gauge - CC606

- ❶ Insert new metal seal (11) with the centering ring (12) centered into the measuring chamber (7). Sealing surface, seal and ceramic part must be clean.
- ❷ Carefully insert the anode (10) incl. ignition aid (10a) into the measuring chamber.
- ❸ Place the pressure piece (9) incl. Washer (10b) on the measuring chamber (7) and tighten the screws (8) incl. lock washers (8a) uniformly until the stop position is reached.
- ❹ Position the mounting tool against the ignition aid (10a) which has already been installed on the anode (❶ and ❷ of section 6.7). Slide the mounting tool over the anode pin until the mechanical stop is reached.



- ❺ Remove particles in the measuring chamber (7) by blowing with dry nitrogen (while the flange of the measuring chamber is pointing downward).
- ❻ Slide the pole insert (6) into the measuring chamber (7) up to the mechanical stop.
- ❼ Place the circlip (5) snugly fitting on the pole insert.
Visually check that the anode pin is centered over the hole of the pole insert (tolerated eccentricity ≤ 0.5 mm).
- ❽ If possible perform a leak test (leak rate $< 10^{-9}$ mbar l/s).
- ❾ Place the coaxial connector (2a) on the measuring chamber and tighten both hex socket screws (1a).
- ❿ Mount the magnet unit (4) and lock it with the screw (3).

6.10 Troubleshooting

Indication	Possible Cause	Possible Solution
LED display on B-RAX 3500 controller indicates off	No power	Check cable connections and verify that power is being supplied
Displayed pressure appears very different from expected pressure	Gauge not in the proper location to measure system pressure	Ensure the gauge is located in appropriate location
	The process gas is different from the gas (nitrogen) used to calibrate the gauge	Apply gas sensitivity correction factor if applicable
	Gauge has been dropped causing mechanical damage	Replace the Cold Cathode gauge
	The gauge is contaminated	Clean or replace gauge
	Leak in the vacuum system	Re-check for leak in the system Re-check that all metal seals are used when operating below 1.00×10^{-7} Torr
	Incorrect Sensitivity or CAL FACTORS C	Ensure correct values programmed in the controller
Displayed pressure is significantly lower than expected pressure	The gauge is contaminated	Clean or replace gauge
	Incorrect Sensitivity and CAL FACTORS C	Ensure correct values programmed in the controller
Gauge cannot be activated (unable to turn anode voltage on)	Pressure exceeds value programmed for OVER PRESS	Decrease pressure below required value
	Chamber pressure higher than 3.75×10^{-3} Torr	Decrease chamber pressure below value programmed for OVER PRESS
Gauge will not start at low pressure	Pressure is too low to initiate discharge	Repeat step to activate gauge
		Allow more time for gauge activation
		Increase pressure

7 Factory Service and Support

If you need help setting up, operating, troubleshooting, or obtaining a return materials authorization number (RMA number) to return the gauge for diagnosis, please contact us during normal business hours (8:00am to 5:00pm Mountain time) Monday through Friday, at 303-651-0551. Or e-mail us at support@instrutechinc.com.

For the safety of our employees, you must download, complete and submit a material disclosure form from our website at www.instrutechinc.com Please use this form to provide a history of the gauge detailing what gases have been used. We cannot accept gauges that have been exposed to hazardous materials.

8 Warranty

SELLER warrants that its products are free of defects in workmanship and material and fit for the uses set forth in SELLER's catalog or product specifications, under the normal use and service for which they are intended.

The entire warranty obligation of SELLER is for the repair or replacement, at SELLER's option, of products or parts (examination of which shall disclose to SELLER's satisfaction that it is defective) returned, to SELLER's plant, properly identified within 24 months (unless otherwise noted) after the date of shipment from InstruTech Plant. BUYER must obtain the approval of SELLER and a return authorization number prior to shipment.

Alteration or removal of serial numbers or other identification marks renders this warranty void. The warranty does not apply to products or components which have been abused, altered, operated outside of the environmental specifications of the product, improperly handled or installed, or units which have not been operated in accordance with SELLER's instructions. Furthermore the warranty does not apply to products that have been contaminated, or when the product or part is damaged during the warranty period due to causes other than ordinary wear and tear to the product including, but not limited to, accidents, transportation, neglect, misuse, use of the product for any purpose other than that for which it was designed.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THIS WARRANTY EXTENDS ONLY IN FAVOR OF THE ORIGINAL BUYER. THE BUYER'S SOLE REMEDY SHALL BE THE REPAIR OR REPLACEMENT, AS IS EXPRESSLY PROVIDED HEREIN, OF ANY WARRANTED DEFECTIVE PRODUCT OR PART, AND UNDER NO CIRCUMSTANCE SHALL SELLER BE LIABLE TO BUYER OR ANYONE ELSE FOR ANY CONSEQUENTIAL DAMAGES TO PERSONS OR PROPERTY, FOR INCIDENTAL DAMAGES OR LOSS OF TIME, FOR ANTICIPATED OR LOST PROFITS, OR ANY OTHER LOSS INCURRED BY THE BUYER RELATED TO THE PRODUCT COVERED BY THIS WARRANTY. THIS EXCLUSIVE REMEDY SHALL NOT BE DEEMED TO HAVE FAILED OF ITS ESSENTIAL PURPOSE SO LONG AS SELLER IS WILLING AND ABLE TO REPAIR OR REPLACE DEFECTIVE PARTS IN THE PRESCRIBED MANNER. THIS LIMITED WARRANTY MAY NOT BE MODIFIED BY SELLER UNLESS SUCH MODIFICATION OR WAIVER IS IN WRITING, EXECUTED BY AN AUTHORIZED OFFICER OF SELLER.



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