



113733-P1
Rev C, 7/98
Instruction Manual

MKS Baratron® Type 121A Absolute Pressure Transducer



WARRANTY

Type 121A Equipment

MKS Instruments, Inc. (**MKS**) warrants that the equipment described above (the "equipment") manufactured by **MKS** shall be free from defects in materials and workmanship for a period of one year from date of shipment and will for a period of two years from the date of shipment, correctly perform all date-related operations, including without limitation accepting data entry, sequencing, sorting, comparing, and reporting, regardless of the date the operation is performed or the date involved in the operation, provided that, if the equipment exchanges data or is otherwise used with equipment, software, or other products of others, such products of others themselves correctly perform all date-related operations and store and transmit dates and date-related data in a format compatible with **MKS** equipment. THIS WARRANTY IS **MKS'** SOLE WARRANTY CONCERNING DATE-RELATED OPERATIONS.

For the period commencing with the date of shipment of this equipment and ending one year later in the case of defects in materials and workmanship, but two years later in the case of failure to comply with the date-related operations warranty, **MKS** will, at its option, either repair or replace any part which is defective in materials or workmanship or with respect to the date-related operations warranty without charge to the purchaser. The foregoing shall constitute the exclusive and sole remedy of the purchaser for any breach by **MKS** of this warranty.

The purchaser, before returning any equipment covered by this warranty, which is asserted to be defective by the purchaser, shall make specific written arrangements with respect to the responsibility for shipping the equipment and handling any other incidental charges with the **MKS** sales representative or distributor from which the equipment was purchased or, in the case of a direct purchase from **MKS**, with the **MKS** home office in Andover, Massachusetts, USA.

This warranty does not apply to any equipment which has not been installed and used in accordance with the specifications recommended by **MKS** for the proper and normal use of the equipment. **MKS** shall not be liable under any circumstances for indirect, special, consequential, or incidental damages in connection with, or arising out of, the sale, performance, or use of the equipment covered by this warranty.

MKS recommends that all **MKS** pressure and flow products be calibrated periodically (typically every 6 to 12 months) to ensure accurate readings. When a product is returned to **MKS** for this periodic re-calibration it is considered normal preventative maintenance not covered by any warranty.

THIS WARRANTY IS IN LIEU OF ALL OTHER RELEVANT WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY AND THE IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, AND ANY WARRANTY AGAINST INFRINGEMENT OF ANY PATENT.

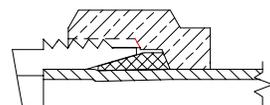
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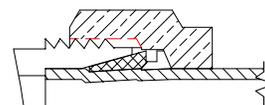
SPECIAL NOTICE

This warranty is void if the product is installed using single or double metal ferrule compression type vacuum fittings, shown below. These fittings are commonly tightened incorrectly, causing damage to the pressure sensor.

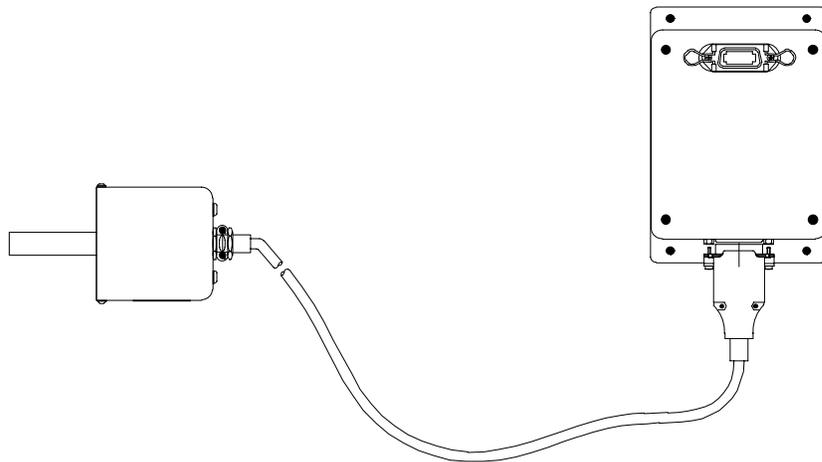
Single Ferrule



Double Ferrule



MKS Baratron® Type 121A Absolute Pressure Transducer



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Pressure Transducer Safety Information

Symbols Used in This Instruction Manual

Definitions of WARNING, CAUTION, and NOTE messages used throughout the manual.

Warning

The **WARNING** sign denotes a hazard to personnel. It calls attention to a procedure, practice, condition, or the like, which, if not correctly performed or adhered to, could result in injury to personnel.

Caution

The **CAUTION** sign denotes a hazard to equipment. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of all or part of the product.

Note

The **NOTE** sign denotes important information. It calls attention to a procedure, practice, condition, or the like, which is essential to highlight.

Symbols Found on the Unit

The following table describes symbols that may be found on the unit.

Definition of Symbols Found on the Unit			
			
On (Supply) IEC 417, No.5007	Off (Supply) IEC 417, No.5008	Earth (ground) IEC 417, No.5017	Protective earth (ground) IEC 417, No.5019
			
Frame or chassis IEC 417, No.5020	Equipotentiality IEC 417, No.5021	Direct current IEC 417, No.5031	Alternating current IEC 417, No.5032
			
Both direct and alternating current IEC 417, No.5033-a	Class II equipment IEC 417, No.5172-a	Three phase alternating current IEC 617-2 No.020206	
			
Caution, refer to accompanying documents ISO 3864, No.B.3.1	Caution, risk of electric shock ISO 3864, No.B.3.6	Caution, hot surface IEC 417, No.5041	

Table 1: Definition of Symbols Found on the Unit

Safety Procedures and Precautions

Observe the following general safety precautions during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of intended use of the instrument and may impair the protection provided by the equipment. MKS Instruments, Inc. assumes no liability for the customer's failure to comply with these requirements.

DO NOT SUBSTITUTE PARTS OR MODIFY INSTRUMENT

Do not install substitute parts or perform any unauthorized modification to the instrument. Return the instrument to an MKS Calibration and Service Center for service and repair to ensure that all safety features are maintained.

SERVICE BY QUALIFIED PERSONNEL ONLY

Operating personnel must not attempt component replacement and internal adjustments. Any service must be made by qualified service personnel only.

USE CAUTION WHEN OPERATING WITH HAZARDOUS MATERIALS

If hazardous materials are used, users must take responsibility to observe the proper safety precautions, completely purge the instrument when necessary, and ensure that the material used is compatible with the materials in this product, including any sealing materials.

PURGE THE INSTRUMENT

After installing the unit, or before removing it from a system, purge the unit completely with a clean, dry gas to eliminate all traces of the previously used flow material.

USE PROPER PROCEDURES WHEN PURGING

This instrument must be purged under a ventilation hood, and gloves must be worn for protection.

DO NOT OPERATE IN AN EXPLOSIVE ENVIRONMENT

To avoid explosion, do not operate this product in an explosive environment unless it has been specifically certified for such operation.

USE PROPER FITTINGS AND TIGHTENING PROCEDURES

All instrument fittings must be consistent with instrument specifications, and compatible with the intended use of the instrument. Assemble and tighten fittings according to manufacturer's directions.

CHECK FOR LEAK-TIGHT FITTINGS

Carefully check all vacuum component connections to ensure leak-tight installation.

OPERATE AT SAFE INLET PRESSURES

Never operate at pressures higher than the rated maximum pressure (refer to the product specifications for the maximum allowable pressure).

INSTALL A SUITABLE BURST DISC

When operating from a pressurized gas source, install a suitable burst disc in the vacuum system to prevent system explosion should the system pressure rise.

KEEP THE UNIT FREE OF CONTAMINANTS

Do not allow contaminants to enter the unit before or during use. Contamination such as dust, dirt, lint, glass chips, and metal chips may permanently damage the unit or contaminate the process.

ALLOW PROPER WARM UP TIME FOR TEMPERATURE-CONTROLLED UNITS

Temperature-controlled units will only meet specifications when sufficient time is allowed for the unit to meet, and stabilize at, the designed operating temperature. Do not zero or calibrate the unit until the warm up is complete.

Sicherheitshinweise für den Druckmeßumformer

In dieser Betriebsanleitung vorkommende Symbole

Bedeutung der mit WARNUNG!, VORSICHT! und HINWEIS gekennzeichneten Absätze in dieser Betriebsanleitung.

Warnung!



Das Symbol **WARNUNG!** weist auf eine Gefahr für das Bedienpersonal hin. Es macht auf einen Arbeitsablauf, eine Arbeitsweise, einen Zustand oder eine sonstige Gegebenheit aufmerksam, deren unsachgemäße Ausführung bzw. ungenügende Berücksichtigung zu Verletzungen führen kann.

Vorsicht!



Das Symbol **VORSICHT!** weist auf eine Gefahr für das Gerät hin. Es macht auf einen Bedienungsablauf, eine Arbeitsweise oder eine sonstige Gegebenheit aufmerksam, deren unsachgemäße Ausführung bzw. ungenügende Berücksichtigung zu einer Beschädigung oder Zerstörung des Gerätes oder von Teilen des Gerätes führen kann.

Hinweis



Das Symbol **HINWEIS** macht auf wichtige Informationen bezüglich eines Arbeitsablaufs, einer Arbeitsweise, eines Zustands oder einer sonstige Gegebenheit aufmerksam.

Erklärung der am Gerät angebrachten Symbole

Nachstehender Tabelle sind die Bedeutungen der Symbole zu entnehmen, die am Gerät angebracht sein können.

Bedeutung der am Gerät angebrachten Symbole			
			
Ein (Energie) IEC 417, No.5007	Aus (Energie) IEC 417, No.5008	Erdanschluß IEC 417, No.5017	Schutzleiteranschluß IEC 417, No.5019
			
Masseanschluß IEC 417, No.5020	Equipotential- anschluß IEC 417, No.5021	Gleichstrom IEC 417, No.5031	Wechselstrom IEC 417, No.5032
			
Gleich- oder Wechselstrom IEC 417, No.5033-a	Durchgängige doppelte oder verstärkte Isolierung IEC 417, No.5172-a	Dreileiter- Wechselstrom (Drehstrom) IEC 617-2, No.020206	
			
Warnung vor einer Gefahrenstelle (Achtung, Dokumen- tation beachten) ISO 3864, No.B.3.1	Warnung vor gefährlicher elektrischer Spannung ISO 3864, No.B.3.6	Höhere Temperatur an leicht zugänglichen Teilen IEC 417, No.5041	

Tabelle 2: Bedeutung der am Gerät angebrachten Symbole

Sicherheitsvorschriften und Vorsichtsmaßnahmen

Folgende allgemeine Sicherheitsvorschriften sind während allen Betriebsphasen dieses Gerätes zu befolgen. Eine Mißachtung der Sicherheitsvorschriften und sonstiger Warnhinweise in dieser Betriebsanleitung verletzt die für dieses Gerät und seine Bedienung geltenden Sicherheitsstandards, und kann die Schutzvorrichtungen an diesem Gerät wirkungslos machen. MKS Instruments, Inc. haftet nicht für Mißachtung dieser Sicherheitsvorschriften seitens des Kunden.

Niemals Teile austauschen oder Änderungen am Gerät vornehmen!

Ersetzen Sie keine Teile mit baugleichen oder ähnlichen Teilen, und nehmen Sie keine eigenmächtigen Änderungen am Gerät vor. Schicken Sie das Gerät zwecks Wartung und Reparatur an den MKS-Kalibrierungs- und -Kundendienst ein. Nur so wird sichergestellt, daß alle Schutzvorrichtungen voll funktionsfähig bleiben.

Wartung nur durch qualifizierte Fachleute!

Das Auswechseln von Komponenten und das Vornehmen von internen Einstellungen darf nur von qualifizierten Fachleuten durchgeführt werden, niemals vom Bedienpersonal.

Vorsicht beim Arbeiten mit gefährlichen Stoffen!

Wenn gefährliche Stoffe verwendet werden, muß der Bediener die entsprechenden Sicherheitsvorschriften genauestens einhalten, das Gerät, falls erforderlich, vollständig spülen, sowie sicherstellen, daß der Gefahrstoff die am Gerät verwendeten Materialien, insbesondere Dichtungen, nicht angreift.

Spülen des Gerätes mit Gas!

Nach dem Installieren oder vor dem Ausbau aus einem System muß das Gerät unter Einsatz eines reinen Trockengases vollständig gespült werden, um alle Rückstände des Vorgängermediums zu entfernen.

Anweisungen zum Spülen des Gerätes

Das Gerät darf nur unter einer Ablufthaube gespült werden. Schutzhandschuhe sind zu tragen.

Gerät nicht zusammen mit explosiven Stoffen, Gasen oder Dämpfen benutzen!

Um der Gefahr einer Explosion vorzubeugen, darf dieses Gerät niemals zusammen mit (oder in der Nähe von) explosiven Stoffen aller Art eingesetzt werden, sofern es nicht ausdrücklich für diesen Zweck zugelassen ist.

Anweisungen zum Installieren der Armaturen!

Alle Anschlußstücke und Armaturenteile müssen mit der Gerätespezifikation übereinstimmen, und mit dem geplanten Einsatz des Gerätes kompatibel sein. Der Einbau, insbesondere das Anziehen und Abdichten, muß gemäß den Anweisungen des Herstellers vorgenommen werden.

Verbindungen auf Undichtigkeiten prüfen!

Überprüfen Sie sorgfältig alle Verbindungen der Vakuumkomponenten auf undichte Stellen.

Gerät nur unter zulässigen Anschlußdrücken betreiben!

Betreiben Sie das Gerät niemals unter Drücken, die den maximal zulässigen Druck (siehe Produktspezifikationen) übersteigen.

Geeignete Berstscheibe installieren!

Wenn mit einer unter Druck stehenden Gasquelle gearbeitet wird, sollte eine geeignete Berstscheibe in das Vakuumsystem installiert werden, um eine Explosionsgefahr aufgrund von steigendem Systemdruck zu vermeiden.

Verunreinigungen im Gerät vermeiden!

Stellen Sie sicher, daß Verunreinigungen jeglicher Art weder vor dem Einsatz noch während des Betriebs in das Instrumenteninnere gelangen können. Staub- und Schmutzpartikel, Glassplitter oder Metallspäne können das Gerät dauerhaft beschädigen oder Prozeß und Meßwerte verfälschen.

Bei Geräten mit Temperaturkontrolle korrekte Anwärmzeit einhalten!

Temperaturkontrollierte Geräte arbeiten nur dann gemäß ihrer Spezifikation, wenn genügend Zeit zum Erreichen und Stabilisieren der Betriebstemperatur eingeräumt wird. Kalibrierungen und Nulleinstellungen sollten daher nur nach Abschluß des Anwärmvorgangs durchgeführt werden.

Informations relatives à la sécurité pour le transducteur de pression

Symboles utilisés dans ce manuel d'utilisation

Définitions des indications AVERTISSEMENT, ATTENTION, et REMARQUE utilisées dans ce manuel.

Avertissement



L'indication **AVERTISSEMENT** signale un danger pour le personnel. Elle attire l'attention sur une procédure, une pratique, une condition, ou toute autre situation présentant un risque d'accident pour le personnel, en cas d'exécution incorrecte ou de non respect des consignes.

Attention



L'indication **ATTENTION** signale un danger pour l'appareil. Elle attire l'attention sur une procédure d'exploitation, une pratique, ou toute autre situation, présentant un risque d'endommagement ou de destruction d'une partie ou de la totalité de l'appareil, en cas d'exécution incorrecte ou de non respect des consignes.

Remarque



L'indication **REMARQUE** signale une information importante. Elle attire l'attention sur une procédure, une pratique, une condition, ou toute autre situation, présentant un intérêt particulier.

Symboles apparaissant sur l'unité

Le tableau suivant décrit les symboles pouvant apparaître sur l'unité.

Définition des symboles apparaissant sur l'unité			
			
Marche (sous tension) IEC 417, No.5007	Arrêt (hors tension) IEC 417, No.5008	Terre (masse) IEC 417, No.5017	Terre de protection (masse) IEC 417, No.5019
			
Masse IEC 417, No.5020	Equipotentialité IEC 417, No.5021	Courant continu IEC 417, No.5031	Courant alternatif IEC 417, No.5032
			
Courant continu et alternatif IEC 417, No.5033-a	Matériel de classe II IEC 417, No.5172-a	Courant alternatif triphase IEC 617-2, No.020206	
			
Attention : se reporter à la documentation ISO 3864, No.B.3.1	Attention : risque de choc électrique ISO 3864, No.B.3.6	Attention : surface brûlante IEC 417, No.5041	

Tableau 3: Définition des symboles apparaissant sur l'unité

Mesures de sécurité et précautions

Prendre les précautions générales de sécurité suivantes pendant toutes les phases d'exploitation de cet appareil. Le non respect des ces précautions ou des avertissements contenus dans ce manuel constitue une violation des normes de sécurité relatives à l'utilisation de l'appareil et peut diminuer la protection fournie par l'appareil. MKS Instruments, Inc. n'assume aucune responsabilité concernant le non respect des consignes par les clients.

PAS DE SUBSTITUTION DE PIÈCES OU DE MODIFICATION DE L'APPAREIL

Ne pas installer des pièces de substitution ou effectuer des modifications non autorisées sur l'appareil. Renvoyer l'appareil à un centre de service et de calibrage MKS pour tout dépannage ou réparation afin de garantir le l'intégrité des dispositifs de sécurité.

DÉPANNAGE UNIQUEMENT PAR DU PERSONNEL QUALIFIÉ

Le personnel d'exploitation ne doit pas essayer de remplacer des composants ou de faire des réglages internes. Tout dépannage doit être uniquement effectué par du personnel qualifié.

PRÉCAUTION EN CAS D'UTILISATION AVEC DES PRODUITS DANGEREUX

Si des produits dangereux sont utilisés, l'utilisateur est responsable de la prise des mesures de précaution appropriées, de la purge complète de l'appareil quand cela est nécessaire, et de la garantie que les produits utilisés sont compatibles avec les composants de cet appareil, y compris les matériaux d'étanchéité.

PURGE DE L'APPAREIL

Après l'installation de l'unité, ou avant son enlèvement d'un système, purger l'unité complètement avec un gaz propre et sec afin d'éliminer toute trace du produit de flux utilisé précédemment.

UTILISATION DES PROCÉDURES APPROPRIÉES POUR LA PURGE

Cet appareil doit être purgé sous une hotte de ventilation, et il faut porter des gants de protection.

PAS D'EXPLOITATION DANS UN ENVIRONNEMENT EXPLOSIF

Pour éviter toute explosion, ne pas utiliser cet appareil dans un environnement explosif, sauf en cas d'homologation spécifique pour une telle exploitation.

UTILISATION D'ÉQUIPEMENTS APPROPRIÉS ET PROCÉDURES DE SERRAGE

Tous les équipements de l'appareil doivent être cohérents avec ses spécifications, et compatibles avec l'utilisation prévue de l'appareil. Assembler et serrer les équipements conformément aux directives du fabricant.

VÉRIFICATION DE L'ÉTANCHÉITÉ DES CONNEXIONS

Vérifier attentivement toutes les connexions des composants pour le vide afin de garantir l'étanchéité de l'installation.

EXPLOITATION AVEC DES PRESSIONS D'ENTRÉE NON DANGEREUSES

Ne jamais utiliser des pressions supérieures à la pression nominale maximum (se reporter aux spécifications de l'unité pour la pression maximum admissible).

INSTALLATION D'UN DISQUE D'ÉCHAPPEMENT ADAPTÉ

En cas d'exploitation avec une source de gaz pressurisé, installer un disque d'échappement adapté dans le système à vide, afin d'éviter une explosion du système en cas d'augmentation de la pression.

MAINTIEN DE L'UNITÉ À L'ABRI DES CONTAMINATIONS

Ne pas laisser des produits contaminants pénétrer dans l'unité avant ou pendant l'utilisation. Des produits contaminants tels que des poussières et des fragments de tissu, de glace et de métal peuvent endommager l'unité d'une manière permanente ou contaminer le processus.

RESPECT DU TEMPS D'ÉCHAUFFEMENT APPROPRIÉ POUR LES UNITÉS À TEMPÉRATURE CONTRÔLÉE

Les unités à température contrôlée atteignent leurs spécifications uniquement quand on leur laisse un temps suffisant pour atteindre d'une manière stable la température d'exploitation. Ne pas remettre à zéro ou calibrer l'unité tant que l'échauffement n'est pas terminé.

Medidas de seguridad del transductor de presión

Símbolos usados en este manual de instrucciones

Definiciones de los mensajes de advertencia, precaución y de las notas usados en el manual.

Advertencia



El símbolo de advertencia indica la posibilidad de que se produzcan daños personales. Pone de relieve un procedimiento, práctica, estado, etc. que en caso de no realizarse u observarse correctamente puede causar daños personales.

Precaución



El símbolo de precaución indica la posibilidad de producir daños al equipo. Pone de relieve un procedimiento operativo, práctica, estado, etc. que en caso de no realizarse u observarse correctamente puede causar daños o la destrucción total o parcial del equipo.

Nota



El símbolo de notas indica información de importancia. Este símbolo pone de relieve un procedimiento, práctica o condición cuyo conocimiento es esencial destacar.

Símbolos hallados en la unidad

La tabla siguiente contiene los símbolos que puede hallar en la unidad.

Definición de los símbolos hallados en la unidad			
			
Encendido (alimentación eléctrica) IEC 417, N° 5007	Apagado (alimentación eléctrica) IEC 417, N° 5008	Puesta a tierra IEC 417, N° 5017	Protección a tierra IEC 417, N° 5019
			
Caja o chasis IEC 417, N° 5020	Equipotencialidad IEC 417, N° 5021	Corriente continua IEC 417, N° 5031	Corriente alterna IEC 417, N° 5032
			
Corriente continua y alterna IEC 417, N° 5033-a	Equipo de clase II IEC 417, N° 5172-a	Corriente alterna trifásica IEC 617-2, N° 020206	
			
Precaución. Consulte los documentos adjuntos ISO 3864, N° B.3.1	Precaución. Riesgo de descarga eléctrica ISO 3864, N° B.3.6	Precaución. Superficie caliente IEC 417, N° 5041	

Tabla 4: Definición de los símbolos hallados en la unidad

Procedimientos y precauciones de seguridad

Las precauciones generales de seguridad descritas a continuación deben observarse durante todas las etapas de funcionamiento del instrumento. La falta de cumplimiento de dichas precauciones o de las advertencias específicas a las que se hace referencia en el manual, constituye una violación de las normas de seguridad establecidas para el uso previsto del instrumento y podría anular la protección proporcionada por el equipo. Si el cliente no cumple dichas precauciones y advertencias, MKS Instruments, Inc. no asume responsabilidad legal alguna.

NO UTILICE PIEZAS NO ORIGINALES O MODIFIQUE EL INSTRUMENTO

No instale piezas que no sean originales ni modifique el instrumento sin autorización. Para asegurar el correcto funcionamiento de todos los dispositivos de seguridad, envíe el instrumento al Centro de servicio y calibración de MKS toda vez que sea necesario repararlo o efectuar tareas de mantenimiento.

LAS REPARACIONES DEBEN SER EFECTUADAS ÚNICAMENTE POR TÉCNICOS AUTORIZADOS

Los operarios no deben intentar reemplazar los componentes o realizar tareas de ajuste en el interior del instrumento. Las tareas de mantenimiento o reparación deben ser realizadas únicamente por personal autorizado.

TENGA CUIDADO CUANDO TRABAJE CON MATERIALES TÓXICOS

Cuando se utilicen materiales tóxicos, es responsabilidad de los operarios tomar las medidas de seguridad correspondientes, purgar totalmente el instrumento cuando sea necesario y comprobar que el material utilizado sea compatible con los materiales del instrumento e inclusive, con todos los materiales de sellado.

PURGUE EL INSTRUMENTO

Una vez instalada la unidad o antes de retirarla del sistema, purgue completamente la unidad con gas limpio y seco para eliminar todo resto de la sustancia líquida empleada anteriormente.

USE PROCEDIMIENTOS ADECUADOS PARA REALIZAR LA PURGA

El instrumento debe purgarse debajo de una campana de ventilación y deben utilizarse guantes protectores.

NO HAGA FUNCIONAR EL INSTRUMENTO EN AMBIENTES CON RIESGO DE EXPLOSIÓN

Para evitar que se produzcan explosiones, no haga funcionar este instrumento en un ambiente con riesgo de explosiones, excepto cuando el mismo haya sido certificado específicamente para tal uso.

USE ACCESORIOS ADECUADOS Y REALICE CORRECTAMENTE LOS PROCEDIMIENTOS DE AJUSTE

Todos los accesorios del instrumento deben cumplir las especificaciones del mismo y ser compatibles con el uso que se debe dar al instrumento. Arme y ajuste los accesorios de acuerdo con las instrucciones del fabricante.

COMPRUEBE QUE LAS CONEXIONES SEAN A PRUEBA DE FUGAS

Inspeccione cuidadosamente las conexiones de los componentes de vacío para comprobar que hayan sido instalados a prueba de fugas.

HAGA FUNCIONAR EL INSTRUMENTO CON PRESIONES DE ENTRADA SEGURAS

No haga funcionar nunca el instrumento con presiones superiores a la máxima presión nominal (en las especificaciones del instrumento hallará la presión máxima permitida).

INSTALE UNA CÁPSULA DE SEGURIDAD ADECUADA

Cuando el instrumento funcione con una fuente de gas presurizado, instale una cápsula de seguridad adecuada en el sistema de vacío para evitar que se produzcan explosiones cuando suba la presión del sistema.

MANTENGA LA UNIDAD LIBRE DE CONTAMINANTES

No permita el ingreso de contaminantes en la unidad antes o durante su uso. Los productos contaminantes tales como polvo, suciedad, pelusa, lascas de vidrio o virutas de metal pueden dañar irreparablemente la unidad o contaminar el proceso.

CALIENTE ADECUADAMENTE LAS UNIDADES CONTROLADAS POR MEDIO DE TEMPERATURA

Las unidades controladas por medio de temperatura funcionarán de acuerdo con las especificaciones sólo cuando se las caliente durante el tiempo suficiente para permitir que lleguen y se estabilicen a la temperatura de operación indicada. No calibre la unidad y no la ponga en cero hasta que finalice el procedimiento de calentamiento.

Chapter One: General Information

Introduction

The MKS Baratron® Type 121A Absolute Pressure Transducer is a precision pressure measurement instrument that operates on a variable capacitance technique. This measurement technique converts pressure to a linear DC output voltage using three components: a sensor, signal conditioner, and power supply/readout unit. The Type 121 Pressure Transducer contains two of the components: the sensor and signal conditioner. An MKS (or MKS-compatible) power supply is required to complete the pressure-to-DC output voltage conversion, and an MKS (or MKS-compatible) display unit can be used for direct pressure readout. The 121 instrument is available in ranges from 1 to 25,000 Torr (mmHg). The Type 121 instrument measures down to 1×10^{-4} Torr (1 Torr Full Scale).

In addition to the sensor and remote electronics unit (signal conditioner), the 121 instrument has a shielded cable (8 ft. standard length) with a Type “D” connector attached to it. The separate housings of the sensor and electronics unit enable the sensor to be heated to 150° C and allow the electronics unit to be mounted in a convenient location. The shielded cable and connector provide maximum zero stability, therefore requiring less adjustment. The cable is also easily disconnected from the sensor when preparing the instrument to operate in temperatures up to 200° C (for maximum bakeout).

The Type 121 Absolute Pressure Transducer also has the following standard features:

- Sensor constructed with all-Inconel® for corrosion resistance
- Total pressure measurement range of over four-decades
- High level 0 to 10 VDC output linear with pressure
- Dual electrode bridge circuit design for maximum zero stability

How This Manual is Organized

This manual is designed to provide instructions on how to set up, install, and operate a Type 121 unit.

Before installing your Type 121 unit in a system and/or operating it, carefully read and familiarize yourself with all precautionary notes in the *Safety Messages and Procedures* section at the front of this manual. In addition, observe and obey all WARNING and CAUTION notes provided throughout the manual.

Chapter One: General Information, (this chapter) introduces the product and describes the organization of the manual.

Chapter Two: Installation, explains the environmental requirements and describes how to mount the instrument in your system.

Chapter Three: Overview, gives a brief description of the instrument and its functionality.

Chapter Four: Operation, describes how to use the instrument and explains all the functions and features.

Chapter Five: Theory of Operation, describes in a general way how the Type 121 Absolute Pressure Transducer operates in a variable capacitance pressure measurement system.

Chapter Six: Maintenance, provides instructions on servicing.

Appendix A: Product Specifications, lists the maintenance requirements for the Type 121 unit.

Appendix B: Model Code Explanation, describes the model code used to order the instrument.

Appendix C: Companion Products and Cables, lists other products offered by MKS.

Appendix D: High Pressure Fitting Selection, defines the pressure range for each fitting option.

Customer Support

Standard maintenance and repair services are available at all of our regional MKS Calibration and Service Centers, listed on the back cover. In addition, MKS accepts the instruments of other manufacturers for recalibration using the Primary and Transfer Standard calibration equipment located at all of our regional service centers. Should any difficulties arise in the use of your Type 121 instrument, or to obtain information about companion products MKS offers, contact any authorized MKS Calibration and Service Center. If it is necessary to return the instrument to MKS, please obtain an ERA Number (Equipment Return Authorization Number) from the MKS Calibration and Service Center before shipping. The ERA Number expedites handling and ensures proper servicing of your instrument.

Please refer to the inside of the back cover of this manual for a list of MKS Calibration and Service Centers.

Warning

All returns to MKS Instruments must be free of harmful, corrosive, radioactive, or toxic materials.

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Chapter Two: Installation

How To Unpack the Type 121 Unit

MKS has carefully packed the Type 121 unit so that it will reach you in perfect operating order. Upon receiving the unit, however, you should check for defects, cracks, broken connectors, etc., to be certain that damage has not occurred during shipment.

Note

Do *not* discard any packing materials until you have completed your inspection and are sure the unit arrived safely.

If you find any damage, notify your carrier and MKS immediately. If it is necessary to return the unit to MKS, obtain an ERA Number (Equipment Return Authorization Number) from the MKS Service Center before shipping. Please refer to the inside of the back cover of this manual for a list of MKS Calibration and Service Centers.

Caution

Only qualified individuals should perform the installation and any user adjustments. They must comply with all the necessary ESD and handling precautions while installing and adjusting the instrument. Proper handling is essential when working with all highly sensitive precision electronic instruments.

Unpacking Checklist

Standard Equipment:

- Type 121 Electronics Unit
- Type 121 Sensor Unit
- Type 121 Instruction Manual (this book)

Optional Equipment:

- Electrical Connector Accessories Kit: 121A-K1 (includes a mating connector for the 14-pin micro-ribbon connector)
- Cables to connect the signal conditioner to a readout or controller. Refer to *Interface Cables*, page 22, for information.

Interface Cables

As of January 1, 1996, most products shipped to the European Community must comply with the EMC Directive 89/336/EEC, which covers radio frequency emissions and immunity tests. In addition, as of January 1, 1997, some products shipped to the European Community must also comply with the Product Safety Directive 92/59/EEC and Low Voltage Directive 73/23/EEC, which cover general safety practices for design and workmanship. MKS products that meet these requirements are identified by application of the CE Mark.

To ensure compliance with EMC Directive 89/336/EEC, an overall metal braided shielded cable, properly grounded at both ends, is required during use. No additional installation requirements are necessary to ensure compliance with Directives 92/59/EEC and 73/23/EEC.

Note



1. An overall metal braided, shielded cable, properly grounded at both ends, is required during use to meet CE specifications.
2. To order an overall metal braided shielded cable, add an “S” after the cable type designation. For example, to order a standard connection cable for the Type 121 transducer, use part number CB-112-14-10; for a braided, shielded cable use part number CB-112S-14-10.

Electronics Unit

The electronics unit also has a micro-ribbon cable connector for power supply/readout units. The ribbon interface cable can be supplied by MKS, in a nominal 10” (3 m) length. MKS offers cables to connect to MKS readouts and controllers, as listed in Table 5.

Interface Cables		
To Connect the 121 Unit to . . .	Use the MKS Cable . . .	
	Standard	Shielded
PDR-C1-C/2C, PDR-5B, and PDR-D-1	CB472-1-10	CB472S-1-10
146,651, 652, 660	CB112-14-10	CB112S-14-10
xx indicates the cable length, in feet; standard length is 10 ft		

Table 5: Interface Cables

Sensor

The Type 121 transducer comes equipped with an 8 foot overall metal braided shielded cable attached to the sensor. The other end of the cable has a Type “D” connector which plugs into the electronics unit.

Note

An optional cable is available up to 20 feet (part number CA-105434-SPCB). Consult the MKS if you need a longer length cable.

Generic Shielded Cable Guidelines

Should you choose to manufacture your own cables, follow the guidelines listed below:

1. The cable must have an overall metal *braided* shield, covering all wires. Neither aluminum foil nor spiral shielding will be as effective; using either may nullify regulatory compliance.
2. The connectors must have a metal case which has direct contact to the cable’s shield on the whole circumference of the cable. The inductance of a flying lead or wire from the shield to the connector will seriously degrade the shield’s effectiveness. The shield should be grounded to the connector before its internal wires exit.
3. With very few exceptions, the connector(s) must make good contact to the device’s case (ground). “Good contact” is about 0.01 ohms; and the ground should surround all wires. Contact to ground at just one point may not suffice.
4. For shielded cables with flying leads at one or both ends; it is important at each such end, to ground the shield *before* the wires exit. Make this ground with absolute minimum length. (A ¼ inch piece of #22 wire may be undesirably long since it has approximately 5 nH of inductance, equivalent to 31 ohms at 1000 MHz). After picking up the braid’s ground, keep wires and braid flat against the case. With very few exceptions, grounded metal covers are not required over terminal strips. If one is required, it will be stated in the Declaration of Conformity or in the instruction manual.
5. In selecting the appropriate type and wire size for cables, consider:
 - A. The voltage ratings.
 - B. The cumulative I^2R heating of all the conductors (keep them safely cool).
 - C. The IR drop of the conductors, so that adequate power or signal voltage gets to the device.
 - D. The capacitance and inductance of cables which are handling fast signals, (such as data lines or stepper motor drive cables).
 - E. That some cables may need internal shielding from specific wires to others; please see the instruction manual for details regarding this matter.

Environmental Requirements

Follow these requirements when installing and using a Type 121 Absolute Pressure Transducer.

1. The normal operating temperature range, for the sensor and cable, is 0° C to 150° C (32° F to 302° F).
The Type 121 sensor is bakeable to 200° C (392° F) with the sensor housing and cable removed.
2. The normal operating temperature range, for the electronics unit (signal conditioner), is 0° C to 50° C (32° F to 122° F).
3. The power input required is ± 15 VDC ($\pm 5\%$) @ 35 mA.
4. The overpressure limit is 35 psia or 120% of sensor Full Scale, whichever is greater.
5. It is important that the unit be kept free from vibration, because the diaphragm, when not subject to gas damping at low pressure, may become susceptible to resonance. The 1 Torr F.S. units are the most sensitive; any vibration that *does* exist should be isolated from the unit with vibration isolation mounting and a bellows coupling (MKS-supplied or MKS-compatible).

For additional Type 121 transducer requirements refer to *Appendix A: Product Specifications*, page 43.

Setup

Follow the guidelines in this section when installing a 121 transducer.

Sensor

Connect the instrument to the vacuum system in either a horizontal or vertical (port down) position, at the point where pressure is to be measured. Refer to Figure 1 for the sensor dimensions.

Note



All dimensions are listed in inches with millimeters referenced in parentheses.

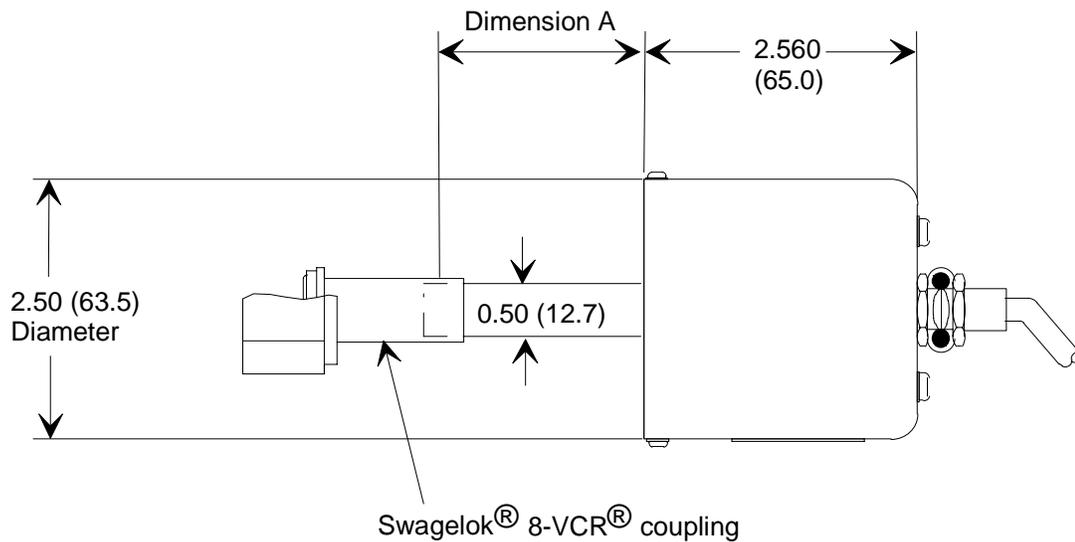


Figure 1: Sensor Dimensions

Dimension A on the Sensor	
Full Scale Range	Dimension
1 Torr to 1K Torr	1.92 (48.4)
5K Torr to 25K Torr	2.02 (51.3)
<i>Dimension listed in inches with millimeters referenced in parentheses</i>	

Table 6: Dimension A on the Sensor

Electronics Unit

1. Place the electronics unit within an 8 ft. radius (standard cable length) of the sensor.
2. Mount the unit in either a horizontal or vertical position.

Refer to Figure 2 for horizontal dimensions and Figure 3, page 27, for vertical dimensions.

Note



Be sure to allow access to the zero potentiometer (zero adjust).

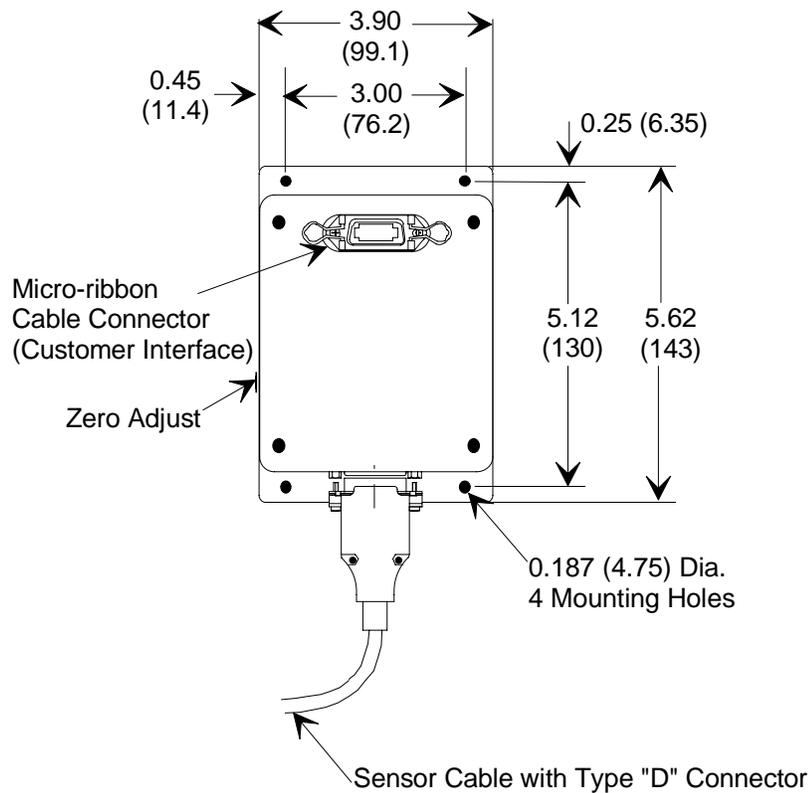


Figure 2: Electronics Unit Horizontal Dimensions

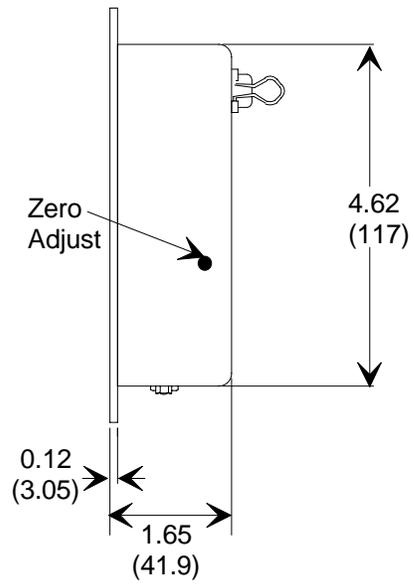


Figure 3: Electronics Unit Vertical Dimensions

Pressure Connections

Standard Fitting

The standard tubing is ½ inch (12.7 mm). To connect the sensor to a Swagelok Ultra-Torr® compression fitting, follow the steps below:

1. Be sure the tubing is clean and free of axial scratches.
2. Insert the tubing through the compression nut and O-ring all the way to the shoulder.
3. Tighten the nut.

Optional Fittings

The following fittings are available as options when specified:

- NW-16-KF
- Mini-CF
- Swagelok 8-VCR (female)

Refer to *Appendix D: High Pressure Fitting Selection*, page 49, for more information.

Caution



During high-temperature operation, (150° C, or 200° C with sensor housing and cable removed), use one of the optional metal seal fittings.

Chapter Three: Overview

Type 121 Absolute Pressure Transducer

The Type 121 Absolute Pressure Transducer converts pressure to a linear DC output voltage using a variable capacitance measurement technique. The instrument has a total pressure measurement range of over four decades and a 0 to 10 VDC output linear with pressure. The Type 121 transducer consists of a sensor, a remote electronics unit (signal conditioner), and an 8 ft. shielded cable with a Type “D” connector.

Sensor

The absolute sensor contains a tensioned metal diaphragm, one side of which is exposed to the process gas. The other (reference) side of the sensor contains an electrode assembly placed in a factory sealed high vacuum reference cavity (10^{-7} Torr) and is maintained at high vacuum (low pressure) by an integral chemical getter system. The diaphragm deflects with changing absolute pressure - force per unit area - independent of the composition of the measured gas. This deflection causes a capacitance change between the diaphragm and the adjacent electrode assembly. The electrode assembly also serves as an overpressure stop for pressures up to 35 psia or 120% of F.S., whichever is greater.

Electronics Unit

The electronics unit contains the signal conditioner and is housed in a flange-mounted aluminum box. The signal conditioner operates with a fixed frequency oscillator, amplifier, demodulator, and calibration circuitry. The capacitance change that occurs in the sensor generates an AC voltage which is sent to the electronics unit where it is amplified, demodulated, and converted into a high level DC output voltage. The output is linear with pressure and provides a 10 Volt DC output at sensor F.S. pressure.

Electrical Connections

For use of a Type 121 Absolute Pressure Transducer with any equipment other than complimentary MKS power supply/readout units, consult the manufacturers' specifications for connection, and for proper electrical and power characteristics. Refer to *Appendix A: Product Specifications*, page 43, for electrical requirements of the Type 121 pressure transducer.

Table 7 lists the pinout of the micro-ribbon connector located on the electronics unit.

Micro-Ribbon Connector Pinout	
Pin Number	Assignment
1	Chassis Ground
2	DC Common
3	No Connection
4	No Connection
5	+15 VDC
6	-15 VDC
7	DC Output Signal
8	Chassis Ground
9	DC Common
10	No Connection
11	No Connection
12	No Connection
13	No Connection
14	No Connection

Table 7: Micro-Ribbon Connector Pinout

Note



A "No Connection" pin assignment refers to a pin with no internal connection.

Labels

The 121 transducer has two serial number labels; one is affixed to the sensor, the other is affixed to the pre-amplifier. An example serial number label is shown in Figure 4.



Figure 4: Serial Number Label

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Chapter Four: Operation

Warm Up and Start Up

To put the Type 121 Absolute Pressure Transducer into operation, follow the steps below.

1. Plug the sensor cable into the electronics unit at the Type “D” connection (taking care not to *crimp* the cable).
2. Plug the micro-ribbon cable (MKS or non-MKS supplied) into the electronics unit at the micro-ribbon connection.

Note

The other end of the ribbon cable should be attached to an MKS (or MKS-compatible) power supply/readout unit. Refer to Table 5, page 22, for a list of available MKS power supply/readout units.

3. Apply power to the transducer. The power requirement is ± 15 VDC (± 5 %) @ 35 mA.
4. Vacuum-pump the system to a pressure below the transducer's resolution (0.01% F.S.). Allow a minimum of 15 minutes for the electronics to stabilize.
5. Zero the output of the transducer by adjusting the zero potentiometer on the electronics unit until the output is 0.0 Volts.

Note

If using an MKS power supply/readout unit, the transducer can also be zeroed at the front panel of the readout unit. If using an MKS-compatible power supply/readout unit, the transducer *must* be zeroed at the electronics unit.

The instrument is ready for normal operation. For best accuracy and repeatability, check the zero and reset as needed.

How To Prepare for Maximum Bakeout

The Type 121 sensor is bakeable up to 200° C with the sensor housing removed and the cable disconnected. The following tools are required to remove the sensor housing:

- Flat blade screwdriver
- Philips screwdriver
- ¼" nut driver
- Needle-nose pliers

Refer to Figure 5 when removing or replacing the sensor housing.

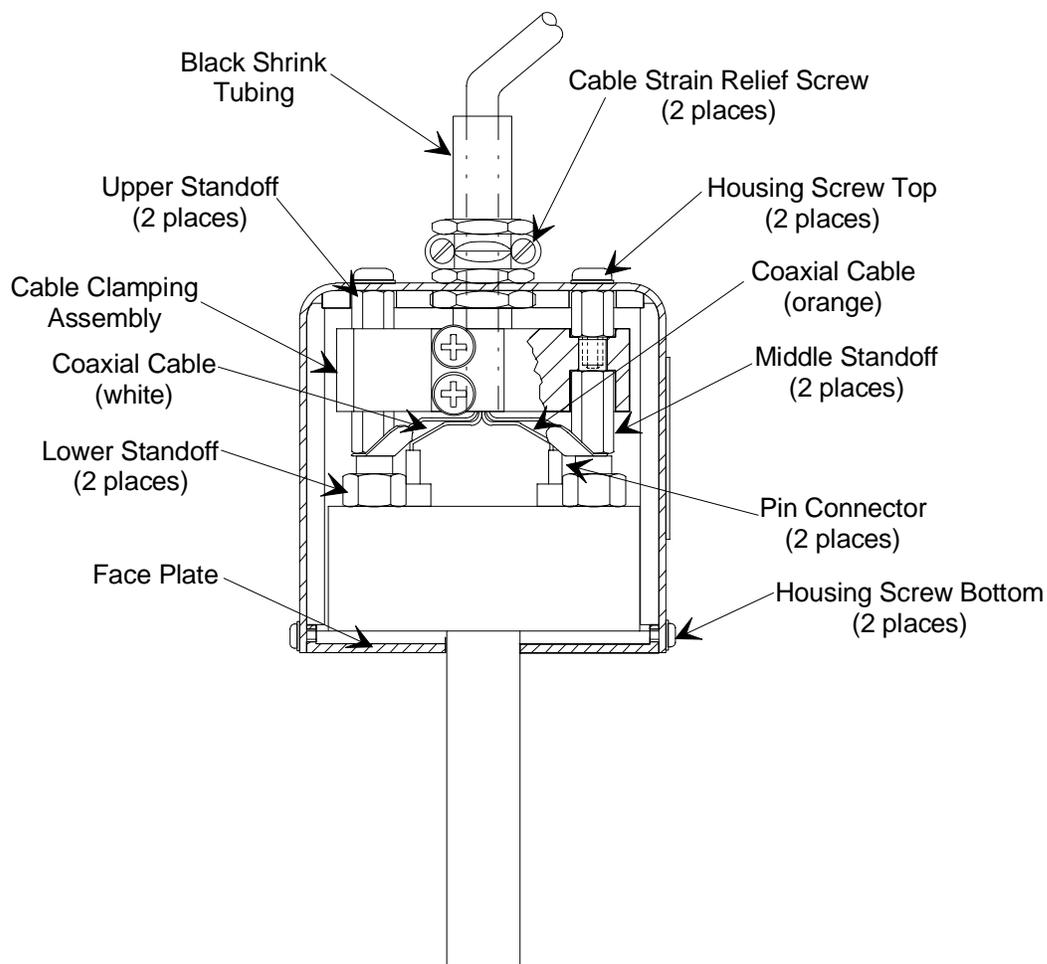


Figure 5: Sensor Assembly

Disassembly

To remove the sensor housing:

1. Turn off power to the instrument.
2. Use a flat head screwdriver to loosen the two cable strain relief screws.
3. Use a Phillips screwdriver to loosen and remove the two top housing screws that hold the metal housing over the sensor.
4. Use a Phillips screwdriver to loosen and remove the three bottom housing screws that attach the housing to the faceplate.
5. Remove the housing.
6. Use a ¼” nut driver to loosen and remove the upper two standoffs at the top of the cable clamping assembly.
7. Disengage the cable clamping assembly from the middle standoffs.
8. Use needle-nose pliers to *gently* lift out the pin connectors.

Caution



Be sure to grip the pin connectors and *not* the coaxial cables.

9. Use a ¼” nut driver to loosen and remove the middle standoffs.
10. Remove the entire cable assembly.

The sensor is ready for bakeout up to 200° C.

Note



It is *not* necessary to remove the faceplate assembly during bakeout.

How To Reassemble the Unit After Bakeout

To put the 121 transducer back into normal operation, it must be reassembled.

Reassembly

To reassemble the sensor housing:

1. Put the cable clamping assembly into position on the faceplate.
2. First place the # 6 lugs on the lower standoffs. Then insert the middle standoffs into position using a ¼” nut driver to tighten them.
3. Position the two pin connectors over the feed-through pins.

Caution



Be sure the coaxial cables are oriented to the sensor correctly. Refer to Figure 5, page 34.

4. *Gently* press the pin connector into place.
5. Put the top of the cable assembly into position over the middle standoffs.
6. Insert the upper standoffs over the cable assembly using a ¼” nut driver to tighten them.
7. Position the housing over the sensor.
8. Insert the two top housing screws that hold the metal housing over the sensor. Use a Phillips screwdriver to tighten them.
9. Tighten the two cable strain relief screws using a flat head screwdriver.
10. Insert the three bottom housing screws that attach the housing to the faceplate. Use a Phillips screwdriver to tighten them.

Warm Up and Start Up

1. Apply power to the transducer. The power requirement is ± 15 VDC ($\pm 5\%$) @ 35 mA.
2. Vacuum-pump the system to a pressure below the transducer's resolution (0.01% F.S.). Allow a minimum of 15 minutes for the electronics to stabilize.
3. Zero the output of the transducer by adjusting the zero potentiometer on the electronics unit or on the power supply/readout unit (if using an MKS power supply/readout unit).
The instrument is ready for normal operation.

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Chapter Five: Theory of Operation

Basic Design

The MKS Type 121 Pressure Transducer is a high accuracy general purpose absolute sensor that utilizes a single-sided, dual-electrode/AC bridge circuit design. In this design, two capacitance electrodes are deposited upon a ceramic disc in a concentric “bull’s-eye” arrangement. This disc is positioned close to an Inconel[®] diaphragm to form two capacitors which are part of an AC bridge circuit. When pressure is equal on both sides of the diaphragm, the bridge is balanced. As pressure deflects the diaphragm toward the electrode, the center capacitance changes more than the outer capacitance, causing the bridge to become unbalanced. By amplifying and demodulating the output of the AC bridge, a useable high-level DC output signal is generated.

Overpressure Considerations

The Full Scale of any transducer is the highest pressure at which valid measurements can be made. At pressures of roughly 30% over Full Scale, a high (12.5 VDC) output signal is produced to warn of invalid readings. At pressures somewhat beyond this, the diaphragm touches the fixed capacitor plate. The capacitor plate serves as a protective overpressure stop to prevent damage to the diaphragm up to 35 psia or 120% of sensor F.S., whichever is higher.

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Chapter Six: Maintenance

General Information

It is recommended that the instrument be recalibrated annually if no other time interval has been established by the user.

Note

Refer to the inside of the back cover of this instruction manual for a complete list of MKS Calibration and Service centers.

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Appendix A: Product Specifications

Type 121 Transducer

Accuracy (includes non-linearity, hysteresis, and non-repeatability)	0.5% of Reading (± temperature coefficients)
CE Compliance Electromagnetic Compatibility ¹	EMC Directive 89/336/EEC
Fittings: Standard Optional	½ inch (12.7 mm) O.D. tubulation NW-16-KF, mini-CF, Swagelok® 8-VCR® (female)
Full Scale (F.S.) Range (Consult factory for other available ranges)	1, 2, 10, 100, 1K, 5K, 10K, 15K, 20K, and 25K Torr (mmHg)
Input Required	±15 VDC @ 35 mA regulated (±5%)
Material Exposed to Gases	Inconel®
Number of Decades Covered	4
Operating Temperature Range: Sensor and Cable Signal Conditioner	0° to 150° C (bakeable to 200° C with cable removed) 0° to 50° C
Output (linear with pressure)	0 to 10 VDC into ≥ 10K ohm load
Overpressure Limit	35 psia or 120% of sensor F.S. (whichever is greater)
Resolution	0.01% of F.S.
RFI Suppression	Standard

¹ An overall metal braided shielded cable, properly grounded at both ends, is required during use.

Temperature Coefficients:	
Zero	0.02% of F.S./°C (200 ppm)
Span	0.04% Reading/°C (400 ppm)
Volume (Px side)	7.0 cc

Due to continuing research and development activities, these product specifications are subject to change without notice.

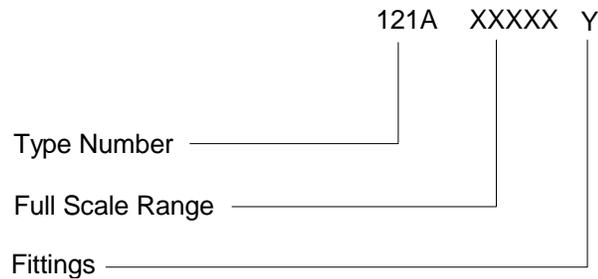
Appendix B: Model Code Explanation

Model Code

The options of your unit are identified in the model code. The model code is identified as follows:

121AXXXXXY

where:



Type Number (121A)

This designates the model number of the instrument.

Full Scale Range (XXXXX)

The full scale range is indicated by a five digit code.

Full Scale Range (Torr)

1
2
10
100
1000
5000
10000
15000
20,000
25000

Ordering Code

00001
00002
00010
00100
01000
05000
10000
15000
20000
25000

Fittings (Y)

The choice of fittings is designated by a one letter code.

Note

The fitting choice is restricted for high pressure units. Refer to *Appendix D: High Pressure Fitting Selection*, page 49, for additional information.

Fittings

½" Diameter tubulation
Swagelok 8-VCR
Mini-CF, rotatable
NW-16-KF

Ordering Code

A
B
C
D

Note

Use metal-sealed fittings for high temperature operation.

Appendix C: Companion Products and Cables

Companion Products

The 121 Absolute Pressure Transducer operates with the following MKS power supplies/readout units:

- PDR-D-1 (single channel unit in compact DIN case)
- PDR-C-1C (single channel unit with two set point relays)
- PDR-C-2C (two channel unit with two set point relays)
- PDR-5B (five channel unit with five set point relays)

The 121 transducer is compatible with all MKS automatic pressure controllers for accurate, closed-loop pressure, flow, or flow ratio control.

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Appendix D: High Pressure Fitting Selection

Description

A high pressure application is defined as an application with a pressure greater than 1000 Torr. Table 8 lists the pressure range for each fitting choice.

Pressure and Fitting Matrix for High Pressure Applications			
Fitting	Ordering Code	Pressure Range	Comments
		5000 Torr (96.7 psia) through 25000 Torr (483.5 psia)	
Swagelok 8-VCR	B	All	The lowest published pressure rating for any weld gland for ½” tubing is (2600 psig)
Mini-CF, rotatable	C	All	Maximum pressure has been calculated as 1414 psi. This is for the flange only. Limited by bolt strength.
NW-16-KF	D	5000 Torr (96.7 psia) only; higher ranges not available	Pressure rating 5 - 100 psig. Must be used with an HPS overpressure ring.

Table 8: Pressure and Fitting Matrix for High Pressure Applications

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