121739-P1
Rev A, 5/98
Instruction Manual

MKS Type 260 PS-7
Power Supply

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WARRANTY

Type 260 PS-7 Equipment

MKS Instruments, Inc. (**MKS**) warrants that for two years from the date of shipment the equipment described above (the "equipment") manufactured by **MKS** shall be free from defects in materials and workmanship and will 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 two years later, **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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MKS Type 260 PS-7
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Printed in the United States of America

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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. 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. 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 ll 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

The following general safety precautions must be observed 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 remove instrument covers. Component replacement and internal adjustments must be made by qualified service personnel only.

GROUNDING THE PRODUCT

This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting it to the product input or output terminals. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

DANGER ARISING FROM LOSS OF GROUND

Upon loss of the protective-ground connection, all accessible conductive parts (including knobs and controls that may appear to be insulating) can render an electrical shock.

GROUND AND USE PROPER ELECTRICAL FITTINGS

Dangerous voltages are contained within this instrument. All electrical fittings and cables must be of the type specified, and in good condition. All electrical fittings must be properly connected and grounded.

USE THE PROPER POWER CORD

Use only a power cord that is in good condition and which meets the input power requirements specified in the manual.

Use only a detachable cord set with conductors that have a cross-sectional area equal to or greater than 0.75 mm^2. The power cable should be approved by a qualified agency such as VDE, Semko, or SEV.

USE THE PROPER POWER SOURCE

This product is intended to operate from a power source that does not apply more voltage between the supply conductors, or between either of the supply conductors and ground, than that specified in the manual.

USE THE PROPER FUSE

Use only a fuse of the correct type, voltage rating, and current rating, as specified for your product.

DO NOT OPERATE IN EXPLOSIVE ATMOSPHERES

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

HIGH VOLTAGE DANGER

High voltage is present in the cable, and in the sensor when the controller is turned on.

Sicherheitshinweise

In dieser Betriebsanleitung vorkommende Symbole

Definition der mit WARNUNG!, VORSICHT! und HINWEIS überschriebenen Abschnitte in dieser Betriebsanleitung.

Warnung!

Das Symbol WARNUNG! weist auf eine Gefahrenquelle hin. Es macht auf einen Arbeitsablauf, eine Arbeitsweise, einen Zustand oder eine sonstige Gegebenheit aufmerksam, deren unsachgemäße Ausführung bzw. ungenügende Berücksichtigung zu Körperverletzung führen kann.

Vorsicht!

Das Symbol VORSICHT! weist auf eine Gefahrenquelle 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 Produkts oder von Teilen des Produkts führen kann.

Hinweis

Das Symbol HINWEIS weist auf eine wichtige Mitteilung hin, die auf einen Arbeitsablauf, eine Arbeitsweise, einen Zustand oder eine sonstige Gegebenheit von besonderer Wichtigkeit aufmerksam macht.

Am Gerät angebrachte Symbole

Der untenstehenden Tabelle sind die Bedeutungen der Symbole zu entnehmen, die an dem Gerät angebracht sind.

Definitionen der am Gerät angebrachten Symbole			
Ein (Netz) IEC 417, Nr. 5007	 Aus (Netz) IEC 417, Nr. 5008	 Erde IEC 417, Nr. 5017	 Schutzleiter IEC 417, Nr. 5019
 Rahmen oder Chassis IEC 417, Nr. 5020	 Äquipotentialanschluß IEC 417, Nr. 5021	 Gleichstrom IEC 417, Nr. 5031	 Wechselstrom IEC 417, Nr. 5032
 Wechselstrom und Gleichstrom IEC 417, Nr. 5033-a	 Geräteklasse II IEC 417, Nr. 5172-a	 Drehstrom IEC 617-2 Nr. 020206	
 Vorsicht! Bitte Begleitdokumente lesen! ISO 3864, Nr. B.3.1	 Vorsicht! Stromschlaggefahr! ISO 3864, Nr. B.3.6	 Vorsicht! Heiße Fläche! IEC 417, Nr. 5041	

Tabelle 2: Definitionen der am Gerät angebrachten Symbole

Sicherheitsvorschriften und Vorsichtsmaßnahmen

Die untenstehenden allgemeinen Sicherheitsvorschriften sind bei allen Betriebs-phasen dieses Instruments zu befolgen. Jede Mißachtung dieser Sicherheits-vorschriften oder sonstiger spezifischer Warnhinweise in dieser Betriebsanleitung stellt eine Zuwiderhandlung der für dieses Instrument geltenden Sicherheits-standards dar und kann die an diesem Instrument vorgesehenen Schutzvor-richtungen unwirksam machen. MKS Instruments, Inc. haftet nicht für eine Mißachtung dieser Sicherheitsvorschriften seitens des Kunden.

Keine Teile austauschen und keine Veränderungen vornehmen!

Bauen Sie in das Instrument keine Ersatzteile ein, und nehmen Sie keine eigenmächtigen Änderungen am Gerät vor! Schicken Sie das Instrument zu Wartungs- und Reparatur-zwecken an einen MKS-Kalibrierungs- und -Kundendienst ein! Dadurch wird sicher-gestellt, daß alle Sicherheitseinrichtungen voll funktionsfähig bleiben.

Wartung nur durch qualifizierte Fachleute!

Das Gehäuse des Instruments darf vom Bedienpersonal nicht geöffnet werden. Das Auswechseln von Bauteilen und das Vornehmen von internen Einstellungen ist nur von qualifizierten Fachleuten durchzuführen.

Produkt erden!

Dieses Produkt ist mit einer Erdleitung und einem Schutzkontakt am Netzstecker versehen. Um der Gefahr eines elektrischen Schlages vorzubeugen, ist das Netzkabel an einer vorschriftsmäßig geerdeten Schutzkontaktsteckdose anzuschließen, bevor es an den Eingangs- bzw. Ausgangsklemmen des Produkts angeschlossen wird. Das Instrument kann nur sicher betrieben werden, wenn es über den Erdleiter des Netzkabels und einen Schutzkontakt geerdet wird.

Gefährdung durch Verlust der Schutzerdung!

Geht die Verbindung zum Schutzleiter verloren, besteht an sämtlichen zugänglichen Teilen aus stromleitendem Material die Gefahr eines elektrischen Schlages. Dies gilt auch für Knöpfe und andere Bedienelemente, die dem Anschein nach isoliert sind.

Erdung und Verwendung geeigneter elektrischer Armaturen!

In diesem Instrument liegen gefährliche Spannungen an. Alle verwendeten elektrischen Armaturen und Kabel müssen dem angegebenen Typ entsprechen und sich in einwand-freiem Zustand befinden. Alle elektrischen Armaturen sind vorschriftsmäßig anzubringen und zu erden.

Richtiges Netzkabel verwenden!

Das verwendete Netzkabel muß sich in einwandfreiem Zustand befinden und den in der Betriebsanleitung enthaltenen Anschlußwerten entsprechen.

Das Netzkabel muß abnehmbar sein. Der Querschnitt der einzelnen Leiter darf nicht weniger als 0,75 mm^2 betragen. Das Netzkabel sollte einen Prüfvermerk einer zuständigen Prüfstelle tragen, z.B. VDE, Semko oder SEV.

Richtige Stromquelle verwenden!

Dieses Produkt ist für eine Stromquelle vorgesehen, bei der die zwischen den Leitern bzw. zwischen jedem der Leiter und dem Masseleiter anliegende Spannung den in dieser Betriebsanleitung angegebenen Wert nicht überschreitet.

Richtige Sicherung benutzen!

Es ist eine Sicherung zu verwenden, deren Typ, Nennspannung und Nennstromstärke den Angaben für dieses Produkt entsprechen.

Gerät nicht in explosiver Atmosphäre benutzen!

Um der Gefahr einer Explosion vorzubeugen, darf dieses Gerät nicht in der Nähe explosiver Stoffe eingesetzt werden, sofern es nicht ausdrücklich für diesen Zweck zertifiziert worden ist.

Hochspannungsgefahr!

Bei eingeschaltetem Steuerteil liegt im Kabel und im Sensor Hochspannung an.

Informations relatives à la sécurité

Symboles utilisés dans ce manuel d'utilisation

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

Avertissement

L'indication AVERTISSEMENT signale un danger potentiel. Elle est destinée à attirer l'attention sur une procédure, une utilisation, une situation ou toute autre chose présentant un risque de blessure en cas d'exécution incorrecte ou de non-respect des consignes.

Attention

L'indication ATTENTION signale un danger potentiel. Elle est destinée à attirer l'attention sur une procédure, une utilisation, une situation ou toute autre chose présentant un risque d'endommagement ou de dégât 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 des informations importantes. Elle est destinée à attirer l'attention sur une procédure, une utilisation, une situation ou toute autre chose présentant un intérêt particulier.

Symboles apparaissant sur l'appareil

Le tableau suivant décrit les symboles apparaissant sur l'appareil.

Définition des symboles apparaissant sur l'appareil			
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 triphasé IEC 617-2 No. 020206	
 Attention : se reporter à la documentation ISO 3864, No. B.3.1	 Attention : risque de secousse électrique ISO 3864, No. B.3.6	 Attention : surface brûlante IEC 417, No. 5041	

Tableau 3 : Définition des symboles apparaissant sur l'appareil

Mesures de sécurité et mises en garde

Prendre toutes les précautions générales suivantes pendant toutes les phases d'utilisation de cet appareil. Le non-respect de ces précautions ou des avertissements contenus dans ce manuel entraîne une violation des normes de sécurité relatives à l'utilisation de l'appareil et le risque de réduire le niveau de protection fourni par l'appareil. MKS Instruments, Inc. ne prend aucune responsabilité pour les conséquences de tout non-respect des consignes de la part de ses clients.

NE PAS SUBSTITUER DES PIÈCES OU MODIFIER L'APPAREIL

Ne pas utiliser de pièces détachées autres que celles vendues par MKS Instruments, Inc. ou modifier l'appareil sans l'autorisation préalable de MKS Instruments, Inc. Renvoyer l'appareil à un centre d'étalonnage et de dépannage MKS pour tout dépannage ou réparation afin de s'assurer que tous les dispositifs de sécurité sont maintenus.

DÉPANNAGE EFFECTUÉ UNIQUEMENT PAR UN PERSONNEL QUALIFIÉ

L'opérateur de l'appareil ne doit pas enlever le capot de l'appareil. Le remplacement des composants et les réglages internes doivent être effectués uniquement par un personnel d'entretien qualifié.

MISE À LA TERRE DE L'APPAREIL

Cet appareil est mis à la terre à l'aide du fil de terre du cordon d'alimentation. Pour éviter tout risque de secousse électrique, brancher le cordon d'alimentation sur une prise de courant correctement câblée avant de le brancher sur les bornes d'entrée ou de sortie de l'appareil. Une mise à la terre de protection à l'aide du fil de terre du cordon d'alimentation est indispensable pour une utilisation sans danger de l'appareil.

DANGER LIÉ À UN DÉFAUT DE TERRE

En cas de défaut de terre, toutes les pièces conductrices accessibles (y compris les boutons de commande ou de réglage qui semblent être isolés) peuvent être source d'une secousse électrique.

MISE À LA TERRE ET UTILISATION CORRECTE D'ACCESSOIRES ÉLECTRIQUES

Des tensions dangereuses existent à l'intérieur de l'appareil. Tous les accessoires et les câbles électriques doivent être conformes au type spécifié et être en bon état. Tous les accessoires électriques doivent être correctement connectés et mis à la terre.

UTILISATION D'UN CORDON D'ALIMENTATION APPROPRIÉ

Utiliser uniquement un cordon d'alimentation en bon état et conforme aux exigences de puissance d'entrée spécifiées dans le manuel.

Utiliser uniquement un cordon d'alimentation amovible avec des conducteurs dont la section est égale ou supérieure à 0,75 mm^2. Le cordon d'alimentation doit être approuvé par un organisme compétent tel que VDE, Semko ou SEV.

UTILISATION D'UNE ALIMENTATION APPROPRIÉE

Cet appareil est conçu pour fonctionner en s'alimentant sur une source de courant électrique n'appliquant pas une tension entre les conducteurs d'alimentation, ou entre les conducteurs d'alimentation et le conducteur de terre, supérieure à celle spécifiée dans le manuel.

UTILISATION D'UN FUSIBLE APPROPRIÉ

Utiliser uniquement un fusible conforme au type, à la tension nominale et au courant nominal spécifiés pour l'appareil.

NE PAS UTILISER DANS UNE ATMOSPHÈRE EXPLOSIVE

Pour éviter tout risque d'explosion, ne pas utiliser l'appareil dans une atmosphère explosive à moins qu'il n'ait été approuvé pour une telle utilisation.

DANGER DE HAUTE TENSION

Une haute tension est présente dans le câble et dans le capteur lorsque le contrôleur est sous tension.

Información sobre seguridad

Símbolos usados en el manual de instrucciones

Definiciones de los mensajes de ADVERTENCIA, PRECAUCIÓN Y OBSERVACIÓN usados en el manual.

Advertencia

El símbolo de ADVERTENCIA indica un riesgo. Pone de relieve un procedimiento, práctica, condición, etc., que, de no realizarse u observarse correctamente, podría causar lesiones a los empleados.

Precaución

El símbolo de PRECAUCIÓN indica un riesgo. Pone de relieve un procedimiento, práctica, etc., de tipo operativo que, de no realizarse u observarse correctamente, podría causar desperfectos al instrumento, o llegar incluso a causar su destrucción total o parcial.

Observación

El símbolo de OBSERVACIÓN indica información de importancia. Pone de relieve un procedimiento, práctica, condición, etc., cuyo conocimiento resulta esencial.

Símbolos que aparecen en la unidad

En la tabla que figura a continuación se indican los símbolos que aparecen en la unidad.

Definición de los símbolos que aparecen 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. Consultar 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 que aparecen en la unidad

Procedimientos y precauciones de seguridad

Las precauciones generales de seguridad que figuran a continuación deben observarse durante todas las fases de funcionamiento del presente instrumento. La no observancia de dichas precauciones, o de las advertencias específicas a las que se hace referencia en el manual, contraviene las normas de seguridad referentes al uso previsto del instrumento y podría impedir la protección que proporciona el instrumento. MKS Instruments, Inc., no asume responsabilidad alguna en caso de que el cliente haga caso omiso de estos requerimientos.

NO UTILIZAR PIEZAS NO ORIGINALES NI MODIFICAR EL INSTRUMENTO

No se debe instalar piezas que no sean originales ni modificar el instrumento sin autorización. Para garantizar que las prestaciones de seguridad se observen en todo momento, enviar el instrumento al Centro de servicio y calibración de MKS cuando sea necesaria su reparación y servicio de mantenimiento.

REPARACIONES EFECTUADAS ÚNICAMENTE POR TÉCNICOS ESPECIALIZADOS

Los operarios no deben retirar las cubiertas del instrumento. El cambio de piezas y los reajustes internos deben efectuarlos únicamente técnicos especializados.

PUESTA A TIERRA DEL INSTRUMENTO

Este instrumento está puesto a tierra por medio del conductor de tierra del cable eléctrico. Para evitar descargas eléctricas, enchufar el cable eléctrico en una toma debidamente instalada, antes de conectarlo a las terminales de entrada o salida del instrumento. Para garantizar el uso sin riesgos del instrumento resulta esencial que se encuentre puesto a tierra por medio del conductor de tierra del cable eléctrico.

PELIGRO POR PÉRDIDA DE LA PUESTA A TIERRA

Si se pierde la conexión protectora de puesta a tierra, todas las piezas conductoras a las que se tiene acceso (incluidos los botones y mandos que pudieran parecer estar aislados) podrían producir descargar eléctricas.

PUESTA A TIERRA Y USO DE ACCESORIOS ELÉCTRICOS ADECUADOS

Este instrumento funciona con voltajes peligrosos. Todos los accesorios y cables eléctricos deben ser del tipo especificado y mantenerse en buenas condiciones. Todos los accesorios eléctricos deben estar conectados y puestos a tierra del modo adecuado.

USAR EL CABLE ELÉCTRICO ADECUADO

Usar únicamente un cable eléctrico que se encuentre en buenas condiciones y que cumpla los requisitos de alimentación de entrada indicados en el manual.

Usar únicamente un cable desmontable instalado con conductores que tengan un área de sección transversal equivalente o superior a 0,75mm². El cable eléctrico debe estar aprobado por una entidad autorizada como, por ejemplo, VDE, Semko o SEV.

USAR LA FUENTE DE ALIMENTACIÓN ELÉCTRICA ADECUADA

Este instrumento debe funcionar a partir de una fuente de alimentación eléctrica que no aplique más voltaje entre los conductores de suministro, o entre uno de los conductores de suministro y la puesta a tierra, que el que se especifica en el manual.

USAR EL FUSIBLE ADECUADO

Usar únicamente un fusible del tipo, clase de voltaje y de corriente adecuados, según lo que se especifica para el instrumento.

EVITAR SU USO EN ENTORNOS EXPLOSIVOS

Para evitar el riesgo de explosión, no usar este instrumento o en un entorno explosivo, a no ser que haya sido certificado para tal uso.

PELIGRO POR ALTO VOLTAJE

Cuando el controlador está encendido, se registra alto voltaje en el cable y en el sensor.

Chapter One: General Information

Introduction

The MKS Type 260 PS-7 Power Supply provides all of the necessary voltages to operate the MKS Type 1153 Mass Flow Controller and the MKS Type 243A Controller and Readout.

The 260 PS-7 unit provides the ±15 VDC ± 5% @ 1 amp required to power the pressure transducers in the 1153 MFC and to power the 243 controller, as well as the 24 VAC @ 8 amps required to power the heater in the 1153 unit.

The ±15 VDC power is isolated using a toroidal transformer and is generated by two separate switching regulators and filtered with two toroid inductors. The output of the filtered DC voltage is then connected to a linear regulator to further filter and regulate the DC voltage. The DC power is available on two 9-pin Type "D" connectors.

The 24 VAC power is provided by a toroidal transformer. The transformer is multi-tapped to handle a wide range of input power voltages. The AC power is available though a 15-pin Type "D" connector.

The input operating voltage range for the unit is 90 to 250 VAC @ 50 to 60 Hz. Four user-selectable voltages are available by changing the Line Voltage Selector in the Power Entry Module on the rear panel of the unit (refer to Figure 7, page 32). The available voltages are 100 V, 120 V, 200 V, and 240 V. The fuses are also located in the Power Entry Module; the fuse value for each voltage level is listed on the voltage/fuse label (refer to Figure 9, page 34).

How This Manual is Organized

This manual is designed to provide instructions on how to set up, install, and operate a Type 260 PS-7 unit.

Before installing your Type 260 PS-7 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, *Maintenance and Troubleshooting*, lists any maintenance required to keep the instrument in good working condition and provides information for reference should the instrument malfunction.

Appendix A, *Product Specifications*, lists the specifications of the instrument.

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

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 260 PS-7 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.**

Chapter Two: Installation

How To Unpack the Type 260 PS-7 Unit

MKS has carefully packed the Type 260 PS-7 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 260 PS-7 Unit
- Type 260 PS-7 Instruction Manual (this book)

Optional Equipment:

- Interface Cables (refer to Table 5, page 20)
- RM-6 Rack Mount Kit

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 

An overall metal braided shielded cable, properly grounded at both ends, is required during use to meet CE specifications.

Interface cables can be purchased from MKS (refer to Table 5), or can be made provided that the appropriate specifications contained herein are maintained. For cables connecting to non-MKS products, MKS can provide normal shielding or braided shielded cable assemblies in a nominal 6’ (1.8 m) or 10’ (3 m) length, terminating in flying leads (pigtail) fashion at both ends.

Interface Cables	
To Connect the 260 PS-7 Unit To...	**Use the MKS Shielded Cable...***
Type 1153 Mass Flow Controller DC Power Connector (±15 VDC)	CB1153S-1-xx
Type 1153 Mass Flow Controller Heater AC Power Connector (24 VAC)	CB1153S-2-xx
Type 243 Controller and Readout	CB1153S-1-xx
xx = length in feet	

Table 5: Interface Cables

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. Refer to Figures 1 and 2, page 22. (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.

Example 1: Preferred Method To Connect Cable
(shown on a transducer)

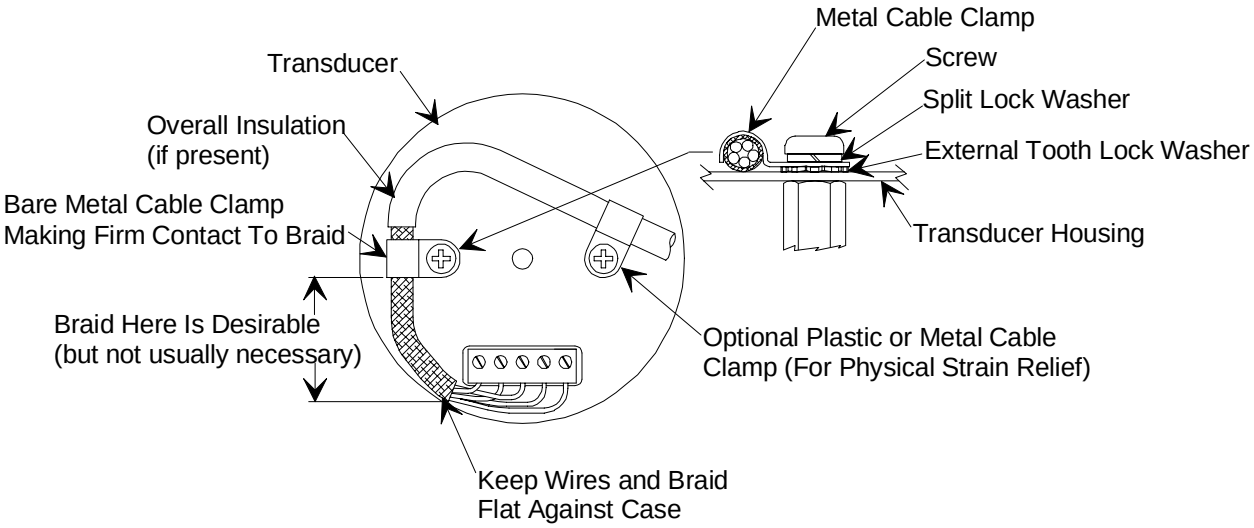

Figure 1: Preferred Method To Connect an Overall Metal Braided Shielded Cable

Example 2: Alternate Method To Connect Cable
(shown on a transducer)

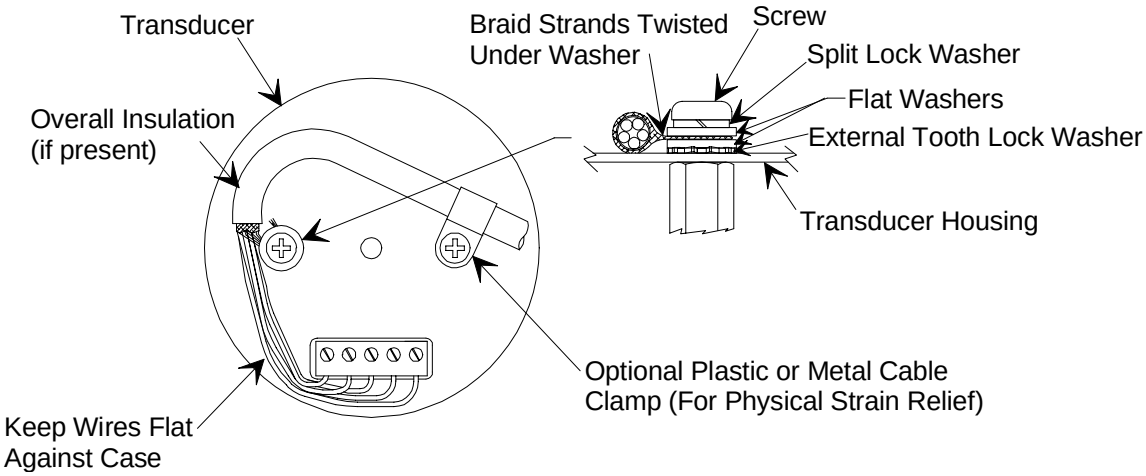

Figure 2: Alternate Method To Connect an Overall Metal Braided Shielded Cable
Use this method when cable clamp is not available

Product Location and Requirements

The Type 260 PS-7 unit meets the following criteria:

- POLLUTION DEGREE 2 in accordance with IEC 664
- INSTALLATION CATEGORY II, for transient overvoltages, according to EN 61010-1

Operating Environmental Requirements

- Ambient Operating Temperature: 15° to 45° C (59° to 113° F)
- Input Operating Voltage Range: 90 to 250 VAC @ 50 to 60 Hz
- Main supply voltage fluctuations must not exceed ±10% of the nominal voltage
- Ventilation requirements include sufficient air circulation
- Connect the power cord into a grounded outlet

Safety Conditions

The 260 PS-7 unit poses no safety risk under the following environmental conditions.

- Altitude: up to 2000 m
- Maximum relative humidity: 80% for temperatures up to 31° C, decreasing linearly to 50% at 40° C

Setup

Dimensions

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

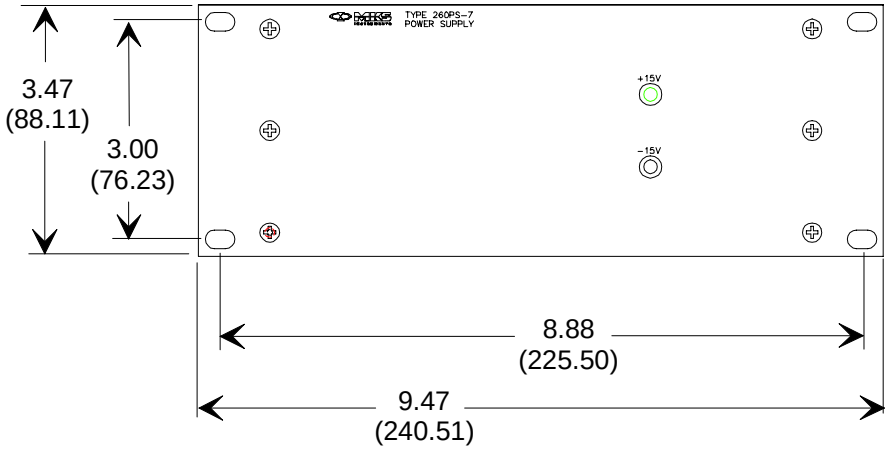

Figure 3: Front Panel Dimensions

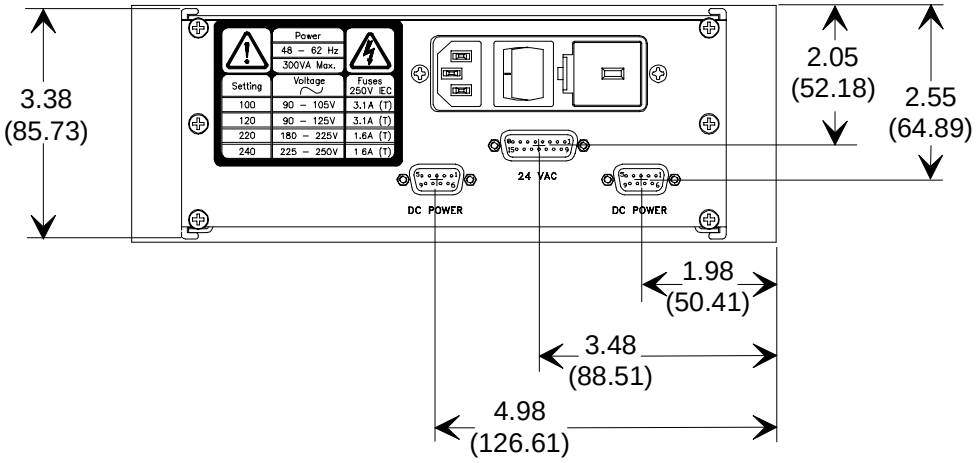

Figure 4: Rear Panel Dimensions

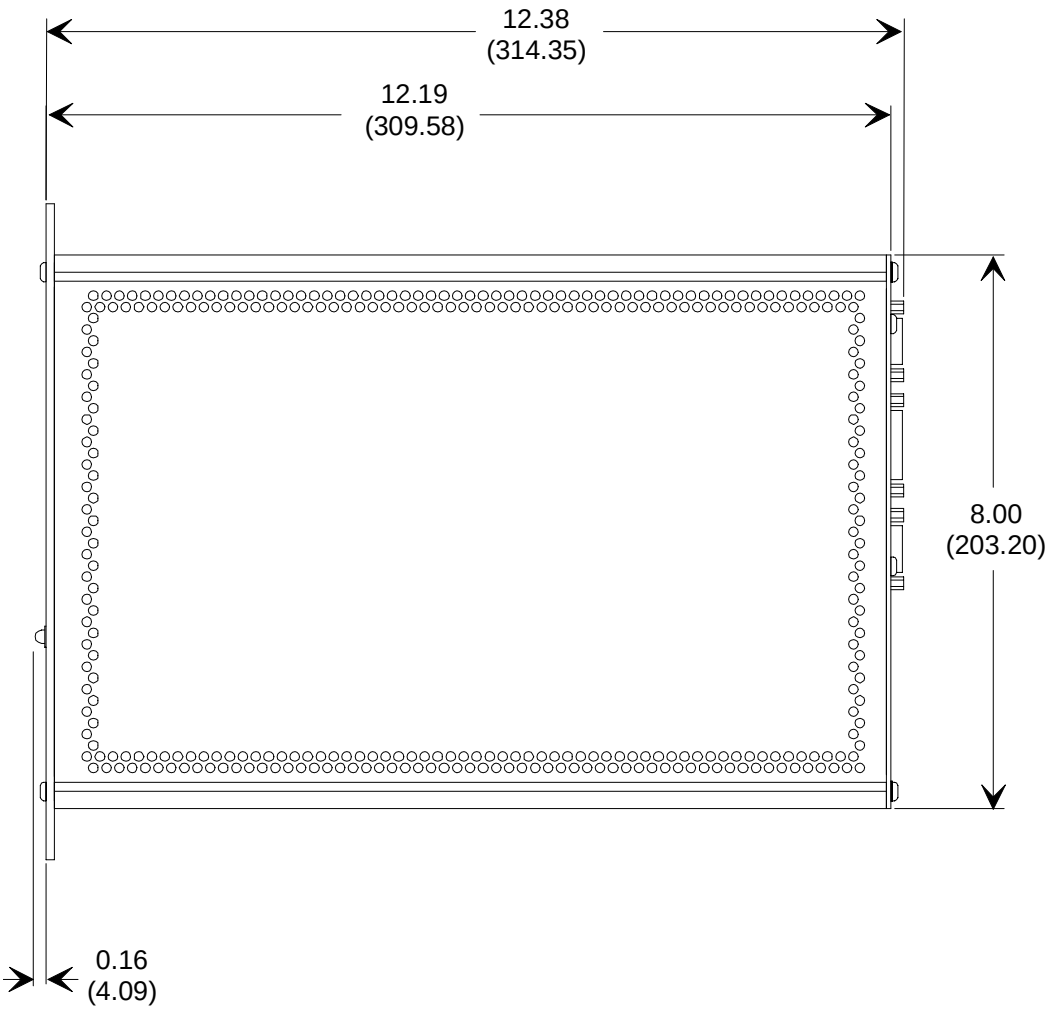

Figure 5: Top Panel Dimensions

Mounting Instructions

The 260 PS-7 unit can be used as a bench top instrument, or can be mounted in a panel cutout or in a half-rack. A rack mounting kit (RM-6) is available from MKS for single or dual unit rack mounting. The mounting position is not critical as the unit will operate properly in any position.

However the unit is mounted, leave adequate space around it for proper ventilation. Refer to *Dimensions*, page 24, for dimensional drawings of the 260 PS-7 unit. No special precautions are needed to protect the unit from ordinary mechanical shock and vibration.

Note Refer to the appropriate instruction manual for complete installation instructions for the 1153 MFC (p/n 119536-P1) and the 243 controller (p/n 121740-P1).

Electrical Information

Fuses

The line fuses protect the internal circuitry; both sides of the line are fused. The fuses are located in the Power Entry Module in the rear panel of the unit (refer to Figure 7, page 32). The fuse values are listed in Table 6.

Fuse Information		
Voltage Setting	**Fuse Type**	**MKS Part Number**
100 / 120 VAC	3.15 A (T) / 250 V	024-1604
220 /240 VAC	1.6 A (T) / 250 V	024-1603

Table 6: Fuse Information

Caution  **Disconnect the line cord from the AC power outlet before replacing the fuse.**

Grounding

For protective earthing, plug the power (AC line) cord into a properly grounded outlet.

How To Set the Line Voltage

The Line Voltage Selector configures the 260 PS-7 unit to accept the value of the selected line voltage of 100, 120, 220, or 240 VAC input voltage. The value is visible through the window in the cover of the Power Entry Module.

Caution  **The Line Voltage Selector on the 260 PS-7 unit must be set to the proper input voltage *before* you connect the power cord and turn on the power. Otherwise, the unit will be severely damaged.**

To change the line voltage:

1. Ensure that the power cord and all interface cables are disconnected from the 260 PS-7 instrument.

2. Use a blunt instrument, such as a flat head screw driver, under the left hand side of the Power Entry Module cover and firmly pull towards you to unsnap the cover.

   The cover is attached firmly, so it requires a strong force from the screwdriver to loosen it. The cover will flip open, from left to right, to expose the line voltage selector drum.

3. Grasp the line voltage selector drum carefully and pull it out of its position.

4. Turn the selector drum to the appropriate line voltage.

5. Replace the line voltage selector drum into the 260 PS-7 unit so that the voltage value can be read from bottom to top.

   The top and bottom of the voltage selector drum are shaped differently so that the drum will only fit into position in the correct orientation. The value of the selected line voltage is visible through the window in the cover when it is closed.

Connectors

The 260 PS-7 unit's three connectors are located on its rear panel (refer to Figure 7, page 32). The interface cables are listed in Table 5, page 20.

DC Power Connectors

The two 9-pin male Type "D" connectors provide the ±15 VDC power required for the pressure transducers in 1153 MFC and to power the 243 controller. The pinouts for both connectors are the same.

DC Power Connector Pinout	
Pin Number	**Assignment**
1	+15 VDC
2	Power Common
3	-15 VDC
4	No Connection
5	No Connection
6	No Connection
7	No Connection
8	No Connection
9	Chassis Ground

Table 7: DC Power Connector Pinout

Note 

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

24 VAC Power Connector

The 15-pin female Type “D” connector provides the 24 VAC required to power the heater in the 1153 MFC.

24 VAC Power Connector Pinout	
Pin Number	**Assignment**
1	+ 24 VAC Out
2	+ 24 VAC Common
3	+ 24 VAC Out
4	+ 24 VAC Common
5	+ 24 VAC Out
6	+ 24 VAC Common
7	+ 24 VAC Out
8	+ 24 VAC Common
9	No Connection
10	No Connection
11	No Connection
12	No Connection
13	No Connection
14	No Connection
15	Chassis Ground

Table 8: 24 VAC Power Connector Pinout

Note 

The “No Connection” pin assignment refers to a pin with no internal connection.

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Chapter Three: Overview

Front Panel Controls

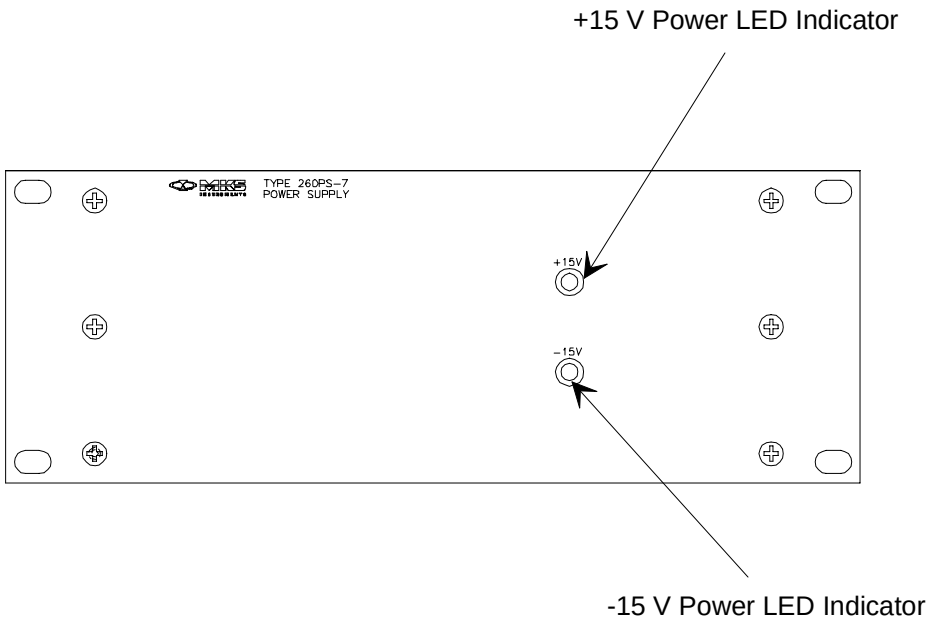

Figure 6: Front Panel Controls

Power LED Indicators

These two LEDs illuminate green when ±15 VDC power is being supplied to the unit.

Rear Panel Controls

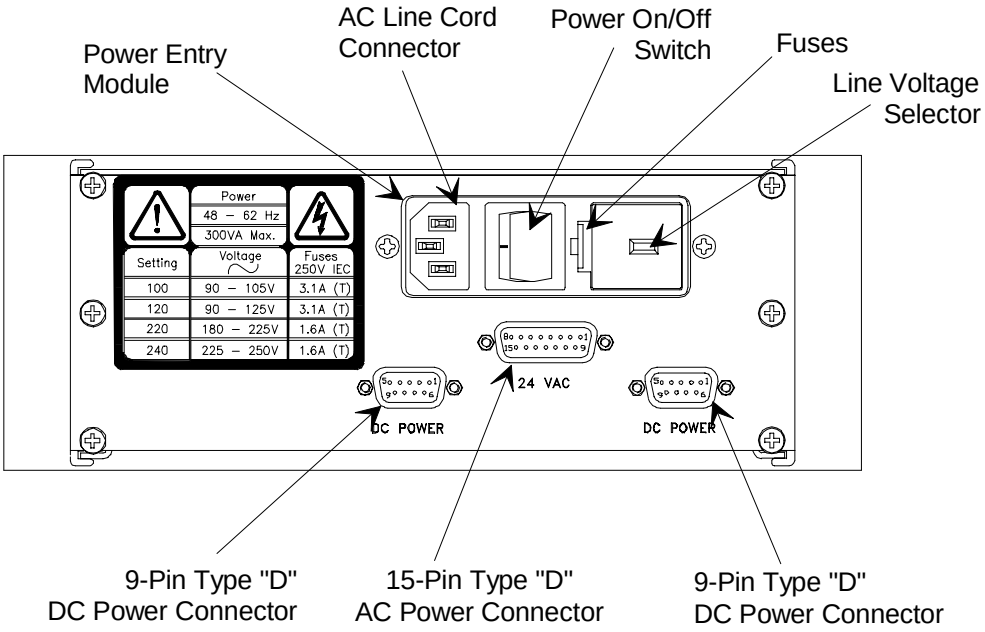

Figure 7: Rear Panel Controls

Power Entry Module

The Power Entry Module contains the AC line cord connector, the power on/off switch, the fuses, and the line voltage selector.

AC Line Cord Connector

The AC Line Cord provides AC power to the 260 PS-7 unit. For protective earthing, plug the power cord into a properly grounded outlet.

Power On/Off Switch

The Power On/Off Switch controls power to the 260 PS-7 unit.

Fuses

The fuse protects the internal circuitry of the 260 PS-7 unit; both sides of the line are fused. The fuse values are listed in Table 6, page 26.

Caution **Disconnect the power cord from the 260 PS-7 unit before you replace the fuse, to avoid any damage.**

Line Voltage Selector

The Line Voltage Selector configures the 260 PS-7 unit to accept either 100, 120, 220, or 240 VAC input voltage. The value of the selected line voltage is visible through the window in the cover of the Power Entry Module. Refer to *How To Set the Line Voltage*, page 27, for more information.

Caution  **The Line Voltage Selector on the 260 PS-7 unit must be set to the proper input voltage *before* you connect the power cord and turn on the power. Otherwise, the unit will be severely damaged.**

24 VAC Power Connector

The 15-pin female Type "D" connector provides power for the heater in the 1153 unit. Refer to Refer to Table 8, page 29, for the AC power connector pinout.

DC Power Connectors

The two 9-pin male Type "D" connectors provide the ±15 VDC power required for the pressure transducers in 1153 MFC and to power the 243 controller. Refer to Table 7, page 28, for the DC power connector pinout.

Labels

Serial Number Label

The serial number label, located on the side of the instrument, lists the serial number and the product model number of the unit, and displays the CE mark signifying compliance with the European CE regulations.

Figure 8: Serial Number Label

Voltage/Fuse Label

The voltage/fuse label, located on the rear panel of the unit, lists the recommended fuse values for each voltage setting.

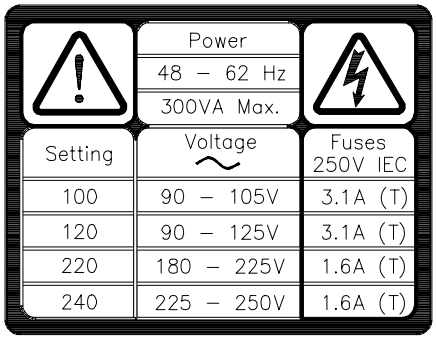

Figure 9: Voltage/Fuse Label

Chapter Four: Operation

General Information

1. Ensure that the 260 PS-7 unit is properly installed.

   Refer to *Mounting Instructions,* page 25, for more information.

2. Verify that the Line Voltage Selector on the rear panel of the unit is set to the proper voltage.

   Refer to *How To Set the Line Voltage*, page 27, for more information.

Caution  **The Line Voltage Selector on the 260 PS-7 unit must be set to the proper input voltage *before* you connect the power cord and turn on the power. Otherwise, the unit will be severely damaged.**

3. Ensure that the Power On/Off Switch is OFF.

Caution  **Plugging the cables in with the power supply ON can damage the 260 PS-7 unit or can cause the unit to malfunction.**

4. Connect the 1153 MFC and the Type 243 controller to the connectors on the rear panel of the 260 PS-7 unit (refer to Figure 7, page 32) using the proper interface cables.

   The interface cables are listed in Table 5, page 20.

Caution  **Ensure that the cables are plugged STRAIGHT into the Type "D" connectors on the 260 PS-7 unit. Plugging the cables in improperly (such as on an angle) can damage the 260 PS-7 unit or can cause the unit to malfunction.**

5. Connect the AC Line Cord into the AC Line Cord Connector on the rear panel of the unit (refer to Figure 7, page 32).

6. Plug the AC Line Cord into the power line and turn on the Power On/Off Switch.

   For protective earthing, plug the power cord into a properly grounded outlet.

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Chapter Five: Maintenance and Troubleshooting

General Information

If the 260 PS-7 power supply fails to operate properly upon receipt, check for shipping damage, and check the cables for proper continuity. Any damage should be reported to the carrier and MKS Instruments immediately. If it is necessary to return the unit to MKS, obtain an ERA number (Equipment Return Authorization Number) from a MKS Service Center before shipping. Please refer to the inside back cover of this manual for a list of MKS Calibration and Service Centers.

Maintenance

Periodically check for wear on the cables and inspect the enclosure for visible signs of damage.

How To Clean the Unit

Periodically wipe down the unit with a damp cloth.

How To Replace the Fuses

The line fuses protect the internal circuitry; both sides of the line are fused.

Caution  **Disconnect the power cord from the 260 PS-7 unit *before* you replace the fuse, to avoid any damage.**

1. Select the proper fuses. Refer to Table 6, page 26, for the fuse values.
2. Disconnect the power cord from the 260 PS-7 instrument.

Warning  **To avoid an electrical shock, be sure to disconnect the power cord *before* proceeding.**

3. Disconnect all cables from the connectors located at the back of the unit.

4. Use a blunt instrument, such as a flat head screw driver, under the left hand side of the Power Entry Module cover and firmly pull towards you to unsnap the cover.

   The cover is attached firmly, so it requires a strong force from the screwdriver to loosen it. The cover will flip open, from left to right, to expose the line voltage selector drum. The two fuse carriers are marked with arrows (➧).

5. Carefully slide the fuse carrier out and remove the fuse.

6. Insert the new fuse into the fuse carrier.

   Be certain that the new fuse is the appropriate type for the line voltage selection.

7. Slide the fuse carrier back into the Power Entry module.

8. Close the Power Entry module cover.

9. Connect any cables removed from the back of the instrument in step 3, page 37.

10. Connect the power cord.

Troubleshooting

If the power supply is not operating properly, check for obvious problems such as whether the power is off, there is an open fuse, defective line cord, input power failure, or loose connections. If, after checking these items the unit still does not function properly, contact MKS for assistance.

Appendix A: Product Specifications

CE Compliance	
Electromagnetic Compatibility[1]	EMC Directive 89/336/EEC
Low-Voltage Requirements	Low-Voltage Directive 73/23/EEC
Installation Category	II, according to EN 61010-1
Pollution Degree	2, according to IEC 664
Product Safety and Liability	Product Safety Directive 92/59/EEC
Fuse Ratings	
100/120 VAC Setting	3.15 A (T)
200/240 VAC Setting	1.6 A (T)
Input Power Requirements	±90 to 250 VAC @ 50 to 60 Hz
Line Voltage Selections	100, 120, 220, 240 VAC
Load Regulation	100 mV from 0 to 2 A (all supplies)
Operating Temperature Range	0° to 50° C (32° to 122° F)
Storage Humidity Range	0 to 95% RH (non-condensing)
Storage Temperature Range	-20° to 80° C (-4° to 176° F)
Warm Up Time	None

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

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

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Appendix B: Model Code Explanation

Model Code

The type number designates the model number of the instrument. The power supply is identified as the Type 260 PS-7.

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