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Siemens Industry, Inc.	INSTALLATION AND SERVICE INSTRUCTION

SD77
Rev. 26
March 2013
Supersedes Issue 25

Model Series 77
Electric-To-Pneumatic Transducers

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SECTION AND TITLE **PAGE**

LIST OF ILLUSTRATIONS

FIGURE AND TITLE **PAGE**

Note: Approval agency certificates (e.g. EC Declaration of Conformity) follow page 12.

Changes for Revision 26, March 2013

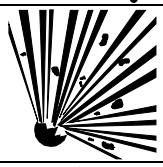
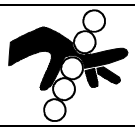
Significant changes for this revision are listed below.

SECTION	CHANGE
Cover, Table of Contents and Preface	Revision number and date changed
Introduction	Rating label examples updated Warranty statement added to Customer/Product Support section EC Declaration of Conformity updated EC Type Examination Certificates added
Warranty	Deleted

PREFACE

Conventions and Symbols

The following symbols may be used in this manual and may appear on the equipment. The reader should be familiar with the symbols and their meanings. Symbols are provided to quickly alert the reader to safety related text.

Symbol	Meaning
	Indicates an immediate hazardous situation which, if not avoided, *will* result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, *could* result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, *may* result in minor or moderate injury.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in property damage.
NOTICE	Indicates a potential situation which, if not avoided, may result in an undesirable result or state.
IMPORTANT	Identifies an action that should be taken to avoid an undesirable result or state.
Note	Identifies supplemental information that should be read before proceeding.
	**Electrical shock hazard –** Either symbol indicates the presence of an electrical shock hazard. The associated text states the nature of the hazard, what can happen as a result of the hazard, and how to avoid the hazard..
	**Explosion hazard –** Symbol indicates that the danger of an explosion hazard exists. The associated text states the nature of the hazard, what can happen as a result of the hazard, and how to avoid the hazard.
	**Electrostatic discharge –** The presence of this symbol indicates that electrostatic discharge can damage the electronic assembly.
	**Pinch hazard –** Symbol indicates that a pinch hazard exists if correct procedures are not followed.

Conventions and Usage Notes

Part numbers are for items ordered from the Instrumentation & Analytics Business Unit of Siemens Industry, Inc., except as noted.

Qualified Persons

The described equipment should be installed, configured, operated, and serviced only by qualified persons thoroughly familiar with this manual. A copy of this manual accompanies the equipment. The current version of the manual, in Portable Document Format (PDF), can be downloaded from the Siemens Internet site; see the Customer/Product Support section of this manual for the address.

For the purpose of this manual and product labels, a qualified person is one who is familiar with the installation, assembly, commissioning, and operation of the product, and who has the appropriate qualifications for their activities such as:

- Training, instruction, or authorization to operate and maintain devices/systems according to the safety standards for electrical circuits, high pressures, and corrosive, as well as, critical media.
- For devices with explosion protection: training, instruction or authorization to work on electrical circuits for systems that could cause explosions.
- Training or instruction according to the safety standards in the care and use of suitable safety equipment.

Scope

This manual does not purport to cover all details or variations in equipment or to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to a support group listed in the Customer/Product Support section of this manual or the local Siemens sales office.

The contents of this manual shall not become part of or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements continued herein do not create new warranties or modify the existing warranty.

General Warnings and Cautions

An intrinsically safe device loses its license as soon as it is operated in a circuit that does not meet the requirements of the examination certificate valid in your country.

The device may be operated with high pressure and corrosive media. Therefore, serious injury and/or considerable material damage cannot be ruled out in the event of handling of the device.

The perfect and safe operation of the equipment is conditional upon proper transport, proper storage, installation and assembly, as well as, on careful operation and commissioning.

The equipment may be used only for the purposes specified in this manual.

1.0 INTRODUCTION

This manual describes the installation, operation, and maintenance of Model Series 77 Electric-to-Pneumatic Transducers. These transducers are FM approved for installation in various National Electrical Code classified hazardous locations. Note that particular attention must be given to the installation and maintenance of the 77F models (see Model Designation below). These models are FM approved to be part of an intrinsically safe system when installed and maintained according to the requirements outlined in this manual and in the installation instructions provided by the energy limiting barrier manufacturer.

IMPORTANT

Save this Instruction and make it available for installation and maintenance of the transducer.

The Model Series 77 E/P Transducer provides a 3 to 15 psig output that is proportional to a DC milliamp input. Several input ranges are available as is an optional 3-27 psig output range (see Model Designation below). Other options include: a tapped exhaust provision, 0 to 4 mA factory calibration, and reverse acting output. Each transducer has a plate that states model designation and applicable certifications. See Figure 1-1 for a sample nameplate

1.1 MODEL DESIGNATION

Sample Model Number — 77 E 3 F N

E/P Transducer

Exhaust

	Exhaust	Top Housing	Boosted
--	Atmosphere	Aluminum	No
E	Tapped	Aluminum	No
B	Atmosphere	Aluminum	Yes
S	Atmosphere	Stainless Steel	No
T	Tapped	Stainless Steel	No

Input/Output

Model No. Entry	Input Range (mAdc)	Output Range (psig)	Input Impedance (Ohms)
3	1-5	3-15	2450
3A	0-4	3-15	2450
8	4-20	3-27	610
16	4-20	3-15	185
40	10-50	3-15	30

Intrinsic Safety Electrical Classification

F = Intrinsically Safe
- Omit for all other electrical classifications
- Not available with Option R below
- Refer to Section 1.3 for ATEX installations

Options

R = Reverse acting output (e.g. 4 mA = 15 psig; 20 mA = 3 psig)
Note: Option R is not available on Series 77F

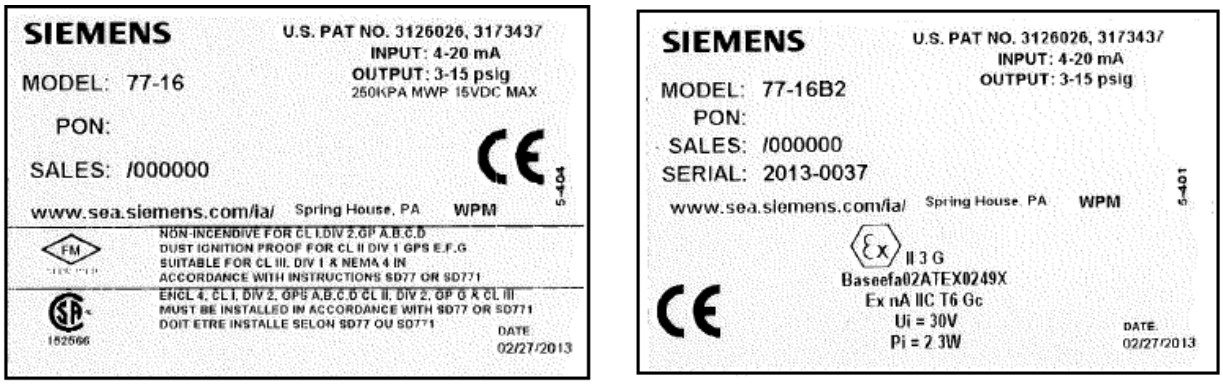


FIGURE 1-1 Sample Rating Labels

1.2 GENERAL SPECIFICATIONS

Supply Pressure

Normal.....20 psig
Maximum .....30 psig
Minimum.....18 psig
3 to 27 psig Output Models
Normal.....30 psig
Maximum .....35 psig

Input/Output Data

Model	Input Span (mAdc)	Standard Input Range* (mAdc)	Output Range (psig)	Nominal Coil Resistance (Ohms)
77-3	4	1 to 5	3 to 15	2450
77-3A	4	0 to 4	3 to 15	2450
77-8	16	4 to 20	3 to 27	610
77-16	16	4 to 20	3 to 15	185
77-40	40	10 to 50	3 to 15	30

*The zero adjustment can shift the span up or down for non-standard input ranges from +40% to -20% (input and output at mid-scale).

Output Capacity.....0.16 SCFM @ 20 psig supply
Maximum Air Consumption.....Less than 0.25 SCFM @ 20 psig supply
Ambient Temperature.....Limits -40°C to +85°C (-40°F to +185°F)
Construction Materials That May Be Used .....Stainless steel, steel, cast iron, aluminum, zinc alloy, brass, neoprene, neoprene on nylon, nitrile rubber, silicone, BUNA-N, silicon on fiberglass, viton® on nomex®, viton

1.3 PRODUCT CERTIFICATIONS

FM Approval

Intrinsically Safe	Class I, Division 1, Groups A, B, C, and D Class II, Division 1, Groups E, F, and G Class III, Division 1 when installed in accordance with drawing 15032-7704 or 15032-7705
Non-Incendive	Class 1, Division 2, Groups A, B, C, and D
Dust Ignition Proof	Class II, Division 1, Groups E, F, and G
Suitable for	Class III, Division 1
Enclosure Type	4

CSA Certified

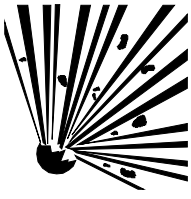
Intrinsically Safe	Class I, Division 1, Groups A, B, C, and D Class II, Division 1, Groups E, F, and G Class III, Division 1 when installed in accordance with drawing 15032-7704
Suitable For	Class 1, Division 2, Groups A, B, C, and D Class II, Division 2, Group G Class III, Division 1
Enclosure Type	4X

ATEX Certified

Intrinsically Safe	⟨Ex⟩ II 1 G BASEEFA 02 ATEX 0247X Ex ia IIC T6 Ga Ui – 30V, Ii = 660 mA, Pi = 1W, Ci = 0, Li = 0
Type of Protection	⟨Ex⟩ II 3 G BASEEFA 02 ATEX 0249X Ex nA IIC T6 Gc
CE Marked	EMC Directive Pressure Equipment Directive ATEX Directive See Declaration of Conformity

Note: Approval agency certificates follow page 12.

1.3.1 ATEX Installations



WARNING

Explosion can cause death or serious injury.

Failure to observe the following precautions could result in an explosion hazard.

Installation in hazardous locations must be in accordance with EN 60079-14, as required by local regulations.

Intrinsically safe models (see below selection guide) must be used in conjunction with energy limiting barriers or isolators.

Do not exceed 42 Vdc in service.

WARNING

Ex nA models are shipped with the sealing screw fitted externally. **Do not** remove the sealing screw. **Do not** remove the condensation drain sealing screw where a 4 or 4X Enclosure Type is required.

Refer to Section 2 Installation.

Model Number:

All ATEX approved units require 4-20 mA input with output range as selected from the table below. The model number is 77-16X, where "-" may be replaced by, "E", "B", "S", or "T", per the Model Designation section, and "X" is replaced by an Intrinsic Safety Code, from the following table, that corresponds to the desired output range.

Code	Certification	Output Range
B1	Ex ia	3-15 psig
B2	Ex nA	3-15 psig
B3	Ex ia	0.2-1 bar
B4	Ex nA	0.2-1 bar
B5	Ex ia	0.2-1 Kg/cm2
B6	Ex nA	0.2-1 Kg/cm2

1.3.2 Supplemental Instructions for ATEX Certified Models

This section provides details concerning the installation, operation, and servicing of the ATEX certified equipment described in this Installation Instruction.

1. Refer to the ATEX certificate for the described equipment for a list of possible operating faults and special conditions that should preclude possible misuse.
2. Process and environmental materials shall be compatible with the elastomers used in the manufacture of the equipment: neoprene, nitrile rubber, silicon, and buna-N.
3. ATEX certified equipment is to be serviced by a factory-authorized repair facility. For a list of these facilities, refer to the attached manual, the Siemens Internet site or contact your local Siemens' Process Instrumentation division representative.
4. The equipment is not to be installed and operated in a hazardous area containing explosive dust.
5. The equipment, when installed in accordance with this Instruction, may not be subjected to mechanical stress in excess of the design specification.
6. The equipment has been designed such that it does not:
   1) Give rise to physical injury or other harm due to contact
   2) Produce excessive surface temperature or infra-red, electromagnetic, and ionizing radiation
   3) Have non-electrical dangers
7. Do not install the equipment where it can be subjected to excessive mechanical and thermal stresses or where it may be attacked by existing or foreseeable aggressive substances.

Ex ia Requirements:

Models 77abB1d[1], 77abB3d, and 77abB5d are suitable for use in Zone 0 and Zone 1 surface industry explosive atmospheres for gas groups IIA, IIB, and IIC. These models have been certified by Baseefa 2001 Ltd. as follows:

⟨Ex⟩ II 1 G Baseefa02ATEX0247X
Ex ia IIC T6 Ga with safety parameters of: Ui = 30V, Ii = 0.66A, Ci = 0, Li = 0, Pi = 1W

Choose suitable [Ex ia] (for Zone 0 or 1) or [Ex ib] (for Zone 1) devices with the parameters shown below.

Parameters:
Uo less than or equal to 30V
Ii less than or equal to 660 mA
P0 less than or equal to 1W
Co greater than or equal to the cable capacitance plus the capacitance of any other device(s) connected to the Model 77
Lo greater than or equal to the cable inductance plus the inductance of any other device(s) connected to the Model 77

Special Conditions for Safe Use

The enclosure of the Model 77 E/P Transducer may contain aluminum and must be deemed suitable for the intended application and must also be protected against friction and impact.

Ex nA Requirements:

Models 77abB2d[1], 77abB4d, and 77abB6d are suitable for use in Zone 2 surface industry explosive atmospheres. Gas groups are not applicable since the Model 77 is considered non-sparking in accordance with EN50021:1999. These models have been certified by Baseefa 2001 Ltd. with ratings as follows:

⟨Ex⟩ II 3 G Baseefa02ATEX0249X
Ex nA IIC T6 Gc Umax: 30V, Wmax: 2.3W

The supply power to these models may not exceed 30V and 2.3W.

Temperature Code Requirements:

All versions of the Model 77 have a temperature code of T6 referenced to an ambient of 40°C. No exposed surface of the Model 77 exceeds 85°C when operated at an ambient temperature of 40°C. The Model 77 can be used with gasses that do not ignite below 85°C.

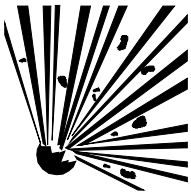
Special Conditions for Safe Use

It must be ensured that the maximum voltage of the external circuit to which the Model 77 E/P Transducer is connected cannot exceed 39.2 Vdc.

[1] For these model numbers a, b, and d are variables defined in the Model 77 model number breakdown.

1.3.3 CSA Hazardous Location Precautions

This section provides CSA hazardous location precautions that should be observed by the user when installing or servicing the equipment described in this manual. These statements supplement those given in the preceding section.



WARNING

Explosion can cause death or serious injury.

Failure to observe the following precautions could result in an explosion hazard.

Installation in hazardous locations must be in accordance with the Canadian Electrical Code, as required by local regulations.

Precautions - English

For Class I, Division 1 and Class I, Division 2 hazardous locations:

- Use only factory-authorized replacement parts. Substitution of components can impair the suitability of this equipment for hazardous locations.

For Division 2 hazardous locations:

When the equipment described in this Instruction in installed without safety barriers, the following precautions should be observed. Switch off electrical power at its source (in non-hazardous location) before connecting or disconnecting power, signal, or other wiring.

Précautions - Français

Emplacements dangereux de classe I, division 1 et classe I, division 2:

- Les pièces de rechange doivent être autorisées par l'usine. Les substitutions peuvent rendre cet appareil impropre à l'utilisation dans les emplacements dangereux.

Emplacement dangereux de division 2:

Lorsque l'appareil décrit dans la notice ci-jointe est installé sans barrières de sécurité, on doit couper l'alimentation électrique a la source (hors de l'emplacement dangereux) avant d'effectuer les opérations suivantes branchment ou débranchement d'un circuit de puissance, de signalisation ou autre.

1.4 CUSTOMER/PRODUCT SUPPORT

For support and the location of your local Siemens representative, refer to the table below for the URL of the Process Instrumentation (PI) portion of the Siemens public Internet site. Once at the site, click **Support** in the right column and then **Product Support**. Next select the type of support desired: sales, technical (see the table below), documentation, or software.

Online Support Request	http://www.siemens.com/automation/support-request
Technical Support	1-800-333-7421; 8 a.m. to 4:45 p.m. eastern time, Monday through Friday (except holidays)
Customer Service & Returns	1-800-365-8766 (warranty and non-warranty)
Public Internet Site	http://www.usa.siemens.com/pi
Technical Publications in PDF	Click the above link to go to the Siemens Internet site and then click **Process Instrumentation**. In the column to the right, click **Support** > **Manuals**. In the column to the left, select the product line (e.g. Pressure or Temperature or Controllers) to open navigation and search panes. Note: Navigation may change as the site evolves.

Warranty

The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements continued herein do not create new warranties or modify the existing warranty.

SIEMENS

EC Declaration of Conformity

Manufacturer:	Siemens Industry, Inc.
Address:	1201 Sumneytown Pike
:	Spring House PA 19477 USA
Product description:	Electric to Pneumatic Transducer Model 77 Type / Typ 77abcd with a=E or -, b=3,8,16 or 40, c = A, C, R or F and d = M1 to M999

The product described above in the form as delivered is in conformity with the provisions of the following European Directives:

2004/108/EC	Council Directive of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility.
97/23/EEC	Directive of the European Parliament and the Council of 29 May 1997on the harmonization of the laws of Member States concerning pressure equipment
94/9/EC	Directive of the European Parliament and the Council of 23 March 1004 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres.

Spring House, 26 February 2013

Siemens Industry, Inc

Sweeney, Approvals Coordinator		Anderson, Manager, PIBU	
Name, function	signatur	Name, function	signatur

Annex A is integral part of this declaration.
This declaration certifies the conformity to the specified directives but contains no assurance of properties.
The safety documentation accompanying the product shall be considered in detail.

SIEMENS

Annex A to the EC Declaration of Conformity

Product description: Electric to Pneumatic Transducer
Model 77
Type / Typ 77abcd with a=E or -, b=3,8,16 or 40, c = A, C, R or F and d = M1 to M999

Conformity to the Directives indicated on page 1 is assured through the application of the following standards:

Directive 2004/108/EC Electromagnetic Compatibility

Conformance to directive 2004/108/EC is based on conformance with the following standards:

Standard	Date	Description
EN 61000-6-3	2007	Electromagnetic compatibility (EMC) – Part 6-3: Generic standards Emission standard for residential, commercial and light industrial environments (IEC 61000-6-3:2006)
EN 61000-6-4	2007	Electromagnetic compatibility (EMC) - Generic standards – Emission standard for industrial environment (IEC 61000-6-4:2006)
EN 61000-6-1	2007	Electromagnetic compatibility (EMC) -- Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments (IEC 61000-6-1:2005)
EN 61000-6-2	2005	Electromagnetic compatibility (EMC) -- Part 6-2: Generic standards - Immunity for industrial environments (IEC 61000-6-2:2005)

Directive 97/23/EC Pressure Equipment

This product has been designed and manufactured in accordance with Article 3, Paragraph 3 of the Pressure Equipment Directive 97/23/EC.

SIEMENS

Anhang EG-Konformitätserklärung
EC Declaration of Conformity

Directive 94/9/EC Explosive Atmospheres

Conformance to directive 94/9/EC is based on an EC – Type Examination Certificate and Type examination certificate issued by Baseefa (2001) Ltd., notified body number 1180 in accordance with article 9 of the Council Directive 94/9/EC of 23 March 1994, The technical basis of compliance with EHSR of the directive is EN60079-0:2012.

II 1G Baseefa02ATEX0247X Ex ia IIC T6 Ga

Certification	Category	Notified Body	Certificate No.
Ex ia IIC T6 Ga	1G	Baseefa 2001 Buxton UK	Baseefa 02ATEX0247X – Issue 4

Standard	Date	Description
EN 60079-0	2012	Electrical apparatus for potentially explosive atmospheres – Part 0 General requirements (IEC 60079-0:2011 modified)
EN 60079-11	2012	Electrical apparatus for potentially explosive atmospheres – Part 11: Equipment protection by Intrinsic safety 'i'

II 3G Baseefa02ATEX0249X Ex nA IIC T6 Gc

Certification	Category	Notified Body	Certificate No.
Ex nA II T6 Gc	3G	Baseefa 2001 Buxton UK	Baseefa 02ATEX0249X – Issue 4

Standard	Date	Description
EN 60079-0	2012	Electrical apparatus for potentially explosive atmospheres – Part 0 General requirements (IEC 60079-0:2011 modified)
EN 60079-15	2010	Electrical apparatus for explosive atmospheres – Part 15 Construction, test and marking of type of protection "n" electrical apparatus (IEC 60079-15:2010)

1 # EC - TYPE EXAMINATION CERTIFICATE

2 **Equipment or Protective System Intended for use in Potentially Explosive Atmospheres Directive 94/9/EC**

3 EC - Type Examination Certificate Number: **Baseefa02ATEX0247X – Issue 4**

4 Equipment or Protective System: **Model 77 E/P Transducer**

5 Manufacturer: **Siemens Industry Inc**

6 Address: **1201 Sumneytown Pike, P.O. Box 900, Spring House, PA, 19477-0900, USA**

7 This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Baseefa, Notified Body number 1180, in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report **12(C)1035**.

9 Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0: 2012 EN 60079-11: 2012

except in respect of those requirements listed at item 18 of the Schedule.

10 If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EC - TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified equipment or protective system. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

12 The marking of the equipment or protective system shall include the following :

Ⓔx II 1G Ex ia IIC T6 Ga

This certificate may only be reproduced in its entirety, without any change, schedule included.

Baseefa Customer Reference No. **3090**

Project File No. **12/1035**

This certificate is granted subject to the general terms and conditions of Baseefa. It does not necessarily indicate that the equipment may be used in particular industries or circumstances.

pp Allan Ogden

R S SINCLAIR
DIRECTOR
On behalf of
Baseefa

Baseefa
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e-mail info@baseefa.com web site www.baseefa.com
Baseefa is a trading name of Baseefa Ltd
Registered in England No. 4305578. Registered address as above.

13 **Schedule**

14 **Certificate Number Baseefa02ATEX0247X – Issue 4**

15 Description of Equipment or Protective System

A MODEL 77 E/P TRANSDUCER is a force balance instrument which is designed to convert a 4-20mA dc signal into a pneumatic signal. The apparatus consists of a pneumatic assembly and an encapsulated coil assembly which includes duplicated shunt protective diodes.

The Model No. is marked in the following manner: **77 a 16 c d** where -

77 = Base Model No.

a = **Top HOUSING** with options as follows

-- = No Tapped Exhaust, Aluminium, Not Boosted

E = Tapped Exhaust, Aluminium, Not Boosted

B = No Tapped Exhaust, Aluminium, Boosted

S = No Tapped Exhaust, Stainless Steel, Not Boosted

T = Tapped Exhaust, Stainless Steel, Not Boosted

b = Input

4 -20mA for 3-14 psi output

c = **Output**

B1 = 3-15 psi

B3 = 0.2-1 bar

B5 = 0.2-1 Kg/cm^2

d = **Modifications**

M600 = Low Viscosity Damping

Input Parameters

$U_i = 30V$ $I_i = 0.66A$ $P_i = 1.0W$ $C_i = 0$ $L_i = 0$

16 Report Number

12(C)1035

17 Specific Conditions of Use

1. The enclosure of the Model 77 E/P Transducer may contain aluminium and must be deemed suitable for the intended application and must also be protected against friction and impact if located in a zone 0.

18 Essential Health and Safety Requirements

All relevant Essential Health and Safety Requirements are covered by the standards listed at item 9.

19 Drawings and Documents

New drawings submitted for this issue of certificate.

Number	Sheet	Issue	Date	Description
5-402	1 of 1	7	1-31-13	Label, Foil, 77, Ex ia

Current drawings also associated with this certificate.

Number	Sheet	Issue	Date	Description
*15032-7706	1 to 3	7	11-11-08	Certification Drawing for models 77 & 771
*12334-421	1 of 1	1	1-23-09	Assy Dwg, Screwed Sticker

* These drawings are common to Baseefa02ATEX0249X - Issue 4

20 Certificate History

Certificate No.	Date	Comments
Baseefa02ATEX0247X	8 May 2003	The release of prime certificate. The associated test and assessment is documented in Report number 02(C)0098
Baseefa02ATEX0247X/1	4 April 2004	To permit minor changes to the coil inductance and the enclosure thickness. These changes do not affect intrinsic safety.
Baseefa02ATEX0247X/2	27 Nov 2006	To permit minor drawing changes and the use of an alternative label material and fixing.
Baseefa02ATEX0247X Issue 3	16 April 2009	This issue of the certificate incorporates previously issued primary & supplementary certificates into one certificate and confirms the current design meets the requirements of EN 60079 0: 2006 & EN 60079-11: 2007 including the revision of the component marking in accordance with these standards. This issue also incorporates a change to the thickness of moulding material around the coil. The associated test and assessment is documented in Report number 08(C)0856.
Baseefa02ATEX0247X Issue 4	7 February 2013	This issue of the certificate confirms the current design meets the requirements of EN 60079 0: 2012 & EN 60079-11: 2012 including the revision of the equipment marking in accordance with these standards.
For drawings applicable to each issue, see original of that issue.		

1 # TYPE EXAMINATION CERTIFICATE

2 **Equipment or Protective System Intended for use in Potentially Explosive Atmospheres Directive 94/9/EC**

3 EC - Type Examination Certificate Number: **Baseefa02ATEX0249X – Issue 4**

4 Equipment or Protective System: **Model 77 E/P Transducer**

5 Manufacturer: **Siemens Industry Inc**

6 Address: **1201 Sumneytown Pike, P.O. Box 900, Spring House, PA, 19477-0900, USA**

7 This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Baseefa certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment of Category 3 intended for use in potentially explosive atmospheres given in Annex II to European Union Directive 94/9/EC of 23 March 1994.

The examination and test results are recorded in confidential report **12(C)1035**.

9 Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0: 2012 EN 60079-15: 2010

except in respect of those requirements listed at item 18 of the Schedule.

10 If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

11 This TYPE EXAMINATION CERTIFICATE relates only to the design of the specified equipment and not to specific items of equipment subsequently manufactured.

12 The marking of the equipment or protective system shall include the following :

Ⓔx II 3G Ex nA IIC T6 Gc

Baseefa Customer Reference No. **3090**

Project File No. **12/1036**

This certificate is granted subject to the general terms and conditions of Baseefa. It does not necessarily indicate that the equipment may be used in particular industries or circumstances.

pp Allan Ocock

R S SINCLAIR
DIRECTOR
On behalf of
Baseefa

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Registered in England No. 4305578. Registered address as above.

13 # Schedule

14 ## Certificate Number Baseefa02ATEX0249X – Issue 4

15 Description of Equipment or Protective System

A MODEL 77 E/P TRANSDUCER is a force balance instrument which is designed to convert a 4-20mA dc signal into a pneumatic signal. The apparatus consists of a pneumatic assembly and an encapsulated coil assembly which includes duplicated shunt protective diodes.

The Model No. is marked in the following manner: **77 a 16 c d** where -

77 = Base Model No.

a = Top HOUSING with options as follows

-- = No Tapped Exhaust, Aluminium, Not Boosted

E = Tapped Exhaust, Aluminium, Not Boosted

B = No Tapped Exhaust, Aluminium, Boosted

S = No Tapped Exhaust, Stainless Steel, Not Boosted

T = Tapped Exhaust, Stainless Steel, Not Boosted

b = Input

4 -20mA for 3-14 psi output

c = Output

B2 = 3-15 psi

B4 = 0.2-1 bar

B6 = 0.2-1 Kg/cm2

d = Modifications

M600 = Low Viscosity Damping

Input Parameters

U_i = 30V d.c.

P_i = 2.3W

16 Report Number

12(C)1035 held with Baseefa02ATEX0247X

17 Specific Conditions of Use

1. It must be ensured that the maximum voltage of the external circuit to which the Model 77 E/P Transducer is connected cannot exceed 39.2V d.c.

18 Essential Health and Safety Requirements

All relevant Essential Health and Safety Requirements are covered by the standards listed at item 9.

19 Drawings and Documents

New drawings submitted for this issue of certificate.

Number	Sheet	Issue	Date	Description
5-401A	1 of 1	7	1-31-13	Label, Foil, 77, Ex nA

Current drawings also associated with this certificate.

Number	Sheet	Issue	Date	Description
*15032-7706	1 to 3	7	11-11-08	Certification Drawing for models 77 & 771
*12334-421	1 of 1	1	1-23-09	Assy Dwg, Screwed Sticker

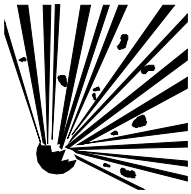
* These drawings are common to, and held with, Baseefa02ATEX0247X - Issue 4

20 Certificate History

Certificate No.	Date	Comments
Baseefa02ATEX0249X	8 May 2003	The release of prime certificate. The associated test and assessment is documented in Report number 02(C)0099
Baseefa02ATEX0249X/1	4 April 2004	To permit minor changes to the coil inductance and the enclosure thickness. These changes do not affect the safety assessment.
Baseefa02ATEX0249X/2	17 May 2005	To permit minor drawing changes and the use of an alternative label material and fixing.
Baseefa02ATEX0249X Issue 3	16 April 2009	This issue of the certificate incorporates previously issued primary & supplementary certificates into one certificate and confirms the current design meets the requirements of EN 60079-0: 2006 & EN 60079-15: 2005 including the revision of the component marking in accordance with these standards. This issue also incorporates a change to the thickness of moulding material around the coil. The associated test and assessment is documented in Report number 08(C)0856.
Baseefa02ATEX0249X Issue 4	7 February 2013	This issue of the certificate confirms the current design meets the requirements of EN 60079 0: 2012 & EN 60079-15: 2010 including the revision of the equipment marking in accordance with these standards.
For drawings applicable to each issue, see original of that issue.		

2.0 INSTALLATION

This section describes transducer installation for both hazardous and non-hazardous locations. Each E/P Transducer nameplate shows the hazardous location classifications for which the transducer has been FM approved, Canadian Standards Association certified or ATEX certified. All transducer installations should be in accordance with either the current edition of the National Electrical Code (NEC), Canadian Electrical Code (CEC), or EN 60079-14, as required by local regulations.



WARNING

Explosion can cause death or serious injury.

Failure to observe the following precautions could result in an explosion hazard.

Installation in hazardous locations must be in accordance with either the NEC, CEC, or EN 60079-14, as required by local regulations.

The 77F models must be used in conjunction with energy limiting barriers. See drawing 15032-7704 or 15032-7705 in Section 8. See Section 1.3 Product Certifications for additional information.

A typical intrinsically safe system consists of one or more Model 77F transducers installed in a hazardous area, the required quantity of appropriate energy limiting barriers installed in a non-hazardous location, and the needed length of interconnecting twisted-pair cables.

For intrinsically safe installations in accordance with ATEX requirements, use barriers suitable for the parameters marked on the nameplate.

2.1 MOUNTING

Figure 2-1 shows transducer dimensions, mounting hole locations, electrical access ports, and pneumatic connections. Mount the transducer in an upright, vertical position. Tilting to 10° from vertical will not affect operation

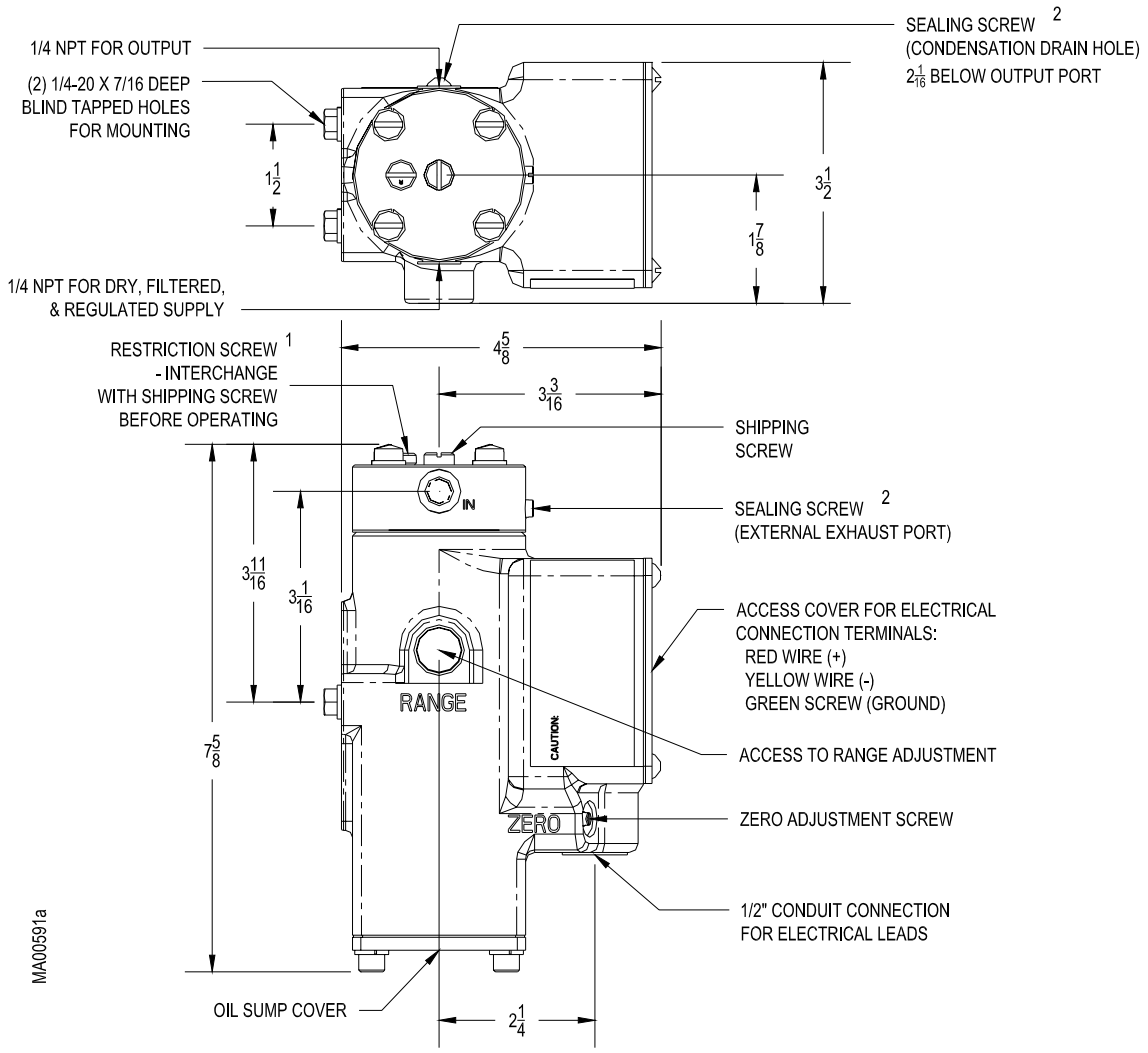
CAUTION

Mounting the transducer where the specified ambient temperature limits may be exceeded can adversely affect performance and may cause damage.

A flat adapter plate is available for mounting the transducer to a blind wall. The adapter plate comes in a kit (PN 12330-100) with two 1/4-20 flat head screws for mounting the transducer to the plate. Two pairs of transducer mounting holes are provided. Either pair can be used. See Figure 2-2 for adapter plate dimensions.

A 2" pipe mounting kit (PN 12334-130) is also available; see Figure 2-3. Use this kit to mount the transducer on a 2" O.D. pipe. It consists of a mounting bracket to mount the transducer and a U-bolt assembly for pipe mounting.

A transducer supplied for use in the European Union (and other locations requiring metric threads) will have a housing with either an M20 conduit connection or a 1/2 NPT conduit connection and a 1/2 NPT to M20 adapter, supplied for installation by the user. See Figure 2-4.



NOTES:
1. CLEARANCE OF AT LEAST 5" ABOVE THE TOP MUST BE LEFT WHEN MOUNTING THIS INSTRUMENT TO PERMIT REMOVAL OF SHIPPING SCREW AND TOP CAP.
2. SEALING SCREW MUST NOT BE REMOVED IN ANY CLASS II HAZARDOUS LOCATION OR UNDER ANY NEMA 4 CONDITION.

FIGURE 2-1 Transducer Installation and Mounting Dimensions

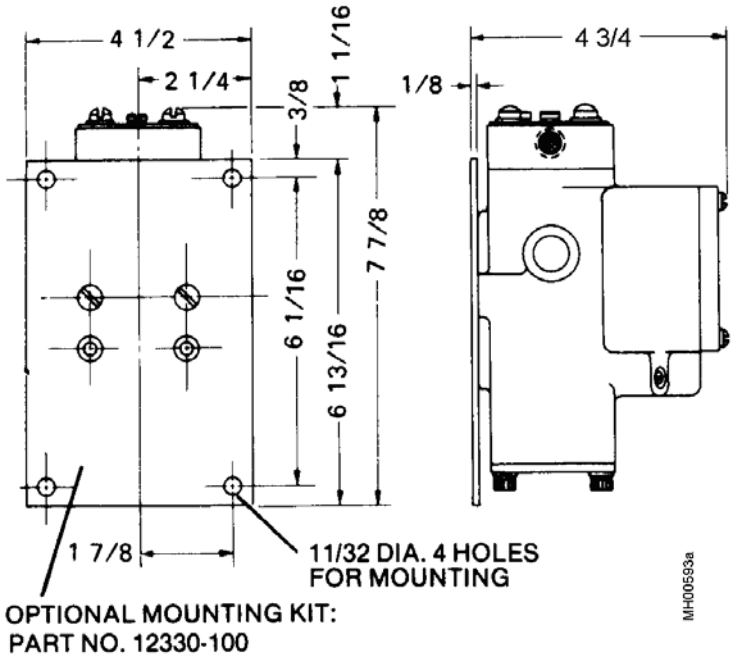


FIGURE 2-2 Transducer with Mounting Bracket Dimensions

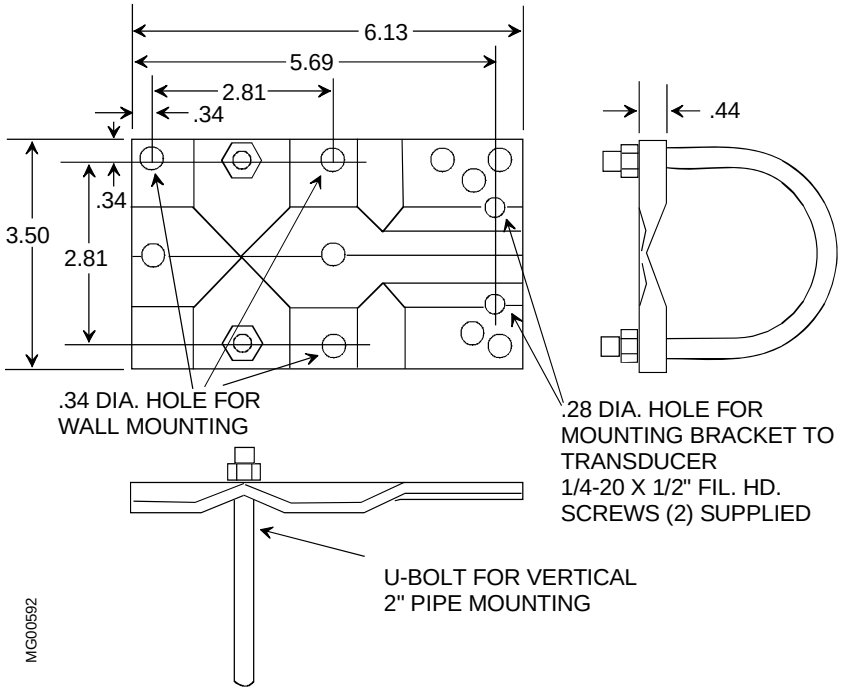
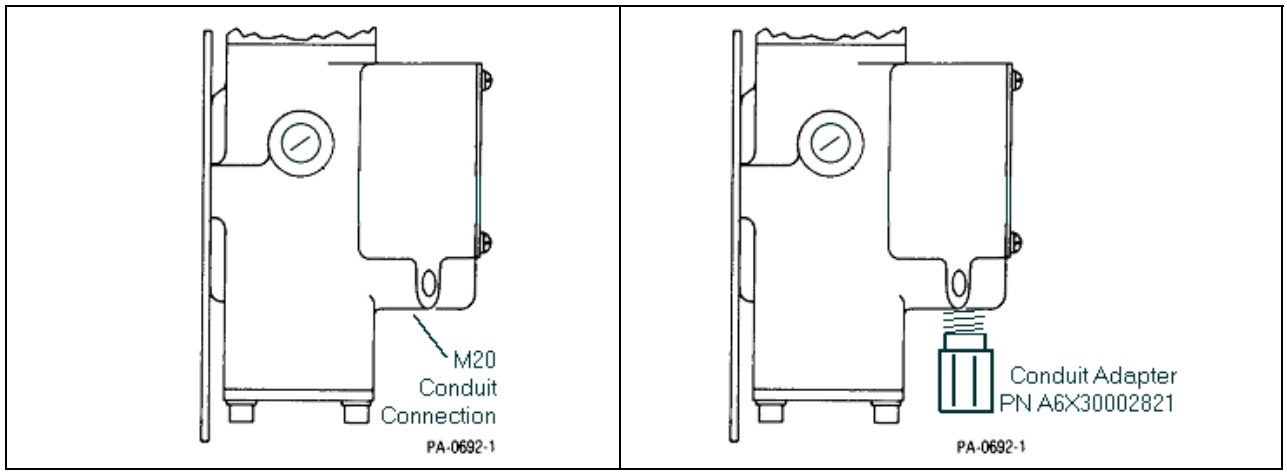


FIGURE 2-3 Pipe Mount Bracket Dimensions



Metric Housing **Standard Housing with Adapter**

FIGURE 2-4 Transducer Housings for Metric Conduit

2.2 INSTRUMENT AIR REQUIREMENTS

Connect the transducer to a source of clean, dry, oil-free instrument air. Failure to do so will increase the possibility of a malfunction or a deviation from specified performance.

CAUTION

Use of process fluids other than instrument air is not recommended. No claim is made as to the suitability of this product for use with other process fluids, such as hazardous gases, except as listed on the appropriate certificate. Non-approved instruments are suitable for use with instrument air only. Optional features and modifications such as tapped exhaust do not imply suitability for use with hazardous gases except as listed on the approval certificate.

The requirements for a quality air supply can be found in the Instrument Society of America's "Quality Standard for Instrument Air" (ISA-S7.3 or BS5967: Part 2). Basically, this standard calls for the following.

Particle Size: The maximum particle size in the air stream at the instrument should be no larger than 3 microns.

Dew Point: The dew point (at line pressure) should be at least 10°C (18° F) below the minimum temperature to which any part of the instrument air system is exposed at any season of the year. Under no circumstances should the dew point (at line pressure) exceed 2°C (35.5°F).

Oil Content: The maximum total oil or hydrocarbon content, exclusive of noncondensibles, should not exceed 1 ppm under normal operating conditions.

Recommended supply pressure is listed in Section 1.2 General Specifications.

Caution

Supply pressure in excess of the specified maximum may cause damage.

2.3 PIPING

The supply (IN) and output (OUT) connections on the transducer are 1/4 inch NPT. See Figure 2-1. Quarter-inch O.D. tubing is recommended for piping to the transducer. Before making connections, blow out all piping.

Use pipe sealant sparingly and then only on the male threads of the tube fittings. A non-hardening sealant is strongly recommended.

There must be no leaks, especially in the output. Leak test all fittings and tube connections.

2.4 TRANSMISSION DISTANCE

If the installation requires the transducer to transmit its output pressure for distances greater than 50 feet (15 meters), a Siemens (or Moore Products Co.) Model 61F 1:1 Booster Relay may be required. Use of the booster relay depends upon the frequency response requirements of the system. If a booster relay is used, connect it to the transducer output with a minimum of 2 to 3 feet (0.6 to 1 meter) of 1/4" O.D. tubing.

2.5 TAPPED EXHAUST

A transducer with the tapped exhaust option provides the capability to pipe its exhaust flow away from the vicinity of the transducer. This is an important option when a gas other than air is used for the supply. Figure 2-5 locates the tapped exhaust port.

As shipped from the factory, sealing screws are installed in the condensation drain hole and the two normal exhaust ports.

IMPORTANT

Do not use the condensation drain feature with the tapped exhaust option. The drain hole is a discharge path for the transducer's exhaust.

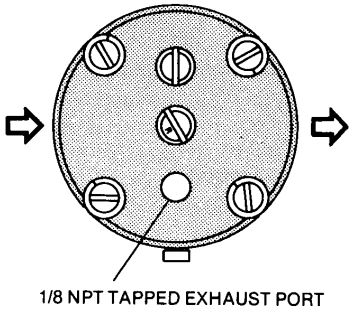


FIGURE 2-5 Tapped Exhaust Port

2.6 EXHAUST PORT SELECTION

The transducer has two exhaust ports: one at the front of the top housing (Figure 2-1) and the other above the terminal block in the terminal enclosure (Figure 2-6). As shipped, two sealing screws are installed: one is installed in the external exhaust port at the front of the top housing, and a second is installed in the condensation drain. This configuration allows the transducer's exhaust air to purge the terminal enclosure, the conduit, and associated electronic enclosure (if used).

CAUTION

Do not remove either the exhaust sealing screw or the condensation drain sealing screw in a Class II hazardous location or where a 4 or 4X Enclosure Type is required.

If airtight conduit, conduit fittings, and electronic enclosures are used, move the exhaust sealing screw to the internal exhaust port in the terminal enclosure (Figure 2-6) and remove the condensation drain sealing screw. This allows the transducer exhaust to be vented to atmosphere through the external exhaust port. It also allows any accumulated condensation from the instrument air supply to drain from the coil cavity.

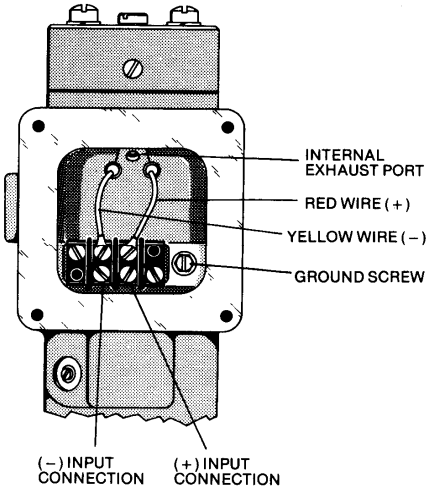


FIGURE 2-6 Terminal Enclosure

2.7 SHIPPING AND RESTRICTION SCREWS

The transducer has a shipping screw in the center of the top housing to protect the transducer's nozzle during shipment. A restriction screw (stamped R) is located just behind the shipping screw. These two screws must be interchanged before placing the instrument into operation. Turn the restriction screw in tightly for proper operation. Note that if the transducer is to be moved to another location, return the shipping and restriction screws to their original positions to protect the nozzle. See Figure 2-1 for the positions.

2.8 WIRING

Connect electrical wiring to the terminal block in the terminal enclosure. Figure 2-1 locates the terminal access cover and the 1/2" conduit connector for input wiring. Figure 2-6 identifies the wiring connections. As shipped from the factory, the conduit connection is a vent path for the transducer's exhaust. Refer to the Exhaust Port Selection section if airtight conduit or fittings are to be used.

For a transducer with the optional reverse acting output (e.g., Model 77-16R), the input wiring must be reversed (i.e. positive to negative and negative to positive).

The recommended wire size is 22 AWG (0.38 mm^2) stranded or solid. Use insulated, crimp-on ring tongue or spring spade tongue terminals for #6 screws. Use a high quality crimping tool recommended by the terminal manufacturer.

No special considerations are required for wiring a non-intrinsically safe transducer. However, intrinsically safe models must be installed as detailed in the next section.

Note

When the transducer is used with a Siemens or Moore Products, Co. Model 348 FIELDPAC™ that employs HART communications, a Communications Filter should be connected across the wiring terminals. Contact the Process Instrumentation & Analytics Business Unit of Siemens Industry, Inc. for additional information and filter availability.

2.8.1 Intrinsically Safe Models

A Model 77F transducer is considered intrinsically safe only when it has a nameplate with the FM logo and the words INTRINSICALLY SAFE.

Install the transducer in strict compliance with the instructions furnished by the barrier manufacturer and in accordance with drawing 15032-7704 (FM and CSA), drawing 15032-7705 (FM only), or ATEX Requirements. See Section 1.3 Product Certifications for additional information.

1. Install a Model 77F transducer in the hazardous area as detailed by this section of this instruction.
2. Install the required energy limiting barriers in the non-hazardous area. Refer to the barrier manufacturer's instructions and to the appropriate connection diagram in this instruction.
3. Install the required wiring between the Model 77F transducer and the barriers. Use shielded or unshielded multi-pair or single-pair cables. Ground the transducer body as required.
4. In a similar manner, install the required wiring between the barriers and the output terminals of device driving the transducer (i.e. providing the input signal).
5. Install the redundant ground system for the barrier installation as specified by the barrier manufacturer.
6. Check all signal and ground connections.
7. Check all pneumatic connections and transducer adjustments.
8. Check the calibration of the transducer as outlined in the Section 4 Calibration.

3.0 OPERATION

The input coil and the float are attached to a common center shaft and make up what is referred to as the “moving coil assembly.” This assembly is free to move vertically. The float is submerged in Silicone fluid and is sized so that the resultant buoyant force equals the weight of the moving coil assembly. This puts the moving coil assembly into a state of neutral buoyancy, which, together with the viscous damping of the Silicone fluid, makes the transducer insensitive to shock and vibration.

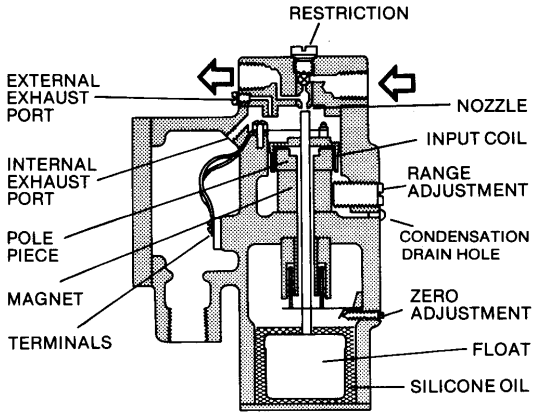


FIGURE 3-1 Schematic

A permanent magnet provides a magnetic field that passes through the input coil. Current flowing through the coil reacts with the magnetic field to force the moving coil assembly closer to the nozzle. The top end of the common center shaft serves as a nozzle seat that restricts the flow of air exhausting from the nozzle.

Air is supplied to the nozzle through a restriction. The restriction and the nozzle form a pressure-divided circuit. The pressure in the nozzle (back-pressure) varies according to the restrictive effect imposed by the nozzle seat. The nozzle backpressure is the output of the transducer.

The nozzle forms a column of air that has a diameter equal to the nozzle diameter. This column of air acts on the nozzle seat to oppose and equal the force produced by the coil. The pressure of this column of air (nozzle backpressure) is determined by the upward force of the moving coil assembly divided by the area of the column of air (i.e. the area of the nozzle). Thus, the force produced by the coil is continuously balanced by the nozzle backpressure so that the transducer output pressure is, at all times, directly proportional to the coil current.

Zero adjustment is accomplished by varying a spring force on the moving coil assembly.

Range adjustment is accomplished by changing the gap between the permanent magnet and the end of the range adjustment screw. This screw shunts a portion of the magnetic field. Varying the gap changes the amount of shunting which, in turn, changes the flux density through the coil.

4.0 CALIBRATION

The E/P Transducer must be positioned so that it is upright and vertical. Tilting within 10 degrees of vertical will not affect operation. If the transducer has been lying on its side, set the unit upright and allow approximately 15 minutes before performing calibration. This will allow the viscous damping fluid to collect at the bottom of the transducer.

The restriction screw (stamped R) must be installed in its operating position. An instruction label on the transducer explains what to do.

The transducer has two calibration adjustments: ZERO and RANGE. These are identified on the transducer and in Figure 2-1.

The ZERO adjustment screw changes the operating level. Turning it clockwise raises the output pressure.

The RANGE adjustment screw is used to trim the span. Turning it clockwise narrows the output span. The RANGE screw provides a limited amount of adjustment, approximate ±2% of span. Because of this limitation, it is important to use an accurate multimeter.

4.1 TEST EQUIPMENT

The following equipment is required to calibrate the transducer. For any instrument, the test equipment used for calibration should be at least twice as accurate as the instrument being calibrated.

1. 0-50 mAdc source
2. Digital Multimeter: Accuracy 0.1% of reading or better
3. Pneumatic Test Gauge: Range, 0-15 psig (0-30 psig for 3 to 27 psig output); 0.02 psi per division; accurate to 0.6% of full scale

4.2 PROCEDURE

Refer to Figures 2-1 and 2-6 for pneumatic and electrical connections.

1. Adjust the supply air source to the specified value and connect it to the transducer's IN port.
2. Connect the test equipment to the transducer.
3. Set the milliamp source to the starting point value for the input signal range (e.g. 4 mA for a 4 to 20 mA range). Adjust the transducer's ZERO for a 3 psig output.
4. Set the milliamp source to the full-scale value for the input signal range (e.g. 20 mA for a 4 to 20 mA range). Adjust the transducer's RANGE for a 15 psig output. Model 77-8 is adjusted for a 27 psig output.
5. The ZERO and RANGE adjustments interact. Repeat the above steps until the calibration is correct.

4.3 RANGE CHANGE

Change the transducer’s range by installing a different coil assembly. Refer to Parts List 12334PL, at the rear of this Instruction, for coil assembly part numbers.

Refer to the procedures in Section 5 Maintenance to remove, install, and align the coil.

5.0 MAINTENANCE

This section presents transducer maintenance procedures.

CAUTION

Improper servicing and/or substitution of components may impair the electrical safety of this instrument.

5.1 PREVENTIVE

As with most pneumatic instruments, a clean, dry and oil-free supply air is recommended. Refer to the Instrument Society of America's "Quality Standard for Instrument Air" (ISA-S7.3).

5.2 CLEANING

The transducer filter screens, restriction screw, nozzle and nozzle seat can be cleaned without dismounting the transducer.

When the transducer top housing is removed, take care to prevent metal chips, dirt, and other contaminants from entering the coil chamber. These foreign objects can interfere with coil movement and may change the magnetic field.

5.2.1 Filter Screens

There is a filter screen in the supply (IN) port and in the output (OUT) port.

1. Disconnect the tubing and remove the tube fittings.
2. Remove the four screws from the top housing and remove it by pulling straight up.
3. Blow the screens down in a reverse direction. Remove the restriction screw, cover the nozzle opening, and blow air into the port from which the restriction screw was removed. If the dirt is not dislodged, loosen it mechanically or chemically and repeat the blow down procedure.
4. If a screen is damaged or cannot be cleaned it must be replaced. Each screen is retained by a fiber washer. Be sure replacement fiber washers are on-hand before removing a screen. When installing a screen, it should be firmly retained at the bottom of its port by a fiber washer.

5.2.2 Restriction Screw

Remove the restriction screw (stamped R) from the top-center of the transducer. The restriction is accessible from the tip of the screw. Cleaning with a solvent is usually sufficient. If necessary, run a 0.021-inch drill blank through the restriction until it can be seen in the cross-drilled hole.

5.2.3 Nozzle and Nozzle Seat

The nozzle is part of the top housing. The nozzle seat is in the transducer housing; the seat is the top end of the center shaft.

1. Disconnect the tubing and remove the four screws from the top housing.
2. Remove the top housing by pulling it straight up.
3. Clean the nozzle and nozzle seat by wiping with a dry cloth or a solvent dampened cloth. Do not use abrasive cleaning agents. The important parts of the nozzle to clean are its inner diameter surfaces and the sharp edge of its face.

5.3 TROUBLSHOOTING

Refer to the trouble analysis table below when troubleshooting the transducer. A transducer input signal must be present and the signal source must be functioning and accurately calibrated. Each darkened area in the table relates a symptom (top row) to a cause (left-most column).

Symptom **Cause**	**No Output**	**Output above full scale and will not reduce**	**Output will not increase to full scale**	**Output will not decrease to start of scale**	**Output oscillates**	**Output erratic during an input change (hangs up and then jumps)**
Shipping screw not in its Stored position		■				
Inadequate or no supply air	■		■			
Leak in output line or fittings			■			
Input leads reversed	■					
Inadequate volume in output					■	
Transducer zero out of adjustment			■	■		
Transducer range out of adjustment			■			
Loose input leads	■					
Clogged filter screen	■					
Misaligned coil			■	■		■
Foreign object interfering with coil movement			■	■		■
Blocked exhaust port		■				
Shorted or open coil	■					
*** Loss of silicon fluid**	■		■			
****Permanent magnet weak**			■			

* Does not occur unless bottom cover has been loosened or removed and maintenance performed.
** Does not occur unless transducer has been dropped or otherwise subjected to a physical shock.

5.4 COIL ASSEMBLY REPLACEMENT

Removal

When the transducer's top housing is removed, care must be taken to prevent metal chips, dirt, and other contaminants from entering the coil chamber. These foreign objects can interfere with coil movement and may change the magnetic field.

Refer to the parts list at the rear of this Instruction and the following procedure.

1. Remove the top housing.
2. Remove the brass clamping plate. It is held by a single screw.
3. Remove the two Teflon washers.
4. Slide the bowed “E” retaining ring off the shaft.

IMPORTANT

Do not bend the center shaft. Support the shaft while removing the retaining ring.

5. Remove the coil assembly by carefully lifting it off the center shaft.

Installation

Refer to the parts list at the rear of this Instruction and the procedure that follows.

IMPORTANT

The coil assembly and coil chamber must be free of metal chips, dirt and corrosion before installing the coil.

1. Lower the coil assembly onto the center shaft and, at the same time, guide the leaf springs onto the contact posts
2. Install the bowed “E” retaining ring on the center shaft - bowed center up.
3. Install the Teflon washers (small diameter up), clamping plate, and clamping plate screw. Do not tighten the screw at this time; it must be loose until the coil is aligned. Refer to the Alignment procedure below.

Alignment

Center the coil so that it does not rub against the transducer housing or the pole piece under the coil. It must also be positioned so that the leaf springs do not buckle or snap.

Make three cardboard or paper shims 0.012" thick x 1-1/2" long x 3/8" wide. These can be made from a matchbook cover.

Refer to Figure 5-1 and use the following procedure.

1. If not already accomplished, loosen the spring clamping plate screw.
2. Insert the shims between the coil and the housing at the points shown in Figure 5-1. Insert the shims until their ends are flush with the top surface of the housing. Then, raise the coil to a higher point on the shims by pulling the center shaft up.

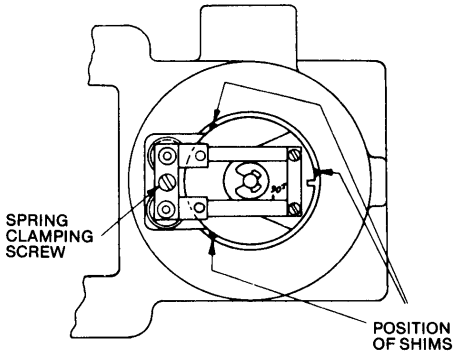


FIGURE 5-1 Coil Alignment

3. Rotate the coil on the center shaft so that the leaf springs are perpendicular to the clamping plate and equidistant from the center shaft.
4. Tighten the clamping plate screw.
5. Remove the shims.
6. Move the coil up and down via the center shaft. Treat the center shaft as though it were a feeler gauge being used to check a point gap. The coil must not rub against the housing or the pole piece, and the leaf springs must not buckle or snap.
    - If rubbing is detected, repeat the alignment procedure.
    - If a leaf spring snaps to a different curvature, the coil is rotated a little too far to the left or right. Repeat the alignment procedure.

5.5 FLOAT REPLACEMENT

Removal

Refer to the parts list at the rear of this Instruction, and use the following procedure.

1. Invert the transducer.
2. Remove the bottom plate. Keep the transducer inverted to prevent spilling of the Silicon fluid. If the fluid is spilled, it must be replaced. Refer to Damping Fluid below.
3. Gently push the float downward and remove its retaining cotter. Lift out the float.
4. Lift the float positioning spring off the center shaft.

Installation

Installation is the reverse of removal. A new gasket is recommended, and the bottom plate must be tightened securely.

IMPORTANT

All traces of Silicon fluid must be wiped from the bottom plate, both sides of the gasket, and the bottom surface of the housing. Otherwise, the fluid will seep past the gasket regardless of how much the screws are tightened.

Check the amount of fluid in the bottom chamber before installing the gasket and plate. Refer to Damping Fluid below.

Damping Fluid

The bottom chamber contains 43cc. of Dow-Corning DC-200 Silicone fluid, 200 centistokes viscosity. Small bottles of this fluid (enough for a little more than one complete fill) may be ordered: PN 12334-43.

Check the fluid depth by inverting the transducer, removing the bottom plate, and inserting a 6" scale between the float and the housing. Allow the scale to bottom in the housing. Fluid depth should be approximately 3/4" (19mm).

IMPORTANT

All traces of Silicon fluid must be wiped from the bottom plate, both sides of the gasket, and the bottom surface of the housing. Otherwise, the fluid will seep past the gasket regardless of how much the screws are tightened.

5.6 MODEL 77 TO MODEL 77-R CONVERSION

With this conversion, the transducer will have a reverse acting output (e.g. 4 mA =15 psig and 20 mA = 3 psig). The parts needed for conversion are listed below.

Description	Part Number	Quantity
12624-4	Spring	1
12392-53	Gasket	1
10660-501	Bottom Cover	1
12330-95	Tag	1

The conversion procedure follows. Refer to Figure 5-2 and to the parts list at the back of this Instruction as needed.

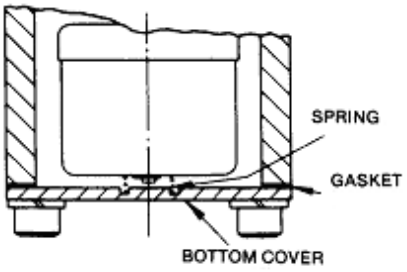


FIGURE 5-2 Conversion Parts

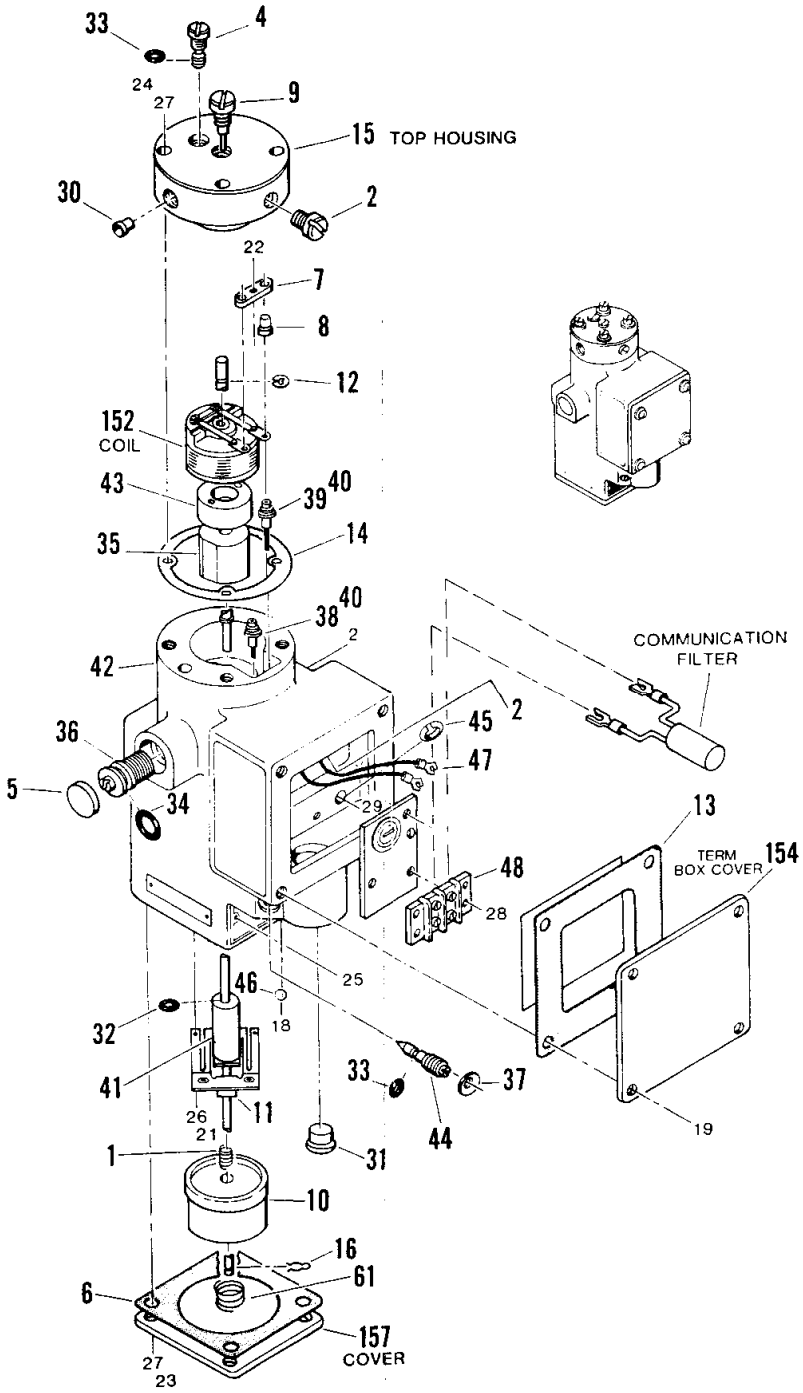
1. Invert the transducer.
2. Remove the bottom plate. Keep the transducer inverted to prevent spilling of the Silicone fluid. If the fluid is spilled, it must be replaced. Refer to Damping Fluid above.
3. Wipe all traces of Silicone fluid from the bottom plate, both sides of the gasket, and the bottom surface of the housing.
4. Place spring PN 12624-4 securely in the groove in the bottom cover, PN 10660-501.
5. Replace the installed gasket with the PN 12392-53 gasket from the kit.
6. Install the bottom cover and spring and tighten securely.
7. Turn the transducer right side up. Strike the lower end of the housing with a plastic hammer to center the spring on the float.
8. Attach the PN 12330-95 paper tag to the transducer.
9. Reverse the polarity of the input signal leads.
10. Refer to Section 4 Calibration and calibrate the transducer. The change to the normal calibration procedure is that the ZERO adjustment is used to achieve a 15 psig output, and the RANGE adjustment is used to achieve a 3 psig output.

For warranty and non-warranty repair, refer to Customer/Product Support in this manual.

6.0 PARTS LIST

Siemens Model Series 77 Electric-To-Pneumatic Transducer

Drawing No. 12334-300PL
5/91 Supersedes 12334PL 8/84



IMPORTANT

Service Parts Kits are available for servicing the instrument. Contact Siemens for available kits; refer to the Customer/ Product Support section of this instruction. Some parts in this Parts List may not be available for separate purchase.

ITEM	PART NO.	DESCRIPTION	QTY.
1	2419-21	Float Spring	1
2	2900-23	Sealing Screw	2
2a	2900-23	Sealing Screw (For units with tapped exhaust option)	3
4	10660-44	Restriction Screw (Interchange positions with Item 9 after installation along with qty. 1 of Item 33.)	1
5	10660-95	Plug	1
6	12392-53	Gasket	1
7	10660-211	Clamping Plate	1
8	10660-225	Washer	2
9	12334-355	Stop Screw Assy. (Shipping Screw) (Interchange positions with ltems 4 and 33 after installation.)	1
10	12334-30	Float Assy.	1
11	12334-61	Center Rod Assy.	1
12	12334-62	Retaining Ring	1
13	12392-54	Cover Gasket	1
14	12392-52	Gasket	1
15a	12334-405	Top Housing Standard	1
15b	12755-50	Tapped Exhaust Top Housing	1
16	12352-1	Cotter Pin	1
30	1604-41	Pipe Plug 1/4"	2
31	1604-42	Pipe Plug 1/2"	1
32	2938-2	O-Ring	1
33	2938-5	O-Ring	2
34	2938-18	O-Ring	1
35	----	Magnet	1
36	10660-97	Adjustment Screw	1
37	10660-191	Retaining Washer	1
38	10660-320	Socket Assy. w/Yellow Wire	1
39	10660-319	Socket Assy. w/Red Wire	1
40	12334-5	Bushing	2
41	12334-9	Center Tube Assy.	1
42	----	Transducer Housing	1
43	12334-331	Pole Piece Assy.	1
44	12334-59	Zero Screw	1
45	12334-138	Terminal Washer	1
46	12349-1	Nylon Ball	1
47	2292-56	Crimp-On Terminal	2
48	7418-580	Terminal Strip	1
61	12624-4	Compression Spring (Reverse Action only)	1

ITEM	PART NO.	DESCRIPTION	QTY.
152	----	Coil Assy. (See Table below)	1
153a	----	----	----
153b	----	----	----
153c	----	----	----
154	5-1026	Terminal Box Cover	1
157a	10660-500	Bottom Cover (Direct Action)	1
157b	10660-501	Bottom Cover (Reverse Action)	1
—	20137-4	HART Communication Filter	1
		HARDWARE	
18	1-5649	8-32 x 3/16" Lg. Cup Pt. Soc. Set Screw	1
19	1-2373	10-32 x 3/8" Lg. Rd. Hd. Screw	4
20	----	----	----
21	1-0137	2-56 x 1/8" Lg. Fil. Hd. Screw	2
22	3175-188	4-40 x 1/2" Slotted Torxpan HD Screw	1
23	1-3251	1/4-20 x 1/2" Lg. Bind. Hd. Screw (2 used with Model 77-16C)	4
24	1-3465	1/4-20 x 1 1/4" Lg. Fil Hd. Screw	4
25	1-6835	2 x 1/8 DRVSC	4
26	1-7216	#2 Lockwasher	2
27	1-7303	1/4 Lockwasher	8
28	1-1018	5-40 x 1/2 Lg. Rd. Hd. Screw	2
29	1-2364	10-32 x 3/8 Lg. SLHX	1
160	----	----	----
161	----	----	----

Intrinsically Safe Coil	Transducer Model	Input Span	Coil Assembly	Coil Marked
Yes	77-3F_ _	4 mA	12334-78	78
	77-3AF_ _	4 mA	12334-78	78
	77-16F_ _	16 mA	12334-103	103
No	77-3_ _	4 mA	12334-20	A
	77-3A_ _	4 mA	12334-20	A
	77-8_ _	16 mA	12725-7	G
	77-16_ _	16 mA	12392-2	B
	77-40_ _	40 mA	12451-2	C
Yes	77-16B_ (ATEX)	16 mA	15277-1a	103

7.0 HAZARDOUS LOCATION INSTALLATION DRAWINGS

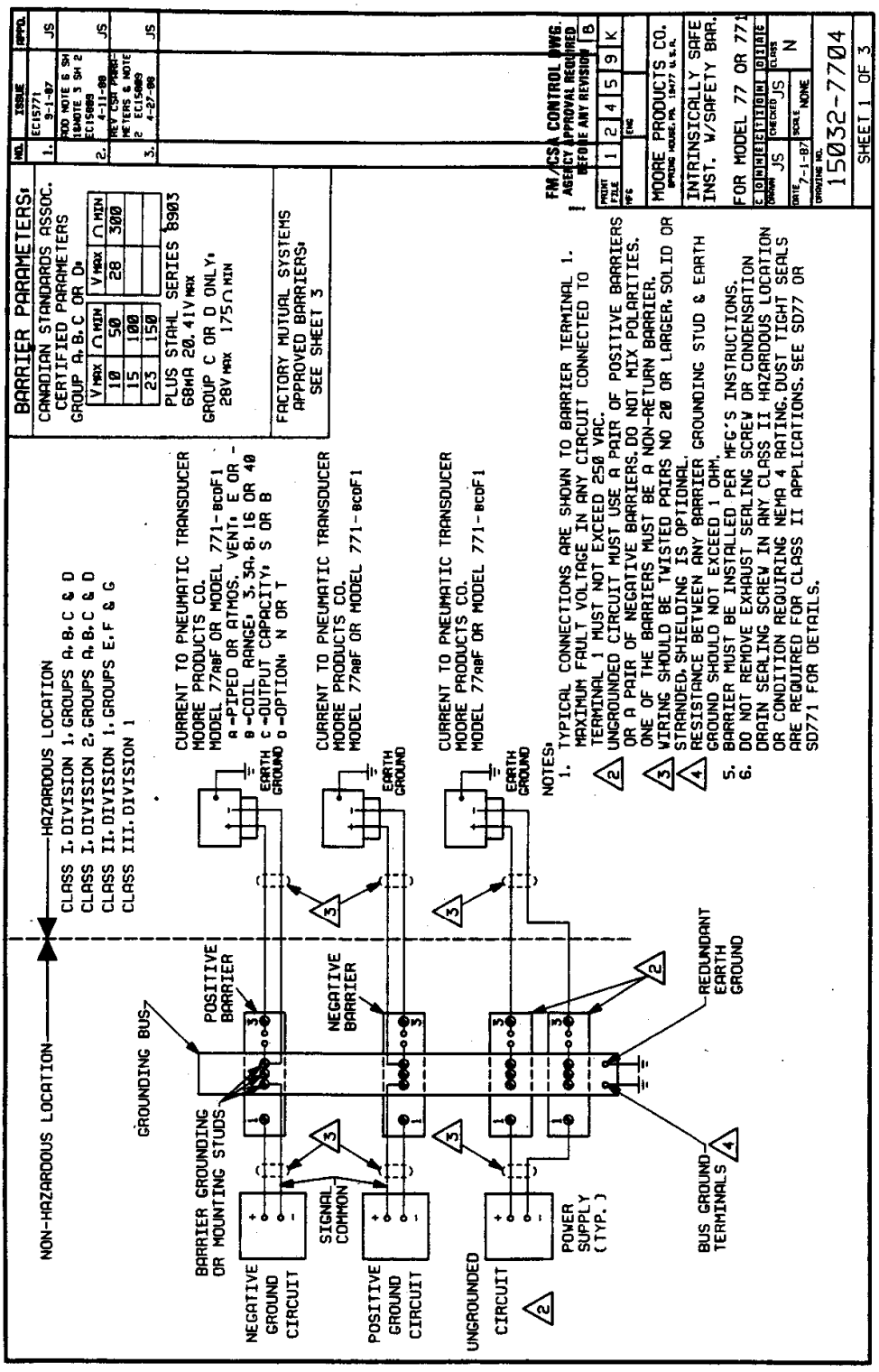


FIGURE 7-1 Intrinsically Safe Installation with Safety Barriers, Model 77 or 771

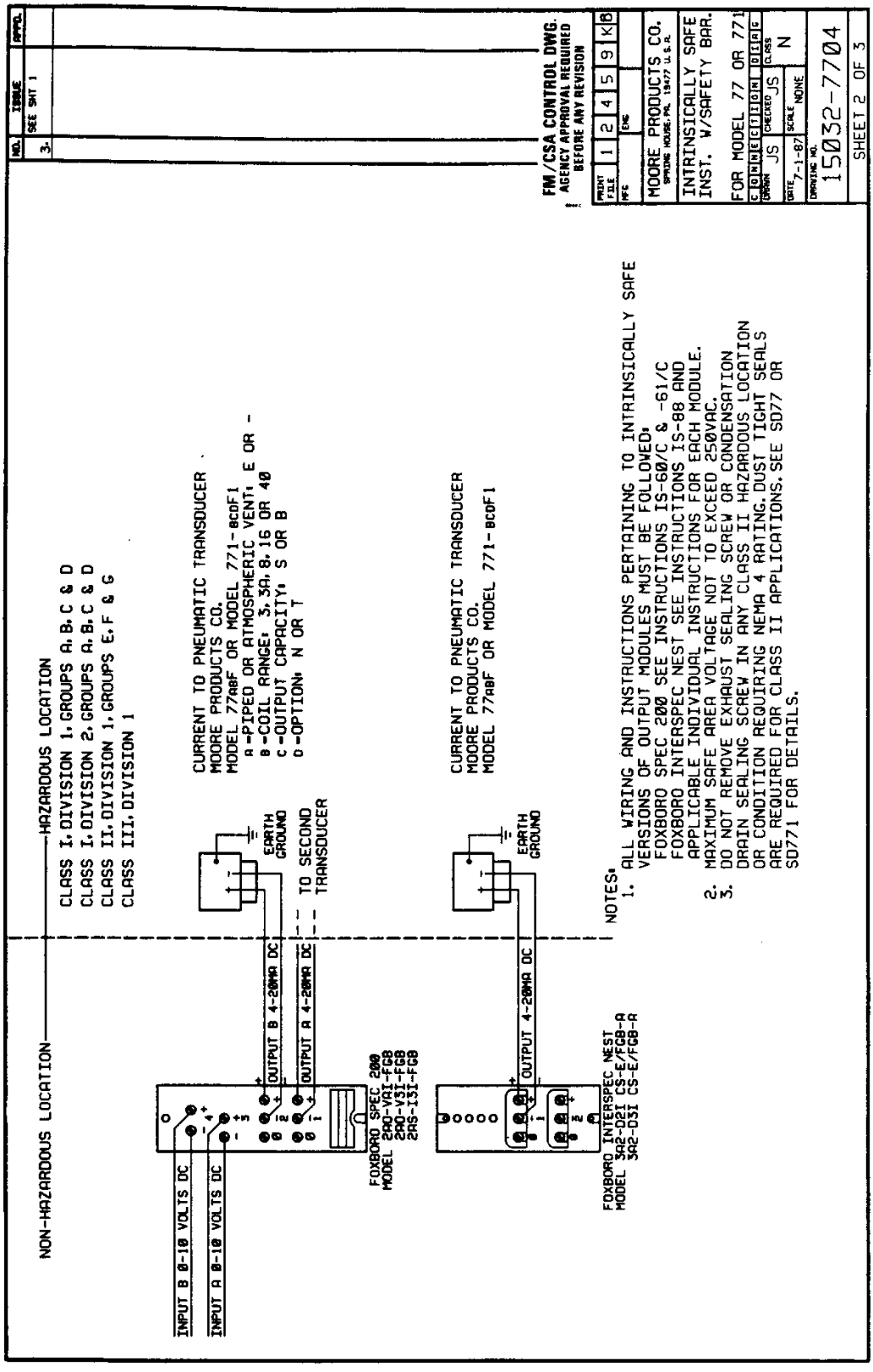
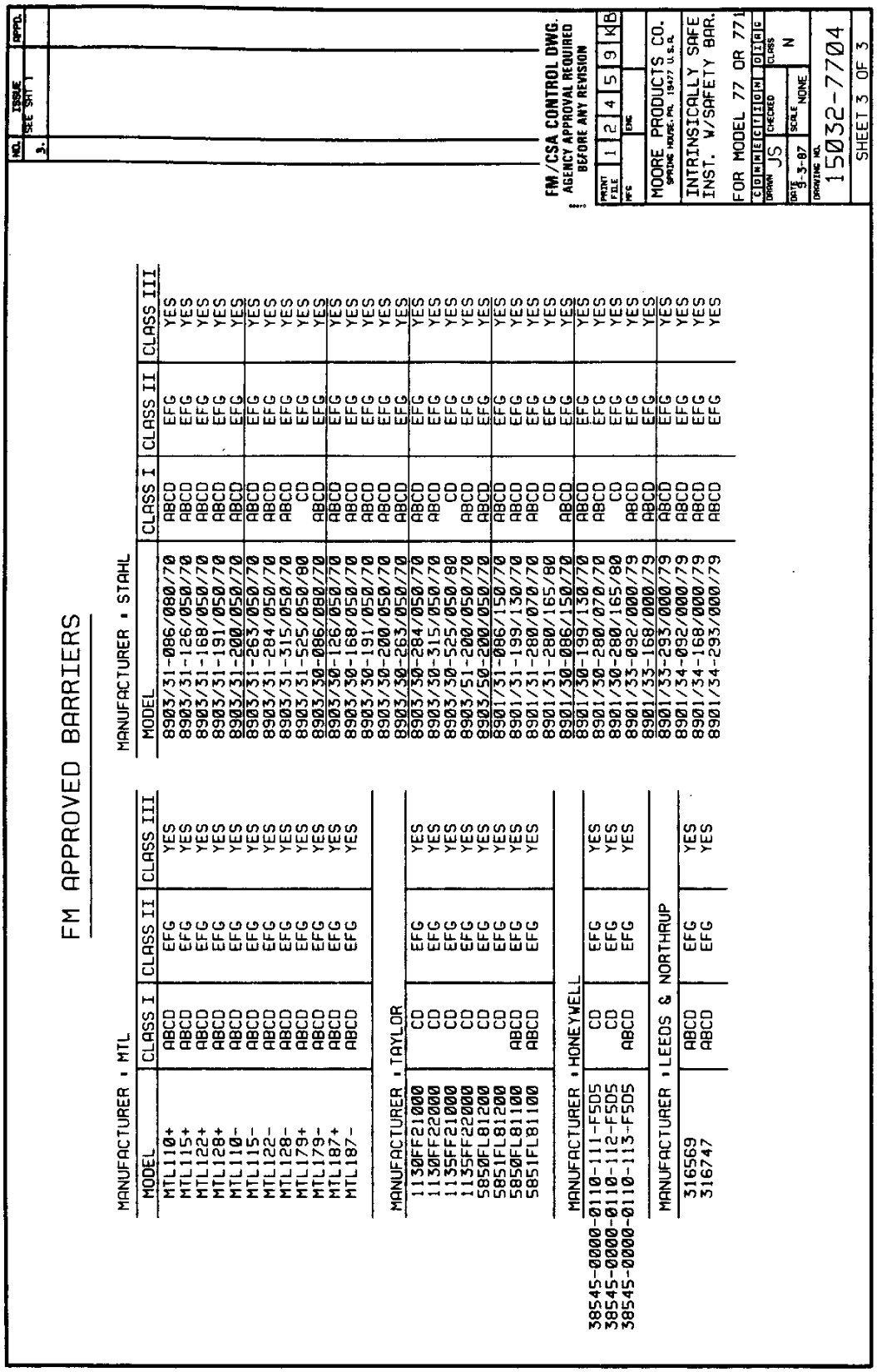


FIGURE 7-2 Intrinsically Safe Installation, Model 77 or 771 & Foxboro Spec 200 or Interspec Nest



FM APPROVED BARRIERS

MANUFACTURER • MTL

MODEL	CLASS I	CLASS II	CLASS III
MTL110+	ABCD	EFG	YES
MTL115+	ABCD	EFG	YES
MTL122+	ABCD	EFG	YES
MTL128+	ABCD	EFG	YES
MTL110-	ABCD	EFG	YES
MTL115-	ABCD	EFG	YES
MTL122-	ABCD	EFG	YES
MTL128-	ABCD	EFG	YES
MTL179+	ABCD	EFG	YES
MTL179-	ABCD	EFG	YES
MTL187+	ABCD	EFG	YES
MTL187-	ABCD	EFG	YES

MANUFACTURER • TAYLOR

MODEL	CLASS I	CLASS II	CLASS III
1130FF21000	CD	EFG	YES
1130FF22000	CD	EFG	YES
1135FF21000	CD	EFG	YES
1135FF22000	CD	EFG	YES
5850FL81200	CD	EFG	YES
5851FL81200	CD	EFG	YES
5850FL81100	ABCD	EFG	YES
5851FL81100	ABCD	EFG	YES

MANUFACTURER • HONEYWELL

MODEL	CLASS I	CLASS II	CLASS III
38545-0000-0110-111-FSDS	CD	EFG	YES
38545-0000-0110-112-FSDS	CD	EFG	YES
38545-0000-0110-113-FSDS	ABCD	EFG	YES

MANUFACTURER • LEEDS & NORTHRUP

MODEL	CLASS I	CLASS II	CLASS III
316569	ABCD	EFG	YES
316747	ABCD	EFG	YES

MANUFACTURER • STAHL

MODEL	CLASS I	CLASS II	CLASS III
8903/31-086/080/70	ABCD	EFG	YES
8903/31-126/050/70	ABCD	EFG	YES
8903/31-168/050/70	ABCD	EFG	YES
8903/31-191/050/70	ABCD	EFG	YES
8903/31-200/050/70	ABCD	EFG	YES
8903/31-263/050/70	ABCD	EFG	YES
8903/31-284/050/70	ABCD	EFG	YES
8903/31-315/050/70	ABCD	EFG	YES
8903/31-525/050/80	CD	EFG	YES
8903/30-086/080/70	ABCD	EFG	YES
8903/30-126/050/70	ABCD	EFG	YES
8903/30-168/050/70	ABCD	EFG	YES
8903/30-191/050/70	ABCD	EFG	YES
8903/30-200/050/70	ABCD	EFG	YES
8903/30-263/050/70	ABCD	EFG	YES
8903/30-284/050/70	ABCD	EFG	YES
8903/30-315/050/70	ABCD	EFG	YES
8903/30-525/050/80	CD	EFG	YES
8903/51-200/050/70	ABCD	EFG	YES
8903/50-200/050/70	ABCD	EFG	YES
8901/31-086/150/70	ABCD	EFG	YES
8901/31-199/130/70	ABCD	EFG	YES
8901/31-280/070/70	ABCD	EFG	YES
8901/31-280/165/80	CD	EFG	YES
8901/30-086/150/70	ABCD	EFG	YES
8901/30-199/130/70	ABCD	EFG	YES
8901/30-280/070/70	ABCD	EFG	YES
8901/30-280/165/80	CD	EFG	YES
8901/33-092/000/79	ABCD	EFG	YES
8901/33-168/000/79	ABCD	EFG	YES
8901/33-293/000/79	ABCD	EFG	YES
8901/34-092/000/79	ABCD	EFG	YES
8901/34-168/000/79	ABCD	EFG	YES
8901/34-293/000/79	ABCD	EFG	YES

FM/CSA CONTROL DWG.
AGENCY APPROVAL REQUIRED
BEFORE ANY REVISION

MOORE PRODUCTS CO.
SPRING HOUSE, PA. 19477 U.S.A.

INTRINSICALLY SAFE
INST. W/SAFETY BAR.

FOR MODEL 77 OR 771

DRAWN JS
CHECKED
CLASS
DATE 9-3-97
SCALE NONE
DRAWING NO. 15032-7704

SHEET 3 OF 3

FIGURE 7-3 Intrinsically Safe Installation, Approved Barriers

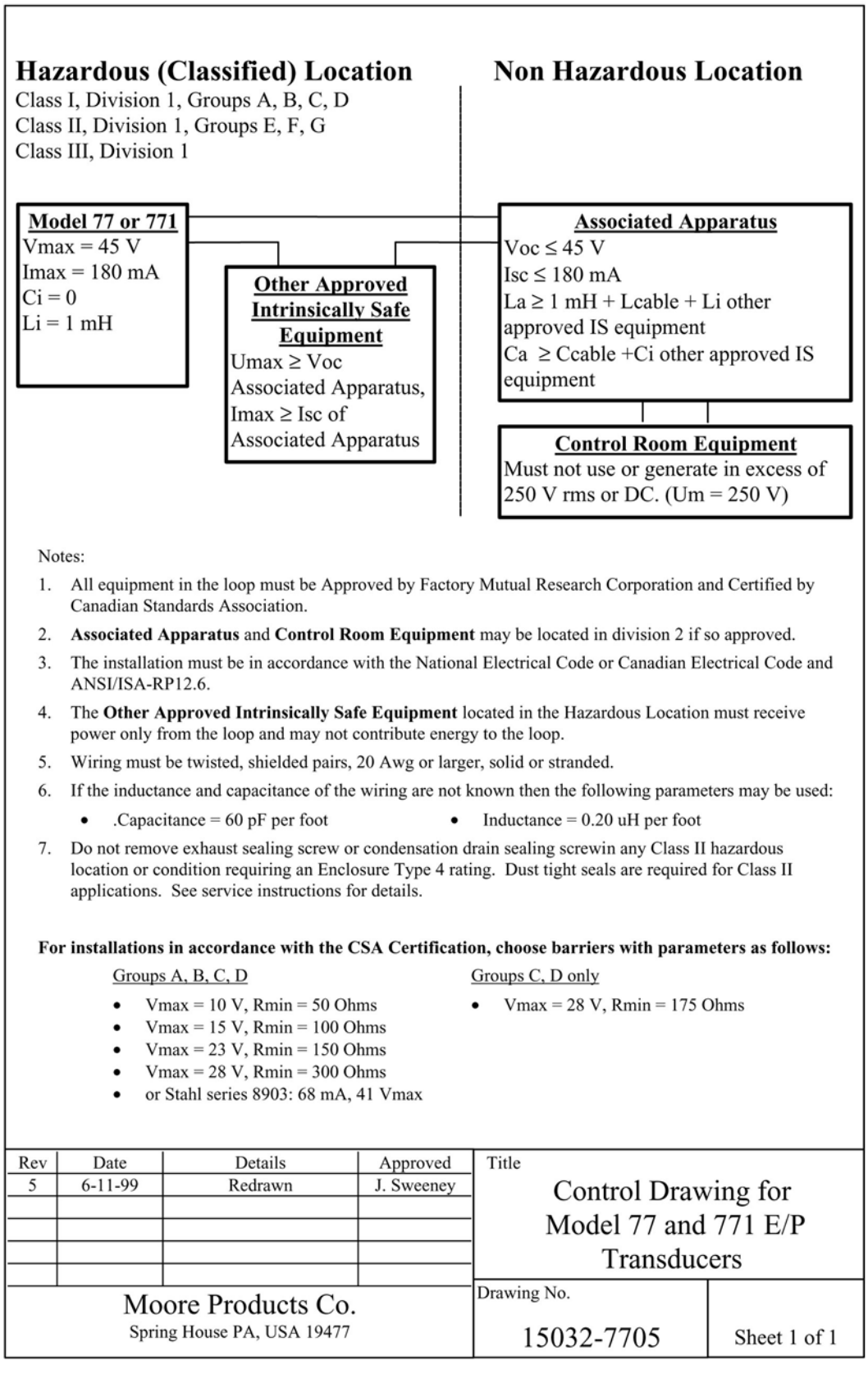


FIGURE 7-4 Intrinsically Safe Connection Diagram, Model 77 and 771, Entity Parameters