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Level Measurement

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Outside North America + 215-674-1234

Installation and Operating Instructions

TF-100™ Series

Vibrating Level Switch

with

TF-T-Current Output

U.S. and Canada:	1-800-553-9092
24-Hour Service:	1-800-527-6297
International:	+1 215-674-1234
Fax:	+1 215-674-2731
E-mail:	drexelbrook.service@ametek.com
Website:	www.drexelbrook.com

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Issue #5

TF-100™ Series

Vibrating Level Switch

with

TF-T-Current Output



AMETEK®
DREXELBROOK
An ISO 9001 Certified Company

205 Keith Valley Road, Horsham, PA 19044
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Fax: +1 215-674-2731
E-mail: drexelbrook.info@ametek.com
Website: www.drexelbrook.com

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Section 1

Section 1: Introduction

These instructions are for the AMETEK Drexelbrook TF-100™ Series Current Output tuning fork (Model TF-T).

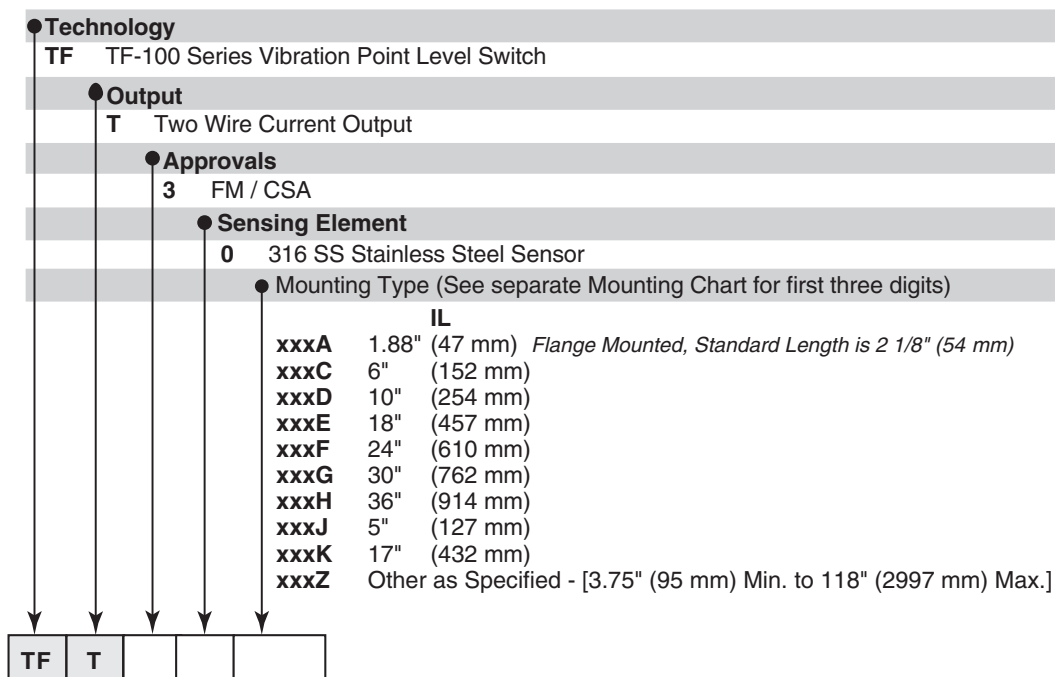
1.1 System Description

The TF-100 vibrating level switch is used for point level detection of liquids.

The TF-100 tuning fork is piezoelectrically energized and vibrates at a frequency of approximately 1200hZ. When the fork is covered in material, the frequency shifts. The frequency shift is detected by the internal oscillator and converted into a switching command.

1.2 Model Number

TF -100 Series



Mounting Chart

A1B	3/4" (19 mm)	NPT	DG1	2" (51 mm)	300# RF 316 / 316LSS
DA1	1" (25 mm)	150# RF 316 / 316LSS	DJ1	3" (76 mm)	300# RF 316 / 316LSS
DB1	1 1/2" (38 mm)	150# RF 316 / 316LSS	DL1	4" (102 mm)	300# RF 316 / 316LSS
DC1	2" (51 mm)	150# RF 316 / 316LSS	C2B	1" (25 mm)	Tri-Clamp 3A Sanitary
DI1	3" (76 mm)	150# RF 316 / 316LSS	C3B	1 1/2" (38 mm)	Tri-Clamp 3A Sanitary
DK1	4" (102 mm)	150# RF 316 / 316LSS	C4B	2" (51 mm)	Tri-Clamp 3A Sanitary
DE1	1" (25 mm)	300# RF 316 / 316LSS	C6B	3" (76 mm)	Tri-Clamp 3A Sanitary
DF1	1 1/2" (38 mm)	300# RF 316 / 316LSS			

Section 2

Section 2: Installation

2.1 Unpacking

Carefully remove the contents of the shipping carton and check each item against the packing list before destroying any packing materials. If there is any shortage or damage report it to the factory at: 1-800-527-6297 (US and Canada) or + 215-674-1234 (International).



Do not hold the TF-100 by the fork. Be careful to keep the fork covered with protective shipping tube to prevent impact damage. Only remove shipping tube just prior to mounting.

Never test the switch by holding the forks as this can damage the sensor. Always dip the sensor in a liquid for testing.

2.2 Mounting

The TF-100 level switch can be mounted vertically or horizontal.

Note - Be careful not to damage the fork while installing through the mounting opening.

The tuning fork has lateral markings (notches) that indicate the switching point for use when the sensor is mounted vertically. The marks indicate where a liquid with the density of water would cause the unit to switch. This switch point is approximately 1/2 inch (13mm) from the end of the fork.

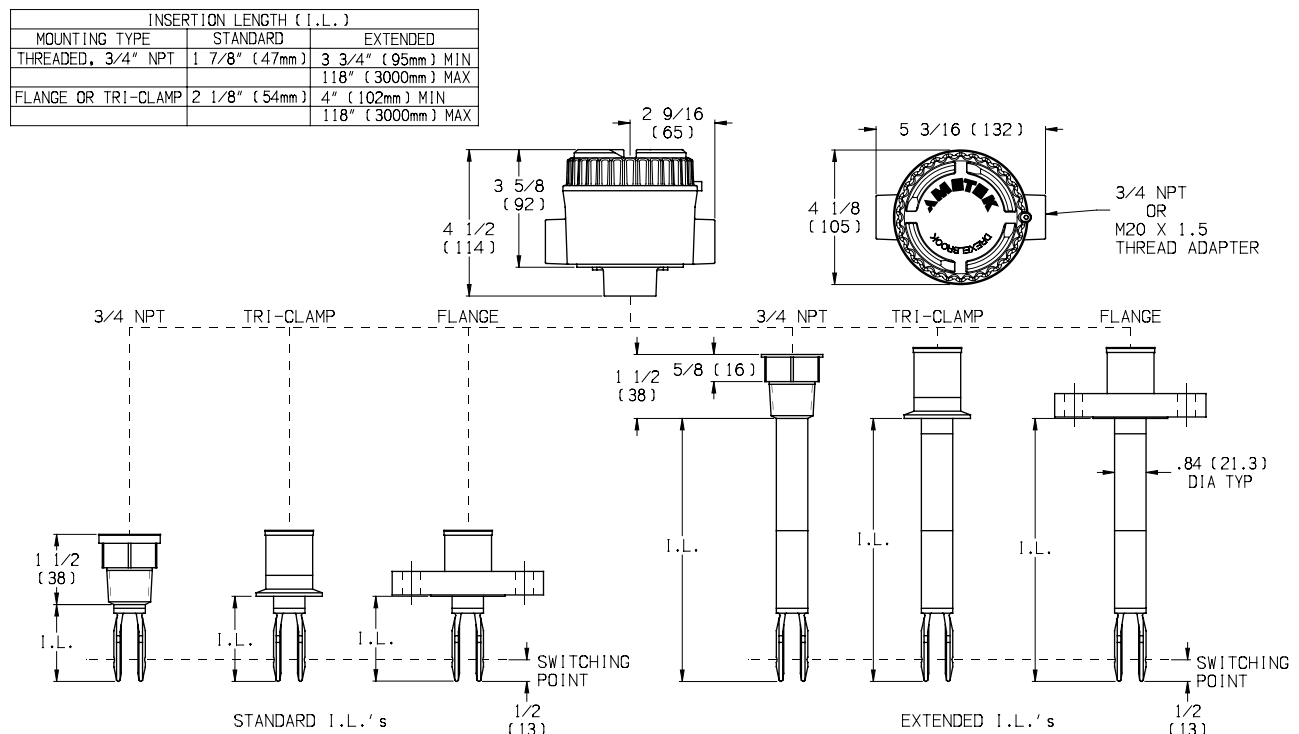


Figure 2-1: Mounting Dimensions

2.2.1 Adhesive / Viscous Materials

When using the TF-100 in adhesives or viscous materials where the sensor is to be mounted horizontally, make certain that the forks are vertical to ensure that material drains freely.

The fork should protrude into the vessel to avoid build up. That is, the forks should not be positioned inside a nozzle where material could build up and cause false alarms.

2.2.2 Inflowing Material

Do not mount the TF-100 so that the fork is located in a fill stream. Mount the TF-100 in a location that is free from splashing material.

In strong product flow, the forks should be mounted so that they are parallel to the direction of the flow to minimize stress on the fork.

2.2.3 Agitators

When specifying the TF-100 for agitated vessels it is best to use a short sensor and mount horizontally. Long vertical sensors in agitated vessels can experience heavy lateral force that can damage the sensor.

If a long vertical sensor is the only practical mounting, a support can be fashioned and located above the fork (See Figure 2-2)

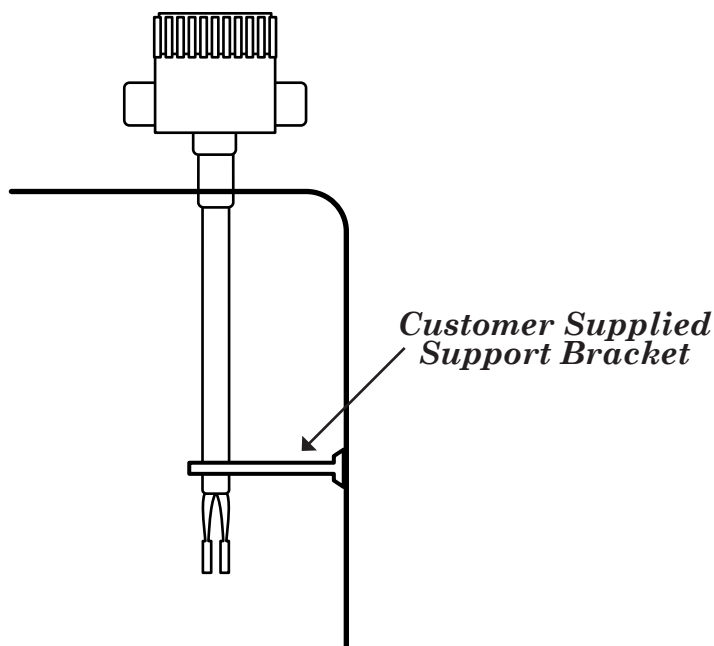


Figure 2-2: Support Bracket

2.3 Power Wiring



Caution



Do not open enclosure cover or make/break any electrical connections without first disconnecting electrical power at the source. Ensure that the area is non-hazardous. Ensure that wiring, electrical fittings and conduit connections conform to electrical codes for the specific location and hazard level.

Refer to Figure 2-3 for power wiring and output connections

Review checklist

- Wiring Correct
- Input voltage matches instrument label.

Replace the cover prior to restoring power if in a hazardous location.

Wiring Two Wire Output Model TF-TXX-XXXX

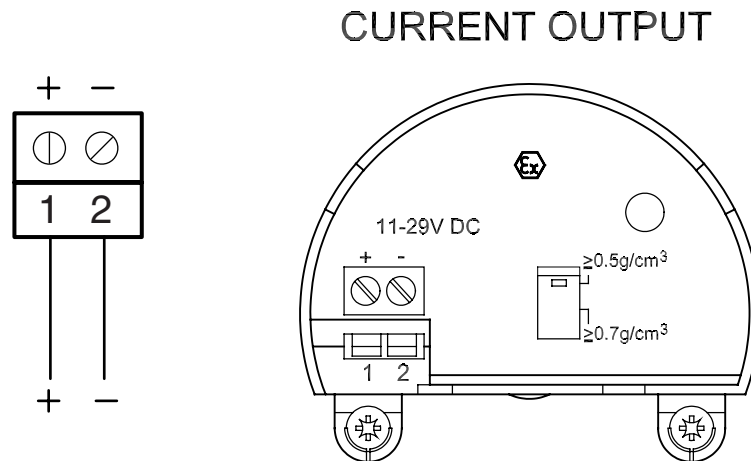
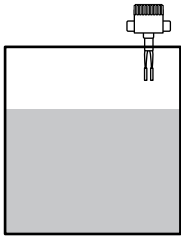

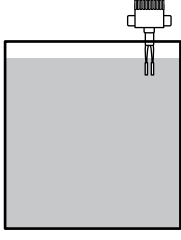

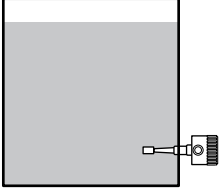

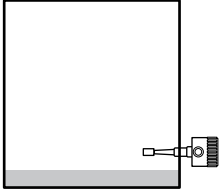

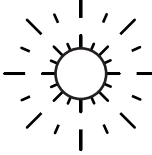


Figure 2-3: Loop Wiring

2.4 Function Chart

	Level	Signal Current	LED Status
Mode A High Level		8 mA	 Green
		16 mA	 Red
Mode B Low Level		16 mA	 Red
		8 mA	 Green
Fault Signal (Mode A or B)	Any	< 2 mA	 Flashes Red

2.5 LED Display

Green = Normal
 Red = Alarm
 Red flashing = Fault

2.6 Fault monitoring

The oscillator of the TF-100 continuously monitors the switch. If the sensor stops vibrating or if the sensor corrodes or is damaged, the switch will go to a fault condition. In case of a fault, the red LED flashes and the relays go to the alarm condition.

Section 3: Set up

3.1 Sensitivity Adjustment

The standard as shipped setting of the TF-100 will operate in liquids with a density greater than 0.7g/cm³. For material with Density from 0.5 g/cm³ to 0.7g/cm³ move the sensitivity selection switch to >0.5.

3.2 Maintenance

When used as directed in this instruction manual, the TF-100 series level switch requires no routine maintenance.

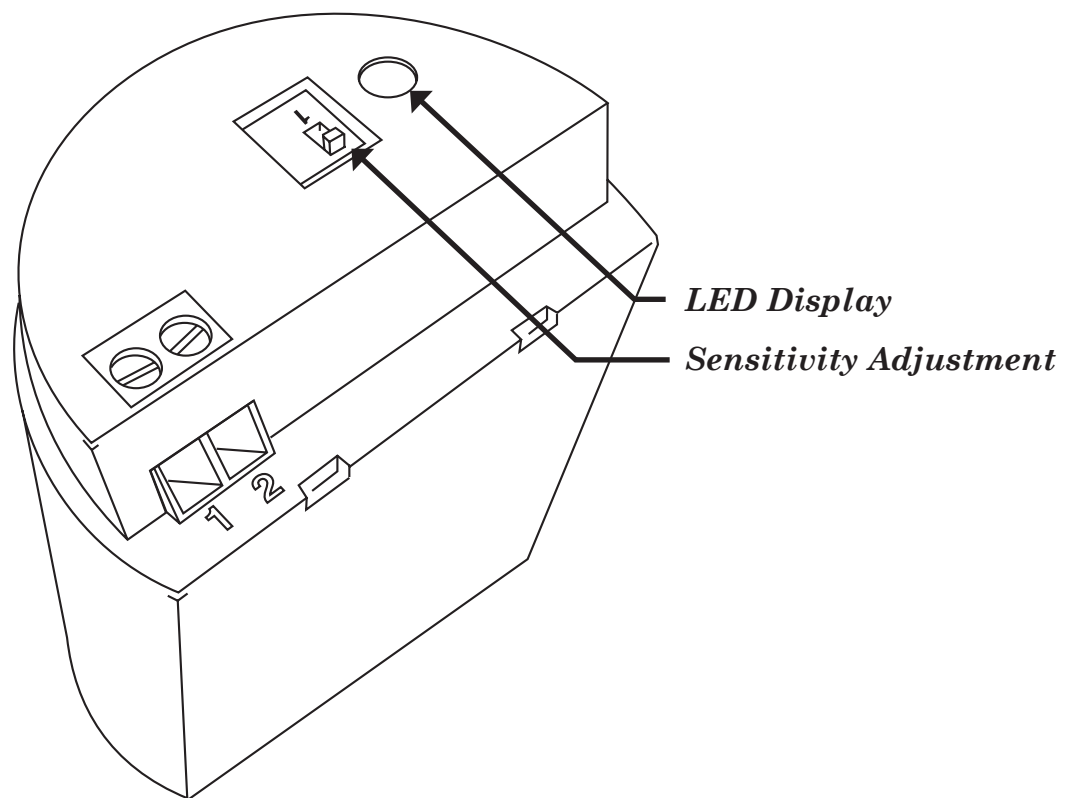


Figure 3-1: Electronic Unit

Section 4

Section 4: **Trouble Shooting**

4.1 **Troubleshooting Guide**

Symptom	Action	Corrective Action
TF-100 fails to “see” material	Check power supply voltage	Correct power supply to meet minimum requirement
LED Flashes RED	Electronics have detected a sensor failure	Contact the factory to for replacement.
LED Flashes alternately Red/Green	Electronics are defective	Contact the factory to replace unit.

4.2 **Telephone Assistance**



If you have questions about your AMETEK Drexelbrook equipment:

- Contact your local Drexelbrook representative
- Call the Drexelbrook Service department toll-free:
1-800-527-6297 (US and Canada) or
215-674-1234 (Outside North America)
- Fax the following information to the Service department:
215-443-5117.

To expedite assistance, please provide the following information:

Instrument Model Number: _____

Original Purchase order number: _____

Material being measured: _____

Temperature: _____

Pressure: _____

Agitation: _____

Brief description of the problem: _____

Checkout procedures that have failed: _____

4.3 Equipment Return

In order to provide the best service, any equipment being returned for repair or credit must be pre-approved and have a return number issued by the factory.

In many applications, the equipment is exposed to hazardous materials.

- OSHA mandates that our employees be informed and protected from hazardous materials.
- Material Safety Data Sheets (MSDS) listing the hazardous material that the system has been exposed to must accompany any return.
- It is your responsibility to fully disclose all chemicals and decontaminate the returned items.

To obtain a return authorization number (RA#), contact the Service department at:

1-800-527-6297 (US and Canada) or
215-674-1234 (Outside North America).

Please provide the following information:

Model Number of Returned Equipment: _____

Serial Number: _____

Original Purchase Order Number: _____



Process Material that the equipment has been exposed: _____

MSDS for any hazardous materials

Billing Address: _____

Shipping Address: _____

Purchase Order Number for Repairs: _____

Please include a purchase order number even if the repair is under warranty. If repair is covered under warranty, you will not be charged.

Ship equipment freight prepaid to:

AMETEK Drexelbrook
205 Keith Valley Road
Horsham, PA 19044

COD shipments will not be accepted.

4.4 Field Service

Trained field service personnel are available on a time-plus-expense basis to assist in start-ups, diagnosing difficult application or equipment problems, or in-plant training of personnel. Preventive Maintenance and Calibration Certification service contracts are also available to maintain plant efficiency. Contact the Service department for further information.

Section 5

Section 5: Specifications

5.1 TF-T Series Current Output

Power Requirement = 11 to 36 VDC

Function = High or Low Level Indication

Density

Sensitivity Setting = 0.7 to 2.5g/cm³ or 0.5 to 0.7g/cm³

Output = 8 mA Normal

16 mA Alarm

< 2 mA Fault

Ambient Temperature = - 40° to 60°C (- 40° to 140°F)
- 40° to 50°C (- 40° to 122°F) for process
temperature above 75°C

5.2 Sensing Element

Material = 316 L Stainless Steel

Mounting = ¾ inch NPT standard
(optional flanges and tri-clamp mountings available)

Process Temperature = -58° F to 302° F (-50° C to 150° C)

Pressure = max 928psi (64 Bar)

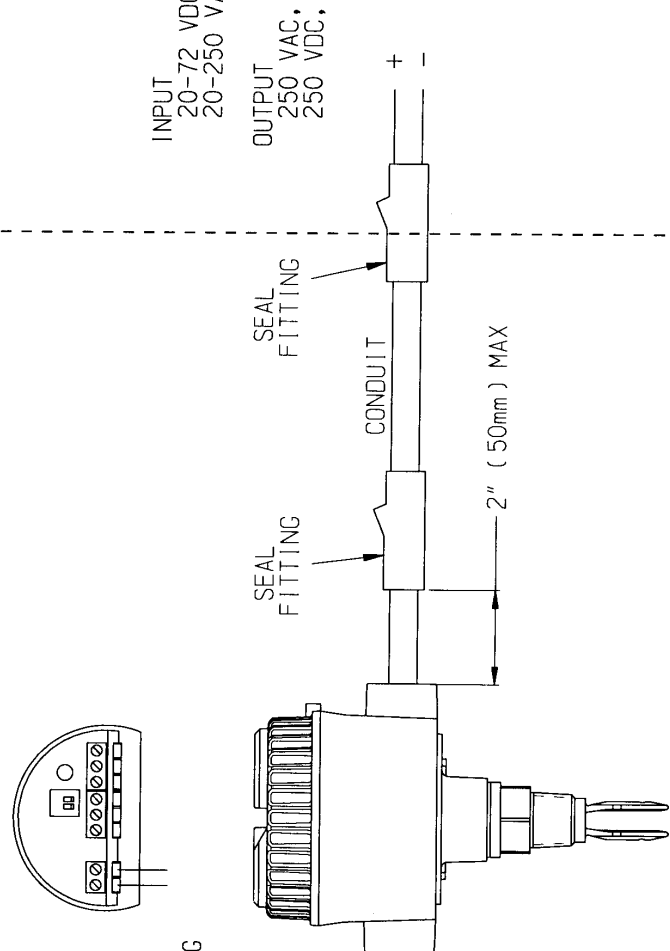
Viscosity = 0.1 to 10,000 Centipoise

Density = 0.7 to 2.5g/cm³ (Standard)
0.5 to 0.7g/cm³ (By switch selection)

Section 6

Section 6: Control Drawings

6.1 FM Control Drawings

EXPLOSIONPROOF INSTALLATION	HAZARDOUS (CLASSIFIED) AREA	NON-HAZARDOUS AREA
<p>XP CL I, DIV 1, GROUPS A-D DIP CL II, III, DIV 1, GROUPS E-G T5 Ta=60°C TYPE 4, 4X 1P66</p>	 <p>SEAL FITTING CONDUIT 2" (50mm) MAX SEAL FITTING</p>	<p>INPUT 20-72 VDC 20-250 VAC</p> <p>OUTPUT 250 VAC, 5A, 750 VA 250 VDC, 1A, 54W</p>
<p>MODEL # OF APPROVED SYSTEMS TFL30-a a= 14 CHARACTER EXPANDED NUMBERING SYSTEM. DOES NOT AFFECT SAFETY.</p>		
<p>NOTES:</p> <ol style="list-style-type: none"> 1. THE INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE [®] ANSI/NFPA 70. 2. CONDUIT SEAL MUST BE 2" (50mm) MAXIMUM FROM ENCLOSURE. 3. DUST TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS. 		
<p>METEK[®] DREXELBROOK</p> <p>205 KEITH VALLEY RD HORSHAM, PA 19044-9986 215-674-1234 FAX 215-674-2731</p>		
<p>TF100 SERIES FM CONTROL DRAWING TFL30 EXPLOSIONPROOF INSTALLATIONS</p>		
<p>420-0004-283-CD</p>		
<p>ISS. 1 OF 2</p>		

NO. 420-0004-283-CD

SHT 1 OF 7

6.1 FM Control Drawings (Continued)

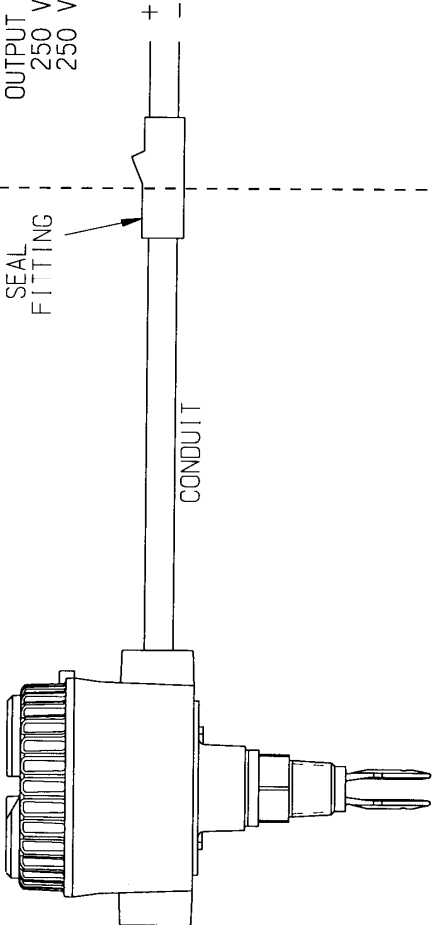
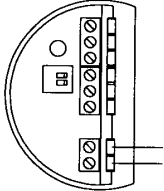
DIV 2 W/O BARRIER INSTALLATION

HAZARDOUS (CLASSIFIED) AREA

NON-HAZARDOUS AREA

NI CL 1, DIV 2, GROUPS A-D
S 11, 111, DIV 2, GROUPS E-G
T5
Ta=60°C
TYPE 4, 4X IP66

MODEL # OF APPROVED SYSTEMS
TFL30-a
a= 14 CHARACTER EXPANDED
NUMBERING SYSTEM.
DOES NOT AFFECT SAFETY.



INPUT
20-72 VDC
20-250 VAC

OUTPUT
250 VAC, 5A, 750 VA
250 VDC, 1A, 54W

SEAL FITTING

CONDUIT

NOTES:
1. THE INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE® ANSI/NFPA 70.
2. DUST TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS.

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by

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ANETEK DREXELBROOK

SCALE NONE

UNLESS OTHERWISE STATED

ALL DIMENSIONS IN INCHES (MM)

DR. JJS 6-13-06

CK. *clc*

DATE

APP'D

NO.

EDS

ISS.

TF100 SERIES
FM CONTROL DRAWING
TFL30 DIV 2 WITHOUT
BARRIER INSTALLATIONS

420-0004-283-CD

215-674-1234
FAX 215-674-2731
205 KEITH VALLEY RD
HORSHPAN, PA 19044-9986

215-674-1234
FAX 215-674-2731

16

6.1 FM Control Drawings (Continued)

NO. 420-0004-283-CD SHT 4 OF 7

DIV 2 W/O BARRIER INSTALLATION

HAZARDOUS (CLASSIFIED) AREA

NON-HAZARDOUS AREA

NI CL 1, DIV 2, GROUPS A-D
S II, III, DIV 2, GROUPS E-G
T₅ T_a=60°C
TYPE 4, 4X IP66

MODEL # OF APPROVED SYSTEMS
TFP30-a
a= 14 CHARACTER EXPANDED
NUMBERING SYSTEM.
DOES NOT AFFECT SAFETY.

NOTES:

1. THE INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE® ANSI/NFPA 70.
2. DUST TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS.

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ENG		ALL DIMENSIONS IN INCHES (IN)	
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		DATE 3-14-05	
ISS. EDO/DSR NO. APP'D			
DE #			

TF100 SERIES
FM CONTROL DRAWING
TFP30 DIV 2 WITHOUT
BARRIER INSTALLATIONS

420-0004-283-CD SHT. 4 OF 7

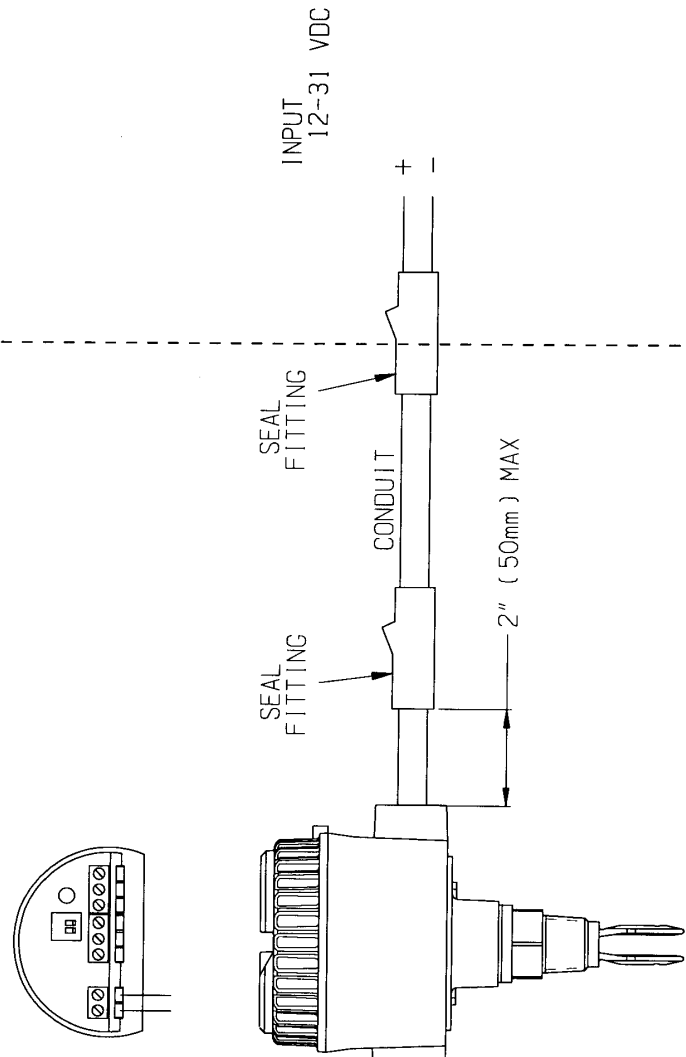
ISS. 2

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FAX 215-674-2731

6.1 FM Control Drawings (Continued)

EXPLOSIONPROOF INSTALLATION	HAZARDOUS (CLASSIFIED) AREA	NON-HAZARDOUS AREA
<p>XP CL I, DIV 1, GROUPS A-D DIP CL II, III, DIV 1, GROUPS E-G T5 Ta=60°C TYPE 4, 4X 1P66</p> <p>MODEL # OF APPROVED SYSTEMS TFT30-a a= 14 CHARACTER EXPANDED NUMBERING SYSTEM. DOES NOT AFFECT SAFETY.</p>		
<p>NOTES:</p> <ol style="list-style-type: none"> 1. THE INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE® ANSI/NFPA 70. 2. CONDUIT SEAL MUST BE 2" (50mm) MAXIMUM FROM ENCLOSURE. 3. DUST TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS. 		
<p>AMETEK® DREXELBROOK</p> <p>205 KEITH VALLEY RD. HORSHAM, PA 19044-9986 215-674-1234 FAX 215-674-2731</p>		
<p>TF100 SERIES FM CONTROL DRAWING TFT30 EXPLOSIONPROOF INSTALLATIONS</p>		
<p>NO. 420-0004-283-CD SHT 5 OF 7</p>		

6.1 FM Control Drawings (Continued)

NO. 420-0004-283-CD

SHT 6 OF 7

ISS. 6

DF 7

2

FM APPROVED ASSOCIATED N.I. FIELD WIRING APPARATUS

INPUT 12-31 VDC

Vt OR Voc = 31 V
Ca
La

FOR THIS CURRENT CONTROLLED CIRCUIT, THE PARAMETER (Imax) IS NOT REQUIRED AND NEED NOT BE ALIGNED WITH PARAMETER (Isc OR It) OF THE BARRIER OR ASSOCIATED NONINCENDIVE FIELD WIRING APPARATUS.

HAZARDOUS (CLASSIFIED) AREA

NON-HAZARDOUS AREA

SEAL FITTING

CONDUIT OR NON-INCENDIVE FIELD WIRING

Vmax = 31 V
Ci = 0 uF
Li = 0 mH

DIVISION 2 & ZONE 2 INSTALLATION

NI CL 1, DIV 2, GROUPS A-D
S 11, 111, DIV 2, GROUPS E-G
T5
TYPE 4, 4X 1P66

MODEL # OF APPROVED SYSTEMS
TFT30-a
a= 14 CHARACTER EXPANDED
NUMBERING SYSTEM.
DOES NOT AFFECT SAFETY.

FUNCTIONAL RATINGS
1. THESE RATINGS DO NOT SUPERSEDE
HAZARDOUS LOCATION VALUES.
NORMAL CURRENT = 4...20mA
NORMAL VOLTAGE = 12...31V

DIVISION 2 AND ZONE 2 INSTALLATION (CURRENT CONTROLLED CIRCUIT)

NOTES:
1. THE NONINCENDIVE FIELD WIRING CONCEPT ALLOWS INTERCONNECTION OF NONINCENDIVE FIELD WIRING APPARATUS WITH ASSOCIATED NONINCENDIVE FIELD WIRING APPARATUS USING ANY OF THE WIRING METHODS PERMITTED FOR UNCLASSIFIED LOCATIONS.
2. Vmax ≥ Voc OR Vt. Ca ≥ Ci + Ccable. La ≥ Li + Lcable.
3. THE INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE® ANSI/NFPA 70.
4. DUST TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS.

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USER

DE #

by

DATE

NO. APP'D

ISS. EDO/DSR

DATE

CK.

DR.

JUS

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3-14-05

6-15-08

2

6-06-215

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11-04-333

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SCALE

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FAX 215-674-2731

TF100 SERIES

FM CONTROL DRAWING

TFT30 DIV 2 & ZONE 2

INSTALLATIONS

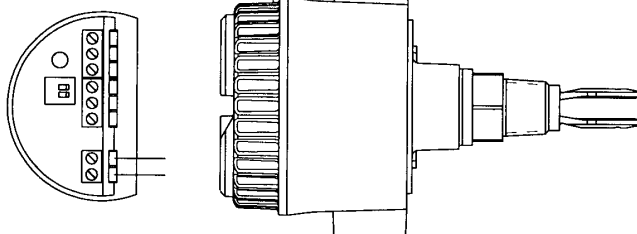

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ISS. 6

DF 7

2

6.1 FM Control Drawings (Continued)

ENTITY INSTALLATION	HAZARDOUS (CLASSIFIED) AREA	NON-HAZARDOUS AREA
<p>IS CL I, II, III DIV 1, GROUPS A-G CLASS I, ZONE 0 AEx ia IIC T4 Ta=60°C TYPE 4, 4X IP66</p> <p>MODEL # OF APPROVED SYSTEMS TFT30-a a= 14 CHARACTER EXPANDED NUMBERING SYSTEM. DOES NOT AFFECT SAFETY.</p>	 <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: 150px;"> $U_i = 31 \text{ VDC}$ $I_i = 116 \text{ mA}$ $C_i = 0 \text{ uF}$ $L_i = 0 \text{ mH}$ $P_i = 667 \text{ mW}$ </div>	<div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: 150px;"> $V_{oc} \leq 31 \text{ V}$ $I_{sc} \leq 116 \text{ mA}$ $P_o \leq 667 \text{ mW}$ $C_A \geq 0.0 \text{ uF} + \text{C CABLE}$ $L_A \geq L_i + L \text{ CABLE}$ </div> <p>FM APPROVED ASSOCIATED APPARATUS</p>
<p>NOTES:</p> <ol style="list-style-type: none"> 1. THE INTRINSIC SAFETY ENTITY CONCEPT ALLOWS THE INTERCONNECTION OF TWO FM APPROVED INTRINSICALLY SAFE DEVICES WITH ENTITY PARAMETERS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM WHEN: $V_{oc} \text{ OR } U_o \text{ OR } V_f \leq V_{max}$, $I_{sc} \text{ OR } I_o \text{ OR } I_f \leq I_{max}$, $C_A \text{ OR } C_o \geq C_i + C_{cable}$, $L_A \text{ OR } L_o \geq L_i + L_{cable}$, $P_o \leq P_i$. 2. IF THE ELECTRICAL PARAMETERS OF THE CABLES ARE UNKNOWN, THE FOLLOWING VALUES MAY BE USED: $C_{cable} = 60 \text{ pF/FT}$, $L_{cable} = 0.20 \text{ uH/FT}$. 3. DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS. 4. CONTROL EQUIPMENT CONNECTED TO THE ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc. 5. INSTALLATION SHOULD BE IN ACCORDANCE WITH ANSI/ISA RP12.06.01 "INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS (CLASSIFIED) LOCATIONS", AND THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) SECTIONS 504 AND 505. 6. THE CONFIGURATION OF THE ASSOCIATED APPARATUS MUST BE FM APPROVED UNDER ENTITY CONCEPT. 7. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT. 8. THE IF SERIES ARE APPROVED FOR CLASS I, ZONE 0, APPLICATIONS. IF CONNECTING AEXIib) ASSOCIATED APPARATUS OR AEX ib I.S. APPARATUS TO CLASS I, DIVISION 1, HAZARDOUS (CLASSIFIED) LOCATIONS. 9. NO REVISION TO DRAWING WITHOUT PRIOR AGENCY APPROVAL. 		
		
<p>205 KEITH VALLEY RD HORSHAM, PA 19044-9986 215-674-1234 FAX 215-674-2731</p>		
<p>TF100 SERIES FM CONTROL DRAWING TFT30 ENTITY INSTALLATIONS</p>		
<p>420-0004-283-CD</p>		

No. 420-0004-283-CD

SHT 7 OF 7

6.2 CSA Control Drawings

EXPLOSIONPROOF INSTALLATION

HAZARDOUS (CLASSIFIED) AREA

NON-HAZARDOUS AREA

CL I, DIV 1, GROUPS A-D
CL II, III, DIV 1, GROUPS E-G
T₅ T_a=60°C
TYPE 4, 4X 1P66

MODEL # OF APPROVED SYSTEMS
TFL30-a
a= MOUNTING OPTIONS
14 CHARACTER EXPANDED
NUMBERING SYSTEM.
DOES NOT AFFECT SAFETY.

INPUT
20-72 VDC
20-250 VAC

OUTPUT
250 VAC, 5A, 750 VA
250 VDC, 1A, 54W

SEAL FITTING

CONDUIT

2" (50mm) MAX

NOTES:

1. THE INSTALLATION MUST BE IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE CSA C22.1, PART 1, APPENDIX F.
2. CONDUIT SEAL MUST BE 2" (50mm) MAXIMUM FROM ENCLOSURE.
3. DUST TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS.
4. PLUG UNUSED OPENINGS WITH METAL PLUG FOR EXPLOSIONPROOF INSTALLATIONS.

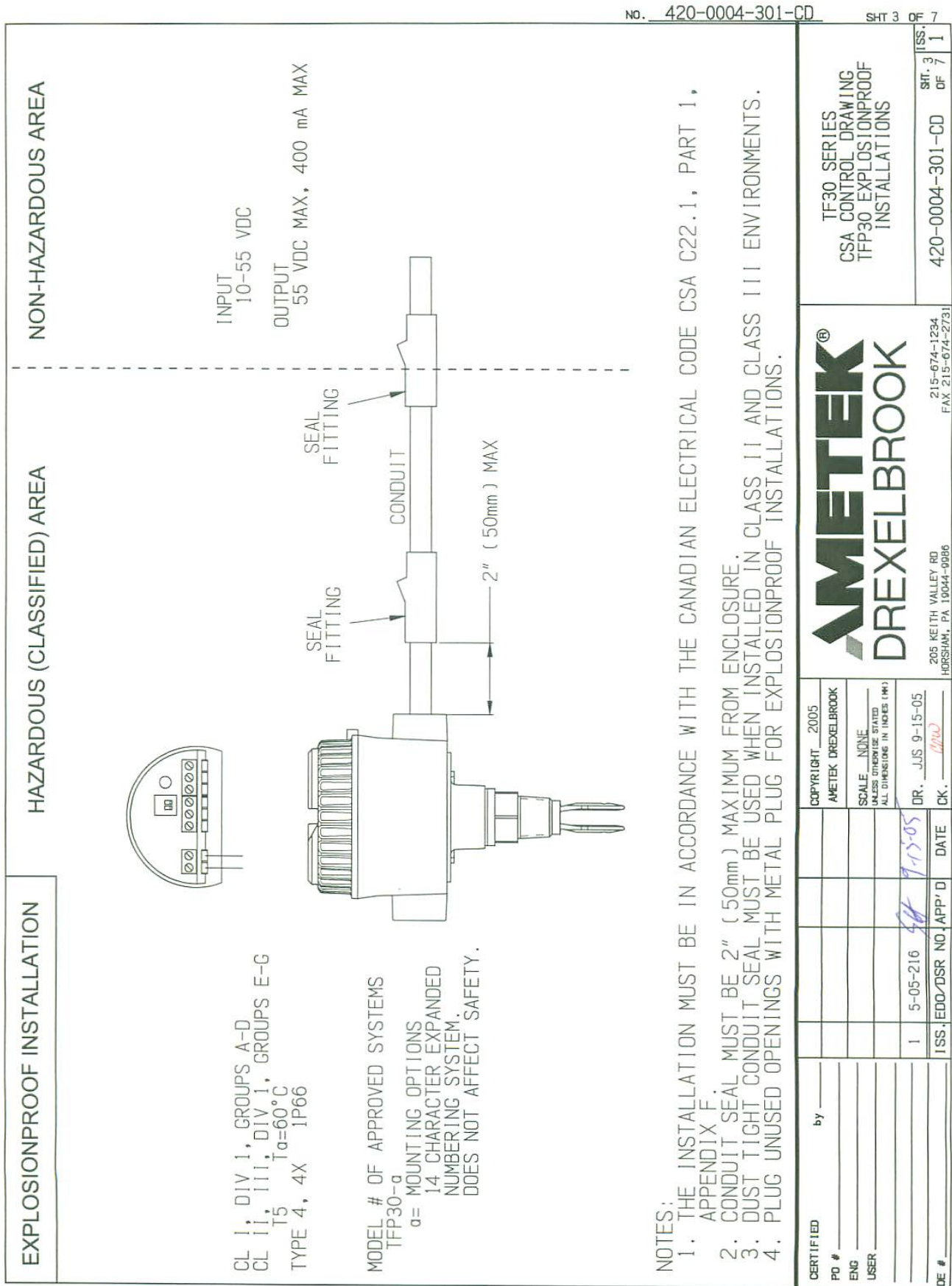
CERTIFIED	by	COPYRIGHT 2005	TF30 SERIES CSA CONTROL DRAWING TFL30 EXPLOSIONPROOF INSTALLATIONS
PO #		AMETEX DREXELBROOK	
ENG		SCALE NONE	
USER		UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM)	
1	5-05-216	DR. JJS 9-15-05	
ISS. EDO/DSR NO. APP'D	DATE	CK. <i>210</i>	
DE #			

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6.2 CSA Control Drawings (Continued)

DIV 2 W/O BARRIER INSTALLATION	HAZARDOUS (CLASSIFIED) AREA	NON-HAZARDOUS AREA
<p>CL 1, DIV 2, GROUPS A-D CL 1, DIV 2, GROUPS E-G T5 Ta=60°C TYPE 4, 4X 1P66</p> <p>MODEL # OF APPROVED SYSTEMS TFL30-a a= MOUNTING OPTIONS 14 CHARACTER EXPANDED NUMBERING SYSTEM. DOES NOT AFFECT SAFETY.</p>	<p>INPUT 20-72 VDC 20-250 VAC</p> <p>OUTPUT 250 VAC, 5A, 750 VA 250 VDC, 1A, 54W</p> <p>SEAL FITTING</p> <p>CONDUIT</p>	<p>TF30 SERIES CSA CONTROL DRAWING TFL30 DIV 2 WITHOUT BARRIER INSTALLATIONS</p>
<p>NOTES:</p> <p>1. THE INSTALLATION MUST BE IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE CSA C22.1, PART 1, APPENDIX F.</p> <p>2. DUST TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS 11 AND CLASS 111 ENVIRONMENTS.</p>		
<p>205 KEITH VALLEY RD. HORSBANE, PA 19044-0986 215-674-1234 FAX 215-674-2731</p>		
<p>NO. 420-0004-301-CD SHT 2 OF 7</p>		
<p>CERTIFIED by _____</p> <p>PO # _____</p> <p>ENG _____</p> <p>USER _____</p> <p>ISS. EDO/DSR NO. APP'D DATE</p> <p>1 5-05-216 9-15-05</p> <p>DR. JJS 9-15-05</p> <p>CK. _____</p>		

6.2 CSA Control Drawings (Continued)



6.2 CSA Control Drawings (Continued)

NO. 420-0004-301-CD

SHT 4 OF 7

DIV 2 W/O NON-INCENDIVE FIELD WIRING INSTALLATION		HAZARDOUS (CLASSIFIED) AREA		NON-HAZARDOUS AREA	
<p>CL 1, DIV 2, GROUPS A-D CL 11, 111, DIV 2, GROUPS E-G T5 T_a=60°C TYPE 4, 4X 1P66</p> <p>MODEL # OF APPROVED SYSTEMS TFP30-a a= MOUNTING OPTIONS 14 CHARACTER EXPANDED NUMBERING SYSTEM. DOES NOT AFFECT SAFETY.</p>				<p>TF30 SERIES CSA CONTROL DRAWING TFP30 DIV 2 WITHOUT NON-INCENDIVE FIELD WIRING INSTALLATIONS</p>	
<p>NOTES:</p> <ol style="list-style-type: none"> 1. THE INSTALLATION MUST BE IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE CSA C22.1, PART 1, APPENDIX F. 2. DUST TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS 11 AND CLASS 111 ENVIRONMENTS. 3. TTC, PLTC OR TC NON-METALLIC WIRING MAY BE USED IN LIEU OF CONDUIT SEAL. 		<p>METEK® DREXELBROOK</p> <p>205 KEITH VALLEY RD HORSHAM, PA 19044-9966</p> <p>215-674-1234 FAX 215-674-2731</p>		<p>420-0004-301-CD</p>	
<p>CERTIFIED by _____</p> <p>PO # _____</p> <p>ENG _____</p> <p>USER _____</p> <p>ISS. EDO/DSR NO. APP' D DATE</p>		<p>COPYRIGHT 2005 AMETEK DREXELBROOK</p> <p>SCALE NONE UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM)</p> <p>DR. JUS 9-15-05 DATE 9-15-05</p>		<p>TF30 SERIES CSA CONTROL DRAWING TFP30 DIV 2 WITHOUT NON-INCENDIVE FIELD WIRING INSTALLATIONS</p>	
<p>DE # _____</p>		<p>1 5-05-216</p>		<p>420-0004-301-CD</p>	

6.2 CSA Control Drawings (Continued)

NO. 420-0004-301-CD SHT 5 OF 7

EXPLOSIONPROOF INSTALLATION

HAZARDOUS (CLASSIFIED) AREA

NON-HAZARDOUS AREA

CL I, DIV I, GROUPS A-D
CL II, III, DIV I, GROUPS E-G
T5
Ta=60°C
TYPE 4, 4X IP66

MODEL # OF APPROVED SYSTEMS
TFT30-a
a= MOUNTING OPTIONS
14 CHARACTER EXPANDED
NUMBERING SYSTEM.
DOES NOT AFFECT SAFETY.

INPUT
11-36 VDC

SEAL
FITTING

CONDUIT

SEAL
FITTING

2" (50mm) MAX

NOTES:

1. THE INSTALLATION MUST BE IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE CSA C22.1, PART 1, APPENDIX F.
2. CONDUIT SEAL MUST BE 2" (50mm) MAXIMUM FROM ENCLOSURE.
3. DUST TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS.
4. PLUG UNUSED OPENINGS WITH METAL PLUG FOR EXPLOSIONPROOF INSTALLATIONS.

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PO #		SCALE	NONE	UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM)	
ENG		DR.	JUS 9-15-05		
USER		CK.	1/26		
ISS	EDD/DSR NO. 147	DATE	5-05-216		
DE #					

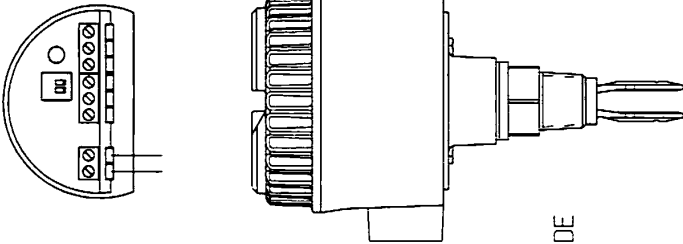
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420-0004-301-CD SHT. 5 OF 7 ISS. 1

6.2 CSA Control Drawings (Continued)

NO. 420-0004-301-CD

SHT 6 OF 7

DIVISION 2 NON-INCENDIVE FIELD WIRING INSTALLATION		HAZARDOUS (CLASSIFIED) AREA		NON-HAZARDOUS AREA	
<p>CL 1, DIV 2, GROUPS A-D CL 11, III, DIV 2, GROUPS E-G T5 T_a = 60°C TYPE 4, 4X 1P66</p> <p>MODEL # OF APPROVED SYSTEMS TFT30-a a= MOUNTING OPTIONS 14 CHARACTER EXPANDED NUMBERING SYSTEM. DOES NOT AFFECT SAFETY.</p> <p>FUNCTIONAL RATINGS DO NOT SUPERSEDE 1. THESE RATINGS DO NOT SUPERSEDE HAZARDOUS LOCATION VALUES. NORMAL CURRENT = 4...20mA NORMAL VOLTAGE = 12...31V</p>		 <p>NON-INCENDIVE FIELD WIRING REQUIRING CSA CERTIFIED ASSOCIATED NON-INCENDIVE FIELD WIRING APPARATUS</p> <p>INPUT 11-36 VDC</p> <p>$V_{max} = 31 \text{ V}$ $C_i = 0 \text{ uF}$ $L_i = 0 \text{ mH}$</p>		<p>TF30 SERIES CSA CONTROL DRAWING TFT30 DIV 2 NON-INCENDIVE FIELD WIRING INSTALLATIONS</p>	
<p>DIVISION 2 INSTALLATION (CURRENT CONTROLLED CIRCUIT)</p> <p>NOTES:</p> <p>1. THE INSTALLATION MUST BE IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE CSA C22.1, PART 1, APPENDIX F.</p> <p>2. DUST TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS.</p>		<p>METEK® DREXELBROOK</p> <p>205 KEITH VALLEY RD. HORSHAM, PA 19044-9086 215-674-1234 FAX 215-674-2731</p>		<p>205 KEITH VALLEY RD. HORSHAM, PA 19044-9086 215-674-1234 FAX 215-674-2731</p>	
CERTIFIED	by	COPYRIGHT	2005	AMETEK DREXELBROOK	
PO #		SCALE	NONE	UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (mm)	
ENG		DR.	JJS 9-15-05	DATE	
USER		ISS.	EDD/DSR NO.	APP'D	
DE #		1	5-05-216	DATE	
		ISS.	EDD/DSR NO.	APP'D	

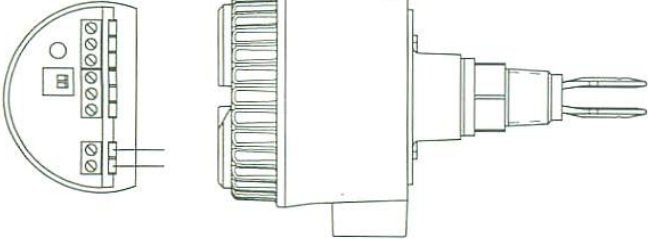
6.2 CSA Control Drawings (Continued)

ENTITY INSTALLATION

CL I, II, III DIV 1, GROUPS A-G
CLASS I, ZONE 0
T_a=60°C
TYPE 4, 4X 1P66

MODEL # OF APPROVED SYSTEMS
TFT30-a
a= MOUNTING OPTIONS
14 CHARACTER EXPANDED
NUMBERING SYSTEM.
DOES NOT AFFECT SAFETY.

HAZARDOUS (CLASSIFIED) AREA



U_i = 31 VDC
I_i = 116 mA
C_i = 0 uF
L_i = 0 mH
P_i = 667 mW

NON-HAZARDOUS AREA

CSA CERTIFIED
ASSOCIATED APPARATUS

V_{DC} ≤ 31V
I_{SC} ≤ 116 mA
P₀ ≤ 667 mW
C_A ≥ 0.0uF + C_{cable}
L_A ≥ 0 mH + L_{cable}

NOTES:

1. THE INTRINSIC SAFETY ENTITY CONCEPT ALLOWS THE INTERCONNECTION OF TWO CSA CERTIFIED INTRINSICALLY SAFE DEVICES WITH ENTITY PARAMETERS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM WHEN:
V_{oc} OR U_o OR V_t ≤ V_{max}, I_{sc} OR I_o OR I_t ≤ I_{max}, C_a OR C_o ≥ C_i + C_{cable}, L_a OR L_o ≥ L_i + L_{cable}, P_o ≤ P_i.

2. IF THE ELECTRICAL PARAMETERS OF THE CABLES ARE UNKNOWN, THE FOLLOWING VALUES MAY BE USED:
C_{cable} = 60pF/FT, L_{cable} = 0.20uH/FT.

3. DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS.

4. CONTROL EQUIPMENT CONNECTED TO THE ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 V_{rms} OR V_{dc}.

5. INSTALLATION SHOULD BE IN ACCORDANCE WITH ANSI/ISA RP12.06.01 "INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS (CLASSIFIED) LOCATIONS" AND THE CANADIAN ELECTRICAL CODE CSA C22.1, PART 1, APPENDIX F.

6. THE CONFIGURATION OF THE ASSOCIATED APPARATUS MUST BE CSA APPROVED UNDER ENTITY CONCEPT.

7. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.

8. THE TFT30 SERIES ARE CERTIFIED FOR CLASS I, ZONE 0, APPLICATIONS. IF CONNECTING EX[ib] ASSOCIATED APPARATUS TO THE TFT30 SERIES, THE I-S. CIRCUIT IS ONLY SUITABLE FOR CLASS I, ZONE 1, OR CLASS 1, ZONE 2, AND IS NOT SUITABLE FOR CLASS 1, ZONE 0 OR CLASS 1, DIVISION 1, HAZARDOUS (CLASSIFIED) LOCATIONS.

9. NO REVISION TO DRAWING WITHOUT PRIOR AGENCY APPROVAL.


NO. 420-0004-301-CD

SHT 7 OF 7

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420-0004-301-CD

TFT30 SERIES
CSA CONTROL DRAWING
TFT30 ENTITY
INSTALLATIONS



215-674-1234
FAX 215-674-2731

205 KEITH VALLEY RD
HORSBACH, PA 19044-9986

CERTIFIED

PO #

ENG

USER

DE #

by

DATE

ISS. EDO/DSR NO. APP'D

DR. JJS 9-15-05

DATE 9-15-05

DR. CK.

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SCALE NONE

UNLESS OTHERWISE STATED
ALL DIMENSIONS IN INCHES (IN)

TERMS AND CONDITIONS OF SALE

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PRICES: All prices and terms are subject to change without notice. Buyer-requested changes to its order ("Orders"), including those affecting the identity, scope and delivery of the goods or services, must be documented in writing and are subject to Seller's prior approval and adjustments in price, schedule and other affected terms and conditions. Orders requiring certified test data in excess of commercial requirements, are subject to a special charge.

ORDER ACCEPTANCE: All Orders are subject to final approval and acceptance by Seller at its office located at 205 Keith Valley Road, Horsham, Pennsylvania 19044.

TERMS OF PAYMENT: Seller's standard terms of payment for Buyers who qualify for credit are net thirty (30) days from date of invoice. All invoices must be paid in United States dollars.

CREDIT: Seller reserves the right at any time to revoke any credit extended to Buyer or otherwise modify terms of payment if Buyer fails to pay for any shipments when due or if in Seller's opinion there is a material adverse change in Buyer's financial condition. Seller may, at its option, cancel any accepted Order if Buyer fails to pay any invoices when due.

DELIVERY: Shipments are F.O.B place of manufacture ("Shipping Point") and the Buyer shall pay all freight, transportation, shipping, duties, fees, handling, insurance, storage, demurrage, or similar charges from Shipping Point. Delivery of goods to common carrier shall constitute delivery and passing of title to the Buyer, and all risk of loss or damage in transit shall be borne by Buyer. Any claims or losses for damage or destruction after such delivery shall be the responsibility of Buyer.

Seller reserves the right to make delivery in installments which shall be separately invoiced and paid for when due, without regard to subsequent deliveries. Delay in delivery of any installment shall not relieve Buyer of its obligation to accept remaining deliveries.

Acknowledged shipping dates are approximate only and based on prompt receipt of all necessary information from Buyer and Buyer's compliance with terms of payment.

TAXES: All sales, excise and similar taxes which Seller may be required to pay or collect with respect to the goods and/or services covered by any Order, shall be for the account of the Buyer except as otherwise provided by law or unless specifically stated otherwise by Seller in writing.

TERMINATION AND HOLD ORDERS: No Order may be terminated by Buyer except upon written request by Buyer and approval by Seller, and if said request is approved by Seller, under the following conditions: (1) Buyer agrees to accept delivery of all of the units completed by Seller through the workday on which Seller receives the written termination request; (2) Buyer agrees to pay to Seller all direct costs and expenses applicable to the portion of the Order that is incomplete.

WARRANTY:

A. Hardware: Seller warrants its goods against defects in materials and workmanship under normal use and service for one (1) year from the date of invoice.

B. Software and Firmware: Unless otherwise specified, Seller warrants for a period of one (1) year from date of invoice that standard software or firmware, when used with Seller specified hardware, shall perform in accordance with Seller's published specifications. Seller makes no representation or warranty, expressed or implied, that the operation of the software or firmware shall be uninterrupted or error-free, or that functions contained therein shall meet or satisfy the Buyer's intended use or requirements.

C. Services: Seller warrants that services, including engineering and custom application, whether provided on a fixed cost or time and material basis, shall be performed in accordance with generally accepted industry practices.

D. Remedies: Seller's liability under this section is restricted to replacing, repairing, or issuing credit (at Seller's option) for any returned goods and only under the following conditions: (1) Seller must be promptly notified, in writing, as soon as possible after the defects have been noted by the Buyer, but not later than (1) year from date of invoice from Seller; (2) The defective goods are to be returned to the place of manufacture, shipping charges prepaid by the Buyer; (3) Seller's inspection shall disclose to its satisfaction that the goods were defective in materials or workmanship at the time of shipment; (4) Any warranty service (consisting of time, travel and expenses related to such services) performed other than at Seller's factory, shall be at Buyer's expense.

E. Repaired/Reconditioned Goods: As to out-of-warranty goods which Seller has repaired or reconditioned, Seller warrants for a period of sixty (60) days from date of its invoice only new components replaced in the most recent repair/reconditioning.

F. Returns and Adjustments: No goods may be returned unless authorized in advance by Seller and then only upon such conditions to which Seller may agree. Buyer must obtain an RMA (Return Material Authorization) number from Seller prior to any return shipment and such RMA number must appear on the shipping label and packing slip. Buyer shall be responsible for the returned goods until such time as Seller receives the same at its plant and for all charges for packing, inspection, shipping, transportation, or insurance associated with returned goods. In the event that credit for returned goods is granted, it shall be at the lesser of the then current prices or the original purchase price. Claims for shortage or incorrect material must be made within five (5) days after receipt of shipment.

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FORCE MAJEURE: Seller shall not be responsible for delays in delivery or any failure to deliver due to causes beyond Seller's control, including but not limited to the following items: acts of God, war, terrorism, mobilization, civil commotion, riots, embargoes, domestic or foreign governmental regulations or orders, governmental priorities, port congestion, acts of the Buyer, its agents or employees, fires, floods, strikes, lockouts and other labor difficulties, shortages of or inability to obtain shipping space or transportation, inability to secure fuel, supplies or power at current prices or on account of shortages thereof, or due to limitations imposed by the extent of availability of Seller's normal manufacturing facilities.

If a delay excused per the above extends for more than ninety (90) days and the parties have not agreed upon a revised basis for continuing providing the goods or services at the end of the delay, including adjustment of the price, then Buyer, upon thirty (30) days' prior written notice to Seller may terminate the Order with respect to the unexecuted portion of the goods or services, whereupon Buyer shall promptly pay Seller its reasonable termination charges upon submission of Seller's invoices thereof.

LIMITATION OF LIABILITY: Seller's liability for any claim of any kind, except infringement of intellectual property rights, shall not exceed the purchase price of any goods or services which give rise to the claim. **SELLER SHALL IN NO EVENT BE LIABLE FOR BUYER'S MANUFACTURING COSTS, LOST PROFITS, LOSS OF USE OF THE GOODS OR SERVICES, COST OF CAPITAL, COST OF SUBSTITUTE GOODS, FACILITIES, SERVICES OR REPLACEMENT POWER, DOWNTIME COSTS, CLAIMS OF BUYER'S CUSTOMERS FOR DAMAGES, OR OTHER SPECIAL, PROXIMATE, INCIDENTAL, INDIRECT, EXEMPLARY OR CONSEQUENTIAL DAMAGES.** Any action against Seller must be brought within eighteen (18) months after the cause of action accrues. These disclaimers and limitations of liability shall apply regardless of the form of action, whether in contract, tort or otherwise, and further shall extend to the benefit of Seller's vendors, appointed distributors and other authorized resellers as third-party beneficiaries.

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NON-WAIVER BY SELLER: Waiver by Seller of a breach of any of these terms and conditions shall not be construed as a waiver of any other breach.

SEVERABILITY AND ENTIRE AGREEMENT: If any provision of these terms and conditions is unenforceable, the remaining terms shall nonetheless continue in full force and effect. This writing, together with any other terms and conditions Seller specifically agrees to in writing, constitutes the entire terms and conditions of sale between Buyer and Seller and supercedes any and all prior discussions, and negotiations on its subject matter.



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