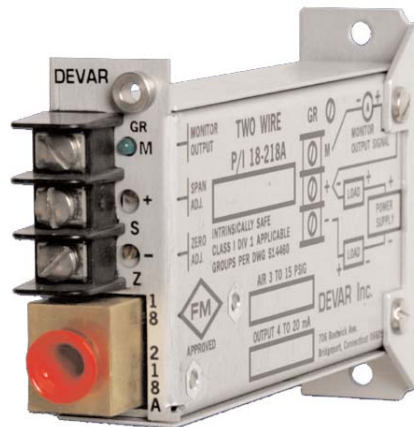


# DEVAR Inc.

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## Model 18-218A TWO WIRE P/I CONVERTER TRANSMITTER



REV B

MANUAL NO. 990588

## TABLE OF CONTENTS

<u>SECTION</u>	<u>TITLE</u>	<u>PAGE</u>
I	GENERAL DESCRIPTION	1
II	SPECIFICATION	2
III	INSTALLATION	3
IV	RECALIBRATION	5
V	TROUBLESHOOTING	6
VI	PARTS LIST	7
VII	INTRINSICALLY SAFE INSTALLATION DWGS 514460	8-10
<u>FIGURES</u>		
3-1	EXTERNAL WIRING	3
3-2	OUTLINE DIMENSIONS 18-218A CASE	3
3-3	M-31 MOUNTING BRACKET	3
3-4	GENERAL DIMENSIONS FOR RACKS	4
4-1	SCHEMATIC	5
5-1	COMPONENT LOCATIONS	6

### SECTION I GENERAL DESCRIPTION

The 18-218A two wire Pneumatic to Current Converter acts as a media in connecting of pneumatic operating plant signals to minicomputers used in data acquisition and direct digital control installations. Its conversion accuracy improves the process of controlling a pneumatically instrumented plant.

The unit is not affected by vibration and noise, and without air consumption. Excellent signal conversion accuracy is obtained by utilizing a diffused silicon semiconductor pressure transducer.

The 18-218A uses two wires for supplying power and signal transmission. This two wire technique facilitates field wiring and provides the utmost in economical and reliable signal transmission. The transmitter has a regulator circuit, which allows the unit to operate on a wide range of supply voltages (12 to 42 volts). A green LED is used as an output signal indicator. The brightness of LED increases as the output signal level increases.

It is normally calibrated for a 3 to 15 PSIG input range, but can be provided for other input signal ranges as 18-218A-SC. A 4/20mA output signal is standard, but a 10/50mA output signal is available as 18-218A-2. The output signal is normally directly proportional to the input signal, and can be provided for the output signal to be inversely proportional to the input signal as 18-218A-R. In addition a high accurate 4/20mA output signal is available as 18-218A-H.

The 18-218A with 4/20mA output has been Factory Mutual approved as intrinsically safe for Class I Division 1 and applicable groups when used with energy limiting barriers per Devar drawings 514460 shown in section VII of this manual.

SECTION II

SPECIFICATION

2-1 General

- |                            |  |
|----------------------------|--|
| a. Standard Accuracy       | 0.15% full scale Typ., 0.2% max.   |
| High Accuracy              | 0.075% full scale Typ., 0.1% max.<br>(Includes combined effects of linearity,<br>hysteresis and repeatability) |
| b. Repeatability           | 0.1% F.S.  |
| c. Hysteresis              | Negligible   |
| d. Environmental Influence |  |
| 1. Operating Temp. Range   | 0 to 160 <sup>0</sup> F  |
| 2. Thermal Zero Shift      | Less than 0.01% of span/ <sup>0</sup> F  |
| 3. Thermal Span Shift      | Less than 0.01% of span/ F   |
| e. Vibration Effect        | Negligible   |
| f. RFI Effect              | Negligible   |
| g. Power Requirements      | 12 to 42 VDC (44 VDC max.)   |
| h. Mounting Position       | Any Plane  |
| i. Weight                  | 6.5 oz.  |

2-2 Input Signal

- |                        |  |
|------------------------|--|
| a. Pressure Medium     | Instrument Air   |
| b. Input Range         | 3 to 15 PSI standard<br>(other ranges specify - SC)                          |
| c. Max. Pressure Input | 3 x F.S. (5 min.) without recalibration<br>4 x F.S. (1 min.) without failure |
| d. Burst Pressure      | Exceeds 60 PSI for 3 to 15 PSI range   |
| e. Input Connection    | 1/8 - 27 NPT female  |

2-3 Output Signals

- |              |  |
|--------------|--|
| a. 18-218A-1 | 4/20mA (600 Ohms with 24 VDC power supply)                               |
| b. 18-218A-2 | 10/50mA (240 Ohms with 24 VDC power supply)                              |
| c. Monitor   | Current output may be monitored locally<br>without disconnecting output. |

2-4 Product Coding

- |                              |  |
|------------------------------|--|
| 18-218A-1- (F.M. Approved) - | 3/15 PSIG input, 4/20mA output                             |
| 18-218A-2-                   | 3/15 PSIG input, 10/50mA output                            |
| -SC                          | -a Calibration other than 3/15 PSIG                        |
| -R                           | -b Output signal inversely proportional to<br>input signal |
| -H                           | -c High accuracy   |
| -M31                         | -d Bracket for wall or snap track mounting                 |

## SECTION III

### INSTALLATION

The 18-218A P/I transmitter has been minaturized to allow 34 units in a 5½ x 19" rack or 17 units in a 3½ x 19" rack of 16 units in a 5½ x 10" rack. Refer to FIG. 3-4 for different rack dimensions. Refer to FIG. 3-2 for general dimensions of 18-218A.

Connect appropriate DC power source in series with load to (+) and (-) VDC terminals. For detailed wiring instructions refer to FIG. 3-1.

Attach the pneumatic signal tubing with an appropriate fitting to the 1/8" NPT female fitting provided. Hold 5/8 fitting on the case to prevent it from twisting while tightening fitting. Follow label instructions for correct wiring of terminal block.

When P/I transmitters are packaged in a rack, slide out each transmitter so that the pneumatic tubing may be attached to the 1/8" NPT female fitting easily. Then each transmitter may be pushed back into the rack.

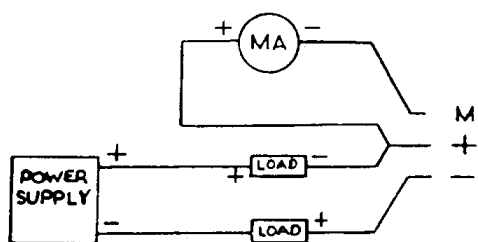


FIG. 3-1 External Wiring

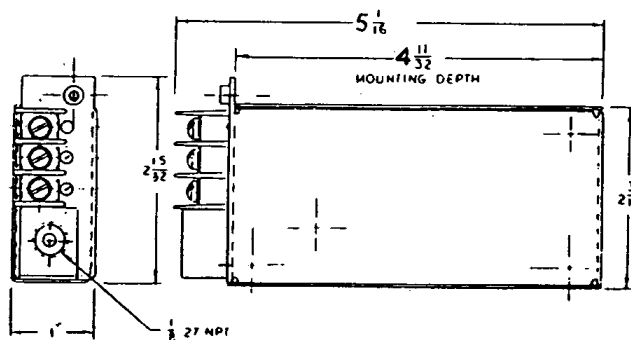
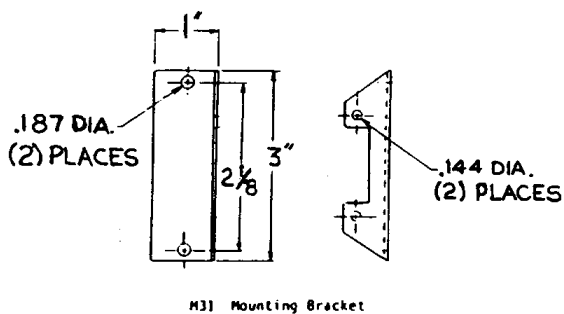
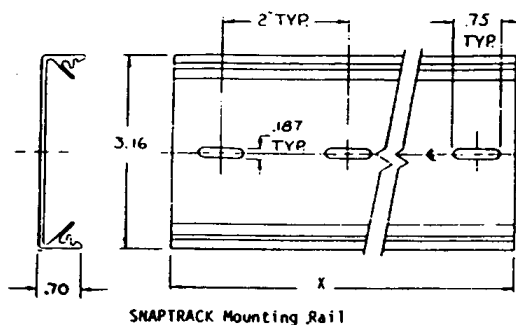


FIG. 3-2 Outline Dimensions 18-218A Case

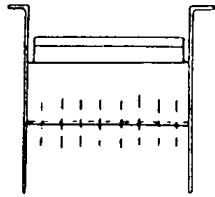


M31 Mounting Bracket

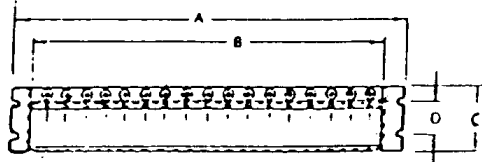
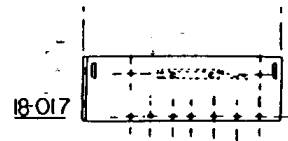
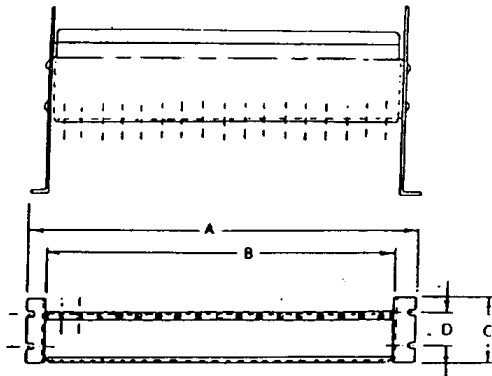
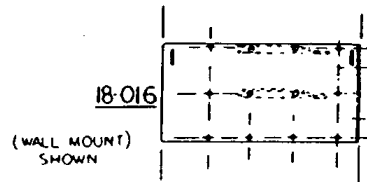
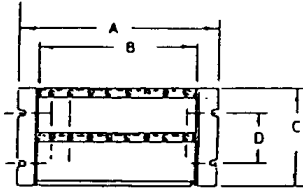
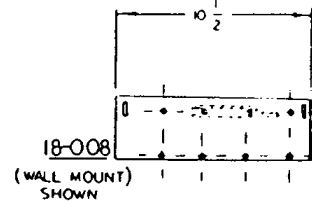
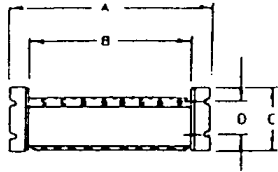


SNAPTRACK Mounting Rail

FIG. 3-3 M-31 Bracket For Wall or Snap Track Mounting



18-008	10"	8 1/8"	3 1/2"	1 3/4"
18-016	10"	8 1/8"	5 1/4"	2 1/4"
18-017	19"	17 7/32"	3 1/2"	1 3/4"
18-034	19"	17 7/32"	5 1/4"	2 1/4"
MODEL	DIMENSION			



PDP

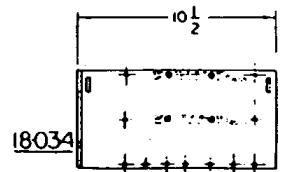
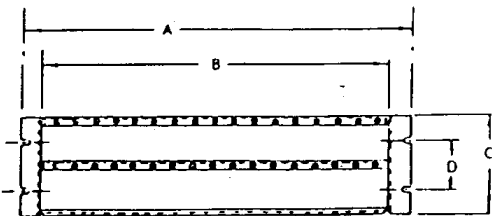


FIG. 3-4 General Dimensions For Racks 18-008, 18-016, 18-017, & 18-034

## SECTION IV

### RECALIBRATION

The 18-218A transmitter has been designed to maintain accuracy of calibration for long periods of time. However, when necessary, small changes of calibration can be made by adjusting the zero and span trimmer accessible from the front of the transmitter case.

To change the output current range of the 18-218A transmitter from 4/20mA to 10/50mA, add a shunt resistor (R21) across R19 as determined by formula

$$R21 = \frac{100 R19}{150 + R19}$$

A slight adjustment in zero and span trimmer may be necessary when the above change is made.

To recalibrate the 18-218A pneumatic transmitter after a change of component or a major change of signal range, proceed as follows:

- a. Connect a calibrated air supply to the unit.
- b. Connect a DC power supply in series with appropriate load and current meter to (+) VDC and (-) VDC terminals as shown in FIG. 3-1. Allow 10 minutes minimum warm-up before final calibration.
- c. Adjust zero and span potentiometers until desired calibration is achieved between minimum and maximum signal ranges.

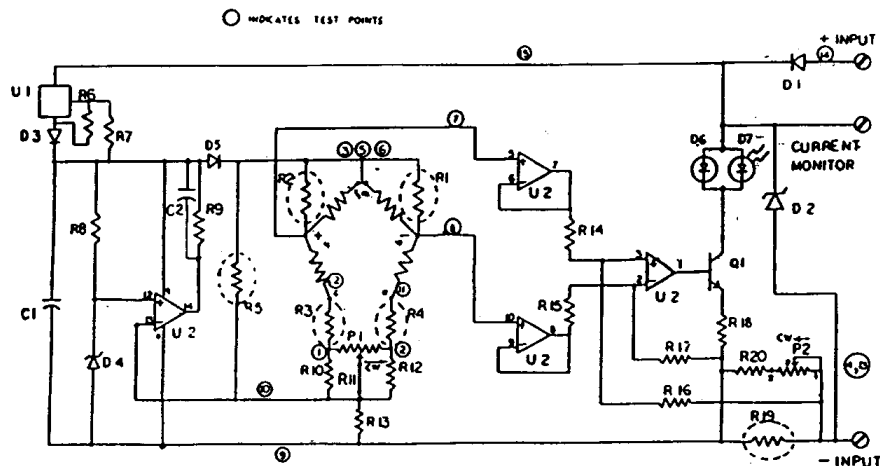


FIG. 4-1 Schematic

## SECTION V

### TROUBLESHOOTING

If the transmitter is not working properly, it may be because of a loose connection, an air leak, or improper wiring to external terminals. Check external connections to Monitor, (+) VDC, and (-) VDC terminals. In addition, check for air leaks at the air fitting.

Pertinent transmitter voltages are as follows:

- 12 VDC minimum supply voltage at the terminal block.
- 1.23 V between test points 10 & 9 (Across R13).
- 3 V minimum at 25°C between test points 3 & 10 (Bridge excitation)
- The voltage across R19 (Test points 9 & 13) should be ten times greater than the output voltage of the pressure transducer (Test points 7 & 8).

For location of components, refer to FIG. 5-1.

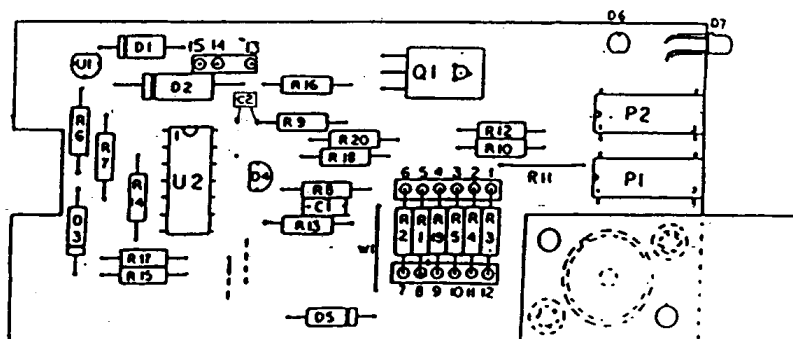


FIG. 5-1 Component Locations

## SECTION VI

PARTS LIST

Whenever possible, specify items by part number. To order spare or replacement parts, contact your local DEVAR, INC. Control Products Division representative.

Resistors

R6	40.2 $\Omega$	1% Metal Film	223737-52
R7	402 $\Omega$	1% " "	223737-14
R8	5.23 $\Omega$	1% " "	223737-15
R9	1.62K	1% " "	223737-171
R10,12	24.9 $\Omega$	1% " "	223737-56
R13	1.21K	1% " "	223737-22
R14,15	10K	1% " "	221734-07
R16,17	100K	1% " "	223737-135
R18,20	100 $\Omega$	1% " "	223737-41

Capacitors

C1,2	0.1 $\mu$ F	Disc Ceramic	220589-17
------	-------------	--------------	-----------

Semiconductors

D1	IN4002	Diode	380666-01
D2	IN6287A	Zener Diode	513952-47
D3,5	IN4153	Diode	220095-01
D4	LM385BZ	Volt. Ref	382209-01
D6,7		Green LED	514137-02

Transistors

Q1	2N5191		380934-01
----	--------	--	-----------

Integrated Circuits

U1	LM234	Current Source	514318-01
U2	LM2902M	Quad. Amp	382541-03

Transducer

SG	1813-009		513571-04
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Hardware

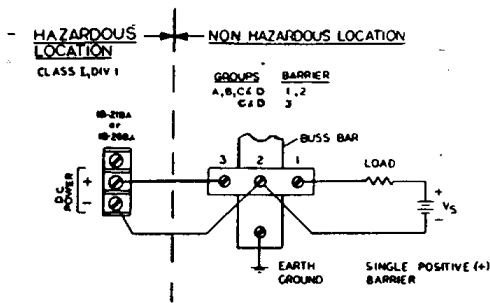
Pin Socket Strip (snap-off)			514292-01
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## SECTION VII

### ENERGY LIMITING BARRIERS FOR USE WITH DEVAR INSTRUMENTS

Model No.	Barrier Manufacturers and Type No.		DEVAR Wiring Dwg. No.	Class I Div. 1 Groups	
18-218A or 18-268A	Stahl	1	8903/31 - 315/050/70	514460 SHEET 2	A,B,C&D
		2	8901/31 - 280/100/70		
	3	8901/31 - 280/165/80	3	A,B,C&D	
	4	8903/30 - 315/050/70			
	5	8901/30 - 280/100/70			
	6	8901/30 - 280/165/80	4	C&D	
	7	8903/31 - 315/050/70 8901/33 - 086/000/00			
	8	8901/31 - 280/165/80 8901/33 - 086/000/00	5	C&D	
9	8901/33 - 086/000/00				
Honeywell		38545 - 0000 - 0110-111 - F5B5	5	C&D	
		38545 - 0000 - 0110-112 - F5B5	6		
Measurement Technology Ltd.		MTL188(+)	7	A,B,C&D	
		MTL128(-)	8		
		MTL188R(+)	9		
Leeds & Northrup		316569	10	A,B,C&D	
		316747	11		

NO REVISIONS WITHOUT PRIOR FACTORY MUTUAL APPROVAL SHEET 1 CONT'D  
A514460 REV A



- STAHL BARRIERS**
- 1 # 8903/31-315/050/70 (1.4V+110 A)
  - 2 # 8901/31-280/100/70 (320 A)
  - 3 # 8901/31-280/165/80 (201 A)

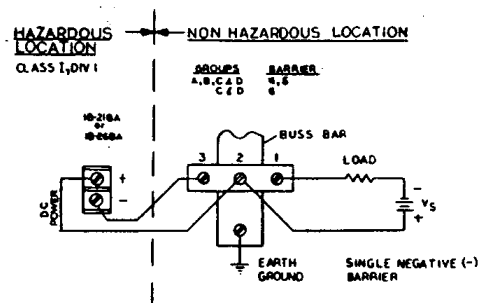
NOTES: 1) CONNECT PER BARRIER MANUFACTURER'S INSTRUCTION - 8901603310 & 8903601310.

- 2) MAXIMUM SAFE AREA VOLTAGE NOT TO EXCEED 250V rms.
- 3) NO REVISIONS WITHOUT PRIOR FACTORY MUTUAL APPROVAL.

18-218A OR 18-268A WITH STAHL BARRIERS

SHEET 2 CONT

<b>DEVAR INC.</b>			
CONTROL PRODUCTS DIVISION			
700 South 4th Ave., P.O. Box 699, Oshkosh, Wisconsin 54901			
<i>[Signature]</i>	<i>[Signature]</i>	REVISED ON A-514460	REV A



- STAHL BARRIERS**
- 4 # 8903/30-315/050/70 (1.4V+110 A)
  - 5 # 8901/30-280/100/70 (320 A)
  - 6 # 8901/30-280/165/80 (201 A)

NOTES: 1) CONNECT PER BARRIER MANUFACTURER'S INSTRUCTION - 8901603310 & 8903601310.

- 2) MAXIMUM SAFE AREA VOLTAGE NOT TO EXCEED 250V rms.
- 3) NO REVISIONS WITHOUT PRIOR FACTORY MUTUAL APPROVAL.

18-218A OR 18-268A WITH STAHL BARRIERS

SHEET 3 CONT

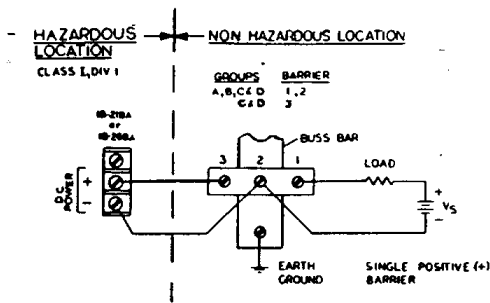
<b>DEVAR INC.</b>			
CONTROL PRODUCTS DIVISION			
700 South 4th Ave., P.O. Box 699, Oshkosh, Wisconsin 54901			
<i>[Signature]</i>	<i>[Signature]</i>	REVISED ON A-514460	REV A

## SECTION VII

### ENERGY LIMITING BARRIERS FOR USE WITH DEVAR INSTRUMENTS

Model No.	Barrier Manufacturers and Type No.		DEVAR Wiring Dwg. No.	Class I Div. 1 Groups			
18-218A or 18-268A	Stahl	1 8903/31 - 315/050/70	514460 SHEET 2	A,B,C&D			
		2 8901/31 - 280/100/70					
		3 8901/31 - 280/165/80					
		4 8903/30 - 315/050/70					
	Honeywell	5 38545 - 0000 - 0110-111 - F5B5	3	A,B,C&D			
		6 38545 - 0000 - 0110-112 - F5B5					
		Measurement Technology Ltd.			7 MTL188(+)	4	A,B,C&D
					8 MTL128(-)		
Leeds & Northrup	9 MTL188R(+)	8	C&D				
	10 316569						
	11 316747		A,B,C&D				

NO REVISIONS WITHOUT PRIOR FACTORY MUTUAL APPROVAL SHEET 1 CONT'D  
A514460 REV A



- STAHL BARRIERS**
- 1 # 8903/31-315/050/70 (1.4V+110 A)
  - 2 # 8901/31-280/100/70 (320 A)
  - 3 # 8901/31-280/165/80 (201 A)

NOTES: 1) CONNECT PER BARRIER MANUFACTURER'S INSTRUCTION - 8901603310 & 8903601310.

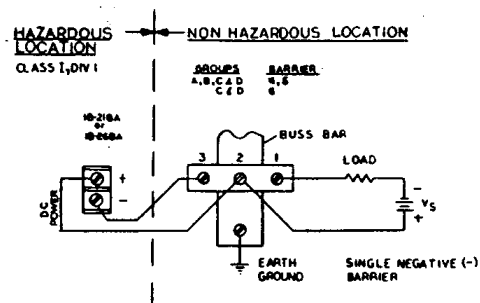
2) MAXIMUM SAFE AREA VOLTAGE NOT TO EXCEED 250V rms.

3) NO REVISIONS WITHOUT PRIOR FACTORY MUTUAL APPROVAL.

18-218A OR 18-268A WITH STAHL BARRIERS

SHEET 2 CONT

<b>DEVAR INC.</b>			
CONTROL PRODUCTS DIVISION			
700 South 4th Ave., P.O. Box 699, Oshkosh, Wisconsin 54901			
<i>[Signature]</i>	<i>[Signature]</i>	REVISED ON A-514460	REV A



- STAHL BARRIERS**
- 4 # 8903/30-315/050/70 (1.4V+110 A)
  - 5 # 8901/30-280/100/70 (320 A)
  - 6 # 8901/30-280/165/80 (201 A)

NOTES: 1) CONNECT PER BARRIER MANUFACTURER'S INSTRUCTION - 8901603310 & 8903601310.

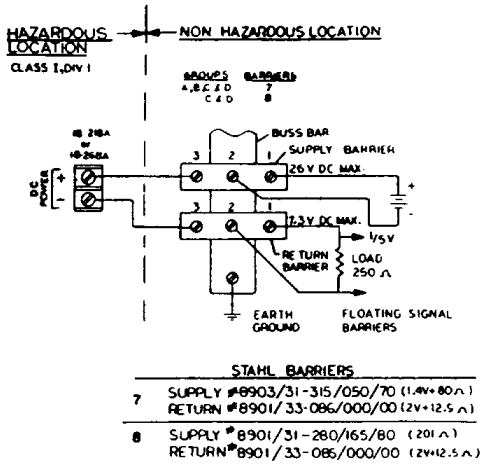
2) MAXIMUM SAFE AREA VOLTAGE NOT TO EXCEED 250V rms.

3) NO REVISIONS WITHOUT PRIOR FACTORY MUTUAL APPROVAL.

18-218A OR 18-268A WITH STAHL BARRIERS

SHEET 3 CONT

<b>DEVAR INC.</b>			
CONTROL PRODUCTS DIVISION			
700 South 4th Ave., P.O. Box 699, Oshkosh, Wisconsin 54901			
<i>[Signature]</i>	<i>[Signature]</i>	REVISED ON A-514460	REV A



**STAHL BARRIERS**

7 SUPPLY #8903/31-315/050/70 (1.4V+80A)  
RETURN #8901/33-086/000/00 (2V+12.5A)

8 SUPPLY #8901/31-280/165/80 (201A)  
RETURN #8901/33-086/000/00 (2V+12.5A)

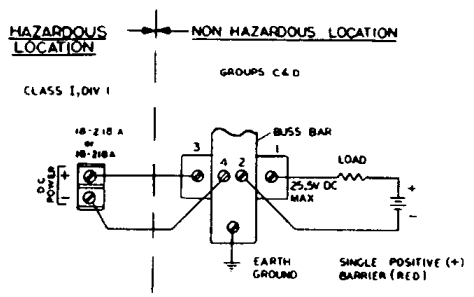
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2) MAXIMUM SAFE AREA VOLTAGE NOT TO EXCEED 250V rms.  
3) NO REVISIONS WITHOUT PRIOR FACTORY MUTUAL APPROVAL.

18-218A OR 18-268A WITH STAHL BARRIERS

SHEET 4 CONT

**DEVAR Inc.**  
CONTROL PRODUCTS DIVISION  
700 South 4th Ave., P.O. Box 599, Delphos, Connecticut 06024

DATE	REV	BY
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DRAWING NO. A-514460		REV. A



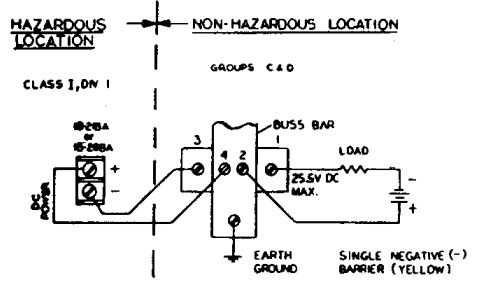
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2) MAXIMUM SAFE AREA VOLTAGE NOT TO EXCEED 250V rms.  
3) NO REVISIONS WITHOUT PRIOR FACTORY MUTUAL APPROVAL.

18-218A OR 18-268A WITH HONEYWELL BARRIER #38545-0000-010-111-F585 (268A)

SHEET 6 CONT

**DEVAR Inc.**  
CONTROL PRODUCTS DIVISION  
700 South 4th Ave., P.O. Box 599, Delphos, Connecticut 06024

DATE	REV	BY
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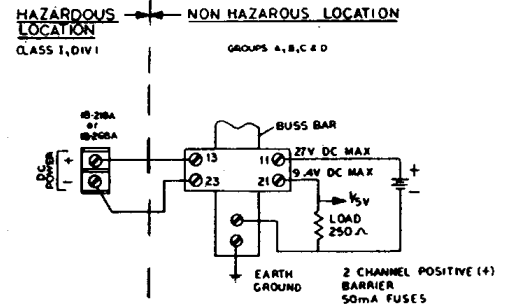
- NOTES: 1) CONNECT PER BARRIER MANUFACTURER'S INSTRUCTION - 30734039-000 & 30734577-000.  
2) MAXIMUM SAFE AREA VOLTAGE NOT TO EXCEED 250V rms.  
3) NO REVISIONS WITHOUT PRIOR FACTORY MUTUAL APPROVAL.

18-218A OR 18-268A WITH HONEYWELL BARRIER #38545-0000-010-112-F585 (1.2V+58A)

SHEET 6 CONT

**DEVAR Inc.**  
CONTROL PRODUCTS DIVISION  
700 South 4th Ave., P.O. Box 599, Delphos, Connecticut 06024

DATE	REV	BY
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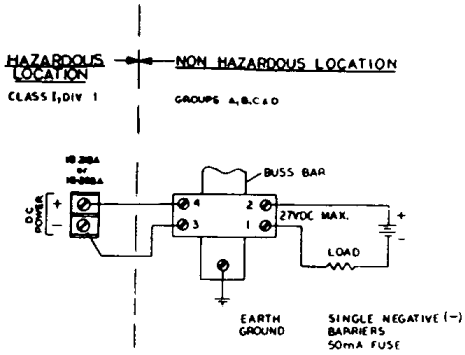
- NOTES: 1) CONNECT PER BARRIER MANUFACTURER'S INSTRUCTION - 1HS300-2.  
2) MAXIMUM SAFE AREA VOLTAGE NOT TO EXCEED 250V rms.  
3) NO REVISIONS WITHOUT PRIOR FACTORY MUTUAL APPROVAL.

18-218A OR 18-268A WITH MEASUREMENT TECHNOLOGY LTD BARRIER #MTL 188(1)(340+80A)

SHEET 7 CONT

**DEVAR Inc.**  
CONTROL PRODUCTS DIVISION  
700 South 4th Ave., P.O. Box 599, Delphos, Connecticut 06024

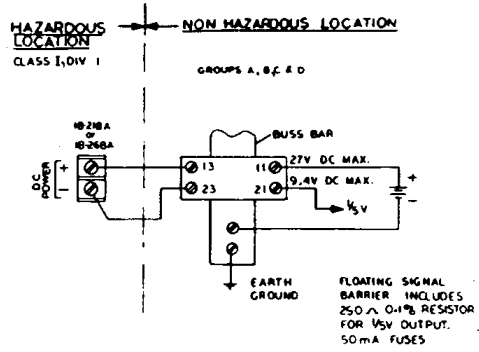
DATE	REV	BY
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DRAWING NO. A-514460		REV. A



- NOTES: 1) CONNECT PER BARRIER MANUFACTURER'S INSTRUCTION - 145300-2  
 2) MAXIMUM SAFE AREA VOLTAGE NOT TO EXCEED 250V rms.  
 3) NO REVISIONS WITHOUT PRIOR FACTORY MUTUAL APPROVAL.

18-218A OR 18-268A WITH MEASUREMENT TECHNOLOGY LTD BARRIER # MTL 128(-)(1340A) SHEET 8 CONT

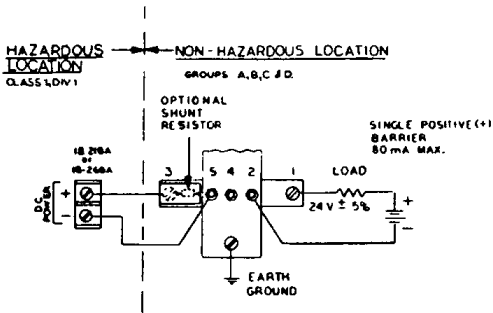
<b>DEVAR INC.</b> CONTROL PRODUCTS DIVISION			
<small>700 Burnham Ave., P.O. Box 500, Bridgport, Connecticut 06601</small>			
DATE 4/12/01	REVISED BY [Signature]	DRAWING NO. A 514460	REV. A



- NOTES: 1) CONNECT PER BARRIER MANUFACTURER'S INSTRUCTION - 145300-2  
 2) MAXIMUM SAFE AREA VOLTAGE NOT TO EXCEED 250V rms.  
 3) NO REVISIONS WITHOUT PRIOR FACTORY MUTUAL APPROVAL.

18-218A OR 18-268A WITH MEASUREMENT TECHNOLOGY LTD BARRIER # MTL 188R(+)(X340+80A) SHEET 9 CONT

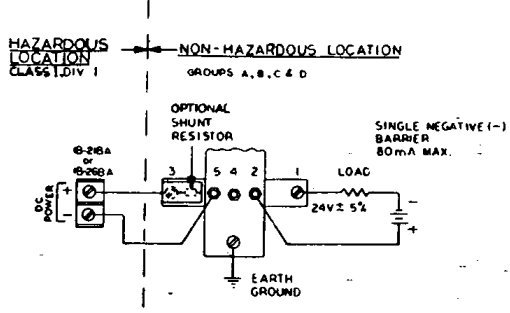
<b>DEVAR INC.</b> CONTROL PRODUCTS DIVISION			
<small>700 Burnham Ave., P.O. Box 500, Bridgport, Connecticut 06601</small>			
DATE 4/12/01	REVISED BY [Signature]	DRAWING NO. A 514460	REV. A



- NOTES: 1) CONNECT PER BARRIER MANUFACTURER'S INSTRUCTION - 177849.  
 2) MAXIMUM SAFE AREA VOLTAGE NOT TO EXCEED 250V rms.  
 3) NO REVISIONS WITHOUT PRIOR FACTORY MUTUAL APPROVAL.

18-218A OR 18-268A WITH LEADS & NORTHROP BARRIER # 316569 (98A) SHEET 10 CONT

<b>DEVAR INC.</b> CONTROL PRODUCTS DIVISION			
<small>700 Burnham Ave., P.O. Box 500, Bridgport, Connecticut 06601</small>			
DATE 4/12/01	REVISED BY [Signature]	DRAWING NO. A-514460	REV. A



- NOTES: 1) CONNECT PER BARRIER MANUFACTURER'S INSTRUCTION - 177849.  
 2) MAXIMUM SAFE AREA VOLTAGE NOT TO EXCEED 250V rms.  
 3) NO REVISIONS WITHOUT PRIOR FACTORY MUTUAL APPROVAL.

18-218A OR 18-268A WITH LEADS & NORTHROP BARRIER # 316747 (98A) SHEET 11 CONT

<b>DEVAR INC.</b> CONTROL PRODUCTS DIVISION			
<small>700 Burnham Ave., P.O. Box 500, Bridgport, Connecticut 06601</small>			
DATE 4/12/01	REVISED BY [Signature]	DRAWING NO. A-514460	REV. A