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GENERAL NOTES:

- 1. THE MODEL PA1001A SHOULD BE PLACED IN A CONVENIENT LOCATION THAT MAINTAINS ACCESS TO THE UNIT SHOULD REPAIRS OR READJUSTMENT BE REQUIRED.
- 2. CONNECTIONS TO THE TERMINAL BLOCK SHOULD BE CAREFULLY DRESSED TO AVOID HAVING BARE WIRES EXTEND PASS THE SCREW CLAMP ON THE TERMINAL BLOCK. THIS IS PARTICULARLY IMPORTANT WHEN THE PC CARD IS MOUNTED WITHIN AN EXPLOSION PROOF ENCLOSURE. WIRES SHOULD BE NEATLY DRESSED NEAR BOTTOM OF ENCLOSURE TO PREVENT PROBLEMS WHEN COVER IS INSTALLED.
- 3. FOR COMPLIANCE WITH EMI/RFI REQUIREMENTS THE PRE-AMPLIFIER MUST BE INSTALLED IN A METAL ENCLOSURE SUCH AS A SUITABLE NEMA 4 (E.G. GUAC) JUNCTION BOX. THE ENCLOSURE MUST BE PROPERLY GROUNDED AND A GROUNDING STRAP IS REQUIRED FROM THE ENCLOSURE TO THE POWER SUPPLY COMMON (PIN 7).
- 4. THE CABLE ENTRY REQUIRES 360° GROUNDING COVERAGE TO THE ENCLOSURE CASE. THIS IS OBTAINED BY USING TWISTED PAIR WITH FULL BRAID CABLE AND A CABLE FITTING THAT PROVIDES A METAL TO METAL CABLE CLAMPING CONNECTION. THE INSULATION OF THE CABLES SHOULD BE STRIPPED BACK TO ALLOW FOR CONNECTION TO THE TERMINAL BLOCK AND ALLOW FOR THE CABLE FITTING TO CLAMP ONTO THE BRAIDED SHIELD. ANY OPEN AREAS SHOULD THEN BE COVERED USING FOIL TAPE.
- 5. IN HAZARDOUS LOCATIONS WHERE METAL CONDUIT IS USED, 360° GROUNDING IS ACHIEVED. ALL CABLE SHIELDS SHOULD BE TERMINATED TO THE ENCLOSURE—GROUNDING STUD.

MATERIAL	APPROVALS			MOTION SENSORS INC.
NONE	DRAWN D.GUYDAN	DATE 10/28/05		ELIZABETH CITY, NC 27909
	CHECK J.DEFEO	11/02/05	TITLE	<u>'</u>
FINISH	ISSUED M.BERGMAN	11/02/05		INSTALLATION DRAWING
NONE	DIMENSION INCH	[MM]		PA1001A PRE-AMPLIFIER
CONFIDENTIAL PROPERTY OF MOTION	DEFAULT TOLERANCES SHALL BE AS INDI UNLESS OTHERWISE SPECIFIED (UOS):	CATED BELOW		
SENSORS, INC. (MSI) NOT TO BE DISCLOSED TO OTHERS, REPRODUCED, OR USED FOR ANY OTHER PURPOSE, EXCEPT AS AUTHORIZED IN WRITING BY MSI. MUST	1 PLACE DECIMAL ±015 2 PLACE DECIMAL ±01 3 PLACE DECIMAL ±.005		SIZE	OY2U4 ST-A-1555 A
BE RETURNED ON DEMAND.	FRACTIONAL ±1/64 ANGULAR ±1/2*		SCALE	NONE SHEET 1 OF 8

NOTES (REFER TO FIGURE 1):

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A ORIGINAL RELEASE PER DDR 11/02/05 ADG

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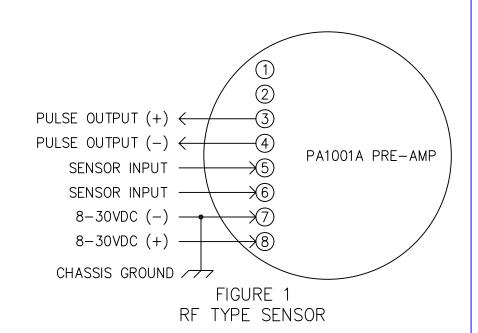
- 1. SET JUMPER HD2 (SEE FIGURE 3) TO THE RF POSITION.
- 2. CONFIGURE JUMPER HD1 (SEE FIGURE 3) TO THE DESIRED PULSE OUTPUT AS FOLLOWS:

PULSE OUTPUT TYPE
OPEN COLLECTOR
SQUARE WAVE TO Vin
TTL/CMOS
0-10 VDC SQUARE WAVE

HD1 JUMPER CONFIGURATION
JP2
JP1 AND JP2
JP1, JP2 AND JP3
JP1, JP2 AND JP4

- 3. INSTALL PICKUP (E.G. IN METER) AND PROVIDE POWER TO PA1001A. USE A DIGITAL VOLTMETER SET TO DC VOLTAGE AND ATTACH THE POSITIVE LEAD TO TERMINAL 6 AND THE COMMON LEAD TO TERMINAL 2. ADJUST THE CARRIER ADJUSTMENT (R2) (SEE FIGURE 3) TO A READING OF 3.00 VDC TO FINE—TUNE THE PICKUP FOR AIR GAP, WALL THICKNESS, ETC.
- 4. WITH POWER STILL SUPPLIED TO PA1001A DETERMINE IF A PULSE OUTPUT IS BEING GENERATED IN THE ABSENCE OF MOTION.

 ADJUST THE RF TRIGGER (R24) (SEE FIGURE 3) CW UNTIL THE FALSE PULSATION HAS STOPPED. IF PULSATION CONTINUES WHEN ADJUSTED FULLY CW, CHECK THAT ALL SHIELDS HAVE BEEN PROPERLY TERMINATED AND GROUNDED.
- 5. ALL CABLES ARE TO BE TWISTED-PAIR WITH FULLY BRAIDED SHIELD
- 6. ALL SHIELDS TO BE TERMINATED TO CHASSIS GROUND
- 7. ANALOG OUTPUT OPTION (FIGURE 3):
 - A) CURRENT OUTPUT WIRE TWO CONDUCTOR SHIELDED CABLE TO TERMINAL 2 (COMMON) AND TERMINAL 3 (CURRENT OUTPUT)
 - B) VOLTAGE OUTPUT WIRE TWO CONDUCTOR SHIELDED CABLE TO TERMINAL 2 (COMMON) AND TERMINAL 1 (VOLTAGE OUTPUT)



MATERIAL	APPROVALS			$M \cap TTC$	ON SEN	SORS	TNI	\mathcal{C}
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NONE	M.BERGMAN 11/02/ DIMENSION UNITS UOS INCH)5 } }			1A PRE	, ,,,,,		ER
CONFIDENTIAL PROPERTY OF MOTION	DEFAULT TOLERANCES SHALL BE AS INDICATED BELCO UNLESS OTHERWISE SPECIFIED (UOS):	W		(RF	TYPE :	2F1/12($\mathcal{I}(\mathcal{I})$	
SENSORS, INC. (MSI) NOT TO BE DISCLOSED TO OTHERS, REPRODUCED, OR USED FOR ANY OTHER PURPOSE, EXCEPT AS AUTHORIZED IN WRITING BY MSI. MUST	1 PLACE DECIMAL ±015 2 PLACE DECIMAL ±01 3 PLACE DECIMAL ±005 FRACTIONAL ±1/64		SIZE	CAGE CODE	DWG NO ST-	- A — 15		05.0
BE RETURNED ON DEMAND.	ANGULAR ±1/2*	3	CALE	NONE		SH	2	OF 8

NOTES (REFER TO FIGURE 2):

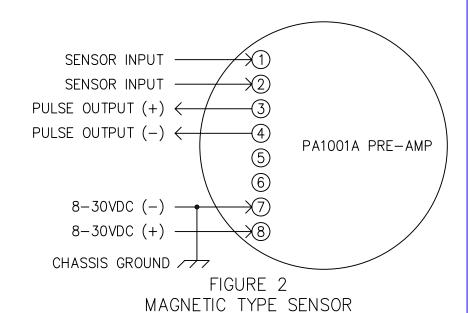
REVISIONS DESCRIPTION REV DATE ORIGINAL RELEASE PER DDR 11/02/05 ADG

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- 1. SET JUMPER HD2 (SEE FIGURE 3) TO THE MAG POSITION.
- 2. CONFIGURE JUMPER HD1 (SEE FIGURE 3) TO THE DESIRED PULSE **OUTPUT AS FOLLOWS:**

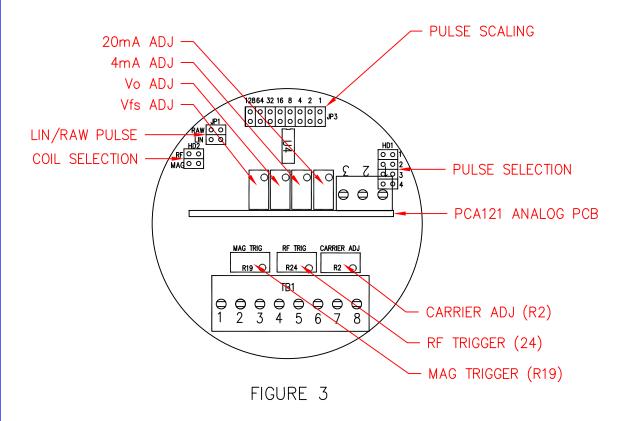
PULSE OUTPUT TYPE HD1 JUMPER CONFIGURATION OPEN COLLECTOR JP2 JP1 AND JP2 SQUARE WAVE TO Vin TTL/CMOS JP1, JP2 AND JP3 0-10 VDC SQUARE WAVE JP1, JP2 AND JP4

- 3. INSTALL PICKUP (E.G. IN METER) AND PROVIDE POWER TO PA1001A. DETERMINE IF A PULSE OUTPUT IS BEING GENERATED IN THE ABSENCE OF MOTION. ADJUST THE MAG TRIGGER (R19) (SEE FIGURE 3) CW UNTIL THE FALSE PULSATION HAS STOPPED. IF PULSATION CONTINUES WHEN ADJUSTED FULLY CW. CHECK THAT ALL SHIELDS HAVE BEEN PROPERLY TERMINATED AND GROUNDED.
- 4. ALL CABLES ARE TO BE TWISTED-PAIR WITH FULLY BRAIDED SHIELD
- 5. ALL SHIELDS TO BE TERMINATED TO CHASSIS GROUND
- ANALOG OUTPUT OPTION (FIGURE 3):
 - A) CURRENT OUTPUT WIRE TWO CONDUCTOR SHIELDED CABLE TO TERMINAL 2 (COMMON) AND TERMINAL 3 (CURRENT OUTPUT)
 - B) VOLTAGE OUTPUT WIRE TWO CONDUCTOR SHIELDED CABLE TO TERMINAL 2 (COMMON) AND TERMINAL 1 (VOLTAGE OUTPUT)



MATERIAL	APPROVALS			$M \cap T T \cap$	N SENS	ORS INC	Y
NONE	D.GUYDAN	DATE 10/28/05			ABETH CITY,		•
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	ISSUED M.BERGMAN	11/02/05				AMPLIFIER	
NONE	DIMENSION UNITS UOS INCH MICH MINITS UOS INCH MINITS UOS INCH MINITS UNITS SHALL BE AS INDICATED BELOW UNIESS OTHERWISE SPECIFIED (UOS):				· · · · · · —	— —.	•
CONFIDENTIAL PROPERTY OF MOTION				(MAGNE	LIIC TYPE	E SENSOF	()
SENSORS, INC. (MSI) NOT TO BE DISCLOSED TO OTHERS, REPRODUCED, OR USED FOR ANY OTHER PURPOSE, EXCEPT	1 PLACE DECIMAL ±.015 2 PLACE DECIMAL ±.01 3 PLACE DECIMAL ±.005		SIZE	CAGE CODE	DWG NO ST-A	\ −1555	
AS AUTHORIZED IN WRITING BY MSI. MUST BE RETURNED ON DEMAND.	FRACTIONAL ±1/64 ANGULAR ±1/2*		SCALE	NONE	•	SHEET 3 OF	F 8

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CONTROL AND ADJUSTMENT DETAILS

MATERIAL	APPROVALS			MOTION SENSORS INC.
NONE	DRAWN D.GUYDAN	DATE 10/28/05		ELIZABETH CITY, NC 27909
FINISH	CHECK J.DEFEO	11/02/05	TITLE	
	ISSUED M.BERGMAN	11/02/05		INSTALLATION DRAWING
NONE	DIMENSION UNITS UOS			PA1001A PRE-AMPLIFIER
CONFIDENTIAL PROPERTY OF MOTION	DEFAULT TOLERANCES SHALL BE AS INDI UNLESS OTHERWISE SPECIFIED (UOS):	ICATED BELOW		
SENSORS, INC. (MSI) NOT TO BE DISCLOSED TO OTHERS, REPRODUCED, OR USED FOR ANY OTHER PURPOSE, EXCEPT AS AUTHORIZED IN WRITING BY MSI. MUST	1 PLACE DECIMAL ±.015 2 PLACE DECIMAL ±.01 3 PLACE DECIMAL ±.005		SIZE	OY2U4 ST-A-1555 A
BE RETURNED ON DEMAND.	FRACTIONAL ±1/64 ANGULAR ±1/2*		SCALE	NONE SHEET 4 OF 8

PRE-AMP ADJUSTMENTS:

- 1. CARRIER ADJUSTMENT A TWENTY TURN CONTROL USED TO PRECISELY TUNE THE SPECIFIC SENSING DEPTH, WALL THICKNESS, MATERIAL TYPE, AIR GAP, ETC. OF THE RF SENSOR COIL.
- 2. RF TRIGGER A TWENTY TURN CONTROL USED TO SET THE TRIGGER LEVEL OF THE RF COIL INPUT ABOVE THE AMBIENT NOISE LEVEL.
- 3. MAG TRIGGER A TWENTY TURN CONTROL USED TO SET THE TRIGGER LEVEL OF THE MAGNETIC COIL INPUT ABOVE THE AMBIENT NOISE LEVEL.
- 4. COIL SELECTION A TWO (2) POSITION JUMPER THAT IS USED TO SELECT THE DESIRED SENSOR COIL TO BE USED AS THE INPUT:

INPUT COILTYPE HD2 SETTING

RF RF MAGNETIC MAG

5. LIN\RAW PULSE - A TWO (2) POSITION JUMPER THAT IS USED TO SELECT THE DESIRED PULSE TRAIN:

PULSE TYPE
RAW PULSE TRAIN
RAW (STD)

6. PULSE SELECTION — A FOUR (4) POSITION JUMPER THAT IS USED TO SELECT THE DESIRED TYPE OF PULSE OUTPUT:

PULSE OUTPUT TYPE HD1 JUMPER SETTINGS

OPEN COLLECTOR JP2

SQ WAVE TO VIN JP1 AND JP2

TTL/CMOS JP1, JP2 AND JP3 0-10 VDC SQ WAVE JP1, JP2 AND JP4

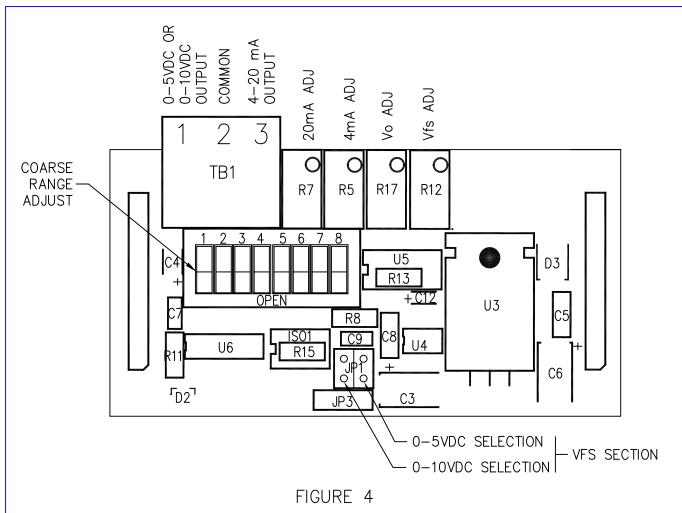
7. PULSE SCALING ADJUSTMENTS (PULSE SCALER) — AN EIGHT (8) POSITION JUMPER HEADER LOCATED ON PA1001A CIRCUIT BOARD WHICH IS USED IN PROGRAMMING THE DESIRED PULSE OUTPUT SCALING OF /1, /2, /4, /8, /16, /32, /64, OR /128. UNIT SHIPPED WITH /1 AS STANDARD.

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CONTROL AND ADJUSTMENT DEFINITIONS

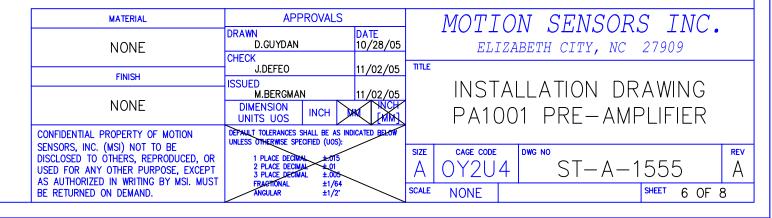
MATERIAL	APPROVALS			MOTION SENSORS INC.					
NONE	DRAWN D.GUYDAN	DATE 10/28/05			ABETH CITY, NC				
FINISH	CHECK J.DEFEO	11/02/05	TITLE		,				
NONE	ISSUED M.BERGMAN DIMENSION	11/02/05			llation dr				
	UNITS UOS INCH			PA1001	1a pre–am	IPLIFIER			
CONFIDENTIAL PROPERTY OF MOTION SENSORS, INC. (MSI) NOT TO BE	DEFAULT TOLERANCES SHALL BE AS INC UNLESS OTHERWISE SPECIFIED (UOS):	JICATED BEEOW	0.75	0.05.005	DWG NO		DEV		
DISCLOSED TO OTHERS, REPRODUCED, OR USED FOR ANY OTHER PURPOSE, EXCEPT AS AUTHORIZED IN WRITING BY MSI. MUST	1 PLACE DECIMAL ±.015 2 PLACE DECIMAL ±.01 3 PLACE DECIMAL ±.005	_	SIZE	OY2U4	ST-A-	1555	A		
BE RETURNED ON DEMAND.	FRACTIONAL ±1/64 ANGULAR ±1/2*		SCALE	NONE		SHEET 5 OF	8		

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REVISIONS
REV DESCRIPTION DATE APP
A ORIGINAL RELEASE PER DDR 11/02/05 ADG

CONTROL AND ADJUSTMENT DETAILS



ANALOG OUTPUT ADJUSTMENTS:

- 20MA ADJ A TWENTY TURN ADJUSTMENT WHICH IS USED TO SET CURRENT OUTPUT TO THE DESIRED SPAN CORRESPONDING TO THE EQUIVALENT FULL SCALE RANGE, I.E., 20 MA AT 100 RPM
- 2. 4MA ADJ A TWENTY TURN ADJUSTMENT THAT IS USED TO SET THE CURRENT OUTPUT SIGNAL TO THE DESIRED ZERO VALUE, I.E., 4MA AT ZERO RPM.
- 3. VFS ADJ A TWENTY TURN ADJUSTMENT THAT IS USED TO SET THE VOLTAGE OUTPUT TO THE DESIRED SPAN CORRESPONDING TO THE EQUIVALENT FULL SCALE RANGE, I.E., 5VDC OR 10VDC AT 100 RPM.
- 4. VO ADJ A TWENTY TURN ADJUSTMENT THAT IS USED TO SET THE VOLTAGE OUTPUT SIGNAL TO THE DESIRED ZERO VALUE, I.E., OVDC AT ZERO RPM.
- 5. COARSE RANGE ADJ A DUAL IN LINE (DIP) SWITCH WHICH IS LOCATED ON THE PCA—121 BOARD, WHICH IS USED TO PERFORM A COARSE RANGE ADJUSTMENT FOR THE INPUT FREQUENCY RANGE.
- 6. VFS SELECTION A TWO (2) POSITION JUMPER THAT IS USED TO SELECT THE DESIRED VOLTAGE OUTPUT RANGE OF EITHER 0-5VDC OR 0-10VDC.

TABLE 2						
FREQ (kHZ)	SW POS					
.051	1					
.12	2					
.24	3					
.48	4					
.8–1.6	5					
1.6-3.2	6					
3.2-6.4	7					
6.4-12.8	8					

TABLE 1						
MAN	MODEL	DESCRIPTION				
FLUKE	8060A	TRUE RMS MULTIMETER				
TOPWARD	8112	DIGITAL FUNCTION GENERATOR				
VIZ	WD-755	MULTI-FUNCTION GENERATOR				
SPECTROL	8-T000	ADJUSTMENT TOOL				

CONTROL AND ADJUSTMENT DETAILS

REVISIONS

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MATERIAL	APPROVALS		MOTION SENSORS INC.				
NONE	DRAWN D.GUYDAN CHECK	DATE 10/28/05			ABETH CITY, NC 27909		
FINISH	J.DEFE0	11/02/05	TITLE				
	ISSUED M.BERGMAN	11/02/05		INSTAI	LLATION DRAWING		
NONE	DIMENSION INCH	[MM]		PA1001	1A PRE-AMPLIFIER		
CONFIDENTIAL PROPERTY OF MOTION	DEFAULT TOLERANCES SHALL BE AS IND UNLESS OTHERWISE SPECIFIED (UOS):	ICATED BELOW					
SENSORS, INC. (MSI) NOT TO BE DISCLOSED TO OTHERS, REPRODUCED, OR USED FOR ANY OTHER PURPOSE, EXCEPT AS AUTHORIZED IN WRITING BY MSI. MUST	1 PLACE DECIMAL ±.015 2 PLACE DECIMAL ±.01 3 PLACE DECIMAL ±.005		SIZE	OY2U4	ST-A-1555	REV A	
BE RETURNED ON DEMAND.	FRACTIONAL ±1/64 ANGULAR ±1/2*		SCALE	NONE	SHEET 7 OF	8	

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CALIBRATION PROCEDURE:

- 1. FOR FIELD CALIBRATION/TROUBLESHOOTING THE PC121S REFER TO TABLE 1 FOR SUGGESTED EQUIPMENT.
- 2. CURRENT OUPUT:
 - A) CONNECT A DIGITAL MILLIAMPMETER OR EQUIVALENT, ACROSS THE CURRENT OUTPUT TERMINALS.
 - B) ON THE PCA-121 SELECT THE "COARSE RANGE ADJ" THAT CORRESPONDS TO THE MAXIMUM INPUT FREQUENCY. REFER TO TABLE 2 FOR SELECTION OPTIONS.
 - C) ADJUST "4MA ADJ" CONTROL FOR DESIRED "ZERO" CURRENT, I.E. 4MA.
 - D) INJECT THE FULL-SCALE TEST FREQUENCY (DC SQUARE WAVE-5V) WHILE ADJUSTING "20MA ADJ" FOR CURRENT EQUAL TO SET (SPAN).
 - E) ITERATE ABOVE STEPS UNTIL NO CHANGE IS OBSERVED.
- 3. VOLTAGE OUTPUT:
 - A) NOTE: FOR PROPER ADJUSTMENT OF THE VOLTAGE OUTPUT, FIRST PERFORM CALIBRATION OF THE CURRENT OUTPUT.
 - B) CONNECT A DIGITAL VOLTMETER ACROSS THE VOLTAGE OUTPUT TERMINALS.
 - C) ON THE PCA-121 SELECT THE "COARSE RANGE ADJ" THAT CORRESPONDS TO THE MAXIMUM INPUT FREQUENCY. REFER TO TABLE 2 FOR SELECTION OPTIONS.
 - D) ADJUST "VO ADJ" FOR 0.00 VOLTS.
 - E) INJECT THE TEST FREQUENCY (SINE WAVE) WHILE ADJUSTING "VFS ADJ" FOR VOLTAGE EQUAL TO SET (SPAN).

MATERIAL

F) ITERATE ABOVE STEPS UNTIL NO CHANGE IS OBSERVED.

CONTROL AND ADJUSTMENT DETAILS

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CONFIDENTIAL PROPERTY OF MOTION	DEFAULT TOLERANCES SHALL BE AS IND UNLESS OTHERWISE SPECIFIED (UOS):	ICATED BELOW			
SENSORS, INC. (MSI) NOT TO BE DISCLOSED TO OTHERS, REPRODUCED, OR USED FOR ANY OTHER PURPOSE, EXCEPT AS AUTHORIZED IN WRITING BY MSI. MUST	1 PLACE DECIMAL ±015 2 PLACE DECIMAL ±01 3 PLACE DECIMAL ±005 FRACTIONAL ±1/64		cage code Y2U4	ST—A—1555	
BE RETURNED ON DEMAND.	ANGULAR ±1/2*		ALE NONE	SHEET	8 OF 8

APPROVALS