

Trig-Tek™
368A
Quad 4-20 mA
Sensor Conditioner
User Manual

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FOR YOUR SAFETY

Before undertaking any troubleshooting, maintenance or exploratory procedure, read carefully the **WARNINGS** and **CAUTION** notices.



CAUTION
RISK OF ELECTRICAL SHOCK
DO NOT OPEN



This equipment contains voltage hazardous to human life and safety, and is capable of inflicting personal injury.



If this instrument is to be powered from the AC line (mains) through an autotransformer, ensure the common connector is connected to the neutral (earth pole) of the power supply.



Before operating the unit, ensure the conductor (green wire) is connected to the ground (earth) conductor of the power outlet. Do not use a two-conductor extension cord or a three-prong/two-prong adapter. This will defeat the protective feature of the third conductor in the power cord.



Maintenance and calibration procedures sometimes call for operation of the unit with power applied and protective covers removed. Read the procedures and heed warnings to avoid "live" circuit points.

Before operating this instrument:

1. Ensure the proper fuse is in place for the power source to operate.
2. Ensure all other devices connected to or in proximity to this instrument are properly grounded or connected to the protective third-wire earth ground.

If the instrument:

- fails to operate satisfactorily
- shows visible damage
- has been stored under unfavorable conditions
- has sustained stress

Do not operate until performance is checked by qualified personnel.

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DOCUMENT CHANGE HISTORY

Revision	Date	Description of Change
A	04/27/2011	Document Control release

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Chapter 1

Introduction

The 368A Quad 4-20 mA Sensor Conditioner **Figure 1-1** is designed to accept Inputs from ICP type sensors and Outputs are proportional 4-20 milliamps. An internal switch for each channel selects the adjustable sensor CURR either ON or OFF. The 4-20 mA output current corresponds to 0 to 500 millivolts RMS full scale eu with a 100 mV/eu sensor. Full scale is adjusted by an internal GAIN potentiometer for 5 to 50 Full Scale eu. The inputs and outputs are on BNC connectors.



Figure 1-1, 368A Quad 4-20 mA Sensor Conditioner

Features include:

- Four channels
- 100 mV/eu input sensitivity
- 5-50 FS eu (adjustable)
- 2-5 mA sensor current
- 4-20 mA outputs
- Full-scale AC output
- Isolated primary power
- BNC inputs & outputs
- 20-36 VDC power

Description

The Quad 4-20mA Sensor Conditioner is packaged in a Hammond Instruments 1590 TFL box. The POWER Input is 20 to 36 Volts DC at approximately 125 milliamps. The primary power has 500 Volts isolation from signal ground. Power is via a three-Pin PT02A-8-3P connector. Pin A is plus power. Pin B is return. Pin C is chassis ground. The mating connector is a PT06A-8-3S-SR.

The Inputs and Outputs are on BNC's. An internal switch for each channel on the PC board CURR ON-OFF. The Output 4-20 milliamps corresponds to 0 to full scale RMS EU. Full scale is adjusted by an internal GAIN potentiometer for 5 to 50 Full Scale RMS EU.

10 to 18 Volts DC power can be supplied as an option at the time of order.

Specifications

EU Input (4ea.)

Impedance	>100 K Ohms
Level	7 VRMS (max).
Sensitivity	100 mV/eu
Full scale eu (internal gain ADJ)	5 to 50 RMS eu.
Full scale Level	0-1 Volt RMS
Sensor Current	2-5 mA (adjustable)
Linearity	±1%.
Frequency Response	0.5 Hz to 10 KHz
Connector	BNC (Low side SIG GND).

Filter A/C (Output)

Note:

1. *Filter cutoff frequencies must be specified at time of order or the nominal cutoff will be used.*
2. *Filters are in series with the full scale and 4-20mA output.*

High Pass 12dB/oct	0.3 Hz–3 dB Cutoff
Low Pass 24dB/oct	Nominal 5 KHz–5% Cutoff

Full Scale AC Output

Impedance	>100 Ohms
Full Scale Level	0-500 mVRMS
Accuracy	±2%
FREQ Response (-5%BW Nominal)	0.5 Hz to 5 KHz (see Filters)
Connector	BNC (Low side SIG GND)

4-20 RMS Milliamps Output (4 ea)

Current @ (Zero)	4.0 ±0.05 milliamps
Current @ Full Scale	20.0 ±0.5 milliamps
Compliance Voltage	12 Volts
Shunt Resistance	300 Ohms max
Load Resistance	300 Ohms max
Accuracy	±3%
Time Constance	2 seconds
Connector	BNC (Low side 100 Ohms Current Shunt)

Dimensions

	5.25" long x 3.25" wide x 2.25" deep
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Power

	20-36 Volts DC @ >150 milliamps
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Chapter 2

Installation

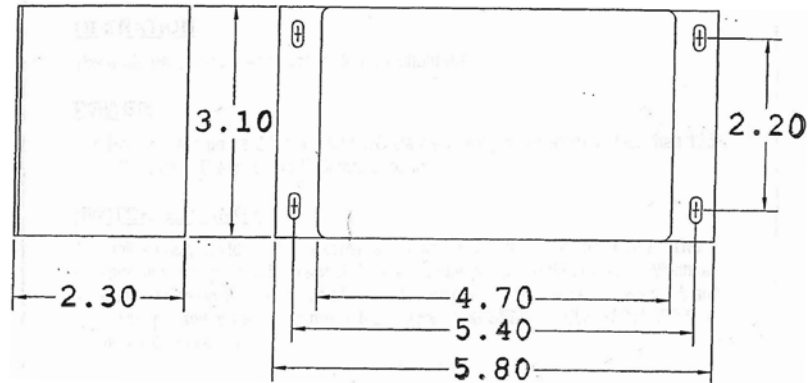


Figure 2-1, 368A Dimension Diagram

The 368A is mounted to a panel or bulkhead using 6-32 hardware. **Figure 2-1** shows the dimensions of the package and of the mounting holes.

Power 20-36 VDC is connected via the 3 pin connector – plus pin A, minus B and C is chassis ground.

The inputs are on BNC connectors – low side at signal ground. The 4-20mA outputs are on BNC's – the low side is the current shunt and must not be grounded.

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Chapter 3

Operation

The 4-20 mA Conditioner has four identical channels.

Power

The Power to the unit is 20 to 36 Volts DC via the three-pin connector at less than 125 mA. Pin A-Plus, B-Minus and C-Signal Ground.

Switch Settings

The unit is designed for ICP type sensors. Sensor current can be ON or OFF. The selection is accomplished by a switch for each channel marked SW100-SW400, which are accessible by removing the top lid of the unit. The current can be set between 2.5 and 5.0 milliamps, and is set for 3.5 mA at the factory. (See **Sensor Current Setting in Calibration Chapter 4**).

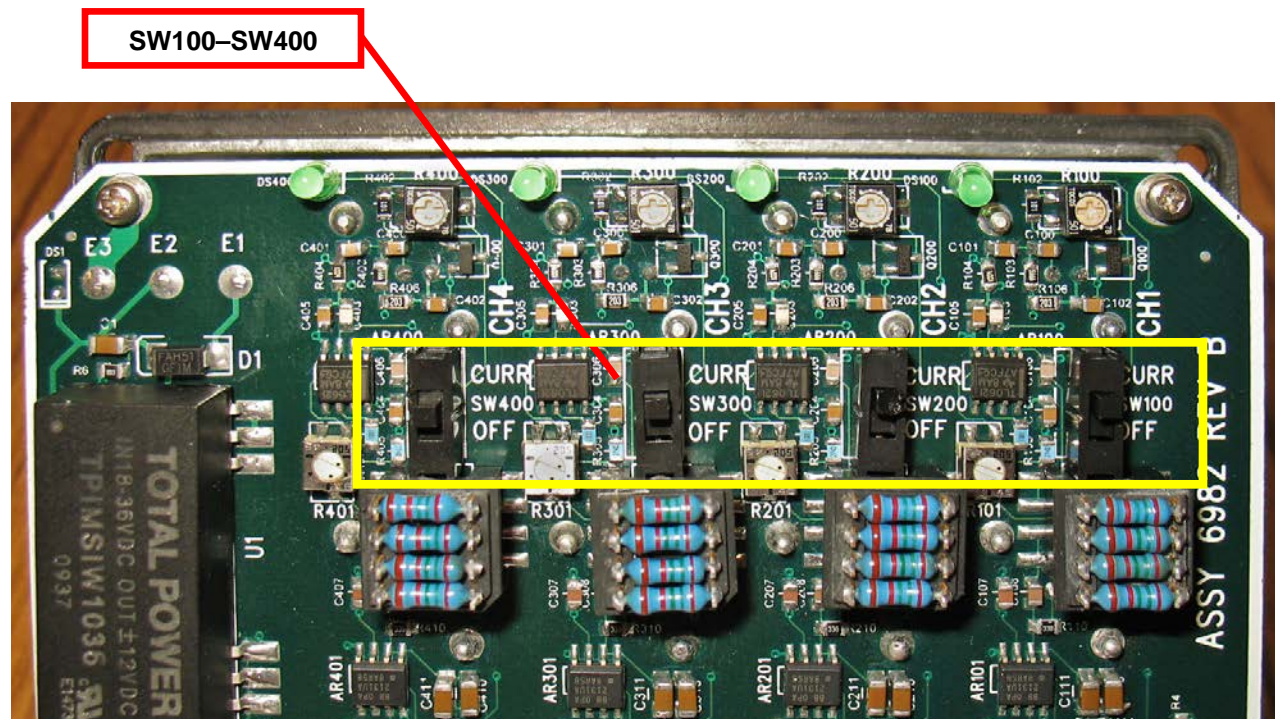


Figure 3-1, Sensor Current Switches

Inputs

The INPUTS (4 ea) is via a BNC connector, with the low side at SIGNAL GND.

Full Scale AC Outputs (4 ea)

The full scale adjustments accessible also by removing the cover should be set to accommodate the expected full scale RMS eu. Full scale settings of 5 to 50 RMS eu can be set with a 100 mV/eu sensor. Full scale AC Output (4 ea) on BNC connectors low side signal ground. **(See Full Scale Settings in Calibration Chapter 4).**

4-20 mA OUTPUTS (4 ea)

The 4-20 mA OUTPUTS are on BNC connectors (low side 100 Ohms current shunt). The output should see a $250 \pm 0.1\%$ Ohm resistor at the differential input for a 5 VDC FS eu output (300 Ohm max).

Chapter 4

Calibration

The 368A has two adjustments. To make these adjustments the top cover must be removed and 20 to 36 VDC power applied to the unit. Once set the calibration of the unit can be checked in place. The circuitry is of the latest integrated technology. A 12- to 18-month calibration schedule is recommended.

Required Test Equipment

Note: Equivalent test equipment can be substituted.

Calibrator	Astronics Test Systems 41P or 45EMD
Millimeter	Fluke 8845A

Procedure

Sensor Current Settings

The sensor current is set for 3.5 milliamps at the factory. To make other current adjustments:

1. Connect the DC current meter to the CH1 INPUT jack.
2. Apply power to the unit.
3. Set current adjust R100 for the required current between 2 and 5 milliamps. (Refer to **Figure 4-1**.)
4. Repeat steps 1 through 3 to set current adjustments using R200, R300, and R400 for the other three channels.
5. Remove test equipment.

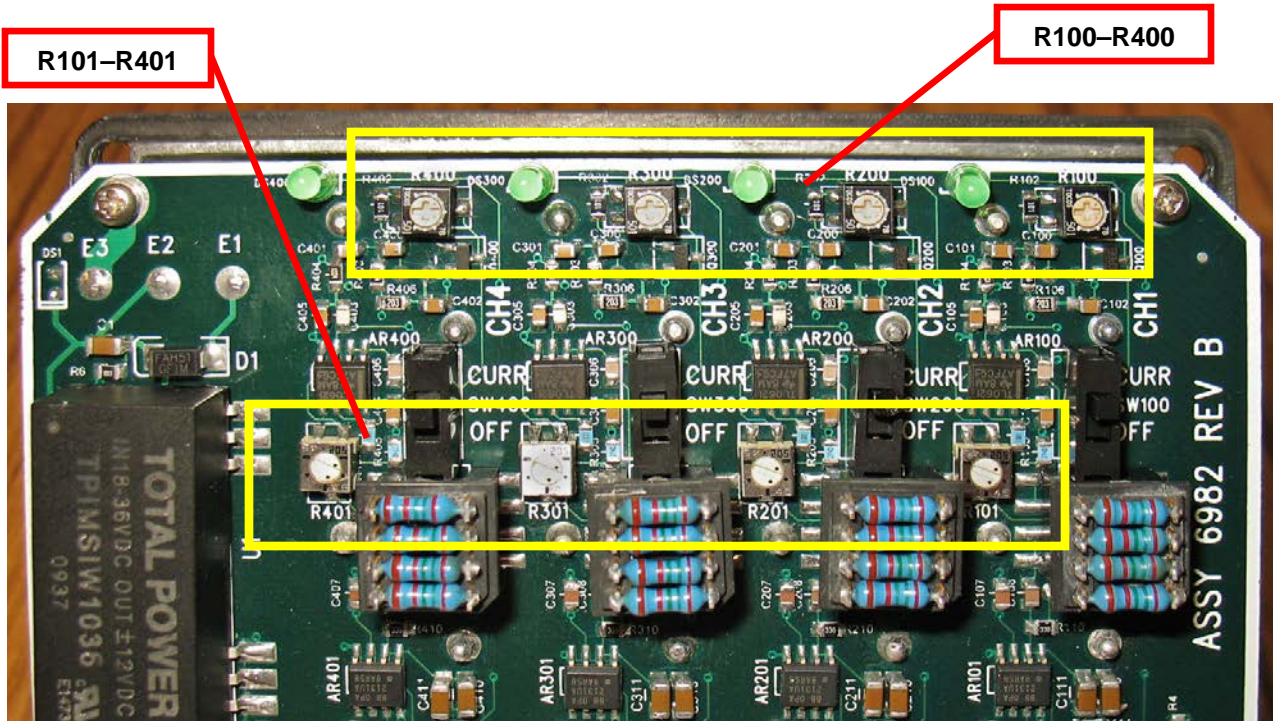


Figure 4-1, Resistor Adjustment Locations

Full Scale Settings

The full scale adjustment permits setting from 5-50 FS eu (engineering units). The setting requires information for the highest eu expected for the situation being monitored. The input sensor sensitivity is 100 mV/eu (engineering units). In this application the eu is acceleration.

An example for setting FS eu for 20 is shown;

Known: 20 milliamp for fullscale output
 100 millivolts/eu input sensitivity
 20 eu full-scale output

1. Connect the calibrator to the CH1 input jack.
2. Set the calibrator for approximately 100 Hz at 2.00 VRMS (20 eu x 100 MVRMS/eu). The Sensor Current should be OFF for this procedure.
3. Connect the DC current meter to the 4-20 mA output jack.
4. Set the FS ADJUST R101 for 20 \pm 0.2 milliamp indication on the DC currentmeter. (Refer to **Figure 4-1**.)
5. Repeat steps 1 through 4 to set FS adjustments using R201, R301, and R401 for the other three channels.
6. Return the sensor current to ON.