

# **GPI Model 806**

## **INSTRUCTION MANUAL**

Integrated Time Systems, Inc.

## WARRANTY

Integrated Time Systems, Inc. is dedicated to designing, engineering, and manufacturing Gas Panel Interfaces of the highest quality and utility. Your satisfaction with our products is of great importance to us.

Our equipment is warranted against defects in materials and workmanship for one year from the date of shipment. We will repair or replace, at our option, products that prove to be defective during the warranty period. All repairs will be made at the manufacturer's facility.

As with any process equipment, malfunction and failure can occur due to unforeseen or uncontrollable circumstances. ITS, its officers, managers, engineers, representatives, etc. cannot be held responsible for such failure nor for the customer's negligence or misuse of this equipment. At the very least, the customer must follow the procedures and recommendations outlined in this manual in order to obtain proper functioning of the system and maintain a reasonable level of performance.

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No other warranty is expressed or implied.

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## **1. DESCRIPTION**

The **GPI Model 806** is a power supply/interface box designed to provide power and/or setpoints for either one or two gas flow channels. In particular, the **Model 806-01** supports a single gas channel and the **Model 806-02** supports two channels. The acronym '**GPI**' in the product name stands for **Gas Panel Interface**. While the **Model 806**, in particular, supports many applications other than semiconductor processing, the unit is one of a series of several interface boxes manufactured by Integrated Time Systems that links a process sequencer to a gas mixing/distribution manifold or tray.

The **GPI Model 806** is particularly useful in the following applications:

- Systems with one or two MFC<sup>1</sup> where the process controller does not provide power for the Mass Flow Controllers or Mass Flow Monitors.
- Systems with one or two MFC where the process controller does not provide analog setpoints for the gas flows.
- Systems that require a redundant means of monitoring the gas flow(s).
- Systems where a secondary gas channel needs to be slaved to a primary gas channel.

Among the features of the **GPI Model 806** are:

- +/- 15 volt switching power supply for MFC's.
- 10-turn wire wound potentiometers for setpoint control of (2) MFC's.
- Accurate 5-volt reference for stable gas flow setpoints.
- MFC 'override' on/off control.
- Internal/External switch to select the setpoint source.
- Standard 1/4 width instrument rack mount enclosure.
- Configurable as a master/slave ratio controller.

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<sup>1</sup>MFC: Mass Flow Controller - controls flow of a gas stream in response to an analog control voltage.

## **2. INSTALLATION OVERVIEW**

### **2.1. Physical Requirements**

The **GPI Model 806** is packaged in a modified, off-the-shelf, quarter-width instrument rack enclosure. Hardware for rack-mounting single or multiple units may be obtained from the enclosure's manufacturer, Lansing Instrument Corp. in Ithaca, New York at 800-847-3535. The basic enclosure is Lansing part number P2Q08-0B1B.

Note: Since many of the front panel controls require actuation force, it is recommended that the GPI be secured in some manner.
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Though the enclosure itself is only 8.0 inches deep, additional clearance may be required to the rear of the **GPI Model 806** enclosure for the electrical connectors on the rear panel.

### **2.2. AC Power**

An AC power entry module is located on the rear panel. This module combines four functions:

- Power entry.
- Fuse.
- Power switch.
- Power line filter.

The power entry module accepts a standard 3-conductor detachable power supply cord. A Belden, part number 17250, line cord is supplied with the unit and is recommended in the event replacement is necessary.

Selection of line voltage is automatic; there is no line voltage selector included in the power entry module.

The power entry module is fitted with a 2-amp 250-volt 3AG fuse. A spare fuse is located inside the fuse compartment. To access the fuses, remove the line cord and gently pry the hinged compartment cover open from the top using a thin, flat-bladed screwdriver. The active fuse is contained in a plastic clip that is easily extracted. Note the direction of the arrows on the hinged cover when reinserting the fuse clip.

### 2.3. MFC Connectors, J1 and J2

Two polarized, flat-cable, insulation displacement connectors are provided for the MFC's. Following is the pinout of these connectors, J1 and J2. The number in the "Card-edge" column identifies the pin on the MFC end of the cable, while the number in the "IDC" column identifies the pin on the flat cable connector end (Insulation Displacement Connector). The pinout shown is compatible with standard Unit Instruments Mass Flow Controllers. Other pinouts can be provided upon request.

Card-edge Pin #	IDC Pin #	Function
1	1	Case Gnd
2	3	Power Common
3	5	Output (0-5v)
4	7	+15 volts
5	9	N/C
6	11	N/C
7	13	Keyway
8	15	N/C
9	17	N/C
10	19	Common

Card-edge Pin #	IDC Pin #	Function
A	2	Setpoint
B	4	Signal Common
C	6	Signal Common
D	8	Valve Test
E	10	N/C
F	12	-15 volts
G	14	Keyway
H	16	N/C
I	18	N/C
J	20	Valve Off

## 2.4. Jumpers

The **GPI Model 806** circuit board contains one or two groups of six jumpers depending on whether it is configured as a single channel unit or a dual channel unit. Each group of six jumpers controls the display scaling and decimal point placement for one gas channel.

To access the jumpers, remove the single screw that secures the top cover of the unit to the rear panel. Slide the top cover out of the enclosure and the jumper area will be accessible at the top of the circuit board.

The jumpers for *Channel A* are numbered JP11 through JP16 while the jumpers for *Channel B* are numbered JP21 through JP26. Jumper JP21 performs the same function for *Channel B* that jumper JP11 performs for *Channel A* and so forth. In the table below, the jumpers are identified as JPx1 through JPx6. Substitute '1' for 'x' to locate the jumpers for *Channel A* and substitute '2' for 'x' to locate the jumpers for *Channel B*.

The panel meters in the **GPI Model 806** are 3 digit units with an input range of 0 to 199.9 millivolts. Unless otherwise specified, jumpers JPx2 and JPx6 are installed by the manufacturer to display signals in the range of 0 to 5 volts as 0 to 100.0% and should not require attention during installation. To display flows in other engineering units, refer to the table below.

Jumper	Voltage Divider	5 volts would display as:
JPx1	1:99	0500
JPx2	2:98	1000 (as shipped)
JPx3	4:96	2000
Jumper	Decimal Point	Full Scale Display
JPx4	DP1	1.999
JPx5	DP2	19.99
JPx6	DP3	199.9 (as shipped)

## 2.5. Ratio Control

The **GPI Model 806** may be configured as a Master/Slave controller wherein the setpoint for *Channel B* is derived from the actual flow in *Channel A*.

Modifying the unit to operate in the *Ratio* mode is accomplished by relocating a wire on the MOLEX connector that connects the Channel B potentiometer to the circuit board. The top cover of the enclosure must be removed to provide access to this connector.

In the standard configuration, the clockwise end of the setpoint potentiometer is connected to Pin 4 of connector J20, where Pin 4 is referenced to +5 volts. To configure the unit as a ratio controller, remove the wire from Pin 4 of the connector and reinstall it in Pin 3 of the same connector. Pin 3 of the *Channel B* connector is connected to the actual gas flow signal for *Channel A*.



## 2.6. Calibration

In its standard configuration, the **GPI Model 806** uses fixed 0.1% resistors to scale the various analog voltages before presenting them to the panel meters. A group of three jumpers then determines which tap of the voltage divider is presented to the panel meter (See *Jumpers*, page 4).

In addition, a ten-turn, potentiometer is installed in parallel with the lowest resistor in the divider chain. This permits the display to be trimmed as required to further reduce display errors. Proper jumpers are installed and the calibration potentiometers are adjusted prior to shipment.

If the user chooses to alter the position of the scaling jumpers, it may be necessary to re-adjust the calibration potentiometers to maintain display accuracy. Access to the calibration potentiometers is obtained by removing the top cover plate.

To calibrate a particular channel, connect a 5.000-volt reference source to Pin 5 of the appropriate 20-pin ribbon cable connector (with Pin 3 as common) and adjust the appropriate potentiometer for a proper full-scale reading. The proper full-scale reading depends on the jumper positions as discussed above.

If the selected full-scale reading is 2000 (with or without decimal points), it will be necessary to calibrate with a reference voltage slightly less than 5.000 volts because the maximum display reading is 1999. In this case, use a reference voltage of 4.950 volts and adjust the potentiometer for a reading of 1980 (ignoring decimal points).

## 2.7. Gas Labels

A white area is provided adjacent to each panel meter to identify the gases being controlled. Imprinted adhesive labels may be obtained from the manufacturer upon request. Otherwise, a felt tip marker or soft pencil may be used.

## **3. OPERATION**

### **3.1. POWER Switch**

The power switch is located in the power entry module on the rear panel. The ON position of the switch is labeled 'I' and the OFF position is labeled 'O'. To operate the unit, place the switch in the ON position.

Note: It is advisable to wait thirty minutes after turning on the power for the temperature inside the enclosure to stabilize before making any adjustments.

### **3.2. INT/EXT Switch**

The **INT/EXT** switch at the right side of the front panel enables the internal setpoint vernier dials. When this switch is in its leftmost or **INT** position, the setpoint potentiometers are engaged. When the **GPI Model 806** is being used with Mass Flow Monitors as opposed to Mass Flow Controllers, this switch will have no effect. In installations where the **GPI Model 806** is being used to monitor Mass Flow Controllers and the gas points are being generated by a separate process sequencer, the conductor in the MFC cable which carries the setpoint from the **GPI Model 806** should be severed to insure that the locally generated setpoint does not conflict with that generated by the process sequencer. Whether or not the conductor is severed, the switch must be left in the **EXT** position under these conditions to disengage the setpoint potentiometers.

### **3.3. ON/OFF Switches**

In their leftmost positions, the **OFF** toggle switches assert an *MFC Override* signal to the Mass Flow Controller(s). These switches have no effect when the **GPI Model 806** is being used with Mass Flow Monitors as opposed to Mass Flow Controllers. In addition, the effectiveness of these switches in stopping gas flow depends on whether the override circuitry in the Mass Flow Controllers is functioning properly. In most applications, some additional means of interrupting gas flow should be provided.

### **3.4. DISPLAY Switches**

The **SET** push-button switches determine whether the panel meters display setpoints or actual gas flows. When the push-button is not depressed, the panel meter displays actual gas flow. To display the setpoint, momentarily depress the proper **SET** switch.

### **3.5. GAS SETPOINT Potentiometers**

When the **GPI Model 806** is being used with Mass Flow Controllers and the **INT/EXT** switch is in the **INT** position, the 10-turn potentiometer(s) determine the gas flow setpoints. To adjust the setpoint for a particular channel, rotate the lock on the setpoint vernier counterclockwise to release the dial. Depress and hold the **DISP** switch while adjusting the gas setpoint potentiometer. Alternatively, the numbers on the setpoint vernier may be used

for coarse adjustments. Once adjustments are complete, rotate the lock on the vernier clockwise to secure the setpoint.

Note that when the **GPI Model 806** is configured as a *Ratio* controller, the number on the *Channel B* setpoint vernier represents the desired fraction of *Channel A* gas flow. In this configuration, the *Channel B* setpoint display will only function when *Channel A* gas is flowing. (See *Ratio Control* on page 4)

## **4. SPECIFICATIONS**

The specifications listed below relate to the requirements and capabilities of the components contained in the **GPI Model 806** electronics enclosure.

### **4.1. Physical**

Width:	3.94 inches.
Height:	3.34 inches.
Depth:	8.00 inches.
Weight:	1 pound, maximum.
Finish:	Black Anodized.

### **4.2. AC Power Requirements**

Voltage:	90 to 264 Volts AC.
Current:	Fused internally at 2 amps.
Frequency:	47 to 63 Hertz.
Power:	45 watts maximum.

### **4.3. MFC Power Supply**

Output 1:	+5 volts DC @ 0.4 amps (for panel meters)
Output 2:	+15 volts DC @ 1.2 amps
Output 3:	-15 volts DC @ 0.5 amps

**APPENDIX A, FRONT & REAR PANEL DRAWING**

