
I/O Input/Output (I/O) Module

- Wide array of I/O Modules available to meet your data acquisition and control requirements
- I/O Modules compatible with all NGA 2000 analyzer module technologies
- Easy I/O Module addition in the field
- Bi-directional communications with NGA 2000 Platform and analyzer modules
- Can replace auto calibration functions of PLC in CEMS applications

Data is meaningless unless it is communicated to the external world. This communication with external devices is made possible, in the case of the NGA 2000 Next Generation Analysis Series, via various I/O Modules.

The NGA 2000 Series architecture is built on three types of modular building blocks: the Platform, Analyzer Modules and I/O Modules. The Platform provides operator interface through display and keypad and the Analyzer Modules provide gas analysis functions. (See Figure 1.)

An expanding variety of analog and digital I/O Modules are available to fit your communication requirements, whether it be with a distributed control system (DSC), data acquisition system (DAS) or personal computer (PC).

Available analog I/O options include 0 to 5 VDC, 0 to 20 mA, 4 to 20 mA, alarms (3), auto calibration with solenoid valve switching capability and remote range change and identification.

The I/O Module is a printed circuit board with its own on-board microprocessor. This embedded intelligence allows bi-directional communications not only with external devices, but also between itself and the analyzer module and platform.

For analog communications at least one I/O Module is required for each analyzer module. Digital I/O Modules are capable of networking multiple analyzer modules.

The I/O Modules plug easily into the distribution assembly (found in the platform and single analyzer module enclosure). Each distribution assembly can accommodate up to five I/O Modules. These I/O Modules can be added at any time in the field to meet your expanded measurement requirements.

FEATURES

Input and output functions are determined strictly by software. Incorporated into I/O Modules are relay contact outputs, digital inputs and an analog output. (See Table 1 for available functions for individual I/O Modules.)

The connection to the analog I/O Module is made via a 25-pin, Sub D connector while the digital connection is via a 9-pin, Sub D connector. (For a traditional connection to a chart recorder, a terminal strip adapter is available as an accessory.) The following paragraphs give more details specific to each I/O Module.

BASIC ANALOG OUTPUT/ALARMS ³

This option utilizes up to three of the SPDT sets of relay outputs found on the I/O Module. The relays are configured as common, normally open and normally closed. Alarms may be user-configured via software in a failsafe mode or user-acknowledged reset mode. In the case of an alarm situation, a descriptive alarm message would appear on the operator interface display of the platform.

There are three basic status alarm categories: 1) **Concentration**, 2) **Warning** or **Fault** and 3) **Validity**.

The **Concentration Alarm** is consistent with the traditional concept of alarms in that a relay would be actuated when a setpoint value has been reached. The concentration alarm may be expressed as a percentage of the current range or as an absolute value. Alarms can be configured as low and/or high dependent on the setpoints. Alarm deadband is also a programmable variable, allowing you to set that value up to 20% of fullscale.

The second type of alarm is a **Warning** or **Fault Alarm**. It can be described as follows:

Warning: Warning indicates one or more of the software limits set on any variable has been exceeded (other than the main concentration variable). A software reset or other resolved software fault would also be reported. Examples of warning conditions could include "flow rate low" or "internal voltage too high." (Concentration output would still be valid.)

Fault: Fault indicates an unresolved hardware or software fault (i.e., something is not responding to network communications). Fault could also be safety related should the analyzer shut down due to a fault in safety-related hardware. Examples of fault alarm situations would be lack of purge air to the FID module or general analyzer module fault.

The third type of alarm is **Validity**. This type of alarm can be described by the following subcategories:

- Maintenance:** With this selection, a contact closure indicates a user has entered into the menu system. This could be used to alert the system of unauthorized entry.
- Calibration Mode:** Similar to the above maintenance status alarm, this selection provides contact closure when the system is in calibration.
- Invalid Reading:** This input would come from the analyzer module. The analyzer module would alert the system that there is an error in the reading. A contact closure would indicate this condition. An example of this would follow a calibration error.

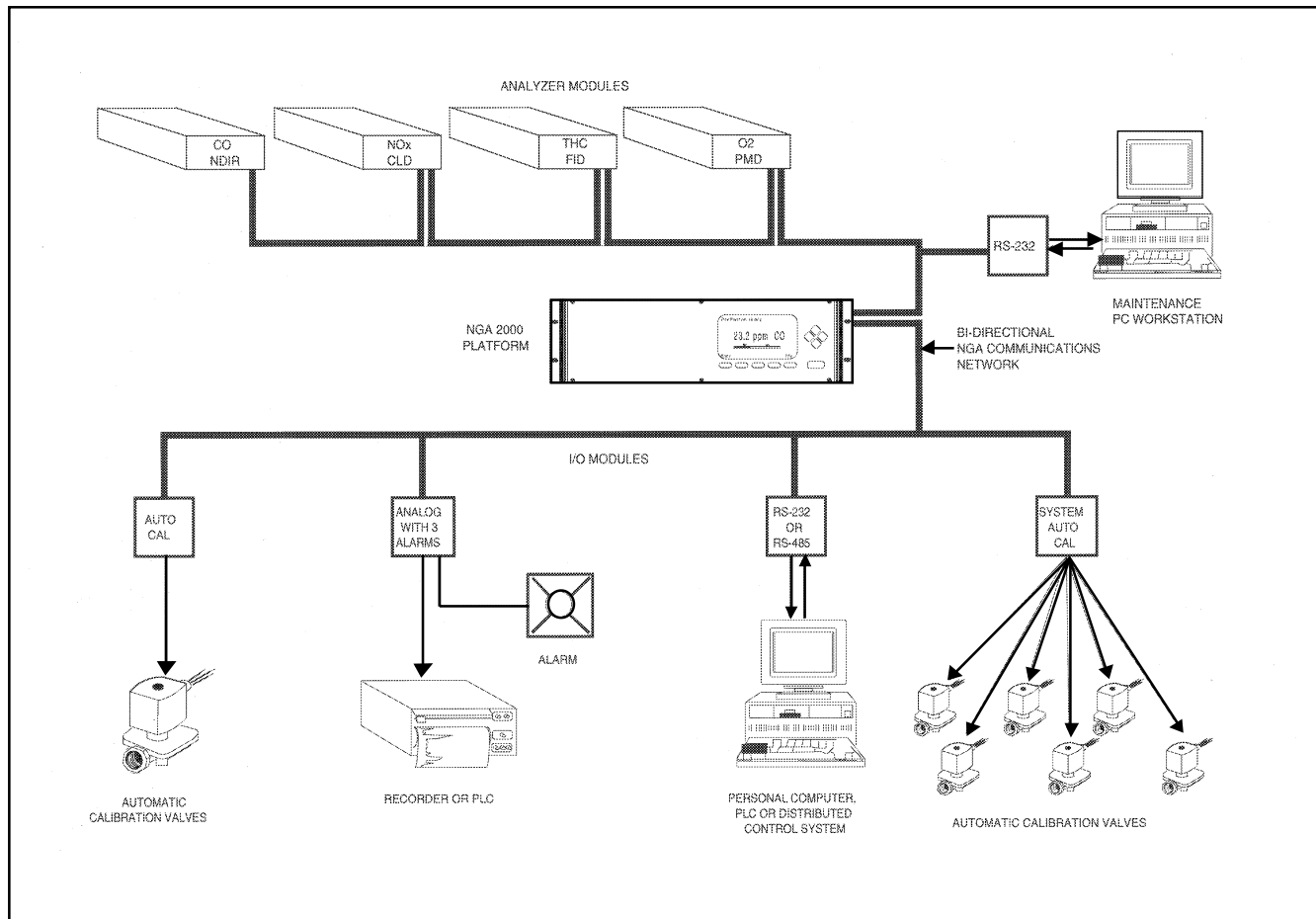
In addition to the alarm functions, this I/O Module also has automatic range change, remote range change and identification capabilities. Automatic range change between high and low ranges is a standard feature of the NGA 2000 Series. A user-adjustable time delay can be entered to prevent range switching to minimize spiking.

TABLE 1: AVAILABLE ANALOG I/O MODULE FUNCTIONS

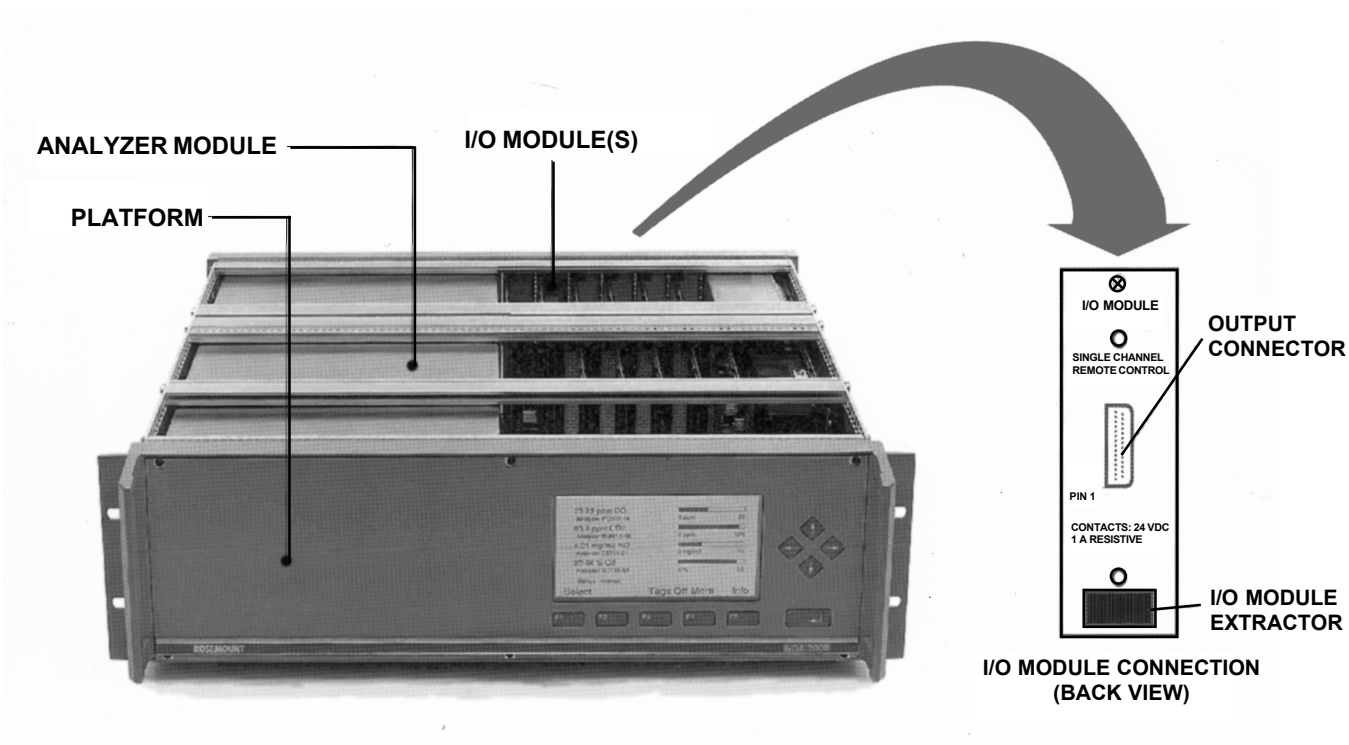
I/O MODULE DESCRIPTION		BASIC ANALOG PN/656193	AUTOCAL W/ANALOG PN/656194	SYSTEM AUTOCAL PN/656586
ITEM	FUNCTION			
OUTPUT	ANALOG, 0-5 v, 0-20 mA, 4-20 mA	✓	✓	
RELAY	ALARM #1	✓*	✓**	✓**
OUTPUT	ALARM #2	✓*		
(7 TOTAL)	ALARM #3	✓*		
	RANGE #1 ID	✓		
	RANGE #2 ID	✓		
	RANGE #3 ID	✓		
	RANGE #4 ID	✓		
	ZERO VALVE DRIVER		✓	✓
	BYPASS VALVE DRIVER		✓	✓
	RANGE #1/GAS #1 VALVE DRIVER		✓	✓
	RANGE #2/GAS #2 VALVE DRIVER		✓	✓
	RANGE #3/GAS #3 VALVE DRIVER		✓	✓
	RANGE #4/GAS #4 VALVE DRIVER		✓	✓
REMOTE	RANGE CHANGE 1 AND 2	✓	✓	
INPUT	RANGE CHANGE 3 AND 4	✓	✓	
(6 TOTAL)	CAL CORRECTION SELECT		✓	✓
	ZERO CALIBRATION		✓	✓
	SPAN CAL ON CURRENT RANGE		✓	
	SPAN CAL CYCLE		✓	✓
	LOCAL/REMOTE (PROBE) TIMING			✓
FEATURE	AUTOCAL TIMING DEVICE		✓	✓
	AUTO RANGE CHANGE SELECT	✓		

* Selectable per alarm class
** Fixed in-calibration alarm

FIGURE 1: NGA 2000 SYSTEM CONFIGURATION



NGA 2000 Platform This picture below show the positioning and connection of the I/O Modules. The platform will hold up to five I/O Modules. (Platform shown with top removed.)



AUTO CALIBRATION WITH ANALOG OUTPUT

This I/O option allows software to be used for automatic calibration of up to four ranges on one analyzer module at set time intervals. The frequency and duration of the calibration cycle is programmable. The four SPST and three SPDT relays are used to drive up to six solenoid valves (customer supplied) which turn zero and span calibration gases on and off when activated and also provide contact closure to indicate in-calibration mode. The output signal can be corrected for zero and span or a simple calibration check can be performed. Input allows remote control.

SYSTEM AUTO CALIBRATION

This I/O Module allows up to four analyzer modules to be automatically calibrated on one range. The frequency and duration of the calibration cycle is programmable. One alarm contact closure is used to indicate in-calibration mode. Six relay outputs are used to drive six solenoid valves. The output signal can be corrected for zero and span. This module can virtually eliminate the need for a programmable logic controller PLC in most CEMS applications.

RS232 DIGITAL INTERFACE

This I/O Module provides three customer selectable protocols and will support multiple analyzer modules and the associated platform(s), the protocols supported include; serial RS232, AK RS232, or Modbus RTU RS232. In addition to allowing remote polling of primary and diagnostic analyzer variables, the Digital I/O Module allows bi-directional control of analyzer module functions including full scale range, range change, calibration, alarm set points, etc.

ORDERING INFORMATION

PART NUMBER	DESCRIPTION
I/O Modules	
656193	Analog Output w/3 Alarms
656194	Analog Output w/Auto Calibration
656586	System AutoCalibration
658100	LON I/O and RS232 Module
658185	High-Speed Analog I/O w/3 Alarms

ACCESSORIES

656318	Terminal Strip Adapter
192702	DDE server, PC Interface Kit

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SI/O AND D/I/O MODULES

The serial capable I/O and Digital I/O modules provide multiple analog output capability on a single PCB or multiple analog outputs plus a RS232 output on the same PCB. These I/O modules are configured as defined in SI/O (multiple output) modules below. All analog channels are 0/2 to 10 VDC, or 0.4 to 20 maDC. The DI/O module provides additional digital inputs (qty. 8) and digital outputs (qty. 24) on each PCB.

PC INTERFACE PACKAGE

The PC Interface Package allows bi-directional communication between the NGA 2000 analyzer system and a standard IBM or IBM-compatible PC operating in the Windows* environment. Each PC Interface package includes both hardware and software components. The central hardware component is the Echelon Series 73000 (external) Serial LONTalk Adapter (SLTA) or PC (buss mounted) Serial LONTalk** Adapter (PCLTA).

GENERAL SPECIFICATIONS

Output:

Output relays:
7 relay contacts (3 relays SPDT, 4 relays SPST)
Contact rating:
24 VDC, 1 amp resistive (requires inductive load protection)

Input:

Standard analog output:
7 relay contacts (3 relays SPDT, 4 relays SPST)

I/O Module Connection:

Analog Output I/O Modules:
25-pin, Sub D "Computer Style" connector; optional terminal strip adapter (see accessories)

PART NUMBER	DESCRIPTION
SI/O (Multiple Output) Modules	
JA00000	2 Analog Outputs, w/3 Alarms
JB0000A	2 Analog Outputs, w/3 Alarms, and RS232
JC00000	4 Analog Outputs, w/3 Alarms
JD0000A	4 Analog Outputs, w/3 Alarms, and RS232
JE00000	6 Analog Outputs, w/3 Alarms
JF0000A	6 Analog Outputs, w/3 Alarms, and RS232
JG00000	8 Analog Outputs, w/3 Alarms
JH0000A	8 Analog Outputs, w/3 Alarms, and RS232
JI00000	Digital I/O Module, w/ 8 D-In and 24 D-Out

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