INSTALLATION INSTRUCTIONS

EXACTA 21 MONITORING AND CONTROL SYSTEM

FORM EXACTA 21 II 11-07

CAUTION: THE EXACTA 21 CONTROL SYSTEM IS CSA CERTIFIED FOR USE IN CLASS I, GROUPS C & D, DIVISION 2 HAZARDOUS LOCATIONS WHEN INSTALLED IN ACCORDANCE WITH THESE INSTRUCTIONS.

THE DIGITAL AND ANALOG SIGNAL INPUTS OPERATE AT A VERY LOW VOLTAGE AND POWER LEVEL AND MUST NOT CONTACT ANY EXTERNAL VOLTAGE SOURCE. DAMAGE TO THE SYSTEM WILL RESULT FROM CONNECTION BETWEEN THE SIGNAL INPUT TERMINALS AND THE IGNITION SYSTEM OR ANY AC OR DC POWER SOURCE.

WARNING: DEVIATION FROM THESE INSTRUCTIONS MAY LEAD TO IMPROPER ENGINE/MACHINE OPERATION WHICH COULD CAUSE PERSONAL INJURY TO OPERATORS OR OTHER NEARBY PERSONNEL.

1.0 DESCRIPTION

1.1 The Altronic **EXACTA 21** control system is an electronic device designed to monitor and control gas compressors and associated site equipment. The **EXACTA 21** can monitor temperatures, pressures, levels, and other signals through analog and discrete I/O boards. The **EXACTA 21** uses a microprocessor and battery-backed RAM to process the input signals and to store the setup and setpoint values. A backlit, 8 line x 40 character LCD display is programmable and shows process values and descriptions, event messages, real time clock and many other variables. A front-mounted, programmable 21-button keypad serves as the user interface.

1.2 The **EXACTA 21** Computer Module communicates to the Analog and Discrete I/O Boards using the Exacta ports on the bottom of the **EXACTA 21** Computer Module. Each of the two Exacta ports can have up to four Analog or Discrete I/O Boards linked together in a series connection. The Analog I/O Boards have 16 analog inputs and 4 analog outputs. The Discrete I/O Boards have 12 digital inputs and 12 digital outputs and one RPM input. A total of eight boards (any combination of Analog or Discrete Boards) may be used in a system. Each board has an Exacta “in” port and an Exacta “out” port used for communications between the computer module and the I/O Boards. The boards are “daisy-chained” to each other using these ports. The Analog Board part numbers are **691404-1** and **691404-2** and the Discrete Board part numbers are **691405-1** and **691405-2**.

1.3 The **EXACTA 21** Computer Module has one **RS232** port and one **RS485/422** port for programming and for downloading reports. An **RJ11** connector is used for the optional modem connection. These ports furnish the capability of communicating with a host system **(SCADA)** through Modbus protocol.

1.4 The recommended power requirement for the **EXACTA 21** system is 24 Vdc, 5 amps max.

1.5 For proper operation, these instructions must be adhered to strictly.

2.0 COMPUTER MODULE - 691403-1

2.1 COMPUTER MODULE

The **691403-1** Computer Module contains the LCD display, integral keypad, and communications ports. The power requirement for the computer module is 24 Vdc, 2 amp max.

2.2 INPUT POWER

Input power is brought into the Computer Module on the side of the unit via a Phoenix-type connector. Minus (–) is power supply common and plus (+) is power supply +24 Vdc. The Computer Module must be grounded to panel ground using the terminal provided.

2.3 EXACTA PORTS

There are two Exacta ports located on the bottom of the Computer Module; they are female DB-9 connectors used to communicate to the I/O Boards. Each Exacta port can handle up to four I/O Boards.

2.4 RS232 AND RS485/RS422 PORTS

The **RS232** port is generally used for uploading and downloading (configuring) the Computer Module. A special cable, **P/N CW1642-1**, must be used from the Computer Module to the PC (personal computer) or laptop computer with the side marked **TO EXACTA** connected to the **EXACTA 21** Computer Module's **RS232** port, and the end marked **TO PC** connected to an **RS232** serial port of the PC or laptop. **FIGURE 7 SHOWS THE PIN-OUT OF THIS CABLE.**

The **RS485/422** port can be used to communicate to **SCADA** systems or to optional graphical user interfaces using Modbus RTU.

2.5 MODEM CONNECTOR

The modem connector is a standard **RJ11** phone line connector. This connector can be used to remotely connect to the Exacta 21 computer using a phone line to update a configuration parameter, diagnose problems, collect record data and others.

NOTE: The optional internal socket modem, P/N CW6460, must be installed in the computer module modem socket to make use of this feature.

3.0 ANALOG I/O BOARD - 691404-1 AND ANALOG INPUT BOARD - 691404-2

3.1 ANALOG I/O BOARD

The **691404-1** Analog I/O Board accepts up to 16 analog inputs and 4 analog outputs. The analog inputs can be 4 to 20 mA, 0 to 5 volts, type J and K thermocouples, resistive temperature devices (RTD's), resistive inputs and normally-open or normally-closed discrete switches.

3.2 ANALOG INPUT BOARD

The **691404-2** Analog Input Board accepts up to 16 analog inputs. The analog inputs can be 4 to 20 mA, 0 to 5 volts, type J and K thermocouples, resistive inputs and normally-open or normally-closed discrete switches.

3.3 ANALOG INPUTS

Up to 16 analog inputs can be connected to the Analog Input Board. Any combination of the listed sensor types can be used in any of the 16 locations. Input voltage range is 0 to 5 Vdc. Connect the sensors to the analog input connector; the minus (–) terminals are internally tied together. Place the switch in the proper position for each transducer type as **DESCRIBED IN SECTION 6.3** and on **FIGURES 3 AND 4**. For 3 or 4 wire RTD's, a third terminal is provided for RTD excitation voltage.

3.3 ANALOG OUTPUTS

The **691404-1** Analog I/O Board has four 4-20 mA analog outputs. Each output has a plus (+) and minus (–) output terminal. The minus terminals are internally tied together. The analog outputs are typically supplied from an internal supply of 24 volts (jumpers J4A and J4B from center pin to pin B); this allows for a maximum load resistor of 1000 ohms. Typically either a 250 ohm or 500 ohm load resistor will be used which equates to 1 to 5 volts or 2 to 10 volts. If a higher loop voltage is required, place jumpers J4A and J4B from center pin to pin A, and supply an external voltage of up to 32 volts to the external loop supply terminals, marked "S". The maximum load resistor versus supply voltage can be calculated using RL (max) = (Vs-2V)/20 mA. With an external supply voltage of 32 volts, the maximum load resistor will be 1500 ohms resulting in a loop voltage of 6 to 30 volts.

3.4 EXACTA PORTS

The Analog Board has an Exacta "in" port (Exacta port from previous unit) and an Exacta "out" port (Exacta port to next unit). These ports carry the communications connections from the **EXACTA 21** Computer Module or I/O Board to the next Analog or Discrete Board. No connection is required for the Exacta "out" port on the last board of the chain.

4.0 DISCRETE I/O BOARD, 12X12 - 691405-1 AND DISCRETE INPUT BOARD - 691405-2

4.1 DISCRETE I/O BOARD

The **691405-1** 12x12 Discrete I/O Board accepts up to 12 normally-open (N/O) or normally-closed (N/C) discrete (on/off) switches, one RPM input from a magnetic pickup, and provides up to 12 discrete (digital) outputs.

4.2 DISCRETE INPUT BOARD

The **691405-2** Discrete Input Board accepts up to 12 normally-open (N/O) or normally-closed (N/C) discrete (on/off) switches.

4.3 DISCRETE INPUTS

Each discrete input is optically isolated and can be wired for a normally open or a normally closed, dry-contact switch. Each input has a (+) and (–) terminal. The switch should be connected across (+) and (–). This is **SHOWN IN FIGURES 5 AND 6**, the Discrete Board wiring diagram. No external "wetting current" is required.

4.4 DISCRETE OUTPUTS

Each discrete output is optically isolated and is rated at 60 Vdc max, fused at 3 amps. Each output has an isolated (+) and (–) terminal. The outputs can be wired as either high-side or low-side switches. **REFER TO FIGURE 5**. Each output has an LED indicator that is ON when the output is energized.

4.5 RPM INPUT

The **691405-1** 12x12 Discrete I/O Board has one RPM input marked "RPM A" and "RPM B". The RPM input will accept a signal from a magnetic pickup from 1.5 volts peak to 15 volts peak. An **ALTRONIC 691118-X** magnetic pickup and **693104-X** cable assembly are recommended.

NOTE: The Exacta 21 can be configured for one RPM input only even if two or more Discrete I/O Boards are used in the system.

4.6 EXACTA PORTS

The Discrete Board has an Exacta "in" port (Exacta port from previous unit) and an Exacta "out" port (Exacta port to next unit). These ports carry the communications connections from the **EXACTA 21** Computer Module to the Analog and Discrete Boards. Connections are made using the **DB 9** type of connector. No connection is required for the Exacta "out" port on the last board of the chain.

NOTE: Avoid mounting the Computer Module with the LCD display facing direct sunlight. The display temperature range is –22°F to +158°F (–30°C to +70°C). Sensor wires should be without splices to avoid any chance of moisture problems.

5.0 MOUNTING

5.1 Mount the Computer Module and the I/O Boards inside a control panel. **SEE FIGURE 1** for mounting dimensions. The Computer Module should be mounted so that the display is at a convenient viewing height.

5.2 Mount the I/O Boards either at the bottom or the side of the main panel. They are made to be rail-mounted onto commercially-available 32 or 35 mm DIN mounting rails. Two end brackets, **P/N 604199**, should be used to secure the boards from sliding off the ends of the mounting rail. The Computer Module and I/O Boards are electrically connected with a DB9 male/female cable, **P/N 693116-X** series or equivalent. The operating temperature range of the I/O Boards is –31°F to +176°F (–35°C to +80°C).

6.0 WIRING (SEE WIRING DIAGRAMS)

6.1 POWER WIRING

The **EXACTA 21** will operate from 18-36 Vdc. A 24 volt DC power supply, rated 5 amps minimum, is recommended.

COMPUTER MODULE

Connect the power input wires, plus to terminal **(+)** and minus to terminal **(–)**. Connect the minus terminal to panel ground which should be the same as engine ground. Connect the module ground terminal to the panel. **DO NOT** ground this device directly to the ignition system common coil ground. Use a heavy gauge grounding strap to ground the panel to the engine block or skid. Use a heavy gauge (#14 AWG or larger) wire for the positive connection from the 24 volt power supply to the Computer Module.

NOTE: All of the minus (–) terminals on the Discrete Board are common. Place a wire across the unused inputs.

6.2 DISCRETE I/O BOARD WIRING

FOLLOW FIGURE 5 OR 6 for wiring the input and output discrete components. Unshielded wire is recommended.

6.3 ANALOG INPUT WIRING

The **691404-1** and **691404-1** Analog Boards have 16 input channels and will accept signals in the range of 0 to 5 volts DC. Each input can be individually wired for a different sensor type. Set each programming switch on the input board for each analog input. Follow the table below for proper switch position.

ANALOG INPUT	SWITCH POSITION 1	2
"J" TYPE TC	OFF	OFF
"K" TYPE TC	OFF	OFF
RTD	OFF	OFF
VOLTAGE (0-5 VDC)	OFF	ON
CURRENT (4-20 MA)	ON	OFF
RESISTIVE (POTENTIOMETER)	OFF	OFF
DISCRETE (SWITCH)	OFF	ON

NOTE: All of the minus (–) terminals on the Analog Board are common.

Place a jumper wire across each unused input from (–) to (+).

Take care not to damage the insulation when installing and take precautions against later damage from vibration, abrasion, or liquids in conduits. In addition, it is essential that the following practices be adhered to:

A. **Never run sensor wires in the same conduit with ignition wiring or other high energy wiring such as AC line power.**

B. **Keep secondary wires to spark plugs and other high voltage wiring at least eight inches (200mm) away from sensor and sensor wiring.**

THERMOCOUPLES

Ungrounded type J or K thermocouples may be used. Use thermocouple extension wire of the same type as the thermocouple probe to connect the thermocouple to the Analog Board. Use stranded thermocouple wire having a good moisture-resistant insulation such as PVC; for higher ambient temperatures, Teflon or B-fibre insulated thermocouple wire is recommended. To insure an accurate signal is transmitted to the instrument, avoid any added junctions, splices and contact with other metals.

RTD PROBE

Mount a 3-wire 100 ohm RTD probe in a thermowell on the engine or machine. To ensure accuracy, make sure the actual element is surrounded by the measured media. Care should be taken to protect the wiring and connectors from contact with hot surfaces. A 3-wire RTD will require three connections, a single connection on one side (usually colored **RED**) and two connections on the other side of the probe (both usually colored **BLACK**). The single red connection must be connected to minus (–). Connect one black wire to the positive (+) terminal and the other black wire to the corresponding channel number on the RTD excitation terminal block. For example, for an RTD connected to input channel 1, connect the red wire to terminal (–), one of the black wires to terminal (+) and the other black wire to terminal RTD excitation "CH 1" **AS SHOWN IN FIGURE 3**.

6.3 ANALOG INPUT WIRING - RTD PROBE (continued)

For accurate temperature measurements, all three wires must be of the same gauge, type and length for each probe; all three wires must have the same resistance. Standard copper wire may be used. Maximum lead resistance for each lead is **10Ω**.

0 TO 5 VDC TRANSDUCERS

Each analog input will accept from **0 TO 5** Vdc. Typical transducer outputs are **0-5, 0.5-4.5, AND 1-5** Vdc. Wire the transducer as follows: transducer plus excitation voltage to power supply plus, transducer signal output to (+), and transducer minus and supply minus return to (–).

4-20 MA TRANSDUCERS

An internal 200 ohm resistor is available on the Analog Board. To use the internal resistor, set switch 1 to ON, and switch 2 to OFF. This will convert the 4-20 mA signal to 0.8 to 4.0 volts on the Analog Board.

RESISTIVE SENSORS

Wire three-wire resistive sensors with the ends of the resistor on supply plus and minus. Wire the slider to (+) and the supply minus to (–).

DISCRETE SWITCHES

Discrete switches can be connected to the analog input to sense when a switch opens or closes. Set the switches with 1 OFF and 2 ON and wire the switch in series from the supply (+) to terminal (+), supply (–) to terminal (–) on the Analog Board.

NOTE: The maximum voltage on input terminals must not exceed +5 Vdc.

6.4 4-20MA ANALOG OUTPUT WIRING

There are four 4-20 mA outputs available on the Analog Board; loop output (–) is minus and loop output (+) is plus. With board jumpers **J4A** and **J4B** from center pin to pin B, the loop output is supplied from the internal supply of +24 Vdc. An external load resistor value of 1000 ohms or less can be used with the internal supply. If an external load resistor value of breater than 1000 ohms is required, an external 32 Vdc supply is required. Place jumpers **J4A** and **J4B** from center pin to pin A, and connect the external supply to terminals S(+) and S(–) **AS SHOWN IN FIGURE 3.**

6.5 EXACTA PORT WIRING

The Exacta ports carry the communication signals from the Computer Module to each board. Using a DB9 cable, connect the Exacta ports from the Computer Module to the Exacta “in” port of the first I/O Board. Connect the Exacta “out” port of the first I/O Board to the Exacta “in” port of the second I/O Board, etc.

6.6 RS-232 COMMUNICATIONS WIRING

When programming the Computer Module from a laptop or PC, an upload/download cable, **P/N CW1642-1**, is required. Connect the end labeled **TO PC** to the laptop or PC, and the end marked **TO EXACTA** to the **RS232** port on the **EXACTA 21** Computer Module.
SEE FIGURE 7 FOR PIN CONNECTIONS.

6.7 HAZARDOUS AREA OPERATION

The **691403-1 EXACTA 21** control system is **CSA CERTIFIED FOR CLASS I, DIVISION 2, GROUPS C & D** areas. The system is certified as a component only and is required to be installed in a suitable enclosure where the suitability of the combination is subject to the local inspection authority having jurisdiction. The power connections to the **EXACTA 21** must be in accordance with the **NATIONAL ELECTRICAL CODE** or in Canada, the **CANADIAN ELECTRICAL CODE**. In addition, the following requirements must be met:

1. **Run the sensor wires leaving the panel in a separate conduit from all other wiring and keep them separate throughout the installation.**
2. **Power wiring and wiring to the modules must have a grade of insulation capable of withstanding an AC voltage of 500 volts RMS.**
3. **In general, run wires in separate conduits and junction boxes from high voltage wires such as ignition, fuel valve, and other high voltage wiring.**

WARNING: EXPLOSION HAZARD - DO NOT REPLACE FUSES OR CONNECTORS UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

DO NOT DISCONNECT EQUIPMENT IN DIV. 2 ENVIRONMENT UNLESS POWER IS SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

6 .8 TESTING SENSOR LEADS

If it becomes necessary to check sensor to terminal strip wiring with an ohmmeter or other checker, first unplug the connectors from the **EXACTA 21**. This will prevent possible damage to the device's sensitive low voltage detection circuitry.

FIGURES SECTION:

FIG. 1 EXACTA 21 SYSTEM DRAWING AND SPECIFICATIONS

FIG. 2 LAYOUT - COMPUTER MODULE 691403-1

FIG. 3 WIRING DIAGRAM - ANALOG I/O BOARD 691404-1

FIG. 4 WIRING DIAGRAM - ANALOG INPUT BOARD 691404-2

FIG. 5 WIRING DIAGRAM - DISCRETE I/O BOARD 691405-1

FIG. 6 WIRING DIAGRAM - DISCRETE INPUT BOARD 691405-2

FIG. 7 UPLOAD/DOWNLOAD CABLE, EXACTA TO PC CW1642-1

FIG. 1 EXACTA 21 SYSTEM DRAWING AND SPECIFICATIONS

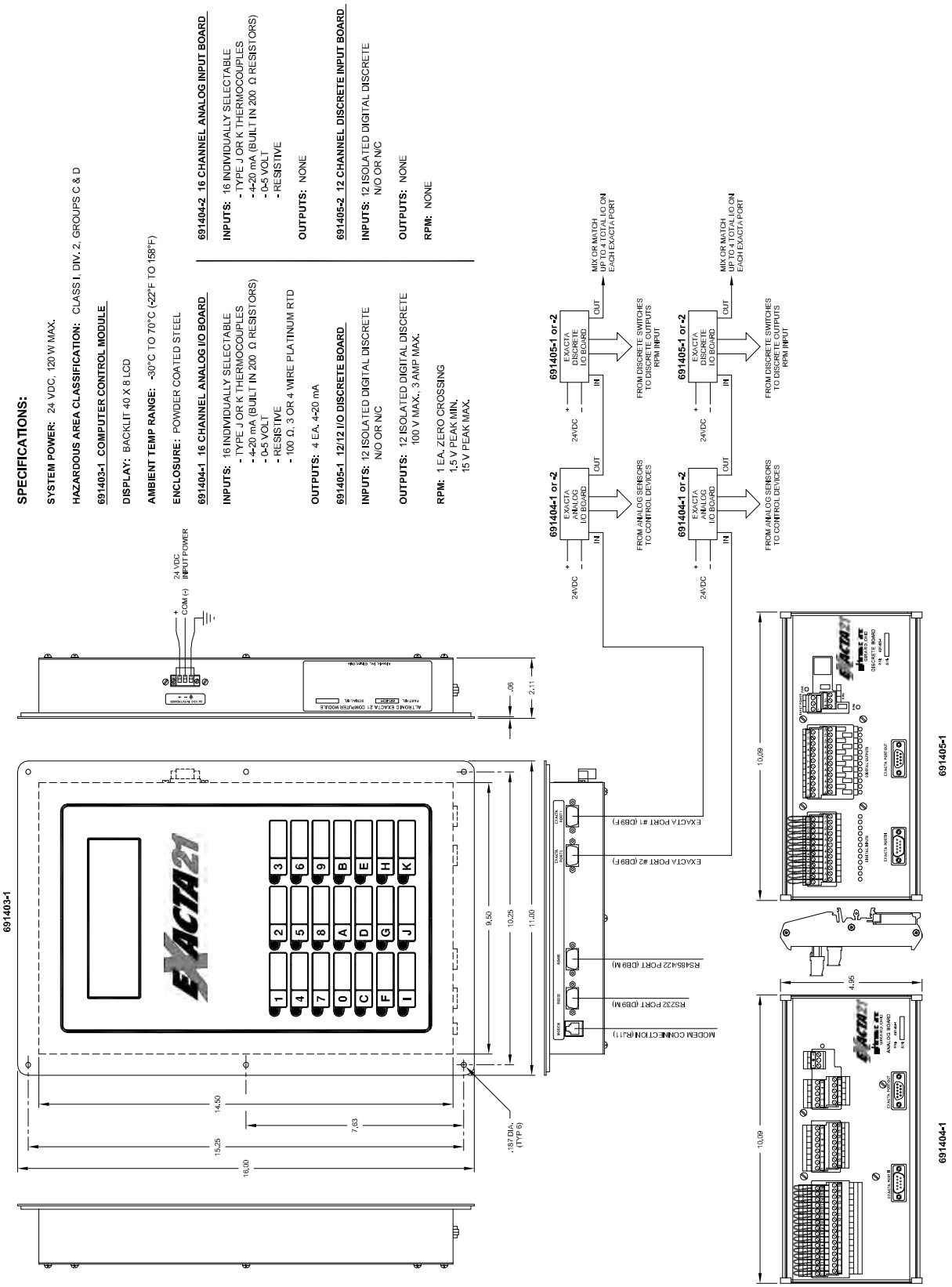
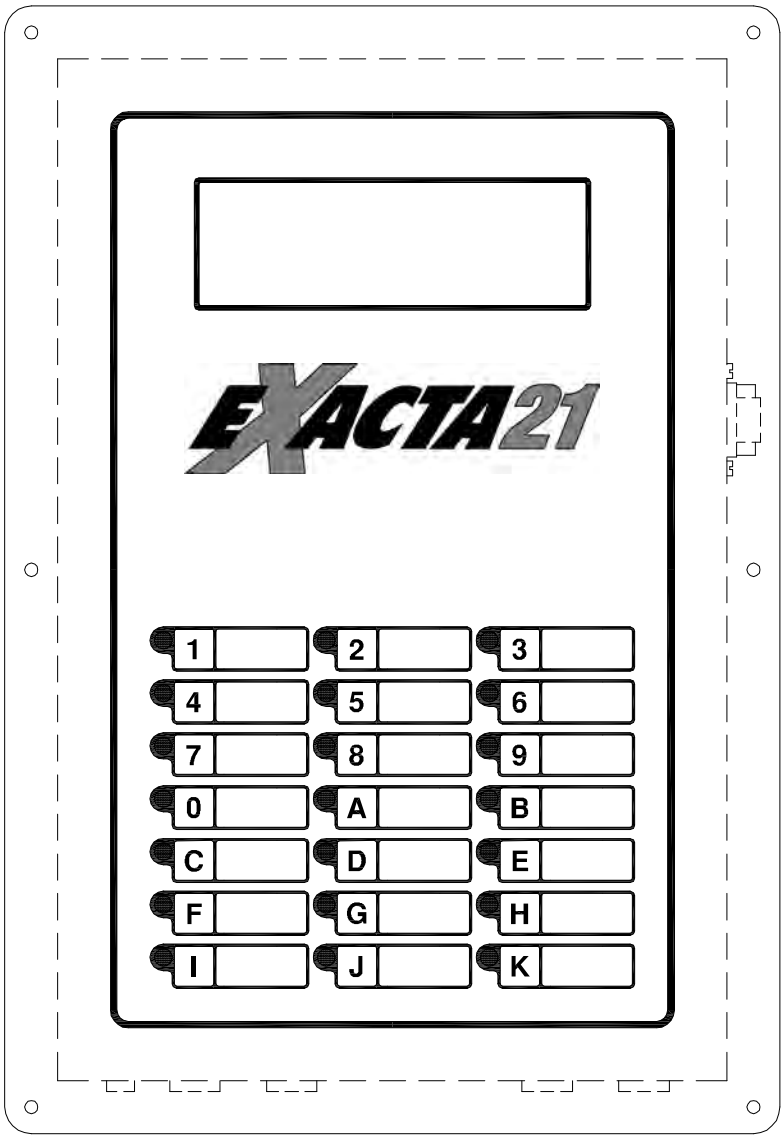
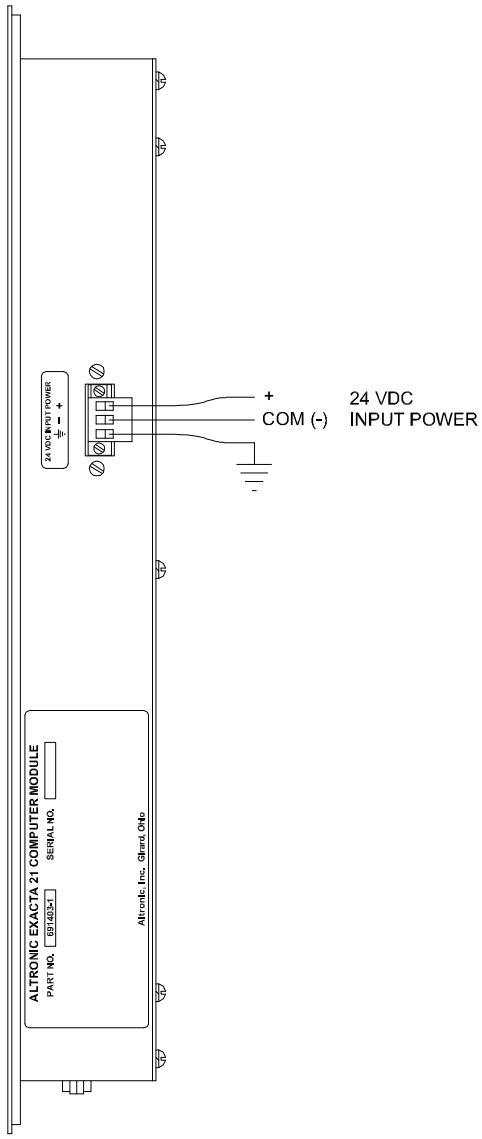
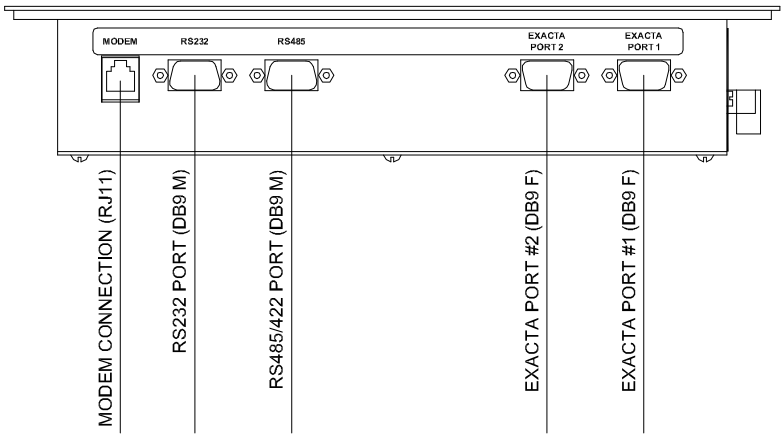


FIG. 2 LAYOUT - COMPUTER MODULE 691403-1

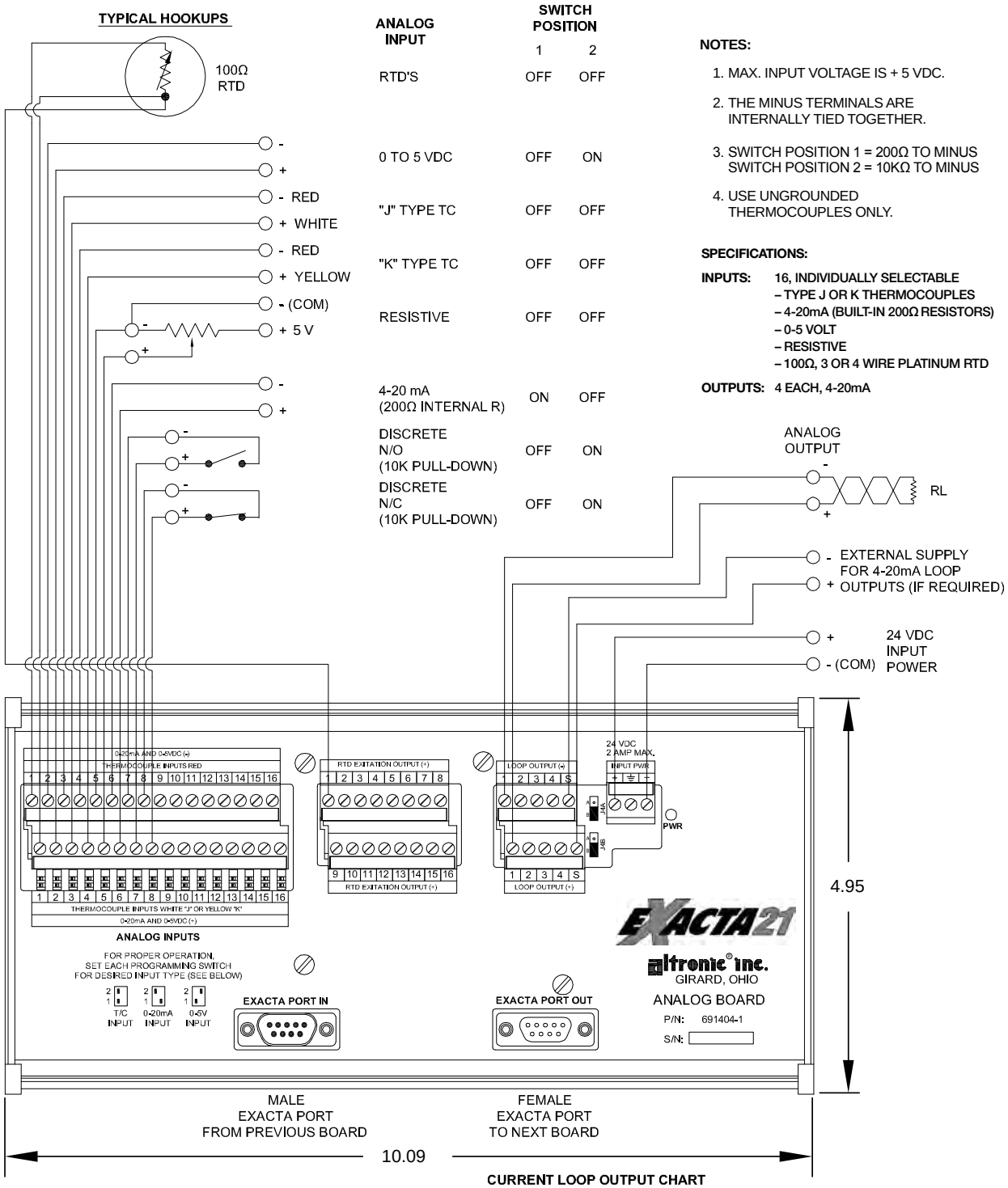




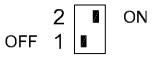


SPECIFICATIONS:
DISPLAY: BACKLIT
AMBIENT TEMP. RANGE: -30°C TO 70°C (–22°F TO 158°F)
ENCLOSURE: POWDER COATED STEEL

FIG. 3 WIRING DIAGRAM - ANALOG I/O BOARD 691404-1



TYPICAL ANALOG INPUT SWITCH



CURRENT LOOP OUTPUT CHART

RL	LOOP VOLTAGE	SUPPLY	JUMPER POSITION (J4A, J4B)
250Ω	1-5V	INTERNAL	B
500Ω	2-10V	INTERNAL	B
1000Ω	4-20V	INTERNAL	B
-	-	EXTERNAL	A

FIG. 4 WIRING DIAGRAM - ANALOG INPUT BOARD 691404-2

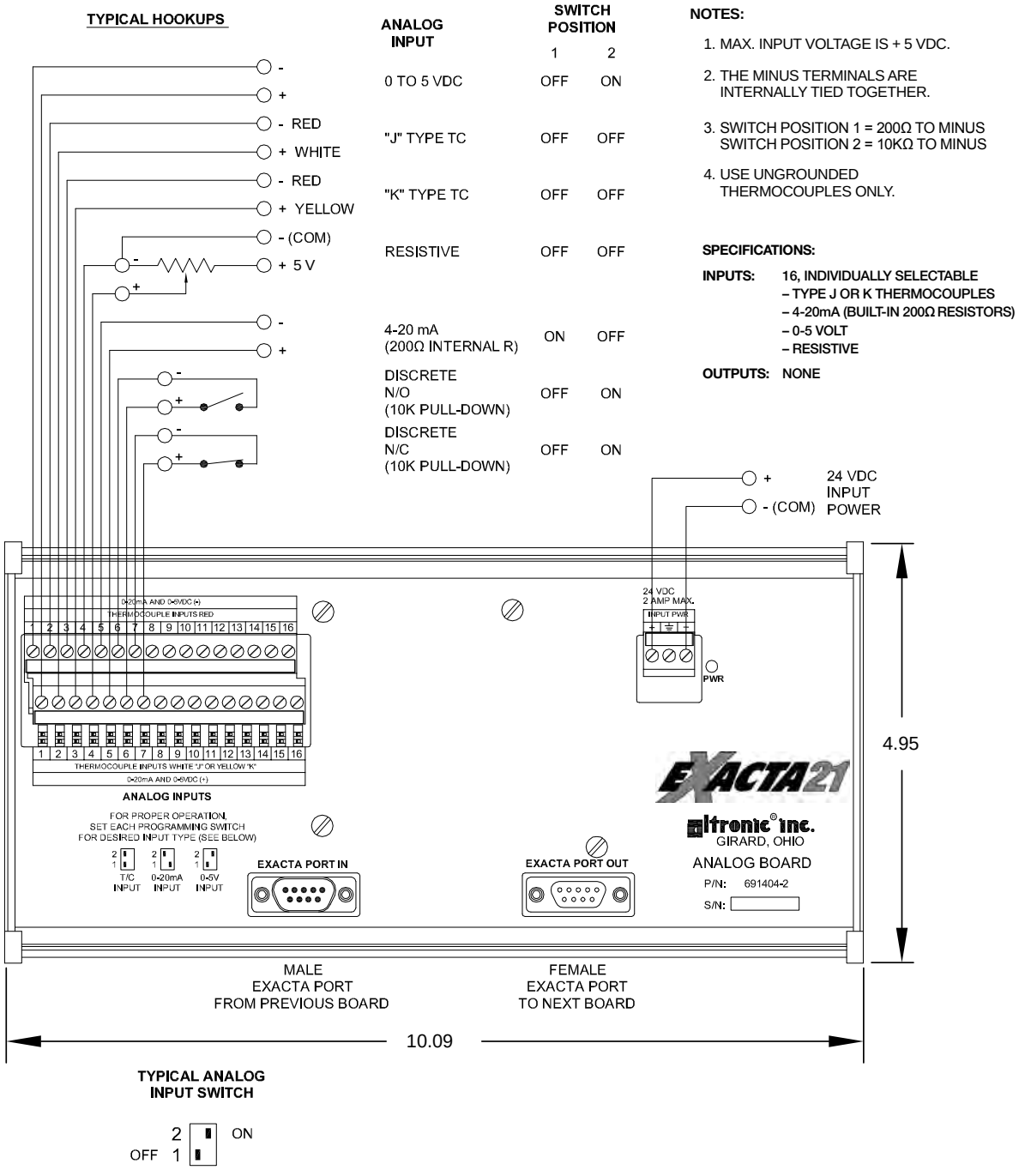
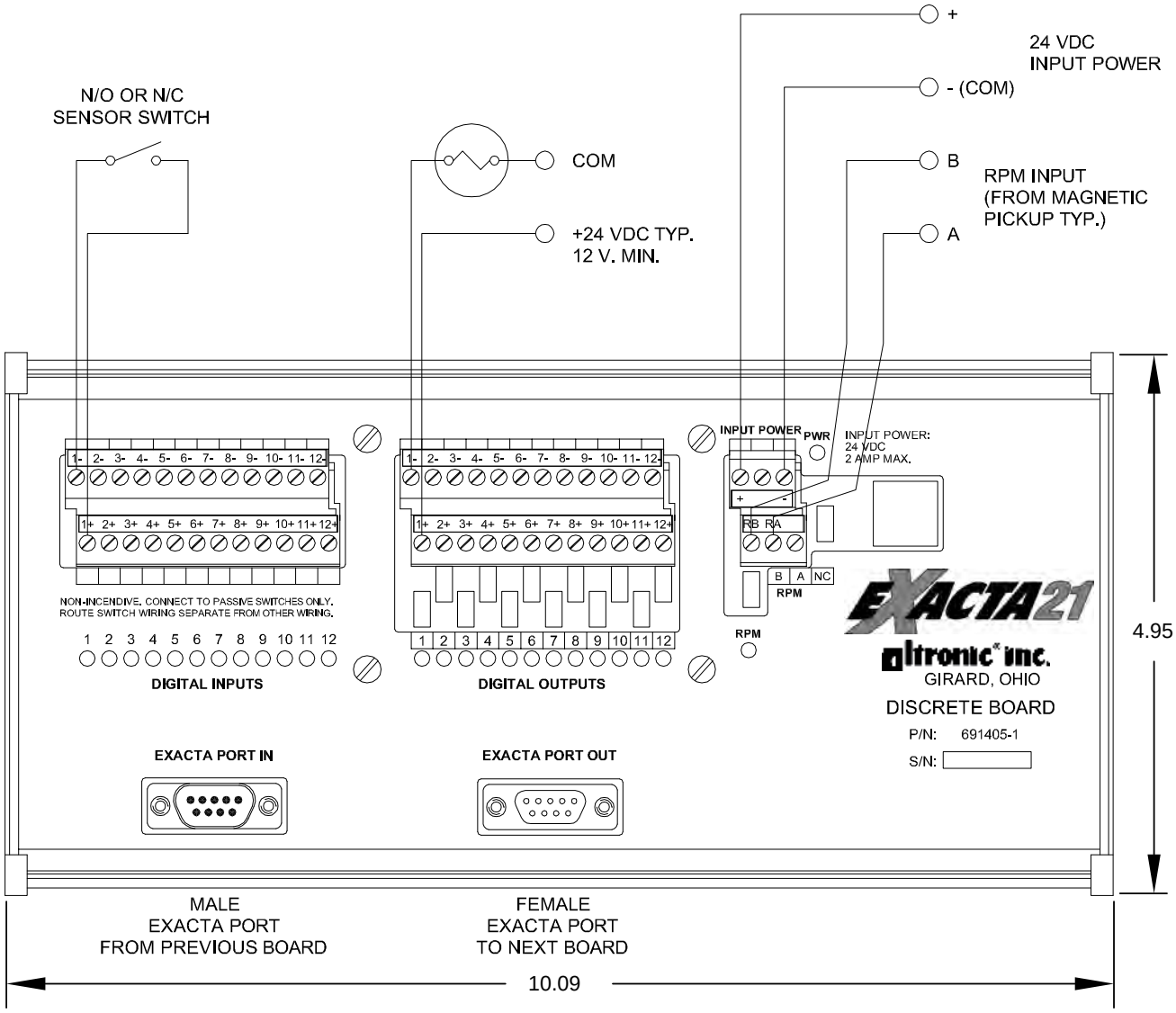


FIG. 5 WIRING DIAGRAM - DISCRETE I/O BOARD 691405-1



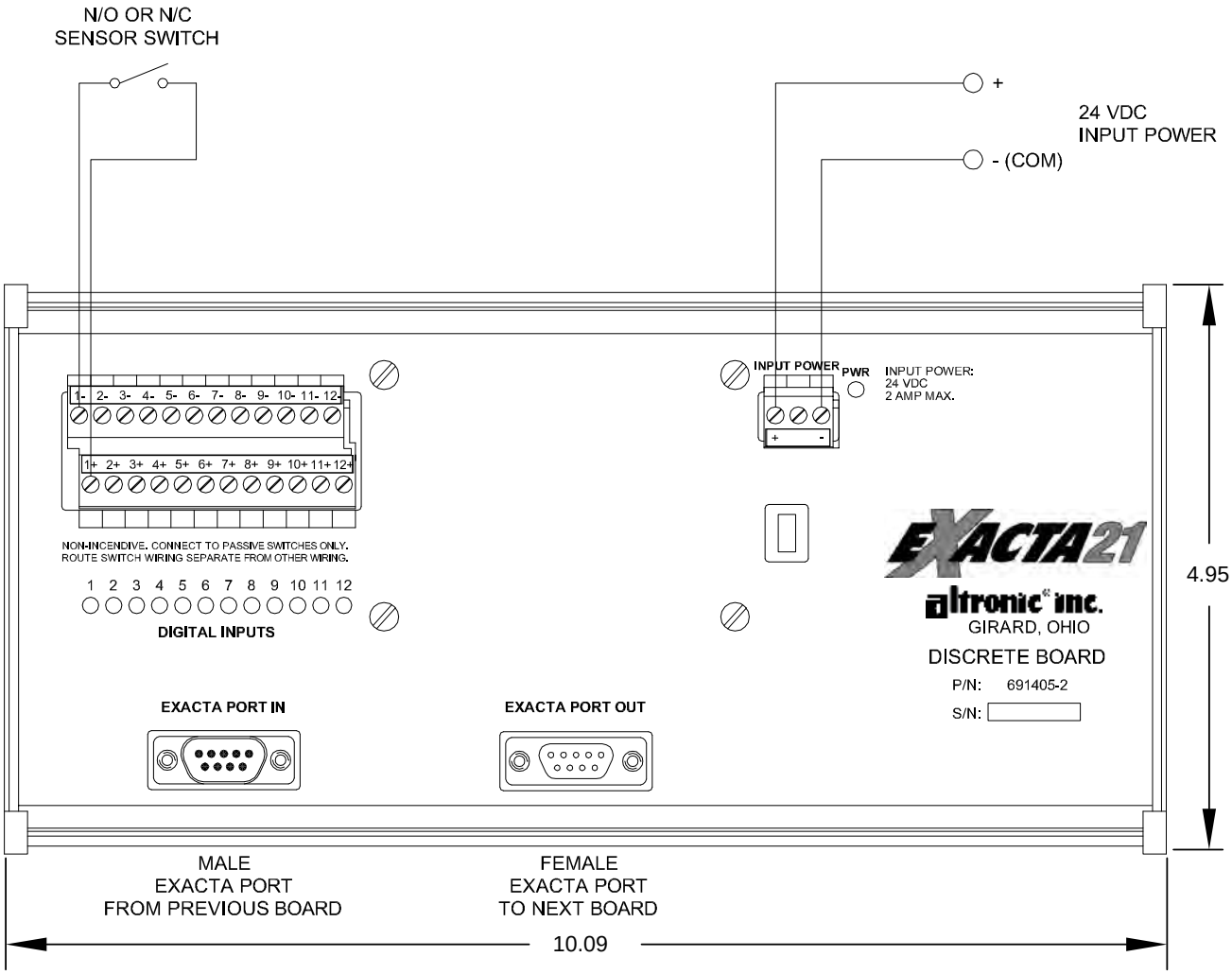
SPECIFICATIONS:

RPM INPUT: MAGNETIC PICKUP
1.5 V PEAK MIN.
15 V. PEAK MAX.

INPUTS: 12 ISOLATED DIGITAL DISCRETE
N/O OR N/C
NOTE: MINUS CONNECTIONS ARE COMMON.

OUTPUTS: 12 ISOLATED DIGITAL DISCRETE
60 VDC MAX.
2.0 AMP MAX. (3 AMP REPLACEMENT FUSE)

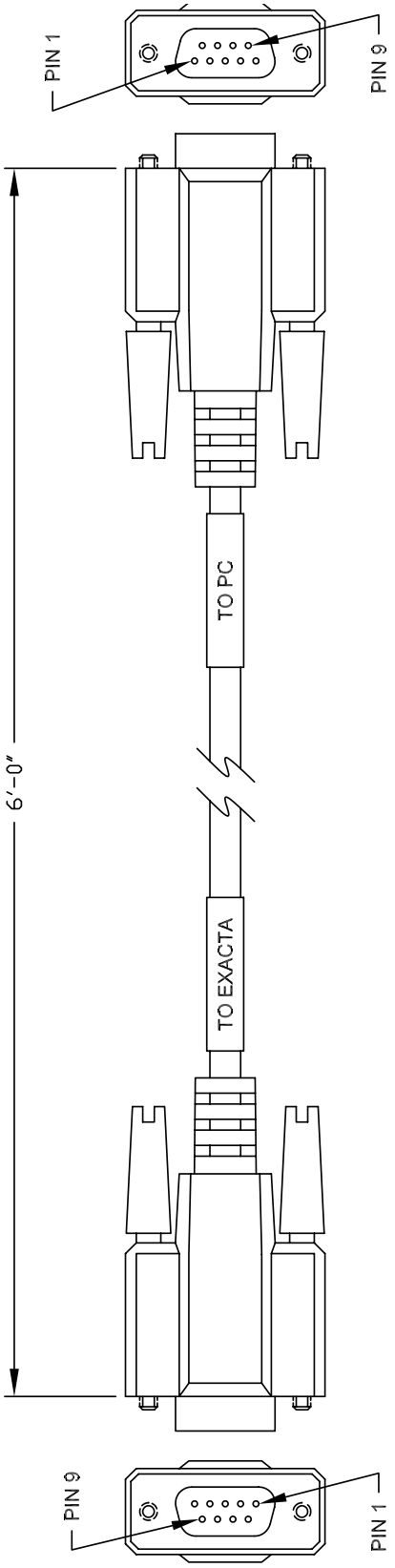
FIG. 6 WIRING DIAGRAM - DISCRETE INPUT BOARD 691405-2



SPECIFICATIONS:

INPUTS: 12 ISOLATED DIGITAL DISCRETE
N/O OR N/C
NOTE: MINUS CONNECTIONS ARE COMMON.

FIG. 7 UPLOAD/DOWNLOAD CABLE, EXACTA TO PC CW1642-1



PIN CONNECTIONS

EXACTA		PC
1 - N/C	→	1 - N/C
2 - TX	→	2 - RX
3 - RX	→	3 - TX
4 - RTS	→	8 - CTS
5 - CTS	→	7 - RTS
6 - DSR	→	4 - DTR
7 - GND	→	5 - GND
8 - DCD	→	9 - N/C
9 - DTR	→	6 - DSR