INSTALLATION

READ THESE INSTRUCTIONS BEFORE YOU BEGIN INSTALLATION.

Ground yourself before touching board. Some components are static sensitive.

MOUNTING:

Circuit board may be mounted in any position. If circuit board slides out of snap track, a nonconductive "stop" may be required.

Use only fingers to remove board from snap track. Slide out of snap track or push against side of snap track and lift that side of the circuit board to remove. Do not flex board or use tools.

POWER CONNECTIONS:

1) 24 VAC - with power off, connect 24 VAC transformer to terminal "H" and the other to terminal "C" on the PHOTON-4. Check the wiring configuration of any other loads that may be connected to this transformer. Any field device connected to this transformer must use the same common. If you are not sure of other field device configuration, use separate transformers.

2) If the 24 volt AC power is shared with devices that have coils such as relays, solenoids, or other inductors, each coil must have a MOV, Transorb, or other spike snubbing device across each of the shared coils. Without these snubbers, coils produce very large voltage spikes when de-energizing that can cause malfunction or destruction of electronic circuits.

 3) The secondary voltage should be isolated from earth ground, chassis ground, and neutral leg of the primary winding. Grounding should be to the system common only. If you do not follow these procedures improper operation can result.

4) You should measure the actual voltage output of the secondary. If the output is not fully loaded you may read a higher voltage than the circuit board can handle.

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LOW VOLTAGE WIRING

RS485 Connection

We recommend #22 AWG (minimum) twisted pair, unshielded wire. Maximum length of system is 4000 feet.

Make the control wiring connections (or RS485 termination) to terminals (+) and (-) in the upper left hand corner of the PHOTON-4, observing polarity. Refer to the diagram on page 1. Strip 1/4 inch of insulation from the "twisted pair" wires and insert into the terminal socket Tighten terminal screws with a 1/8" blade screwdriver. Do NOT overtighten.

On the last PHOTON-4 in the system, install the "END UNIT" jumper shunt in the "yes" position on the last connected PHOTON-4 module in the panel.

Unit address DIP switches should be set at this time. See BUS ADDRESS SETTINGS below.

OVERRIDES

"Panic All On" button will turn on the 4 contactors connected to the PHOTON-4. Action of this button is momentary, as is the "REMOTE ALL ON" connections A and C. These are always momentary and are independent of the action of digital inputs 1 through 4.

"Local Contactor Override" button will toggle corresponding individual contactor on or off.

Press all buttons for at least one second to allow "Contactor Status" LED's to react and indicate on or off state of contactor.

BUS ADDRESS SETTINGS

Available bus addresses are 1 to 255. DIP switch 1 is the lease significant bit and DIP switch 8 is the most significant. All PHOTON-4's must be addressed in consecutive order. If two PHOTON-4's are given the same address, both will react to command but will not report status back to the controlling CPU. Listed are the values for the DIP switch "ON" positions.
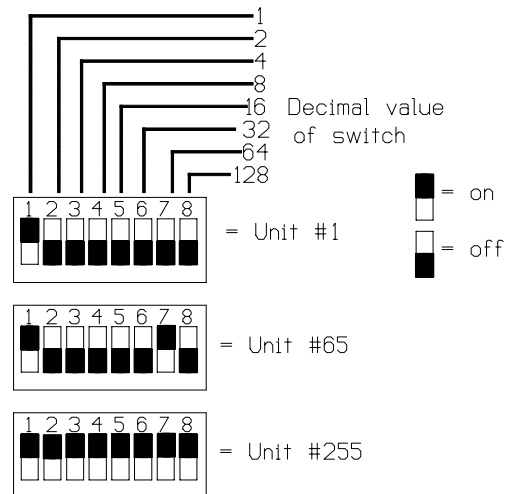
DIP Switch ON	Address Value
1	1
3	4
4	8
5	16
6	32
7	64
8	128

Example of address 57:

DIP switch 6 ON = 32
DIP switch 5 ON = 16
DIP switch 4 ON = 8
DIP switch 1 ON = 1

             TOTAL   57

All switches off is not a valid address

RS485 SERIAL COMMUNICATIONS PROTOCOL/PROGRAMMING

RS485 software allows individual contactor control with an RS485 control signal. The host computer is responsible for the group control of the contactors. The RS485 data is arranged as follows:

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Standard PHOTON-4 RS485 Communications Protocol

ASCII Name	ASCII Value	Description
SYN	22	Synchronize byte
STX	02	Start of Text
TYPE	07	Type of Board (PHOTON-4 is type 7)
ADD	0-255	Address of board (set by DIP switch on PHOTON-4)
		An address of 0 indicates all boards should perform the given command.
CMD	01	Write to Contactors (ULULULUL)
	02	Enter Program Mode
	03	Flash Contactors that are currently on
	04	Set override Times (CCXXXXXX)
	05	Read LED or Contactor Status (Mode Dependent) MACRXXXX
	06	Enter Run Mode
	07	Read Override Status MACRXXXX
	08	Read Digital Inputs MACRXXXX
	09	Change Digital Inputs Mode
	10	Clear Status Flags (All-On, Cold Start)
DATA	0-255	Data For Command
CKS	0-255	Sum Of All Previous Bytes
CKC	0-255	Compliment of Previous Bytes
ETX	03	End Of Text

Commands:

All commands return a command string similar to the one above but with the following differences: data byte in the format MACRXXXX, no TYPE byte, no ADD byte, and no CMD byte. If the address sent in the command is 0, no command string is returned by any unit. A single NAK(21) is returned upon any error in transmission in the CKS, CKC, or ETX. The data byte consists of the following data:

$M=1$	Program Mode
$M=0$	Run Mode
$A=1$	All-On Button Has Been Pressed Since Last Clear Flags Command
$A=0$	All-On Button Has Not Been Pressed
$C=1$	Photon-4 Had a Cold Reset Since Last Clear Flags Command
$C=0$	Photon-4 Did Not Have a Cold Reset
$R=0$	Momentary Digital Inputs
$R=1$	Maintained Digital Inputs

01   Write To Contactors, ULULULUL (U=Unlatch, L=Latch)

02   Enter Program Mode

This command is used only by Advanced Control Technologies, Inc. at this time and should not be used by another user.

03   Flash Contactors That Are "On"

This command turns off all contactors that are currently on for approximately one second and then turn them back on.

04   Set Override Time For a Contactor CCXXXXXX

This command sets an override time for a contactor that turns a contactor "off" after a specified period of time. XXXXXX is the binary representation of a number between 2 to 63. This is the number of minutes to delay before turning the contactor "off". The contactors will flash one minute before they are turned off. A zero for the override time will disable the override timer for a contactor. The following list shows the contactor selected by the CC bits in the data byte:

00	Contactor 1
01	Contactor 2
10	Contactor 3
11	Contactor 4

05   Read LED Status MACRXXXX

This command returns the current status of the LEDs which corresponds to the state of the contactors if the PHOTON-4 is not in Program Mode. The last four bits represent the status of the LEDs in the order 4321.

06   Enter Run Mode

This command puts the PHOTON-4 back into normal operating mode. This command currently is used only by Advanced Control Technologies, Inc. and is not recommended for other's use.

07   Read Override Status

This command returns the current override status of each contactor. The format of the returned data is the same as command 5.

08   Read Digital Inputs

This command returns the current status of the digital inputs. The format of the returned data is the same as command 5.

09   Change Digital Inputs Mode

This command changes the mode of operation for the digital inputs. A value of zero in the data byte will result in the digital inputs being used as overrides for the contactors. Any nonzero value will result in the digital inputs being used only as inputs. In this mode, the digital inputs have no effect on the contactors.

10   Clear Status Flags

This command clears the All-On and Cold Start flags. This allows a remote unit to perform certain functions at power-up and after an All-On. This command could then be used to clear the flags so these operations are performed on a need basis only.

PRE-POWER CHECKLIST

1) Are all contactors are properly wired and circuits identified?
2) Is power supply properly wired and fused?
3) Are low voltage connections properly wired and terminals secured?
4) Are DIP switches set to the proper panel address?
5) Are G.E. contactor leads securely fastened in the Photon-4 clamp terminals?

REMOTE "ALL ON"

To effect a remote "ALL ON" of all four contactors, connect only a momentary dry contact between terminal "A" (in the lower left hand corner of the PHOTON-4 module) and terminal "C". Momentary contact needs to be held for 1 second. (NOTE : Connection of a maintained dry contact will prevent any other ON/OFF action to take place).

INDIVIDUAL CONTACTOR REMOTE OVERRIDES

Digital input signal Overrides - To effect a remote override of an individual contactor, a momentary or maintained (specified when ordering) digital input (5-24VAC/VDC) can be connected to terminals 1 through 4 on each PHOTON-4 module. Whatever source is used to provide the digital inputs, this source must share common with the power source for the PHOTON-4.

WATCH-DOG TIMER

The PHOTON-4 has a automatic timed reset. If for any reason the PHOTON-4's microprocessor should stop or "lockup", the Watchdog Timer will automatically reset the processor. Any manual overrides will be cleared.

INSTALLATION NOTES

G.E. RR7
Remote relays can be mounted in the field at a distance of 1600 feet from the PHOTON-4, using #20 AWG wiring.

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