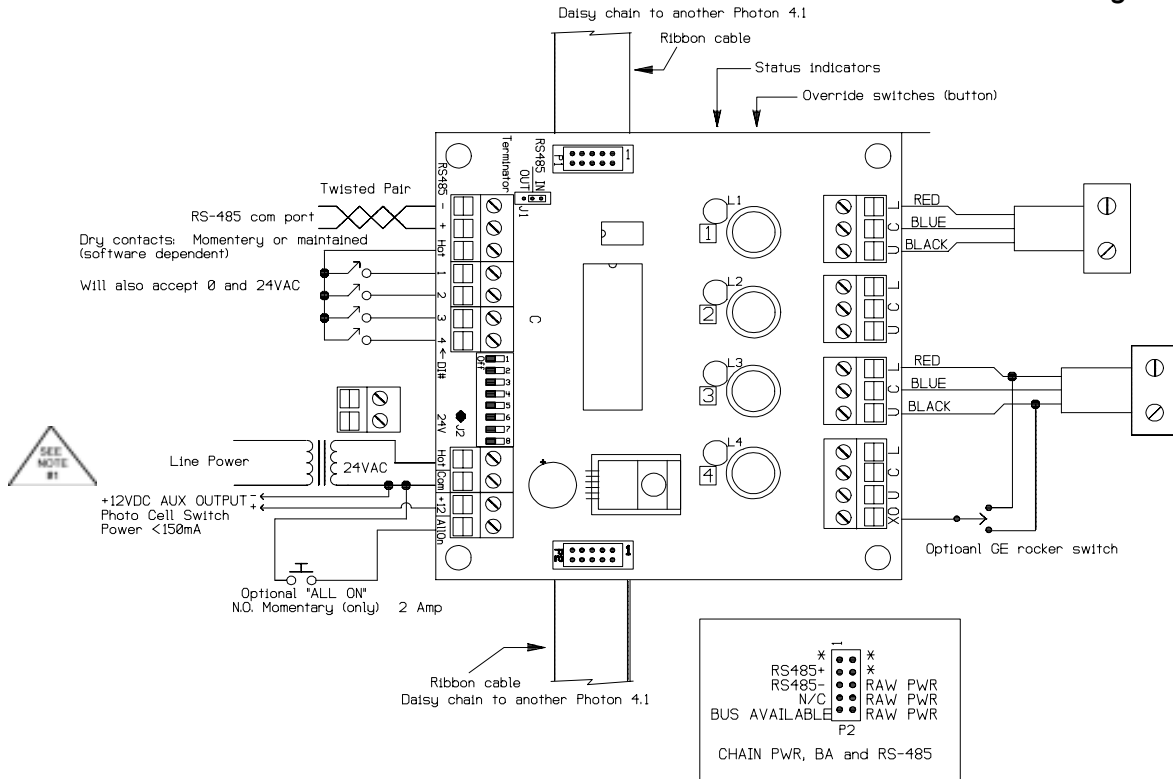


## RS485 to 4 Outputs (Latching Relays) -Version 1 Momentary Digital Inputs & Version 2 Maintained Digital Inputs



### 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 "Hot" and the other to terminal "Com" on the PHOTON4.1. If required by BAS or controller specification, the 24 VAC neutral can be earth grounded at the transformer. Analog input, digital input, and analog output circuits should not be earth grounded at two points. 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 for isolation.

### LOW VOLTAGE WIRING

#### RS485 Connection

We recommend #22 AWG (minimum) twisted pair, un-shielded 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 PHOTON4.1, 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.

Ribbon cable (Part Number HW083) transfers only power and RS485. Daisy chain the signal.

On the last PHOTON4.1 in the system, install the "END UNIT" jumper shunt in the "IN" position (or on the last connected PHOTON4.1 module in the panel).

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

## OVERRIDES

The "REMOTE ALL ON" connections (AION and COM) will accept a momentary contact and turn on the 4 outputs. This is independent of the action of digital inputs 1 through 4.

The on-board "Local Output Override" buttons will toggle corresponding individual output on or off. Press for at least one second to allow "Output Status" LED's to react and indicate on or off state of output.

## DIGITAL INPUTS

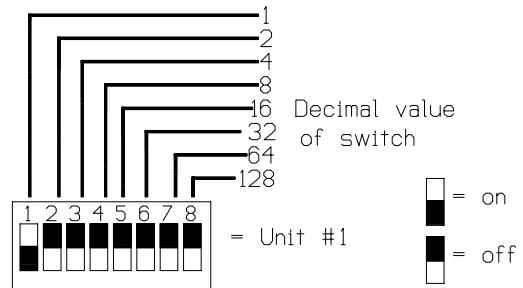
Version 1 accepts four (4) Momentary digital inputs. Version 2 accepts four (4) Maintained digital inputs (Note: Must be specified as Version 1 or Version 2 when ordering).

## BUS ADDRESS SETTINGS

Available bus addresses are 1 to 255. DIP switch 1 is the least significant bit and DIP switch 8 is the most significant. All PHOTON4.1's must be addressed in consecutive order. If two PHOTON4.1'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
2	2
3	4
4	8
5	16
6	32
7	64
8	128

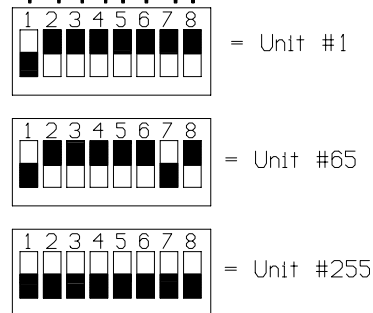


Example of address 57:

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

Baud Rate: 9600 bps      Data Bits: 8      Parity: None      Stop Bits: 1

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

ASCII Name	ASCII Value	Description
SYN	22	Synchronize byte
STX	02	Start of Text
TYPE	07	Type of Board (PHOTON4.1 is type 7)
ADD	0-255	Address of board (set by DIP switch on PHOTON4.1)

**AN ADDRESS OF 0 INDICATES ALL BOARDS SHOULD PERFORM THE GIVEN COMMAND.**

CMD	01	Write to Outputs (ULULULUL)
	02	Enter Program Mode
	03	Flash Contactors that are currently on (ULULULUL) <b>NOTE:</b> LED's do not flash
	04	Set override Times (CCXXXXXX)
	05	Read LED or Output 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 return data byte consists of the following data:

- M=1 Program Mode
- M=0 Run Mode
- A=1 All-On Has Been Activated Since Last Clear Flags Command
- A=0 All-On Has Not Been Activated
- C=1 Photon4.1 Had a Cold Reset Since Last Clear Flags Command
- C=0 Photon4.1 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", ULULULUL (U=Unlatch, L=Latch) **NOTE:** LED's do not flash.  
This command turns off individual contactors that are currently ON for approximately one second and then turns them back on. Place a binary 1 in the unlatch position for each contactor you wish to flash. Always place a zero in all Latch positions. Example: 00000010 transmitted in the data byte will flash contactor 1 if it is on, or 00001000 transmitted in the data byte will flash contactor 2 if it is on, or 01010101 will flash all 4 contactors if they are on, and so on.
- 04 Set Override Time For an Output CCXXXXXX  
This command sets an override time for an output that turns an output "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 output "off". The contactors will flash one minute before they are turned off. A zero for the override time will disable the override timer for an output. The following list shows the output selected by the CC bits in the data byte:
  - 00 Output 1
  - 01 Output 2
  - 10 Output 3
  - 11 Output 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 PHOTON4.1 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 PHOTON4.1 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 output. 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 outputs. 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 outputs.
- 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.

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## PRE-POWER CHECKLIST

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- 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. output leads securely fastened in the PHOTON4.1 terminals?

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## REMOTE "ALL ON"

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To effect a remote "ALL ON" of all four outputs, connect only a momentary dry contact between terminal "AllON" (in the lower left hand corner of the PHOTON4.1 module) and terminal "Com". 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 and damage contactors). The "AllON" switch must be rated 2 amps per PHOTON4.1.

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## INDIVIDUAL OUTPUT REMOTE OVERRIDES

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**Digital input signal Overrides** - To effect a remote override of an individual output, Version 1 offers a momentary or Version 2 a maintained digital input (5 to 24VAC/VDC) connected to terminals 1 through 4 on each PHOTON4.1 module (Version to be specified when ordering). Whatever source is used to provide the digital inputs, this source must share common with the power source for the PHOTON4.1.

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## WATCH-DOG TIMER

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If for any reason the PHOTON4.1's microprocessor should stop or "lock up", the Watchdog Timer will automatically reset the processor. Any manual overrides will be cleared.

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## INSTALLATION NOTES

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G.E.® Relays can be mounted remotely up to a distance of 1600 feet from the PHOTON4.1, using #20 AWG wiring.

If using more than one PHOTON4.1, power and RS485 connections can be linked from board to board using a ribbon cable, ACT Part Number HW083. Maximum number of PHOTON4.1s that can be linked together is six (6).