

# INSTALLATION AND FIELD WIRING

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# CHAPTER 2

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### Installing the H0-CTRIO(2) Module

The H0-CTRIO(2) module is compatible with *Direct*LOGIC DL05 and DL06 PLCs. Consideration must be given to the firmware versions of the PLCs to assure their compatibility with the H0-CTRIO(2). (see chart below).

The H0-CTRIO(2) module plugs into any option card slot of any DL05 and DL06 PLC.

For installation instructions, refer to the:

- DL05 or DL06 User Manual (D0-USER-M or D0-06USER-M)

The first time you power-up the CTRIO module, you should see the OK LED blinking. The blinking LED indicates that the module is in program mode.

#### CPU and CTRIO Compatibility Chart

PLC CPU	Firmware	<i>Direct</i> SOFT5
<b>H0-CTRIO(2)</b>		
DL05	v. 4.60 or later	v. 4.0, Build 16 or later
DL06	v. 1.40 or later	v. 4.0, Build 16 or later

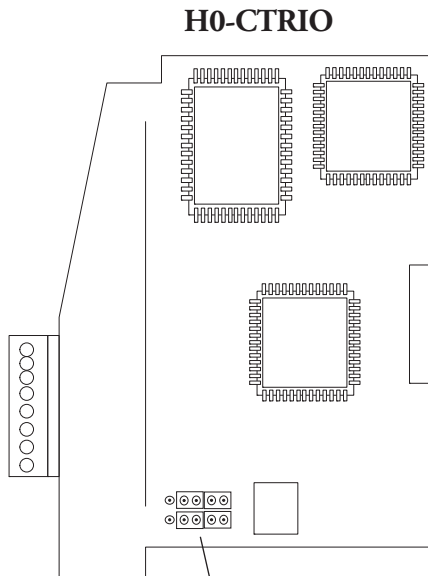
Updated firmware versions can be downloaded from our web site at [www.automationdirect.com](http://www.automationdirect.com)



**NOTE:** *CTRIO Workbench Version 2.2.0 is required for the H0-CTRIO2.*

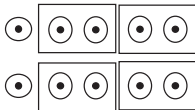
## Setting H0-CTRIO(2) Jumpers

The module's internal jumpers must be set to the High Side Common position for high side switching (sourcing) outputs or to the Low Side Common position for low side switching (sinking) outputs. The sink/source jumper selection sets both outputs to the same option. Source operation is the factory default setting.



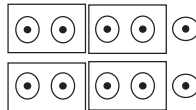
### Jumper Selections

#### Sourcing Outputs

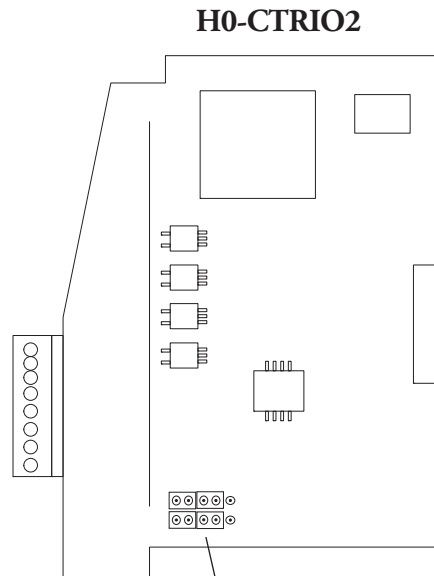


High Common position for switching the high side of a DC load.

#### Sinking Outputs

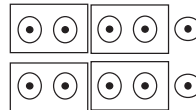


Low Common position for switching the low side of a DC load.



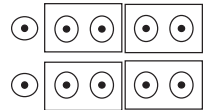
### Jumper Selections

#### Sourcing Outputs



High Common position for switching the high side of a DC load.

#### Sinking Outputs



Low Common position for switching the low side of a DC load.

## Wiring the H0-CTRIO(2) Module

The H0-CTRIO(2) module has one input channel, consisting of 4 optically isolated input points (pts. A-D on common M). The inputs can be wired to either sink or source current. The module has 2 optically isolated output points (pts. Y0-Y1 on common YC). The outputs can be wired to either sink or source current, but the sink/source jumper selection sets both outputs to the same option. Sourcing outputs must be wired so positive current flows into the YC terminal and then out of the Yn terminal. Sinking outputs must be wired so positive current flows into Yn terminal and then out of the YC terminal (see the diagram to the right and the schematic on page 2-8).

Source operation is the factory default setting for the outputs.

The module is configured, using CTRIO Workbench, to accommodate the user's application. The function of each input (counting, timing, reset, etc.) and output (pulse output, discrete output, etc.) is defined in the configuration of the module.

Refer to Chapters 4 and 5 to determine what input and output configurations are possible.

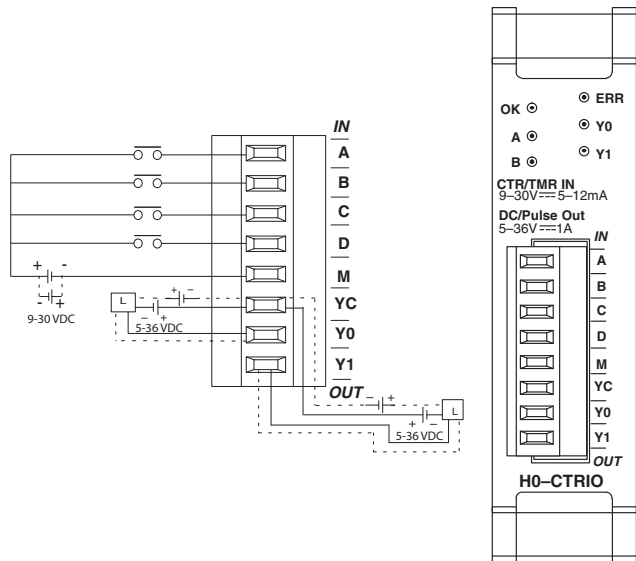


**NOTE:** Field device wiring must be compatible with the module configuration.

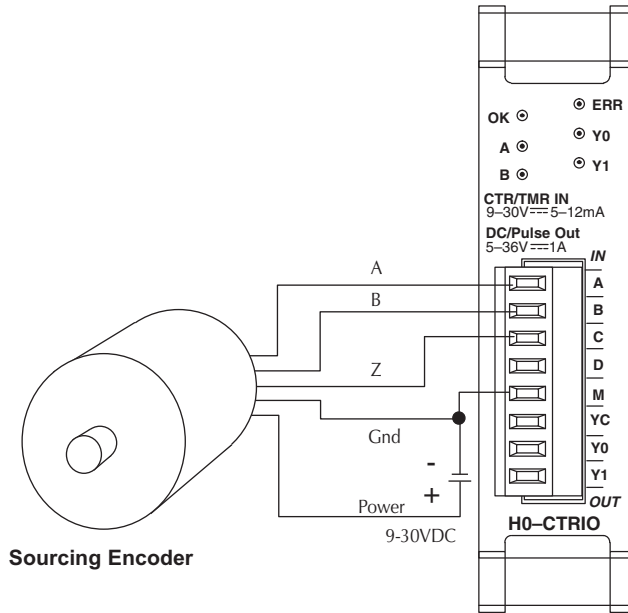
See the notes below for further details about power source considerations, circuit polarities, and field devices. Also, refer to the specifications on pages 1-5 and 1-6 for more information.

### NOTES:

- Inputs (A, B, C, and D) require user-provided 9-30VDC power sources. Terminal M is the commons for the inputs. Maximum current consumption is 12mA per input point.**
- Polarity of the input power sources (shown above) can be reversed. Consideration must be given, however, to the polarity of the field device. Many field devices are designed for only one polarity and can be damaged if power wiring is reversed.**
- The maximum allowable current per output circuit is 1A.**

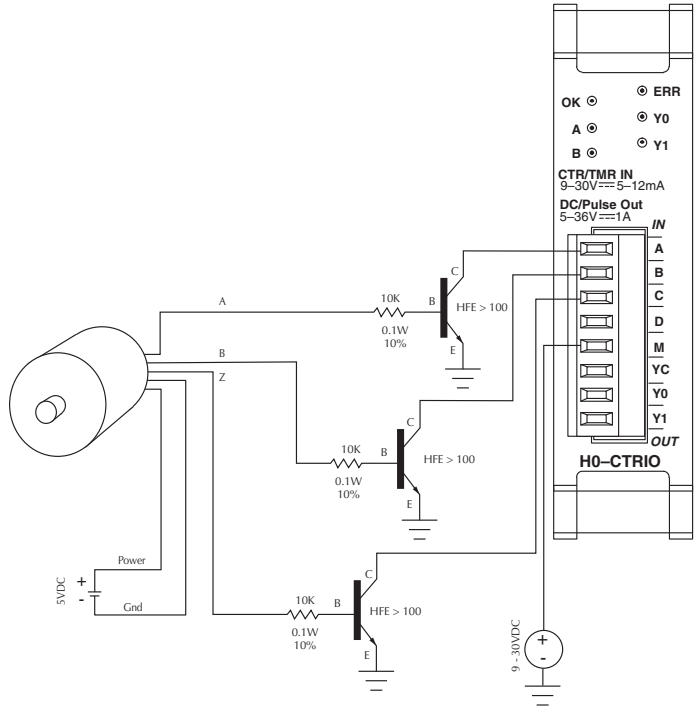


# H0- CTRIO(2) Quadrature Encoder Wiring Example

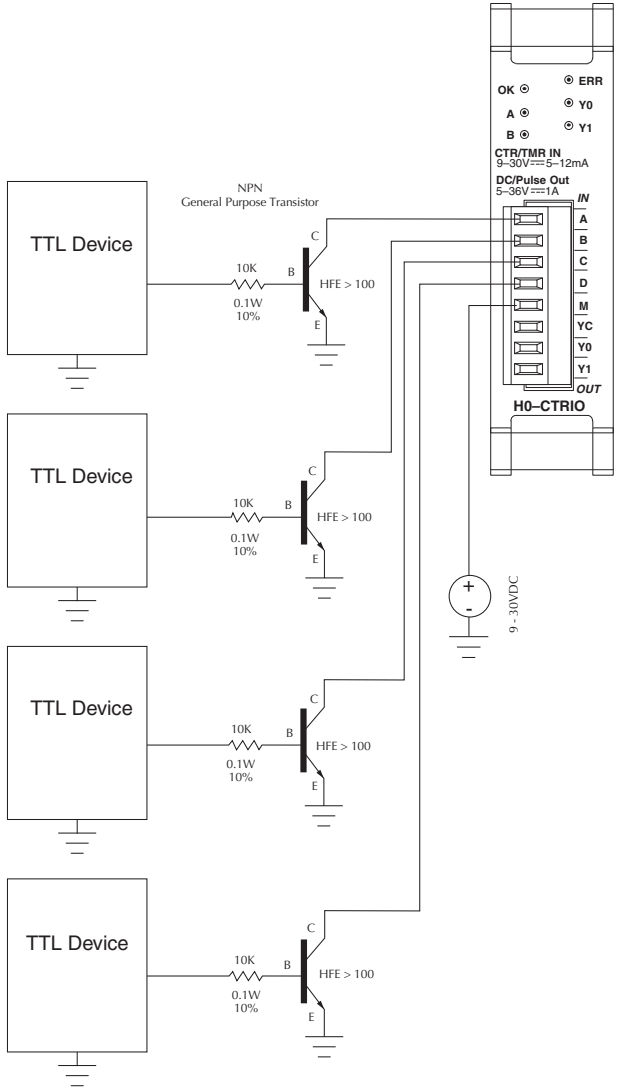


# H0-CTRIO(2) TTL Quadrature Encoder Field Wiring

2



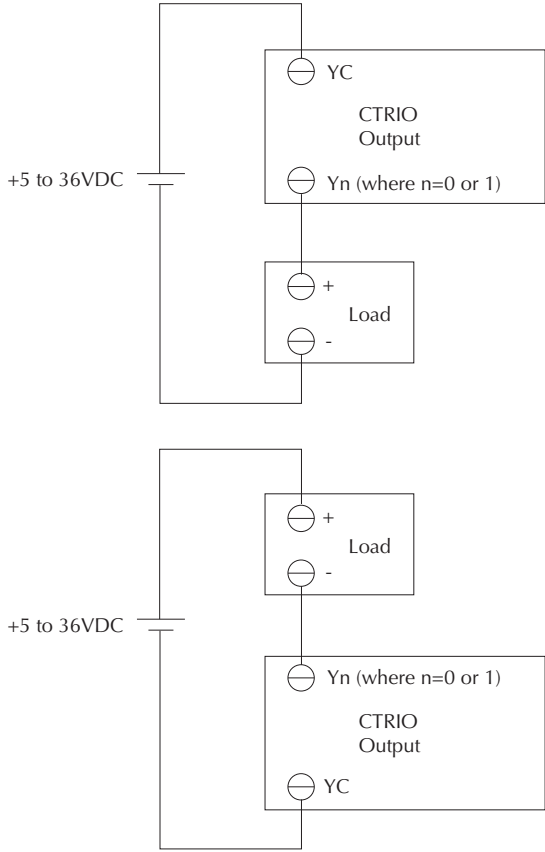
# H0- CTRIO(2) TTL Input Wiring



## H0- CTRIO(2) Output Wiring Schematic

2

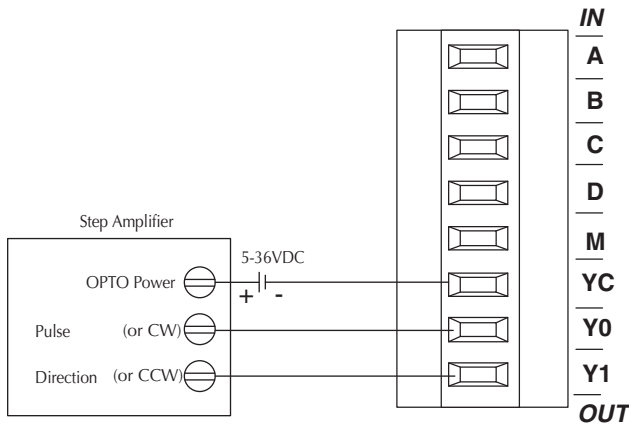
See page 2-3 for locating and setting the jumpers





## H0-CTRIO(2) Stepper/Servo Drive Wiring Example

2

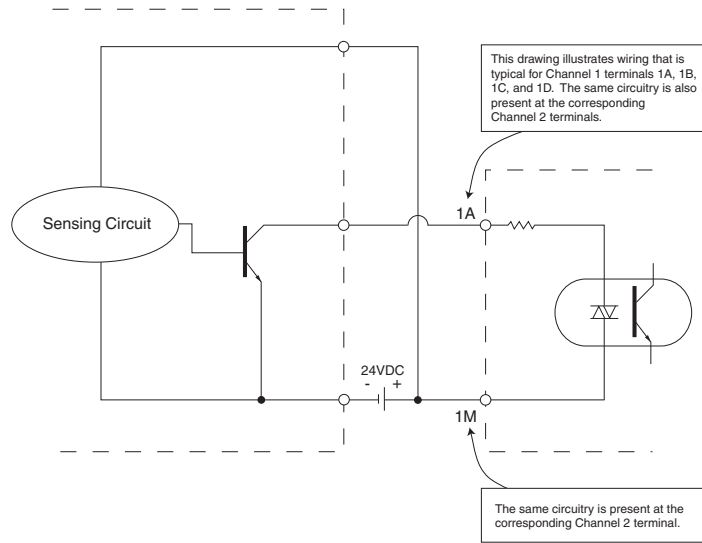


See page 2-3 for locating and setting the jumpers

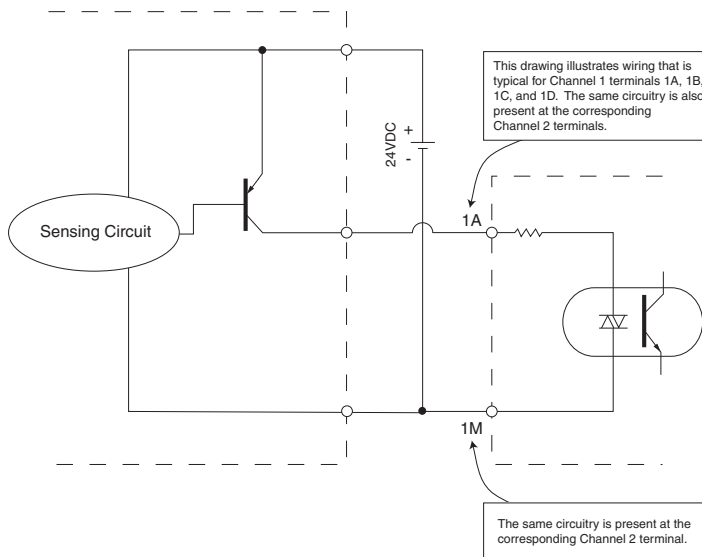
# Solid State Input Device Wiring to the H0-CTRIO(2) Module

## NPN Field Device

2



## PNP Field Device



## Installing the H2-CTRIO(2) Module

The H2-CTRIO(2) module is compatible with Do-more CPUs and several DL205 CPU-slot interface devices. Consideration must be given to the firmware version of the CPU to assure their compatibility with the H2-CTRIO(2). (see chart below).

The H2-CTRIO(2) module plugs into any I/O slot of any Do-more or *Direct*LOGIC 205 base except slot 0 when using a *Direct*LOGIC PLC. Slot 0 is also not allowed if using the H2-CTRIO and a WinPLC or H2-PBC controller. However, slot 0 is available for the H2-CTRIO(2) module when using the H2-EBC interface devices (Slot 0 is the I/O slot adjacent to the CPU). The H2-CTRIO(2) cannot be used in DL205 local expansion bases or in Serial Remote I/O bases.

For installation instructions, refer to the:

- DL205 User Manual (D2-USER-M) if using a *Direct*LOGIC PLC
- DL205 Installation and I/O Manual (D2-INST-M) if using a WinPLC, EBC, Profibus slave interface module
- Do-more H2 series PLC Hardware User Manual (H2-DM-M) if using a Do-more PLC

The first time you power-up the CTRIO module, you should see the OK LED blinking. The blinking LED indicates that the module is in program mode.

### CPU and CTRIO Compatibility Chart

CPU-slot Device	Firmware	Hardware	<i>Direct</i> SOFT5	Slot Restrictions
<b>H2-CTRIO(2)</b>				
D2-240	v. 3.22 or later	-	v. 3.0C, Build 71 or later	any I/O slot except 0
D2-250	v. 1.56 or later	-	v. 3.0C, Build 71 or later	any I/O slot except 0
D2-250-1	v. 3.5 or later	-	v. 3.0C, Build 71 or later	any I/O slot except 0
D2-260	v. 1.2 or later	-	v. 4.0 or later	any I/O slot except 0
H2-WinPLC	-	xK or later	-	any I/O slot except 0
H2-EBC	v. 2.1.357 or later	-	-	prior to Rev 9A any I/O slot except 0; Rev 9A or later any I/O slot
H2-PBC	-	-	-	prior to Rev 4A any I/O slot except 0; Rev 4A or later any I/O slot
Do-more	Any	Any	N/A	None

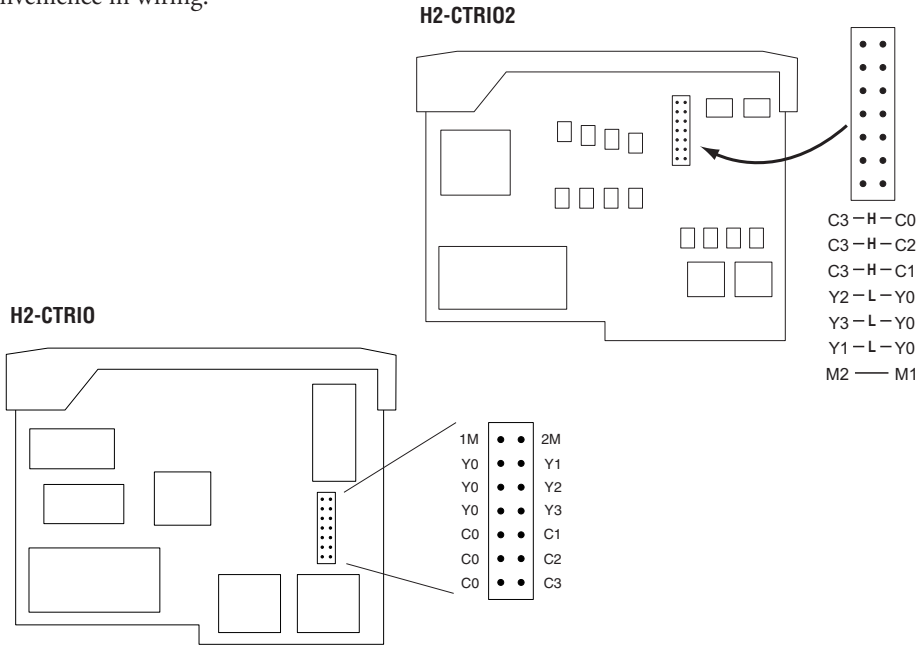
Updated firmware versions can be downloaded from our web site at [www.automationdirect.com](http://www.automationdirect.com)



**SPECIAL NOTE:** For applications requiring multiple CTRIO modules, *DirectLOGIC* CPUs, and dynamic access (in ladder logic) to CTRIO data, we recommend using the D2-250-1 or D2-260 CPU. These CPUs support Bit-of-Word addressing, 32 bit math instructions and have adequate memory for multiple CTRIO applications.

## Setting H2-CTRIO(2) Jumpers

Jumpers are provided to connect input commons or outputs/output commons. Use of these jumpers is not necessary to set up the CTRIO module. The jumpers are provided solely for convenience in wiring.



H2-CTRIO(2) Jumper Functions		
H2-CTRIO	H2-CTRIO2	Function
	1M-2M	Install jumper to internally connect the input commons 1M and 2M in order to reduce wiring if appropriate.
	Y0-Y1	Install jumper(s) to internally connect <b>Y0</b> to other Y terminals in order to reduce wiring if appropriate. Connect wire at <b>Y0</b> .
	Y0-Y2	
	Y0-Y3	
C0-C1		Install jumper(s) to internally connect <b>C0</b> to other C terminals in order to reduce wiring if appropriate. Connect wire at <b>C0</b> .
C0-C2		
C0-C3		
	C3-C0	Install jumper(s) to internally connect <b>C3</b> to other C terminals in order to reduce wiring if appropriate. Connect wire at <b>C3</b> .
	C3-C1	
	C3-C2	

## Wiring the H2-CTRIO(2) Module

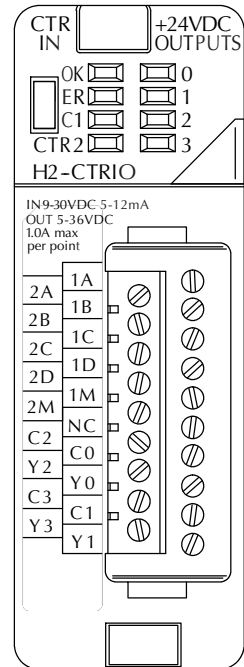
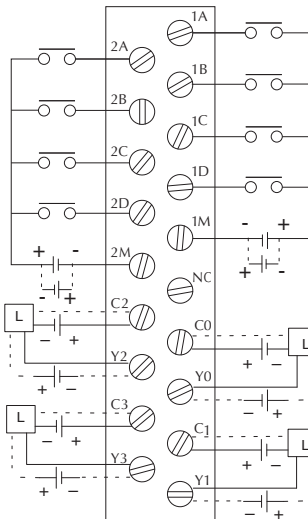
The H2-CTRIO(2) module has two independent input channels, each consisting of 4 optically isolated input points (pts. 1A-1D on common 1M and pts. 2A-2D on common 2M). The inputs can be wired to either sink or source current.

The module has 4 optically isolated output points (pts. Y0-Y3 with isolated commons C0-C3, respectively). The outputs must be wired so positive current flows into Cn terminal and then out of the Yn terminal (see the diagram below and the schematic on page 2-19).

Remember that the internal jumpers can be used to connect the input commons or outputs/output commons together.

The module is configured, using CTRIO Workbench, to accommodate the user's application. The function of each input (counting, timing, reset, etc.) and output (pulse output, discrete output, etc.) is defined in the configuration of the module.

Refer to Chapters 4 and 5 to determine what input and output configurations are possible.



**NOTE:** Field device wiring must be compatible with the module configuration.

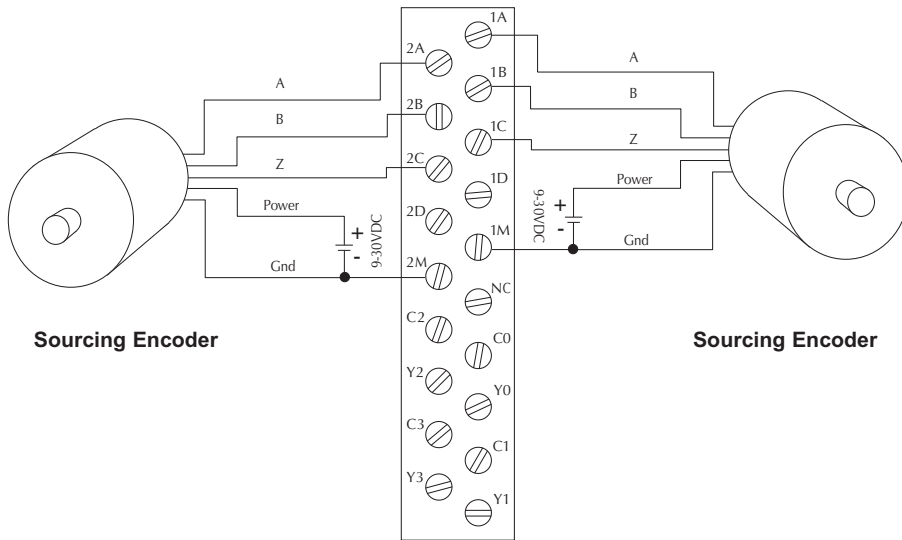
See the notes below for further details about power source considerations, circuit polarities, and field devices.

### NOTES:

1. **Inputs (1A, 1B, 1C, 1D and 2A, 2B, 2C, 2D) require user-provided 9-30VDC power sources. Terminals 1M and 2M are the commons for Channel 1 and Channel 2 inputs. Maximum current consumption is 12mA per input point.**
2. **Polarity of the input power sources (shown above) can be reversed. Consideration must be given, however, to the polarity of the field device. Many field devices are designed for only one polarity and can be damaged if power wiring is reversed.**
3. **Outputs have one polarity only (as shown above) and are powered by user-provided 5-36VDC power sources. The maximum allowable current per output circuit is 1A for the H2-CTRIO and 1A at 23°C or 0.5A at 60°C for the H2-CTRIO2.**

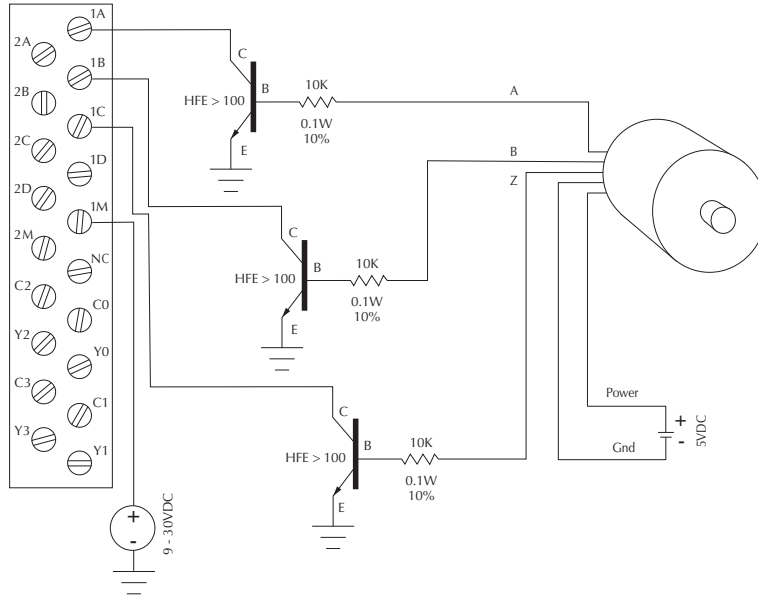
## H2- CTRIO(2) Quadrature Encoder Wiring Example

2



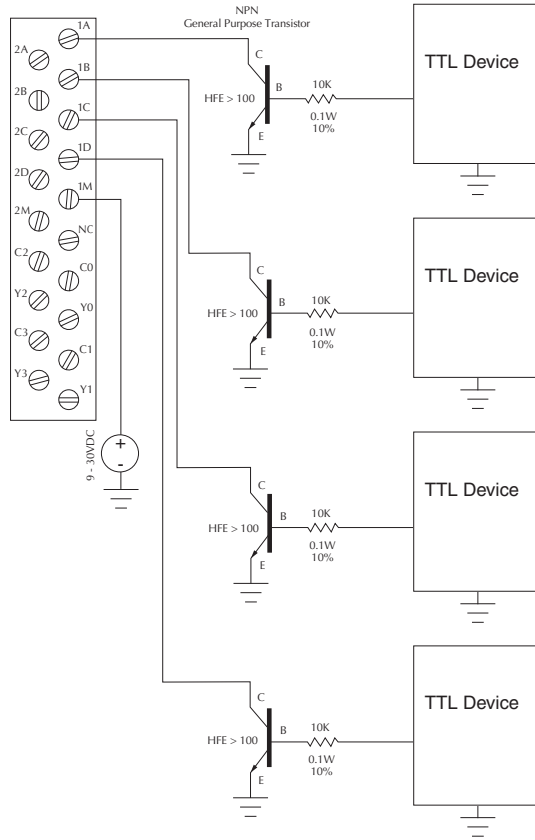
## H2-CTRIO(2) TTL Quadrature Encoder Field Wiring

2



# H2-CTRIO(2) TTL Input Wiring

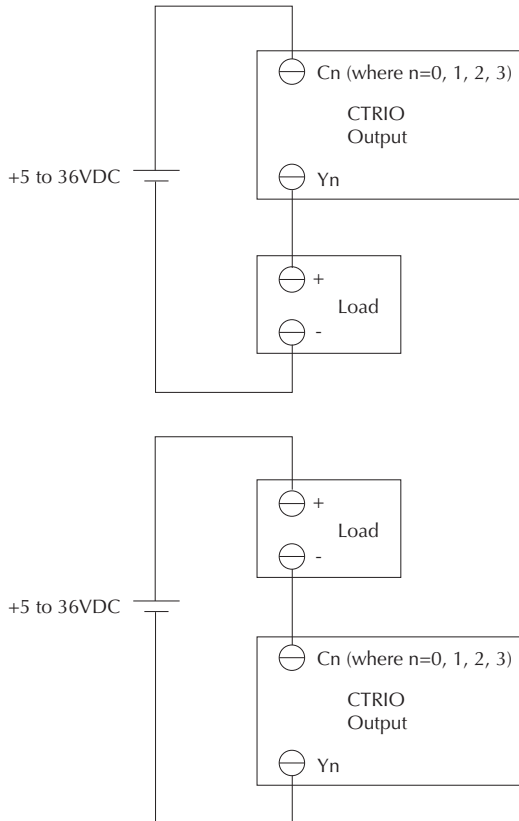
2





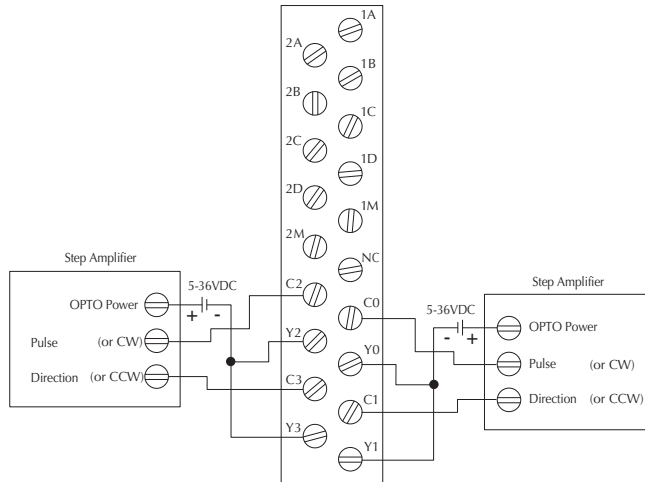
## H2- CTRIO(2) Output Wiring Schematic

The CTRIO outputs are individually isolated DC switches that can be used to break the high or the low side of a DC load.



## H2-CTRIO(2) Stepper/Servo Drive Wiring Example

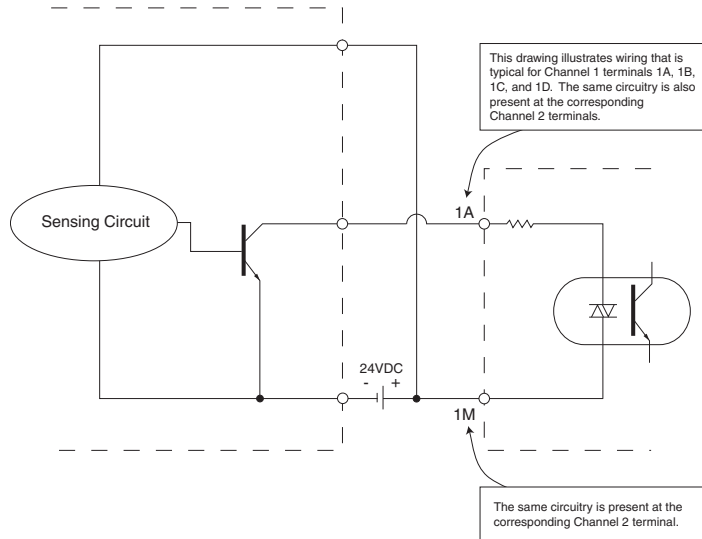
2



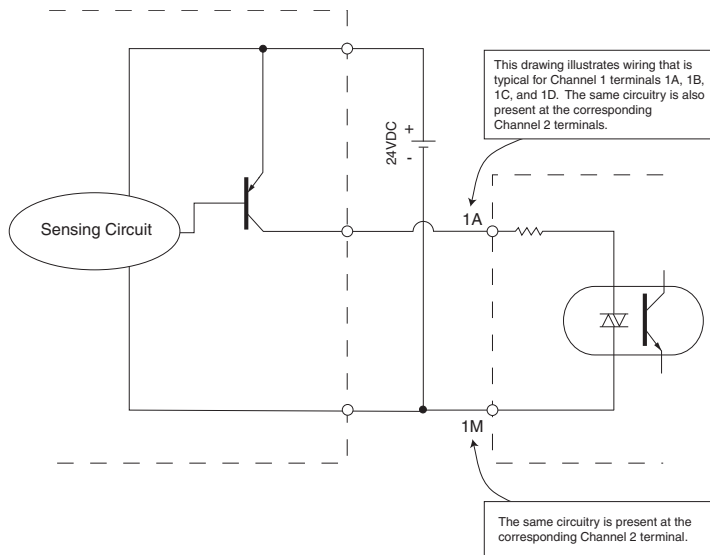
This example assumes that the Step Amplifier interface to be optocoupler LEDs (common anodes at the “OPTO Power” terminal) with internal current limiting resistors. This is a standard method, but you must consult you step amplifier documentation to ensure that this method is applicable.

# Solid State Input Device Wiring to the H2-CTRIO(2) Module

## NPN Field Device



## PNP Field Device



## Installing the H4-CTRIO

The H4-CTRIO module is compatible with two DL405 CPU-slot interface devices. Consideration must be given to the firmware versions of the CPU-slot interfaces to assure their compatibility with the H4-CTRIO. (see chart below).

The H4-CTRIO module plugs into any I/O slot of any *Direct*LOGIC 405 base. H4-EBCs support the use of the H4-CTRIO in DL405 local expansion bases. The H4-CTRIO cannot be used in Serial Remote I/O bases.

For installation instructions, refer to the:

- DL405 User Manual (D4-USER-M) if using a *Direct*LOGIC PLC
- DL405 Installation and I/O Manual (D4-INST-M) if using an H4-EBC interface

The first time you power-up the CTRIO module, you should see the OK LED blinking. The blinking LED indicates that the module is in program mode.

### CPU and CTRIO Compatibility Chart

CPU-slot Device	Firmware	Hardware	<i>Direct</i> SOFT32
D4-450	April 2000 or earlier: H8 (CISC) v. 2.00 SH (RISC) v. 1.500 May 2000 or later: H8 (CISC) v. 2.00 SH (RISC) v. 2.500	-	v. 4.0, Build 16 or later
H4-EBC	2.1.328 or later	v. 4F or later	-

Updated firmware versions can be downloaded from our web site at [www.automationdirect.com](http://www.automationdirect.com)

## Wiring the H4-CTRIO Module

The H4-CTRIO module has two independent input channels, each consisting of 4 optically isolated input points (pts.1A-1D on common 1M and pts. 2A-2D on common 2M). The inputs can be wired to either sink or source current.

The module has 4 optically isolated output points (pts.Y0-Y3 on isolated commons C0-C3, respectively). The outputs must be wired so that positive current flows into Cn terminal and then out of the Yn terminal(see the diagram below and the schematic on page 2-25).

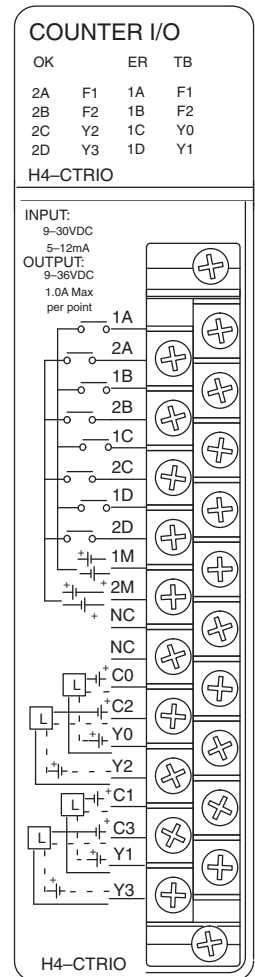
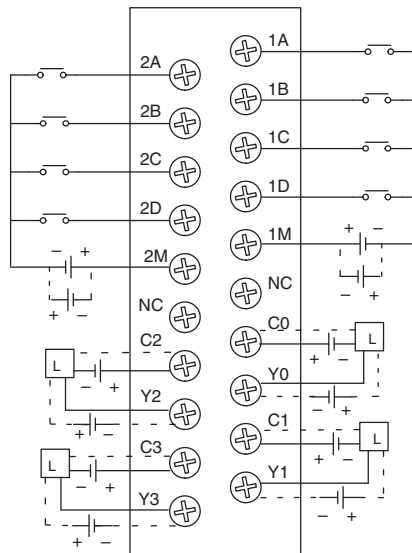
The module is configured, using CTRIO Workbench, to accommodate the user's application. The function of each input (counting, timing, reset, etc.) and output (pulse output, discrete output, etc.) is defined in the configuration of the module.

Refer to Chapters 4 and 5 to determine what input and output configurations are possible.



**NOTE:** Field device wiring must be compatible with the module configuration.

See the notes below for further details about power source considerations, circuit polarities, and field devices. Also, refer to the specifications on pages 1-5 and 1-6 for more information.

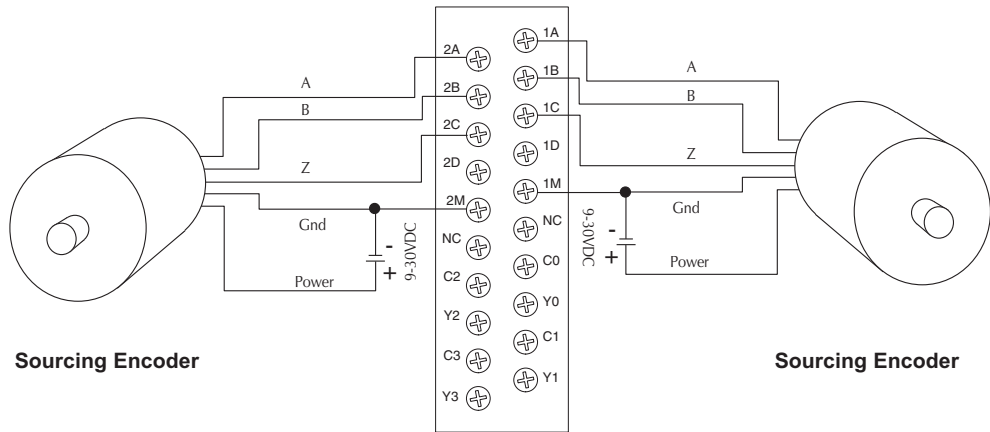


### NOTES:

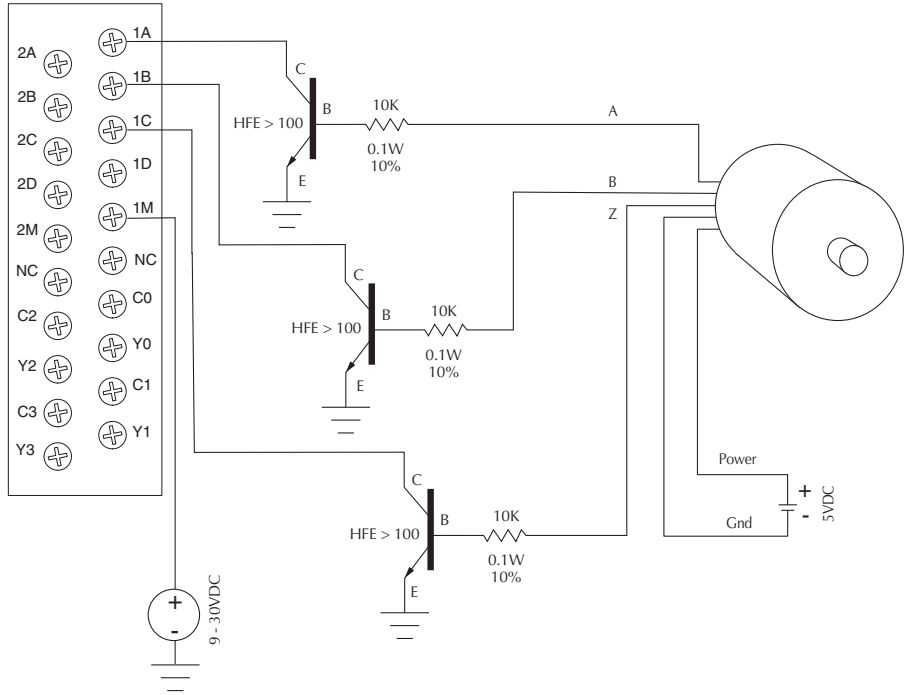
1. Inputs (1A, 1B, 1C, 1D and 2A, 2B, 2C, 2D) require user-provided 9-30VDC power sources. Terminals 1M and 2M are the commons for Channel 1 and Channel 2 inputs. Maximum current consumption is 12mA per input point.
2. Polarity of the input power sources (shown above) can be reversed. Consideration must be given, however, to the polarity of the field device. Many field devices are designed for only one polarity and can be damaged if power wiring is reversed.
3. Outputs have one polarity only (as shown above) and are powered by user-provided 5-36VDC power sources. The maximum allowable current per output circuit is 1A.

# H4-CTRIO Quadrature Encoder Wiring Example

2

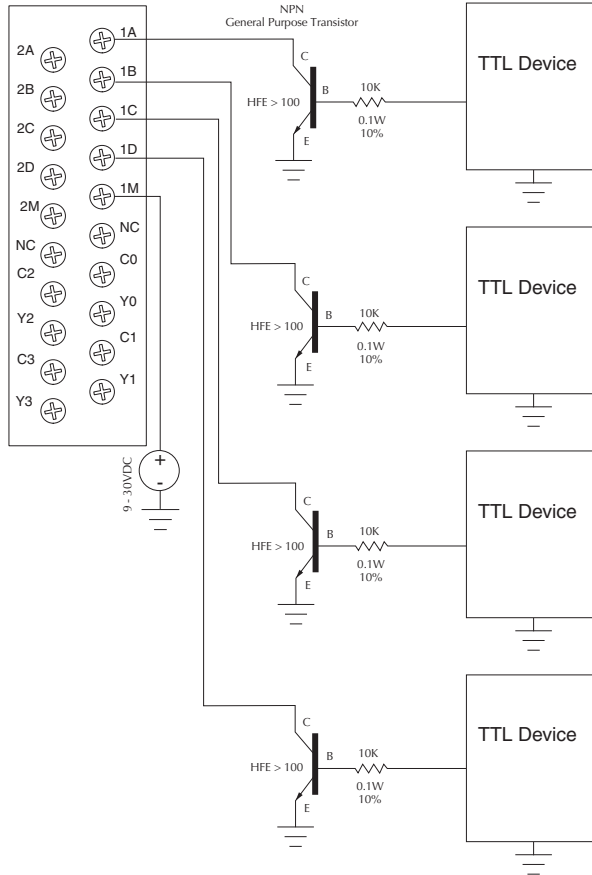


# H4-CTRIO TTL Quadrature Encoder Field Wiring



# H4-CTRIO TTL Input Wiring

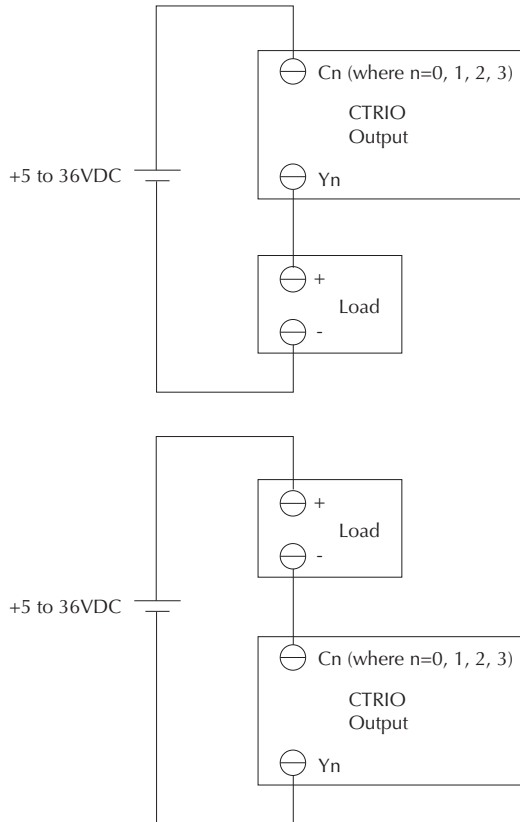
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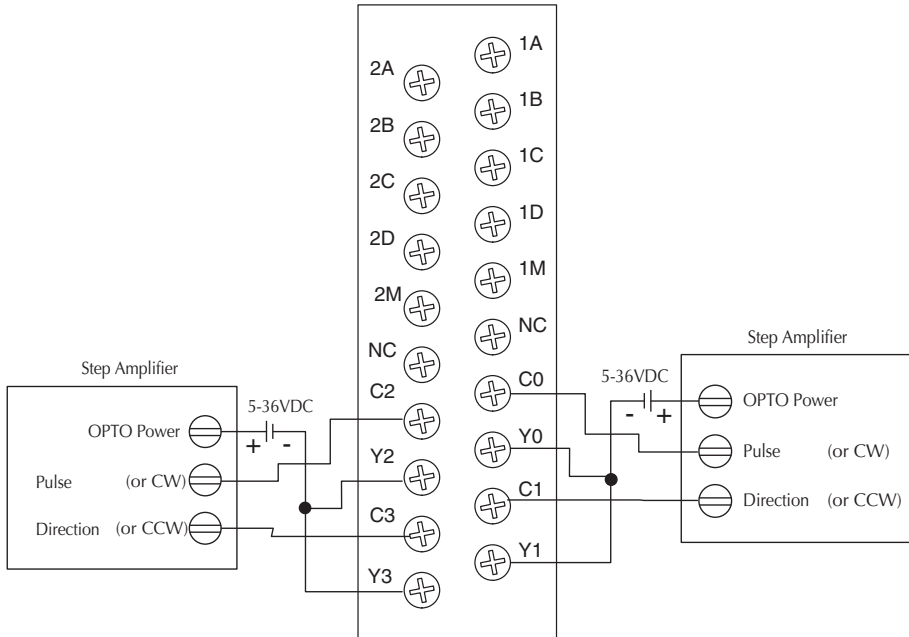
## H4-CTRIO Output Wiring Schematic

The CTRIO outputs are individually isolated DC switches that can be used to break the high or the low side of a DC load.



## H4-CTRIO Stepper/Servo Drive Wiring Example

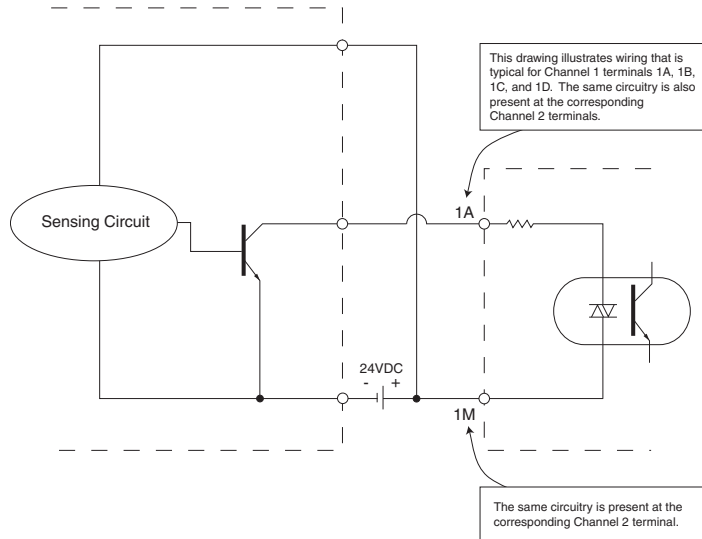
2



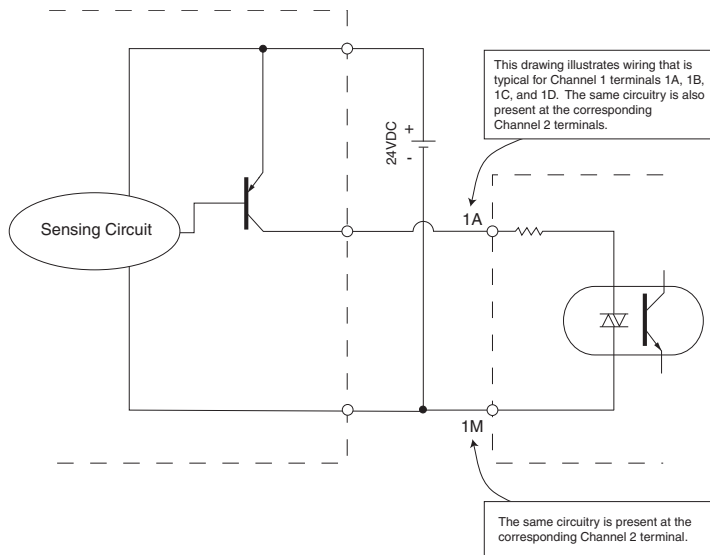
This example assumes that the Step Amplifier interface to be optocoupler LEDs (common anodes at the “OPTO Power” terminal) with internal current limiting resistors. This is a standard method, but you must consult you step amplifier documentation to ensure that this method is applicable.

# Solid State Input Device Wiring to the H4-CTRIO Module

## NPN Field Device



## PNP Field Device



## Installing the T1H-CTRIO

The T1H-CTRIO module is compatible with several Terminator I/O Network interface devices. Consideration must be given to the firmware versions of the Network interfaces to assure their compatibility with the T1H-CTRIO. (see chart below).

The T1H-CTRIO module plugs into any valid I/O slot in a Terminator I/O system. The T1H-CTRIO cannot be used in Serial Remote I/O bases (T1K-RSSS).

For installation instructions, refer to the:

- Terminator I/O Installation and I/O Manual (T1K-INST-M)

The first time you power-up the CTRIO module, you should see the OK LED blinking. The blinking LED indicates that the module is in program mode.

### CPU and CTRIO Compatibility Chart

CPU-slot Device*	Firmware	Hardware
T1H-EBC	v. 1.0.444 or later	v. 2I or later
T1K-PBC	v. 1.1.10 or later	v. 2D or later

Updated firmware versions can be downloaded from our web site at [www.automationdirect.com](http://www.automationdirect.com)



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**NOTE:** The T1H-CTRIO is only supported by the T1H-EBC, T1H-EBC100 and T1H-PBC.

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## Wiring the T1H-CTRIO Module

The T1H-CTRIO module has two independent input channels, each consisting of 4 optically isolated input points (pts. 1A-1D on common 1M and pts. 2A-2D on common 2M). The inputs can be wired to either sink or source current.

The module has 4 optically isolated output points (pts. Y0-Y3 on isolated commons C0-C3, respectively). The outputs must be wired so that positive current flows into Cn terminal and then out of the Yn terminal. (see the diagram on the following page and the schematic on page 2-34)

The module is configured, using CTRIO Workbench, to accommodate the user's application. The function of each input (counting, timing, reset, etc.) and output (pulse output, discrete output, etc.) is defined in the configuration of the module.

Refer to Chapters 4 and 5 to determine what input and output configurations are possible.



**NOTE:** Field device wiring must be compatible with the module configuration.

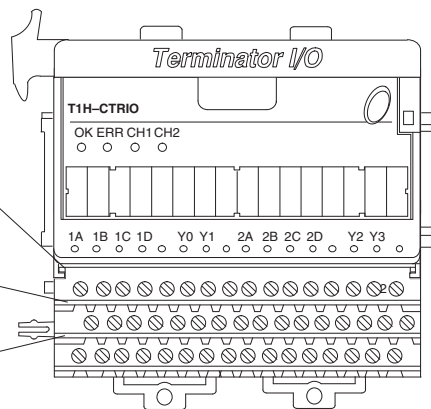
See the notes below for further details about power source considerations, circuit polarities, and field devices. Also, refer to the specifications on pages 1-5 and 1-6 for more information.

Apply the labels that come with the I/O module to the I/O base terminals to properly identify the base terminal points.

Input / Output Channels															
1A	1B	1C	1D	Y0	Y0	Y1	Y1	2A	2B	2C	2D	Y2	Y2	Y3	Y3

Channel Commons															
1M	1M	1M	1M	C0	C0	C1	C1	2M	2M	2M	2M	C2	C2	C3	C3

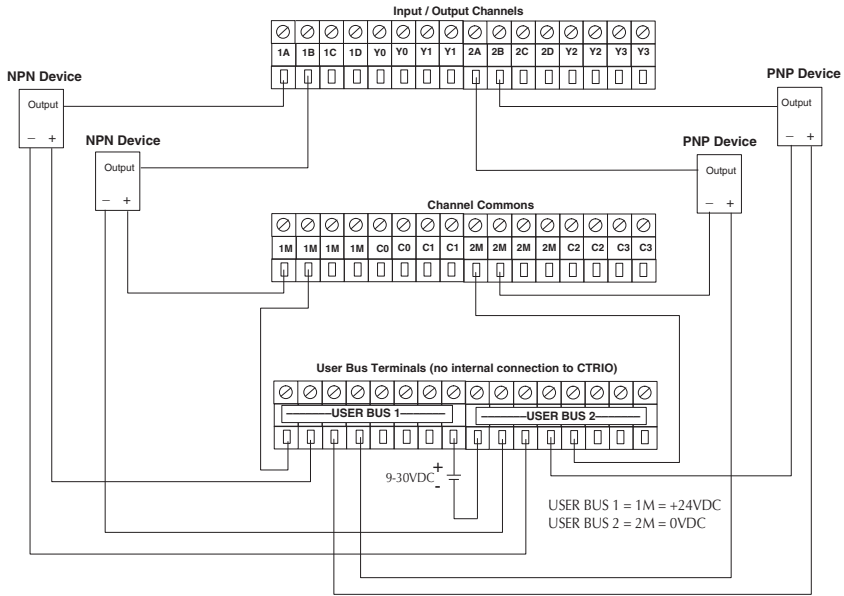
User Bus Terminals (no internal connection to CTRIO)															
USER BUS 1								USER BUS 2							



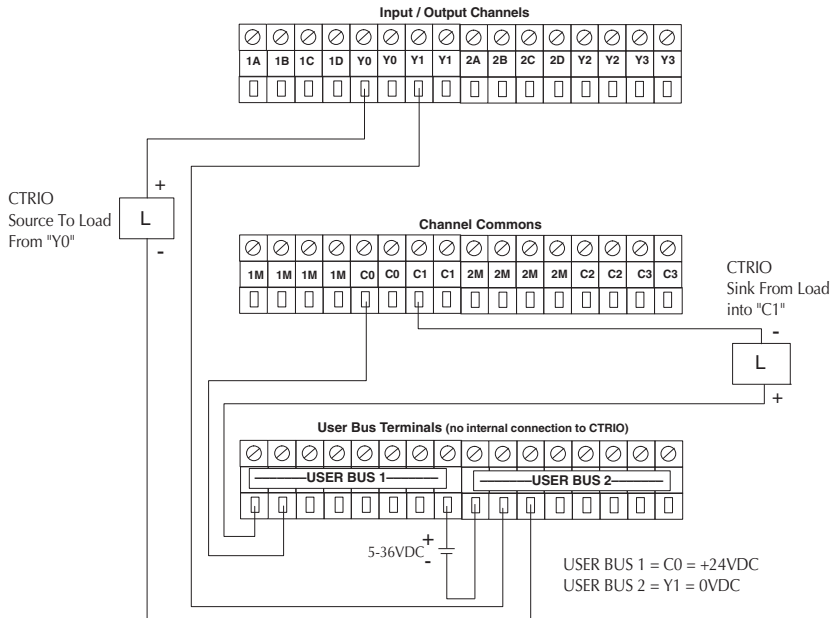
### NOTES:

- Inputs (1A, 1B, 1C, 1D and 2A, 2B, 2C, 2D) require user-provided 9-30VDC power sources. Terminals 1M and 2M are the commons for Channel 1 and Channel 2 inputs. Maximum current consumption is 12mA per input point.
- Polarity of the input power sources can be reversed. Consideration must be given, however, to the polarity of the field device. Many field devices are designed for only one polarity and can be damaged if power wiring is reversed.
- Outputs have one polarity only and are powered by user-provided 5-36VDC power sources. The maximum allowable current per output circuit is 1A.
- User Bus 1 and User Bus 2 are each an independent 8 wiring terminal bus. They can be used for additional power rail connections.

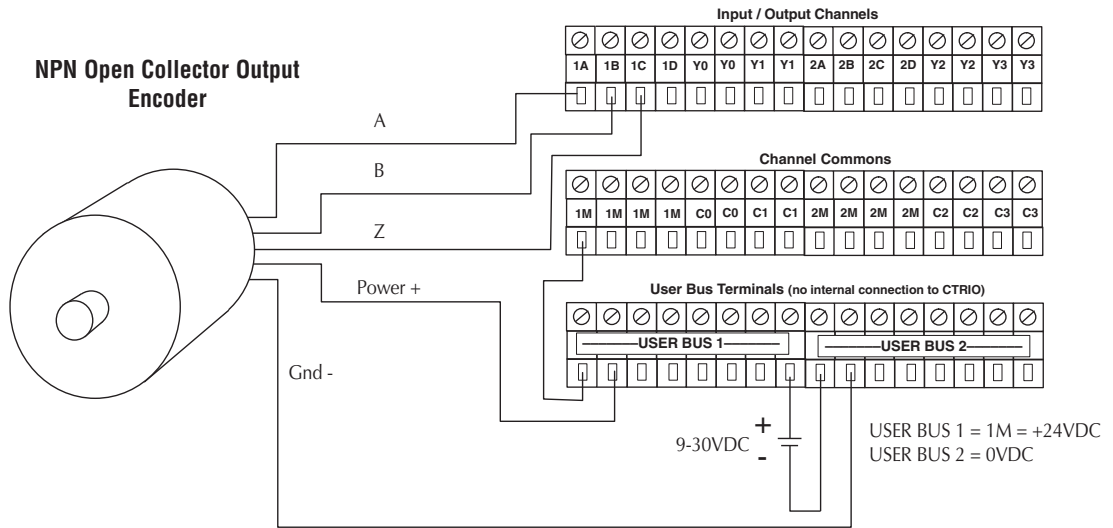
## T1H-CTRIO Input Field Wiring



## T1H-CTRIO Output Field Wiring

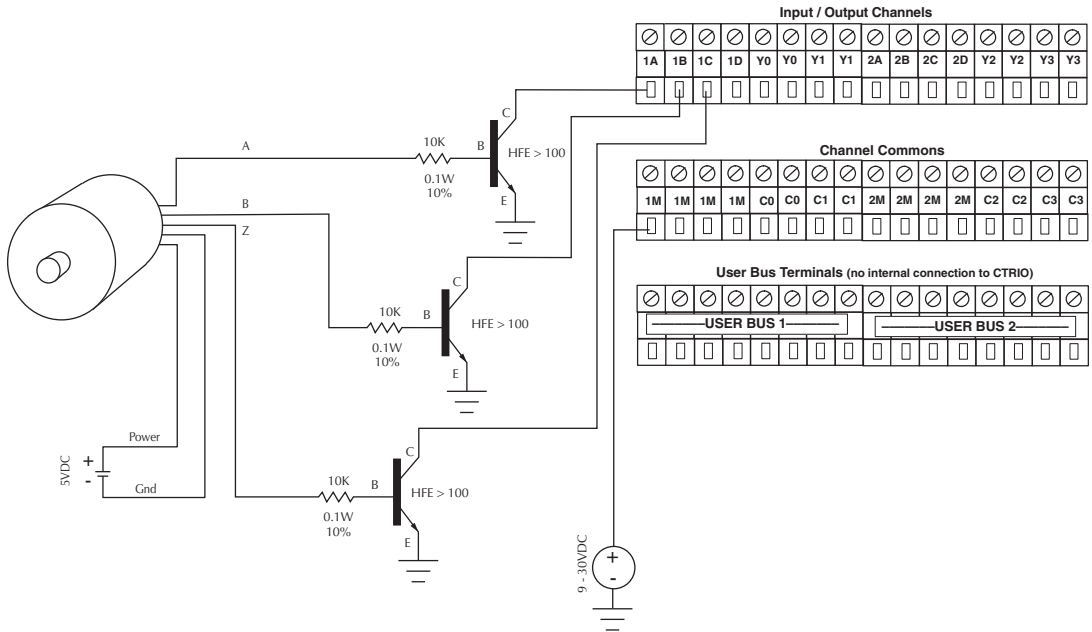


# T1H-CTRIO Quadrature Encoder Wiring Example



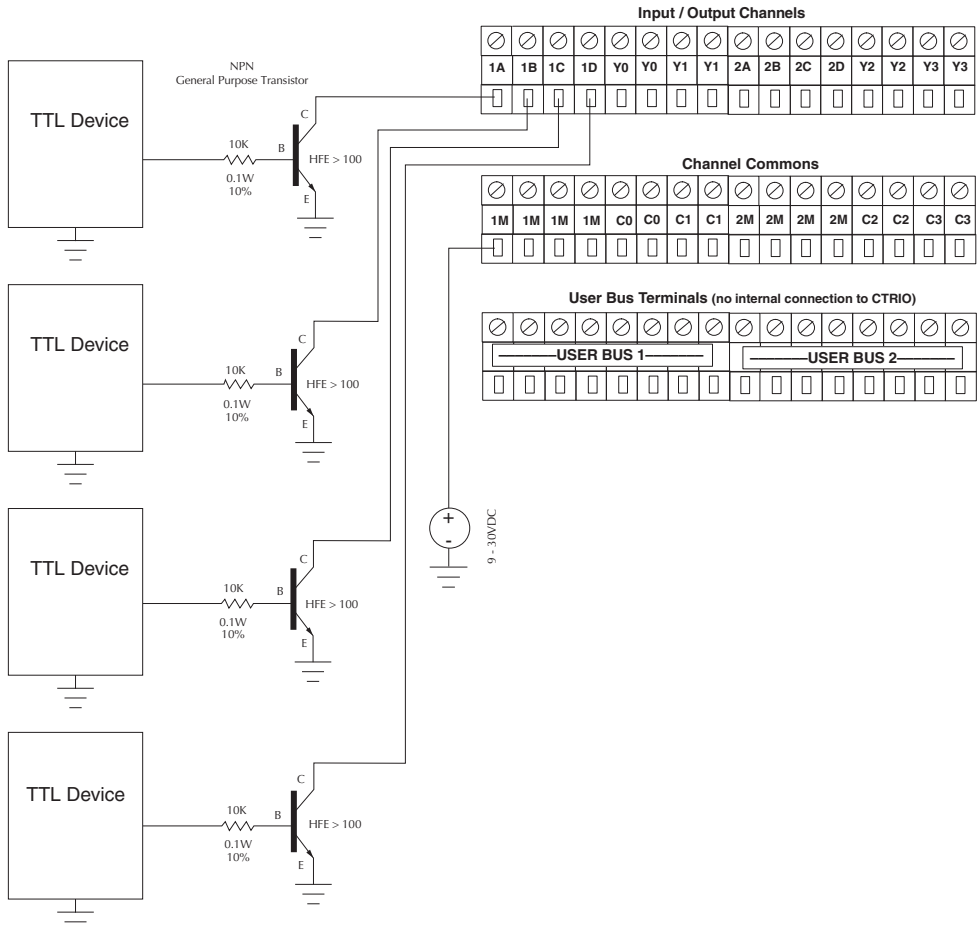
# T1H-CTRIO TTL Quadrature Encoder Field Wiring

2





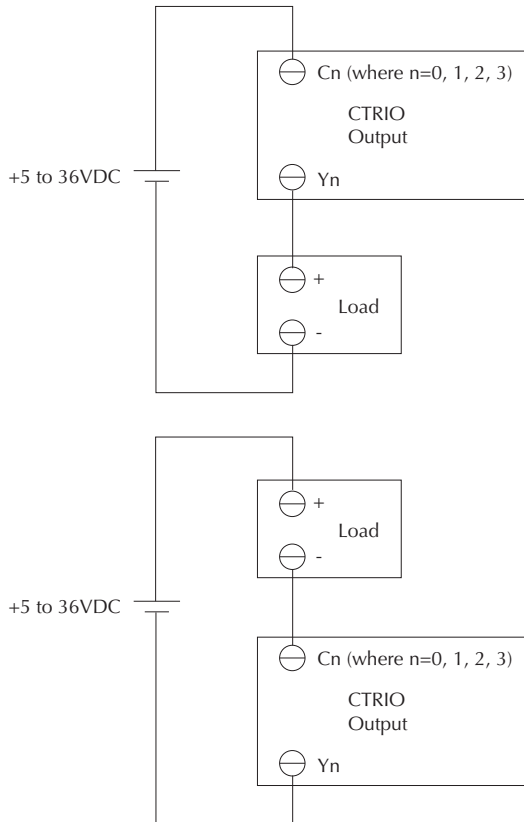
# T1H-CTRIO TTL Input Wiring



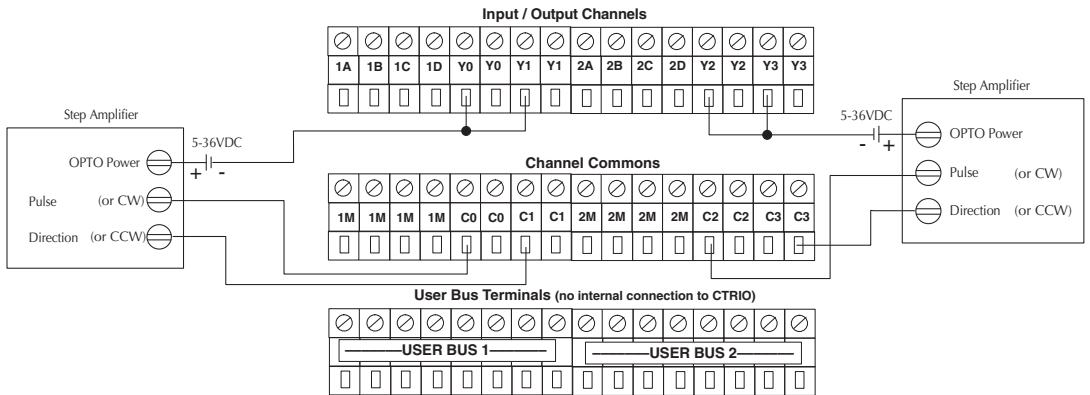
## T1H-CTRIO Output Wiring Schematic

The CTRIO outputs are individually isolated DC switches that can be used to break the high or the low side of a DC load.

2



# T1H-CTRIO Stepper/Servo Drive Wiring Example

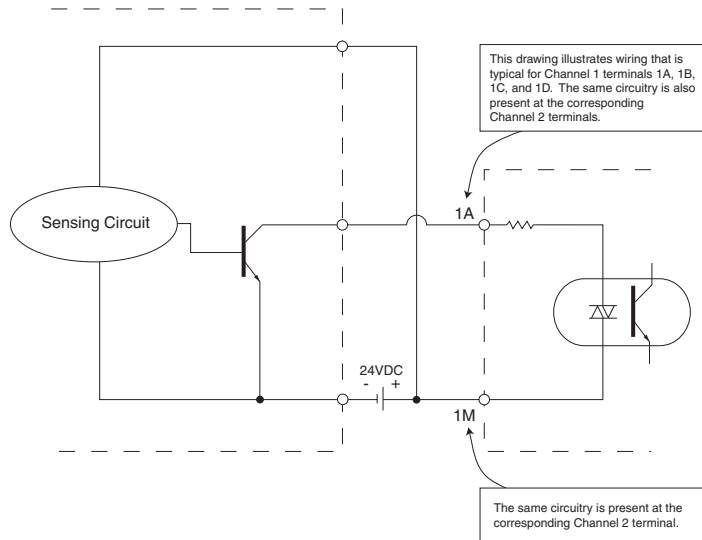


This example assumes that the Step Amplifier interface to be optocoupler LEDs (common anodes at the “OPTO Power” terminal) with internal current limiting resistors. This is a standard method, but you must consult your step amplifier documentation to ensure that this method is applicable.

# Solid State Input Device Wiring to the T1H-CTRIO Module

2

## NPN Field Device



## PNP Field Device

