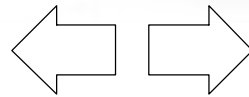
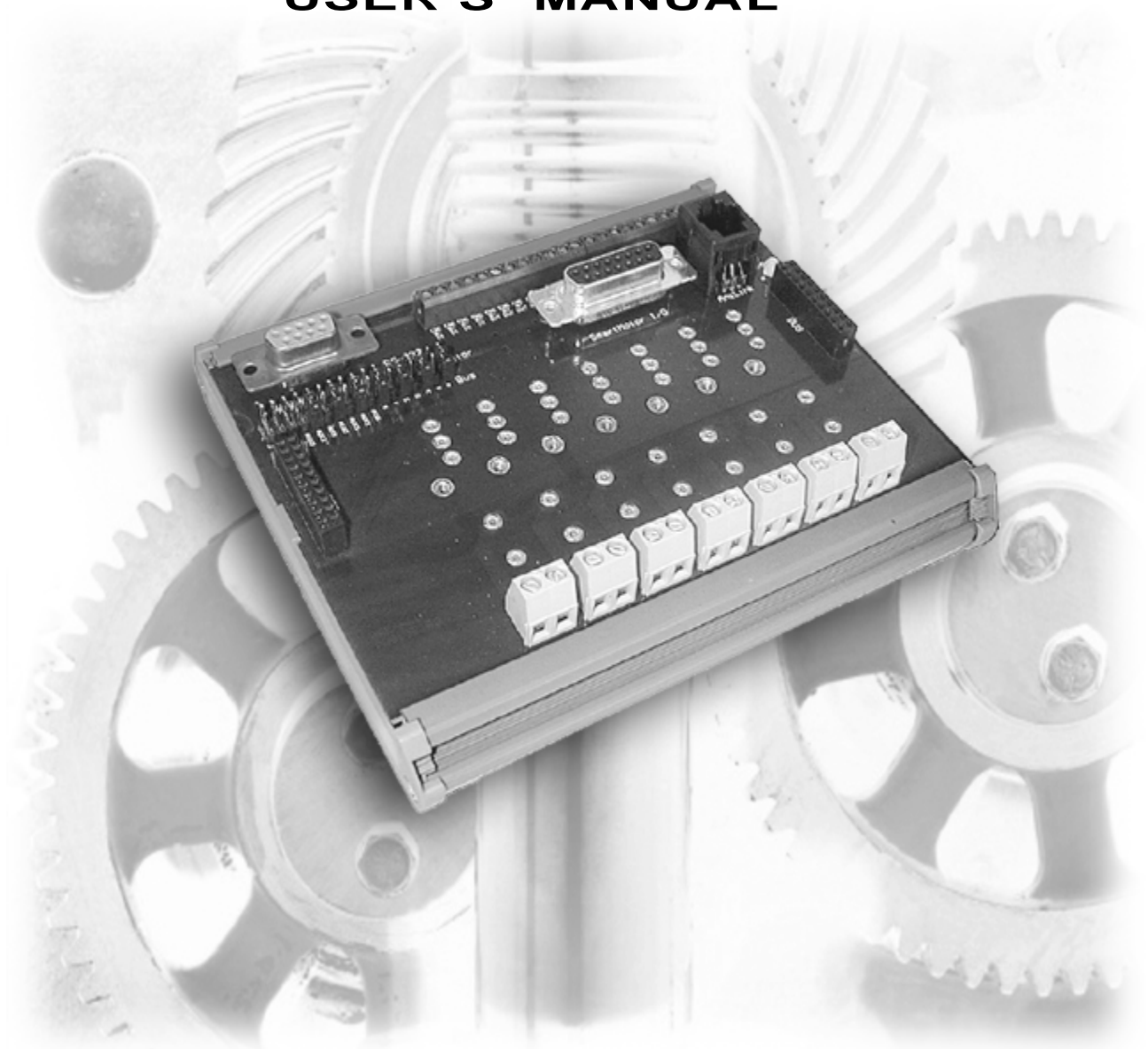


# DINI07

## USER'S MANUAL



ANIMATICS®

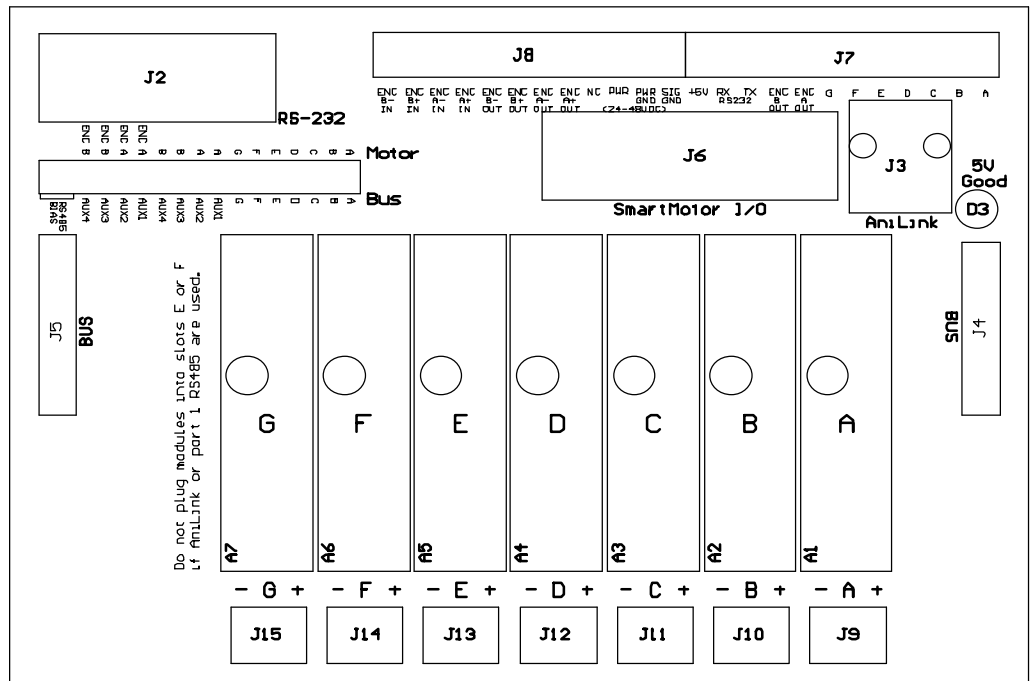
*Defining the Future in Motion Control*

## Overview

The DINIO7 is a DIN-rail mounted peripheral for the SmartMotor™ versions 3 and 4 product lines. Hereafter, the SmartMotor™ version 3 and 4 products will simply be referred to as the SmartMotor™.

Wiring Input/Output up to your SmartMotor™ is made simple with the DINIO7 breakout board. The DINIO7 has slots for 7 Industry standard Opto Modules. This is a DIN rail mount adapter that allows the SmartMotor™ to easily interface to popular I/O blocks like those produced by manufacturers such as Gordos, Grayhill, Opto-22 and others. It can be used with either input or output modules.

These block I/O are application specific and must be purchased separately from the DINIO7.



The DINIO7 has four primary functions:

- SmartMotor™ interface connections
- Block I/O sockets
- Animatics expansion bus
- Optional differential encoder interface

### Mfg. I/O module Cross Ref. chart for DINIO7 Breakout

All modules listed are 5VDC logic side for SmartMotor compatibility

All modules have LED indication

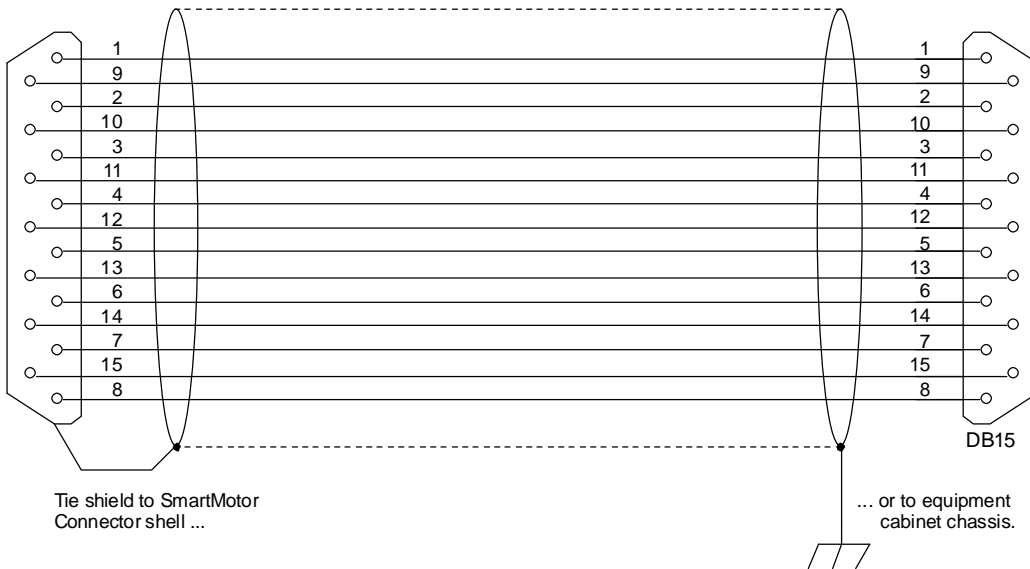
All Output modules have replaceable fuses

Mfg.	DC Input	DC Output	AC Input	AC Output
Opto-22	G4-IDC5	G4-ODC5	G4-IAC5	G4-OAC5A
Grayhill	70G-IDC5	70G-ODC5A	70G-IAC5A	70G-OAC5A
Crydom	X4IDC5	X4ODC5	X4IAC5	X4OAC5
Gordos/Crouzet	C4-IDC5	C4-ODC5	C4-IAC5	C4-OAC5
		(3-32VDC high side)	(120VAC high side)	

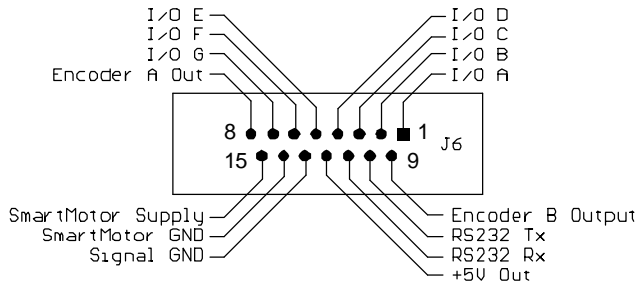
### SmartMotor™ Interface

The DINIO7 provides two means of connecting to the SmartMotor™ – a 15 pin D subminiature connector and a bank of standard pitch screw terminal blocks. The 15 pin D subminiature connector pinout is identical to that of the I/O connector on the SmartMotor™ D series. Thus, you need only to use a male-male 1-to-1 pinned 15 pinned D subminiature connector to fully hook up the DINIO7 to the SmartMotor™. These cables can be purchased from various companies. As the cable will be carrying 5V TTL level signals, Animatics recommends that you use shielded cables. The shield is typically terminated to the metal connector shell at the SmartMotor™ or the equipment cabinet.

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For reference, the pinout of the DINIO7's 15 pin D subminiature connector is

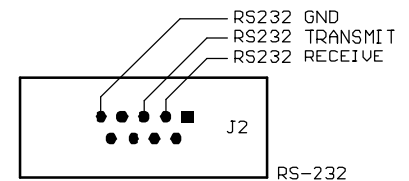


The second SmartMotor™ interface on the DINIO7 is the bank of standard pitch screw terminal blocks. From right to left, these connections are:

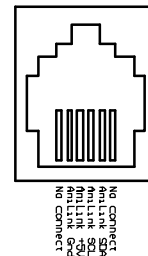
## DINIO7 Terminal Block Pinout

Signal	Description
A	Digital input or output A / Encoder input A / Step input
B	Digital input or output B / Encoder input B / Direction input
C	Digital input or output C / Positive Limit input
D	Digital input or output D / Negative Limit input
E	Digital input or output E / RS-485 + / AniLink
F	Digital input or output F / RS-485 - / AniLink
G	Digital input or output G / Sync
ENC A OUT	Encoder A output from SmartMotor™
ENC B OUT	Encoder B output from SmartMotor™
RS232 TXD	RS-232 transmit from SmartMotor™
RS232 RXD	RS-232 receive to SmartMotor™
+5V	+5V, 210 mA source from SmartMotor™
S16 GND	Signal ground, tied to PWR GROUND within SmartMotor™
PWR GND	Power ground, tied to GROUND within SmartMotor™
PWR	20 to 48VDC input power to SmartMotor™
NC	No connection
ENC A+ OUT	Optional differential encoder A+ output from SmartMotor™
ENC A- OUT	Optional differential encoder A- output from SmartMotor™
ENC B+ OUT	Optional differential encoder B+ output from SmartMotor™
ENC B- OUT	Optional differential encoder B- output from SmartMotor™
ENC A+ IN	Optional differential encoder A+ input from SmartMotor™
ENC A- IN	Optional differential encoder A- input from SmartMotor™
ENC B+ IN	Optional differential encoder B+ input from SmartMotor™
ENC B- IN	Optional differential encoder B- input from SmartMotor™

When all of the connections on the 15 pin I/O connector are carried back to the SmartMotor™, the user has direct access to the AniLink and channel 0 RS-232 port from the DINIO7. Serial communication is accessible through the connector labeled "RS-232":



Similarly, the AniLink network is accessible through the RJ-6 modular connector. Its pinout is given here:



The ratings for the interface to the SmartMotors are given below. Absolute maximum ratings are levels beyond which damage may occur.

Absolute maximum voltage:	5.5VDC
Absolute minimum voltage:	-0.3VDC
Absolute maximum current sourced/sunk by SmartMotor™:	30 mA
Recommended operating voltage (source or sink):	4.75-5.25VDC
Valid logical high signal:	2.0VDC
Valid logical low signal to SmartMotor™:	0.4VDC
Valid logical low signal from SmartMotor™:	0.8VDC

## Block Input/Output Sockets

The DINIO7 has 7 block I/O sockets, one for each of the 7 general purpose I/O on the SmartMotor™. These sockets are compatible with both 24VDC and 110VAC I/O modules from Opto-22, Crouzet and Grayhill. When issuing commands from the SmartMotor™, note that the logical interface to the I/O block is active low. That is, a port value of 0 would turn an output block, on closing its contacts. If you read the value of a port that is connected to an input block, a value of 0 would mean that there is current flowing through the I/O block.

At power up, the SmartMotor™ I/O ports are configured as an input pulled high. In order to close the contacts on an I/O block, you must both configure the SmartMotor™ port as an output and set it low.

Suppose you have a 24VDC output block in port A. If you want the I/O block contacts to close, you must first define port A as an output by using the UAO command. You then set port A to a logical low state by using the UA=0 command. Similarly, if you needed to activate the relay on port B, you would use the UB=0 command. If you want to open the contacts, you would issue the UB=1 command.

Similarly, if you had an input block, you would generally read its state by stuffing its value into a variable. For example, if you had an input block in port C, you would stuff its value into the variable g by issuing the command g=UCI.

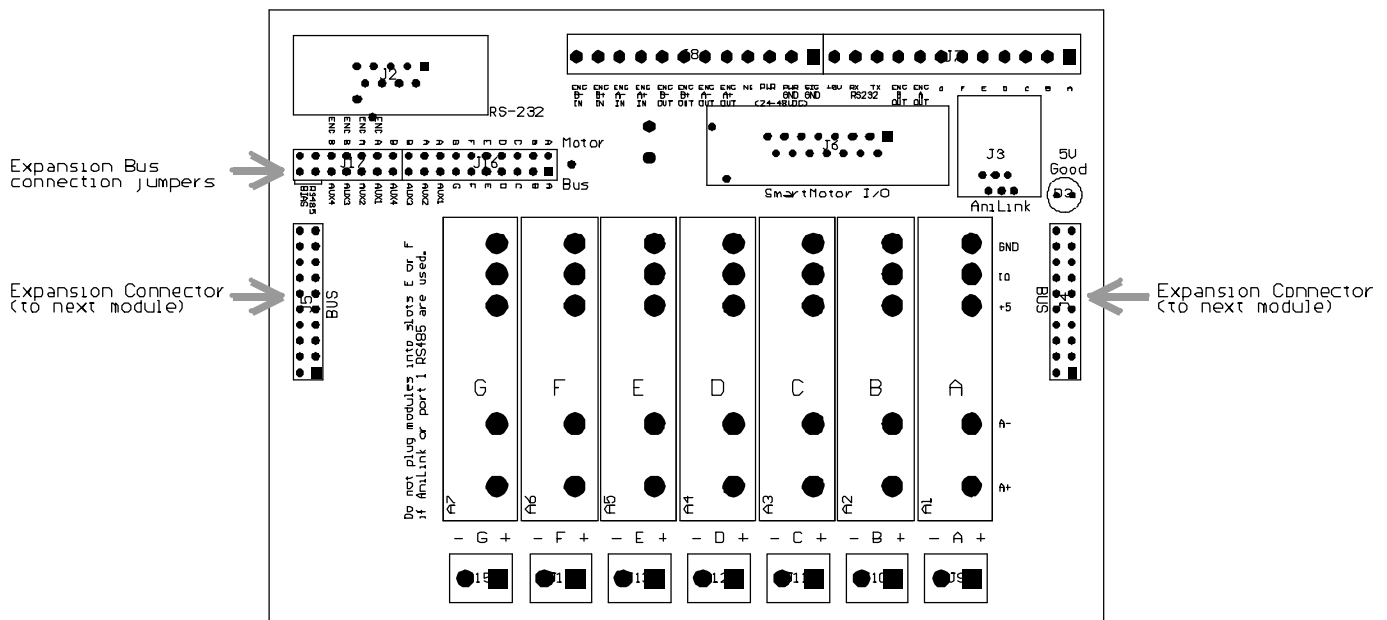
You can also use the port value directly without assigning port value into a variable, but this has limited utility and may lead to confusing timing interaction within the program - so you have been warned. It is interesting to note that you can issue this command regardless of whether the port is configured as an input or an output. For further details, please refer to the SmartMotor™ User's Guide.

Please note that, due to the multi-functional nature of the SmartMotor™ I/O, some features are lost when you use I/O blocks. For example, ports E and F can be used as digital I/O, as well as RS-485 and AniLink. If you use either the RS485 or AniLink functions, do not plug an I/O block into either of the slots corresponding to ports E and F.

*When issuing commands from the SmartMotor™, note that the logical interface to the I/O block is active low.*

## Animatics Expansion Bus

The Animatics Expansion Bus provides a convenient way to connect several SmartMotors and their DIN-rail mount expansion modules without using any additional cable. Every Animators DIN-rail mount expansion module has two expansion bus connectors for receiving signals from modules on either end of it. The bus passes through the module without any direct connection to any SmartMotor™ I/O or expansion module function. To make use of the bus, it has to be connected to some SmartMotor™ I/O or expansion bus card through the jumpers.



For example, let us suppose that your machine has six SmartMotors and you have a DINIO7 connected to each. If you wanted to connect port A on SmartMotors #1 and #4 together, you do not have to run a cable between the two motors. Instead, you would install the expansion bus bridge and the jumpers marked User A on their respective DINIO7s.

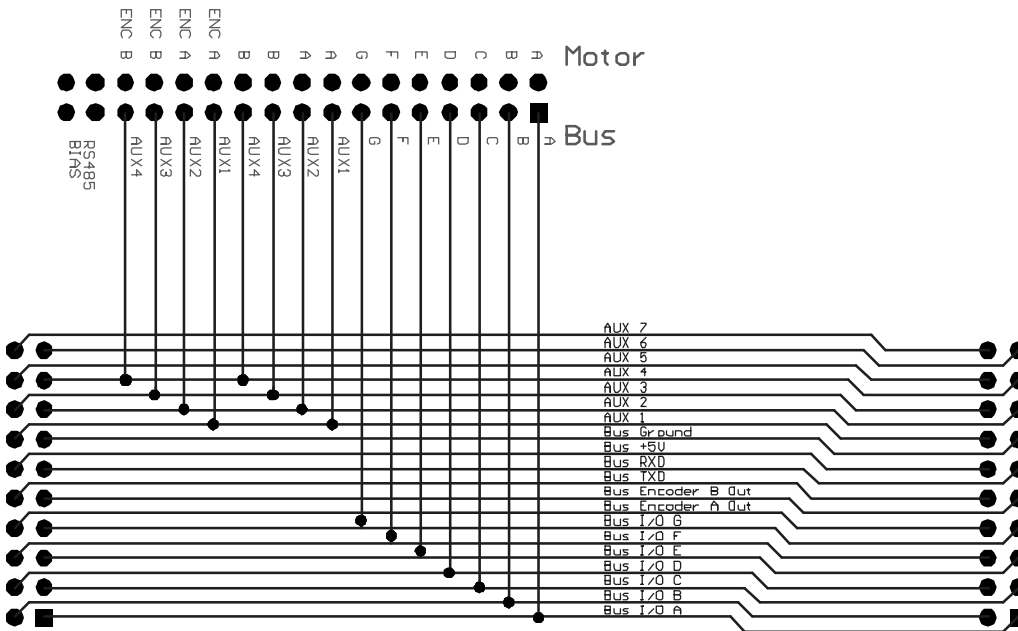
The Expansion Bus also allows for certain specialized connections. Every Expansion Bus is equipped with 7 auxiliary lines that allow you to connect the SmartMotor™ I/O in various ways. The DINIO7 allows you to connect the SmartMotor™ I/O A, B and encoder outputs to auxiliary connections on the Expansion Bus. This allows you to hook up SmartMotors in a mode follow (gearing) configuration without using any cables.

Specifically, to hook up two SmartMotors for mode follow, simply set the following jumper connections:

Master motor: Motor ENC A to Bus AUX 1  
 Motor ENC B to Bus AUX 3

Slave motor: Motor A to Bus AUX1  
 Motor B to Bus AUX3

A schematic of the Animatics expansion bus and the DINIO7 jumpers is shown below:

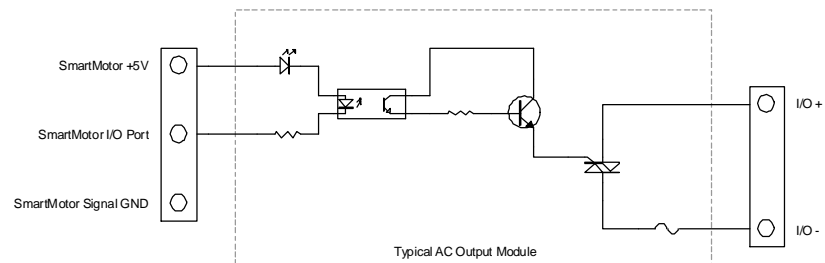
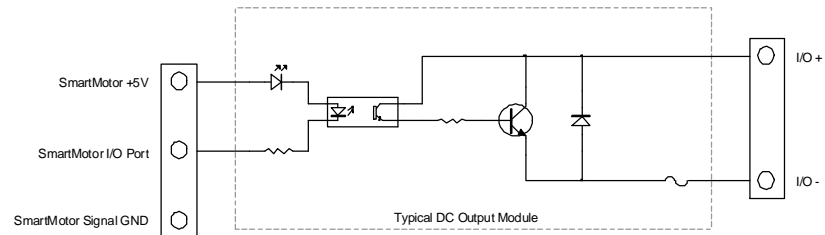
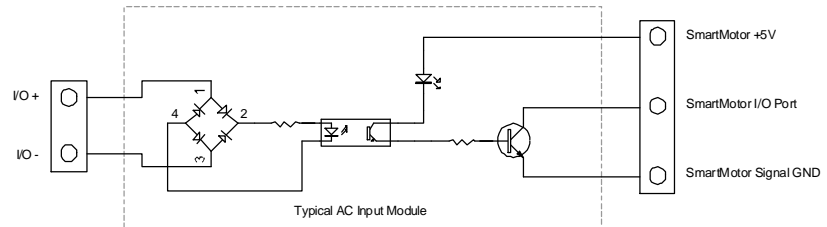
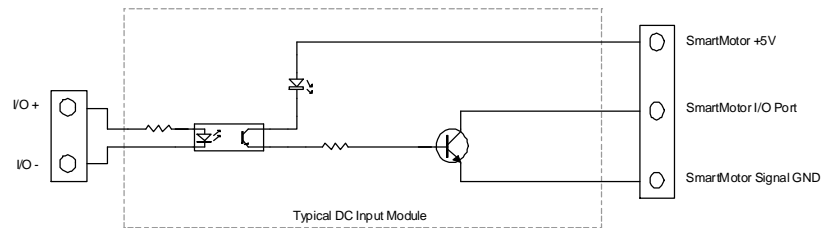


### Optional Differential Encoder Interface

If your DINIO7 is equipped with the optional electronics to interface with differential encoder I/O, these signals can be interface through the Animatics expansion bus, as well as the screw terminal expansion bus. These signals are not isolated from the SmartMotor™, so the user is cautioned to avoid ground loops.

## Application

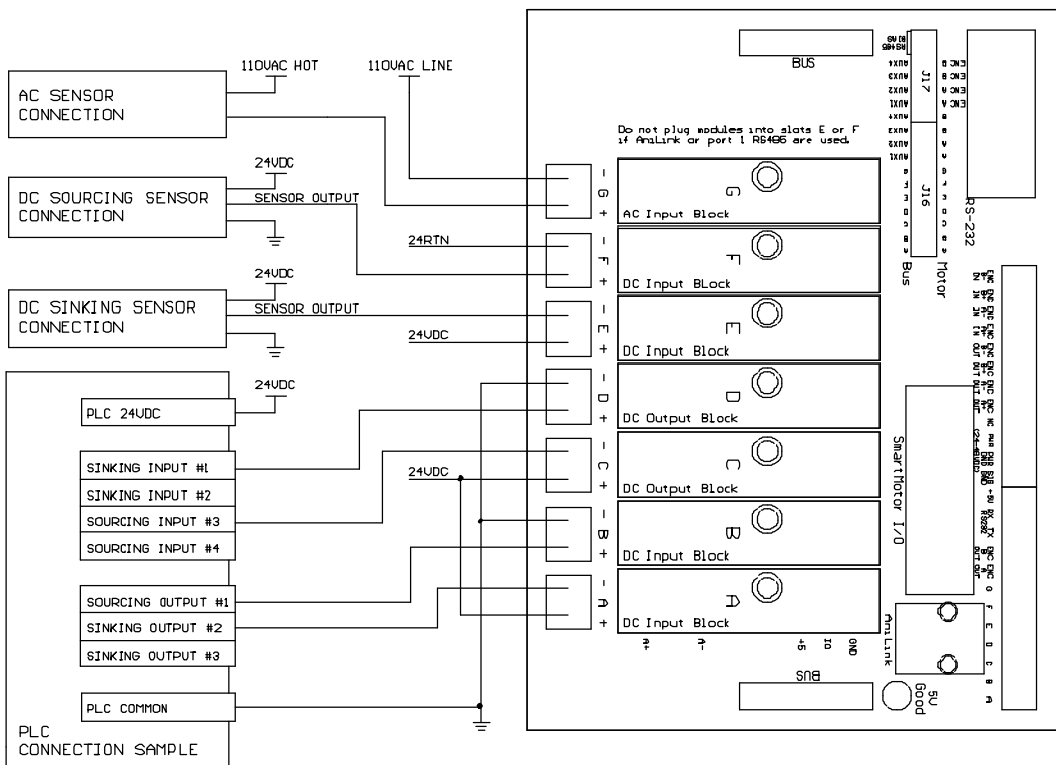
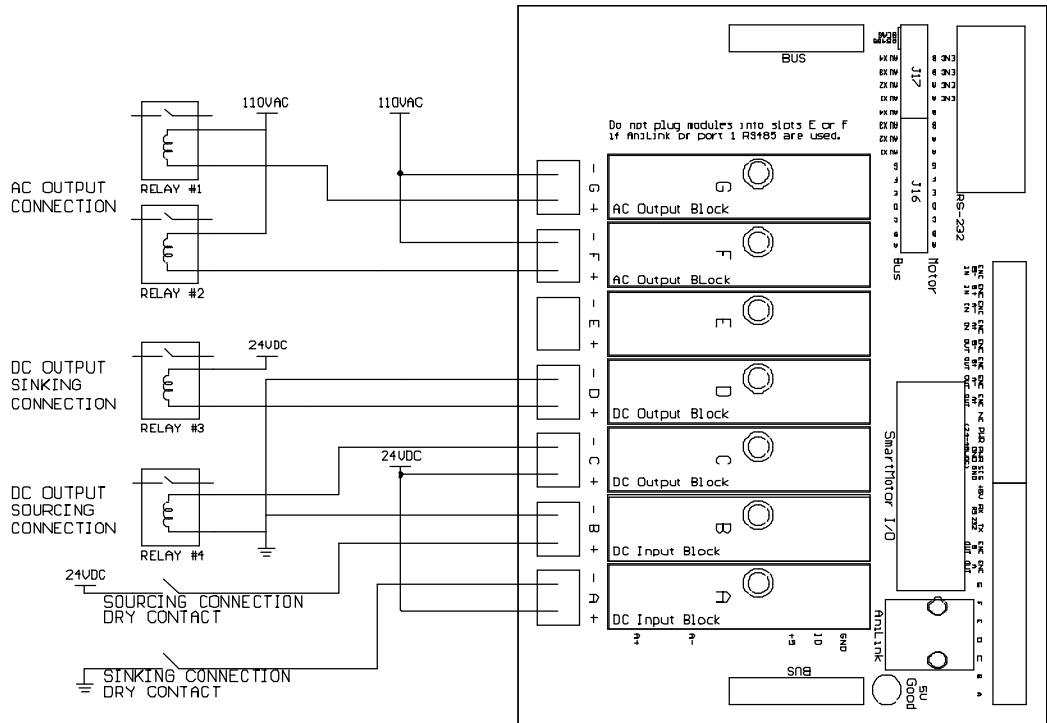
The DINIO7 is intended to provide a convenient interface to 24VDC and 110VAC block I/O modules. These block I/O modules come in four forms: DC input, DC output, AC input and AC output. The diagrams below show the functional representation of an example of each.



These are given for reference only. Your specific I/O module may or may not function as shown in these diagrams.



The diagram below shows a typical interconnect to a combination of some PLC inputs and outputs, sensors, and both 110VAC and 24V relays and I/O blocks.



You control the I/O in the same way as if you were using the local SmartMotor™ I/O. For example, suppose that, in our example, you want to engage relay #3 for 0.1 second. Noting that relay #3 is wired to SmartMotor™ Port D, you would need to set up port E as an output with default high, and turn it on by commanding the output low:

```
UD=1      'Before establishing that port E is an output,
           'predefine it to be default high
UDO       'Define port E as an output
UD=0      'Turn on relay by setting port E low
WAIT=407  'Delay 0.1 second
UD=1      'Turn relay off by setting port E high
```

To read an input, you can either stuff its value into a variable or read it directly. Suppose that you wanted to read the output #1 from the PLC. Note that output #1 is connected to SmartMotor™ port B.

You would typically set up port B as an input and then assign the port value to a variable – let's say we use variable bb:

```
UBI       'Setup port B as an input
bb=UBI    'stuff the port value of B into the variable bb
```

You can also read the port directly. This is generally used only when you are using it in an evaluation expression, such as IF and WHILE. For example, if want to do something if port A is low, the IF statement would be:

```
IF UAI
.
.
.
ENDIF
```

A while statement would look like:

```
WHILE UAI
.
.
.
ENDIF
```

For further details about the IF and WHILE statements, please refer to the SmartMotor™ Users Guide.