
Section 3. INSTALLATION

Precautions

During installation, take the normal precautions against damage caused by electrostatic discharges. Earthed wrist straps should always be worn.

Power Connections

Input power is taken directly from AC supplies via the front panel mounted IEC 3-way mains inlet socket. A mating connector is supplied with the drive. Connect the terminals marked L and N to the AC supply live and neutral respectively, and the terminal marked E to earth.

Motor Wiring EMC Requirements

You must wire the motor using 1mm² 5-core screened cable with a high-quality braided screen. Cables using a metallised plastic bandage for an earth screen are unsuitable, as there is a problem in terminating the screen in a mechanically stable manner and the screen itself is comparatively fragile - bending it round a tight radius can seriously affect the screening performance.

There must be no break in the 360° coverage that the screen mesh provides around the cable conductors. If a connector must be used it should retain the 360° coverage, possibly by the use of an additional metallic casing where it passes through the bulkhead of the enclosure. The cable screen must *not* be bonded to the cabinet at the point of entry. Its function is to return high-frequency switching current back to the drive. This may require mounting the connector on a sub-panel insulated from the cabinet, or using a connector having an internal screen which is insulated from the connector housing.

Within the cabinet itself, all the motor cables should lie in the same trunking as far as possible. They must be kept separate from any low-level control signal cables. This applies particularly where the control cables are unscreened and run close to the drive.

Motor-end connections

At the motor end, the motor cable screen must form a continuous and complete shield of the motor wires by connecting directly to the metal motor housing. It is preferable to use motors with internally mounted screw terminations, where provision has been made for a conductive gland to connect the motor cable screen to the motor body. If flying-lead motors are used, it is important that the unscreened leads are converted into a braided-screen cable within 100mm

Motor-end connections (continued)

conductor length of the motor body. A separate terminal box may be used for this purpose but the braided cable screen must be properly strapped to the motor body using a suitable metal P-clip. The loop created at the motor end of the cable by the exposed motor leads, between where the cable screen is bonded to the motor body and the leads enter the motor body, must be made as small as possible. Take the drive ground connection to the motor earth stud.

Drive-end connections

Fit the ferrite absorber supplied over the motor cable. Connect the five leads in the motor cable to the motor connector as shown in Fig. 3-1. Expose a short length of the cable screen and anchor it to the drive using the metal P-clip located below the mains input connector. Locate the absorber between the P-clip and the motor connector, retaining it in place with the heat-shrink sleeving supplied. The specification of a suitable absorber is given below. Fit the insulated cover supplied with the drive over the motor connector to protect any exposed wires and screw terminals.

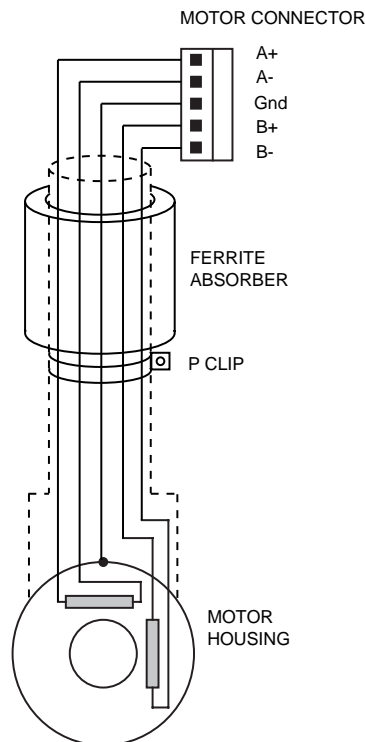


Figure 3-1 PD-E Drive Motor Connections

Ferrite absorber specifications

The absorbers described in these installation instructions are made from a low-grade ferrite material which has high losses at radio frequencies. They therefore act as a high impedance in this waveband.

The recommended components are produced by Parker Chomerics and are suitable for use with cable having an outside diameter up to 10mm. The specification is as follows:

Chomerics part number	H8FE-1115-NC
Outside diameter	17.5mm
Inside diameter	10.7mm
Length	28.5mm
Impedance at 25MHz	80 Ω
Impedance at 100MHz	120 Ω
Curie temperature	130°C (the device should not be operated near this temperature)

Handling and installing ferrite absorbers

Take care when handling the absorbers - they can shatter if dropped on a hard surface. For this reason the preferred method of installation is to use a short length of 19mm diameter heat-shrink sleeving. This gives a degree of physical protection while the cable is being installed. The sleeving should have a shrink ratio of at least 2.5:1. Cable ties may be used as an alternative, however they give no physical protection to the absorber.

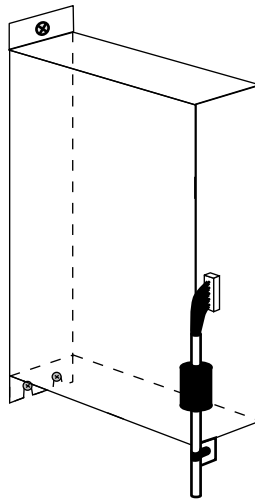


Figure 3-2. Motor wiring installation

Motor Selection

To maintain EMC compliance, the wiring guidelines given in the previous section must be followed. This should be kept in mind when the motor is selected. In particular, if the motor is fitted with flying leads or screened cable with a foil screen, this must be replaced with braided-screen cable as described.

If motors other than those listed are to be used please contact Digiplan.

Usually optimum performance will be obtained when the current rating of the motor is between 1 and 1.5 times the drive rating (refer to specification). For maximum high speed torque a motor rating of 7.5A peak should be used (PDHX15-E). The drives can be derated to accommodate motors with lower current ratings however, the high speed torque will be reduced.

Do not use a drive setting which gives an output current greater than the motor rating. With 4 lead motors the bipolar rating is quoted and this should match the criteria stated above.

With 6 lead motors the unipolar rating is quoted, but for best performance of the PDHX-E Drives, the centre tap of each winding should be left unconnected and the connections made between the winding ends. This will give a bipolar rating 70% of the quoted motor unipolar rating.

With 8 lead motors the bipolar rating of the motor, which is normally quoted refers to a parallel winding connection. With the windings connected in series the current rating of the motor connection will be 50% that of the bipolar rating, and the motor will give improved low-speed torque, but reduced high-speed torque.

Please note that under exceptional operating conditions, for instance prolonged running at high speed, under certain fault conditions or if the drive current setting is too high, the motor temperature may become higher than normal. This may represent a safety hazard if the operator has access to the motor.

Regenerative Power Dump Option

Applications which involve rapid deceleration of high-inertia loads may require that the drive is fitted with a power dissipation circuit. The PDHX15E-D has the same electrical specification as the PDHX15E but incorporates a power dump with a continuous rating of 15 watts (170 watts peak). You will need the PDHX15E-D in the following situation:

Metric formula - if the deceleration time $t < \{J\omega^2 - 0.1\}$

where t is the deceleration time in seconds

J is the total system inertia in $\text{Kg}\cdot\text{m}^2$

ω is the maximum speed in revolutions per second

Imperial formula - if the deceleration time $t < \{0.02J\omega^2 - 100\}$

where t is the deceleration time in milliseconds

J is the total system inertia in oz-in²

ω is the maximum speed in revolutions per second

If the expression in brackets is negative, the power dump option is not required. This option is strongly recommended for size 42 (106) motors.

Note that a program to calculate if a power dump is required is available from Compumotor and Digiplan Technical Support departments (Windows 3.1 required). This program is also available on Compumotor's Bulletin Board Service (Tel: 707/584-4059 in USA).

Long Motor Leads

Using a motor with long leads will cause the cabling resistance to become significant when compared to the resistance of the motor. The DC volt drop of the cable and motor connection when measured at the drive, should not exceed 5 volts in order to limit power dissipation in the drive and maintain maximum system performance.

To maintain EMC compatibility, the motor leads must be assembled and connected as defined under **Motor Wiring EMC Requirements**.

Motor Connections

Motor connection details can be determined from Tables 3-1 and 3-2. For example, Figure 3-3 shows the connection required to be made to a STEBON SDT 852-150-90 motor with its windings connected in parallel. The motor is viewed from the terminal box end with the end plate removed.

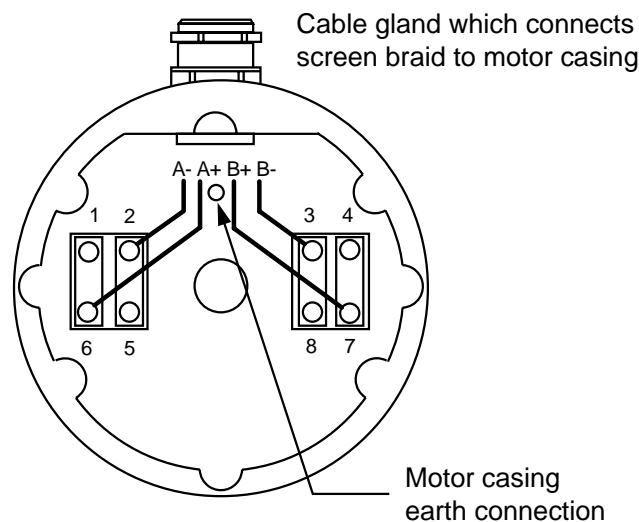


Figure 3-3 Connections for a STEBON Motor

14 PDHX-E SERIES DRIVE USER GUIDE

N.C. - no connection.

MAKE	TYPE	A+	A-	B-	B+	NOTES
Pacific Scientific	6-lead	Black	Orange	Red	Yellow	White/Blk/Org, White/Red/Yel N.C.
	8-lead	Black	Orange	Red	Yellow	Link Wh/Blk & Wh/Org Link Wh/Red & Wh/Yel
	T.box	1	3	2	4	Link 5 & 6, link 7 & 8
Slo-syn	8-lead	Red	Red/Wh	Grn	Grn/Wh	Link Black & White, link Org & Blk/Wh
	T.box (x8)	1	3	5	4	Link 2 & 6, link 7 & 8
Stebon, Digiplan SM	8-lead	Red	Yel	Pink	Blk	Link Blue & violet, link White & Grey
	T.box	1	2	3	4	Link 5 & 6, link 7 & 8
M.A.E.	6-lead	Grn/Wh	Grn	Red	Red/Wh	White & Black N.C.
	8-lead	Black	Orange	Red	Yellow	Link Wh/Blk & Wh/Org, Link Wh/Red & Wh/Yel
	T.box	6	5	8	7	Link 1 & 3, link 2 & 4
Digiplan/Compumotor OEM Series	4-lead	-	-	-	-	Internally wired in parallel
	8-lead	Red	Black	Green	White	Link blue & yellow Link orange & brown
Digiplan/Compumotor QM & S Motors	8-lead	Red	Black	White	Green	Link Yel & Blue Link Org & Brown
Digiplan/Compumotor QM & S Motors (except 106-205)	T.box	1	3	4	5	Link 2 & 6 Link 7 & 8
Digiplan/Compumotor QM & S106-205	T.box	1	3	7	8	Link 5 & 6 Link 2 & 4

Table 3-1. Motor Connection Data - Windings in Series

For 6-lead motors, connections shown are for one half-winding.
N.C. - no connection.

MAKE	TYPE	A+	A-	B-	B+	NOTES
Pacific Scientific	6-lead	Black	Wh/Blk/ Orange	Red	Wh/Red/ Yellow	Or & Yellow N.C.
	8-lead	Black & Wh/Or	Or & Wh/Blk	Red & Wh/Yel	Yel & Wh/Red	
	T.box	1 & 5	3 & 6	2 & 7	4 & 8	
Slo-syn	8-lead	Red & White	Blk & Red/Wh	Grn & Blk/Wh	Org & Grn/Wh	
	T.box(x8)	1 & 2	3 & 6	4 & 7	5 & 8	
Stebon, Digiplan SM	8-lead	Rd & Blue	Yel & Violet	Wh & Pink	Black & Grey	
	T.box	1 & 6	2 & 5	3 & 8	4 & 7	
M.A.E.	6-lead	Grn/Wh	White	Red	Black	Grn & Red N.C
	8-lead	Black & Wh/Or	Or & Wh/Blk	Red & Wh/Yel	Yel & Wh/Red	
	T.box	3 & 6	1 & 5	4 & 8	2 & 7	
Digiplan/Compumotor OEM Series†	4-lead	Red	Black	Green	White	
	8-lead	Red & Blue	Yellow & Black	Green & Orange	Brown & White	
Digiplan/Compumotor QM & S Motors	8-lead	Red & Blue	Blk & Yellow	Wh & Brn	Green & Org.	
Digiplan/Compumotor QM & S Motors (except 106-205)	T.box	1 & 2	3 & 6	4 & 7	5 & 8	
Digiplan/Compumotor QM & S 106-205	T.box	1 & 5	3 & 6	2 & 7	4 & 8	

† Size 34 only. Size 23 can only be operated in series.

Table 3-2. Motor Connection Data - Windings in Parallel

Drive Current Setting

SWITCH SETTINGS			PEAK CURRENT
6	7	8	
ON	ON	ON	5.0A
OFF	ON	ON	4.6A
ON	OFF	ON	4.3A
OFF	OFF	ON	3.9A
ON	ON	OFF	3.6A
OFF	ON	OFF	3.2A
ON	OFF	OFF	2.9A
OFF	OFF	OFF	2.5A

Table 3-3. Peak Current Settings

Compumotor S and QM Motor Drive Settings

When using Compumotor 'S' and 'QM' motors you will need to set the drive current settings as shown in Table 3-4.

The 'S' motor and 'QM' motor are electrically identical e.g. an S57-51 is the same as QM57-51. In the following table, under motor type, a suffix 'S' refers to series connected and 'P' refers to parallel connected.

Motor Type	Switch settings			Peak Motor Current (Amps)	Rotor Inertia Kg-cm ² (oz-in ²)
	SW6	SW7	SW8		
S/QM-57-51S	*	*	*	1.2	0.088 (0.48)
S/QM-57-51P	OFF	OFF	OFF	2.3	
S/QM-57-83S	*	*	*	1.5	0.234 (1.28)
S/QM-57-83P	OFF	ON	OFF	3.1	
S/QM-57-102S	*	*	*	1.7	0.32 (1.75)
S/QM-57-102P	ON	ON	OFF	3.5	
S/QM-83-62S	*	*	*	2.2	0.64 (3.50)
S/QM-83-62P	OFF	ON	ON	4.4	
S/QM-83-93S	ON	OFF	OFF	2.9	1.23 (6.70)
S/QM-83-93P	ON	ON	ON	5.6	
S/QM-83-135S	ON	ON	OFF	3.5	1.87 (10.24)
S/QM-83-135P	ON	ON	ON	6.9	
S/QM-106-178S	ON†	ON†	ON†	6.0	8.05 (44.0)
S/QM-106-178P	ON†	ON†	ON†	12.0	
S/QM-106-205S	ON†	ON†	OFF†	3.6	9.51 (52.00)
S/QM-106-205P	ON†	ON†	ON†	7.2	
S/QM-106-250S	ON†	ON†	ON†	6.2	12.14 (63.00)
S/QM-106-250P	ON†	ON†	ON†	12.4	

* Minimum drive current too high for motor. X Unsuitable motor/drive combination.

† 106 (42) size motors must use PDHX15E-D option (regenerative power dump).

Table 3-4. PD-E Series Current Drive Settings for Compumotor 'S' and 'QM' Motors

Digiplan SM Motor Drive Settings

Table 3-5 lists the PDHX15-E Drive current settings you need to make when using Digiplan 'SM' and STEBON motors. In Table 3-5, under 'Motor Type', a suffix 'S' refers to series connected and 'P' refers to parallel connected.

Motor Type	Switch settings			Peak Motor Current (Amps)	Rotor Inertia Kg-cm ² (oz-in ²)
	SW6	SW7	SW8		
SM-57-51S	*	*	*	1.1	0.11 (0.60)
SM-57-51P	*	*	*	2.1	
SM-57-83S	*	*	*	2.3	0.23 (1.26)
SM-57-83P	OFF	ON	ON	4.7	
SM-57-102S	*	*	*	2.3	0.30 (1.64)
SM-57-102P	OFF	ON	ON	4.6	
SM-83-62S	OFF	ON	OFF	3.2	0.60 (3.30)
SM-83-62P	ON	ON	ON	6.4	
SM-83-93S	OFF	OFF	ON	4.0	1.25 (6.83)
SM-83-93P	ON	ON	ON	7.9	
SM-83-135S	ON	ON	OFF	3.8	2.00 (10.93)
SM-83-135P	ON	ON	ON	7.6	
SM-106-140S	OFF†	ON†	ON†	5.0	3.65 (19.96)
SM-106-140P	ON†	ON†	ON†	9.9	

* Minimum drive current too high for motor. X Unsuitable motor/drive combination.

† 106 (42) size motors must use PDHX15E-D option (regenerative power dump).

Table 3-5. PD-E Series Current Drive Settings for Digiplan 'SM' Motors

Compumotor OEM Motor Drive Settings

The 34 frame size motors (OEM-83-62/93/135) have identical drive current settings to the 'QM' motors listed in Table 3-4. Size 34 (83) motors are internally wired in Parallel. In Table 3-6, under 'Motor Type', a suffix 'S' refers to series connected. The parallel connection can not be used for size 23 (57) motors.

Motor Type	Switch settings			Peak Motor Current (Amps)	Rotor Inertia Kg-cm ² (oz-in ²)
	SW6	SW7	SW8		
OEM-57-40S	OFF	OFF	OFF	2.7	0.07 (0.380)
OEM-57-51S	OFF	ON	OFF	3.3	0.12 (0.650)
OEM-57-83S	ON	ON	OFF	3.8	0.25 (1.360)

Table 3-6. PD-E Series Current Drive Settings for Compumotor 'OEM' Motors

Controller Signals

There are 5 front-panel connectors associated with control inputs and outputs as shown in the diagram. Their functions are as follows:

1. **RS232/RP240** (8-way mini-DIN socket). This socket is normally used for the RP240 Remote Operator Panel but may also be used as an alternative RS232C connection from the host controller. The RS232 connections are in parallel with those on socket 2.
2. **RS232/RS485** (9-way D-connector). This is the connector normally used for serial communication. The initial release of the X150E controller will be supplied with RS232 communication as standard, RS485 being a factory-fitted option. Subsequent issues will allow either RS232 or RS485 to be user-selected.
3. **External encoder** (9-way D-connector). An encoder fitted to this input is used for the connection of an external encoder for following applications.
4. **Primary encoder** (9-way D-connector). A motor or load mounted encoder is fitted to this input.

Note: The ICON command controls the connection of the encoder inputs. Bit 'ENC' must be set to 0 to use the encoder inputs.

5. **Main I/O connector** (23-way two-part screw terminal connector). All the user-programmable inputs and outputs, as well as registration, stop, home and limit inputs, appear on this socket.

Controller Signal Connections

When you make connections to the following ports:

RS232/RP240
RS232/RS485
Ext. Enc.
Prim. Enc.

Observe the following wiring recommendations:

Connections must be made using braided shield signal cable. A foil screen is not suitable for achieving the required EMC performance. The shield of the cable must be 360° bonded through a suitable connector housing to the mating half of the drive connector. The connectors must be conductive bright tin plated, not zinc passivated (i.e. those of a gold/yellow appearance). D-type connectors must be of the 'dimple-D' type, which offer better screening performance than conventional plain sided D-type connectors.

Encoder screened leads that are routed to the same area as the motor must be arranged to avoid creating a loop around the mains inlet cable, see Figure 3-4.

Main I/O Connector

No screening requirements are necessary for EMC purposes, standard equipment wire may be used. Although, care should be taken to avoid looping the wires around the mains inlet wire or other drive connections.

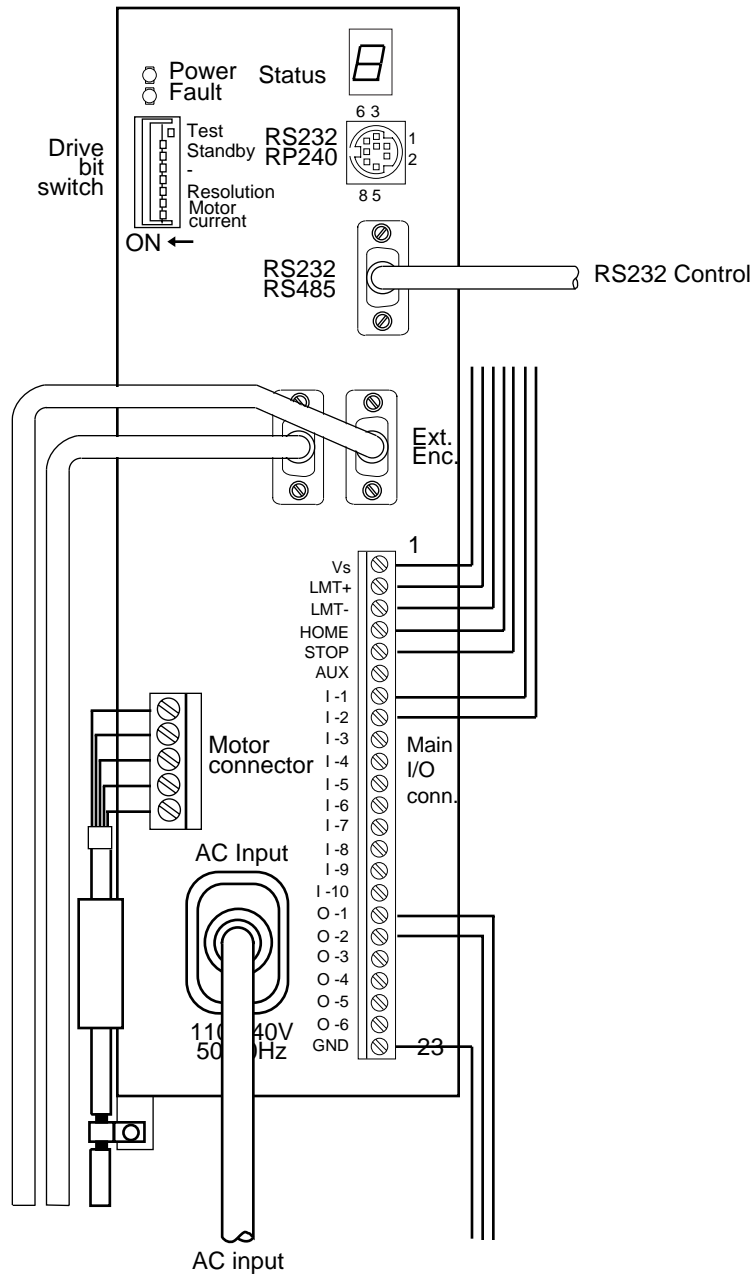


Figure 3-4. PDHX15E Wiring Layout

20 PDHX-E SERIES DRIVE USER GUIDE

CONNECTOR	Pin	Signal Name	Function	Signal Type
Ext. encoder 9-way D-type	1	A+	Secondary Encoder A	C
	2	A-		
	3	B+	Secondary Encoder B	C
	4	B-		
	5	Z+	Secondary Encoder Z	C
	6	Z-		
	7	5V ENC.	+5V DC, 150mA max.	D
	8	GND	Encoder GND	D
	9	n/c		
Pri. encoder 9-way D-type	1	A+/CLK+	Primary Encoder A	C
	2	A-/CLK-		
	3	B+/DIR+	Primary Encoder B	C
	4	B-/DIR-		
	5	Z+	Primary Encoder Z	C
	6	Z-		
	7	5V ENC.	+5V DC, 150mA max.	D
	8	GND	Encoder GND	D
	9	n/c		
RS232/RP240 mini DIN	1	+5V (RP240)	+5V DC, 150mA max	
	2	0V (RP240)		
	3	RxB (RP240)		
	4	n/c		
	5	RxA (Terminal)	RS232 Receive*	E
	6	TxB (RP240)		
	7	Screen		
	8	TxA (Terminal)	RS232 Transmitt†	E
RS232/RS485 9-way D-type	1	Rx+	RS485 Receive +	J
	2	Tx+	RS485 Transmit +	J
	3	0V		
	4	RxA (Terminal)	RS232 Receive*	E
	5	TxA (Terminal)	RS232 Transmitt†	E
	6	Rx-	RS485 Receive -	J
	7	Tx-	RS485 Transmit -	J
	8	n/c		
	9	+5V	+5V DC, 150mA max.	I

*Pin 5 of mini DIN connected internally to pin 4 of 9-way D-type

†Pin 8 of mini DIN connected internally to pin 5 of 9-way D-type

Table 3-7. Controller Signals

MAIN CONNECTOR

1	Vs	+24/5V (100mA)	DC OUTPUT
2	LMT+	+Limit Switch Input	A
3	LMT-	-Limit Switch Input	A
4	HOME	Home Switch Input	A
5	STOP	Stop Input	A
6	AUX	Registration Input	A
7	I - 1	User Input 1	A
8	I - 2	User Input 2	A
9	I - 3	User Input 3	A
10	I - 4	User Input 4	A
11	I - 5	User Input 5	A
12	I - 6	User Input 6	A
13	I - 7	User Input 7	A
14	I - 8	User Input 8	A
15	I - 9	User Input 9	A
16	I - 10	User Input 10	A
17	O - 1	User Output 1	B
18	O - 2	User Output 2	B
19	O - 3	User Output 3	B
20	O - 4	User Output 4	B
21	O - 5	User Output 5	B
22	O - 6	User Output 6	B
23	GND	24/5V GND	DC GND RETURN

Table 3-7. Controller Signals - Continued

Signal Types

Signal Types identified by letters A, B, C, D, E, F, G and I in Table 3-7 are defined below.

Input Circuit Conventions

Inputs may be configured to be active high or active low.

An active high input has a pull-down resistor inside the controller, and must be connected to V_s to turn the input ON, i.e. make the input active. Alternatively, the input may be turned on by connecting it to an external +5V or +24V supply.

An active low input has a pull-up resistor to V_s inside the controller, and must be connected to 0V to make the input active.

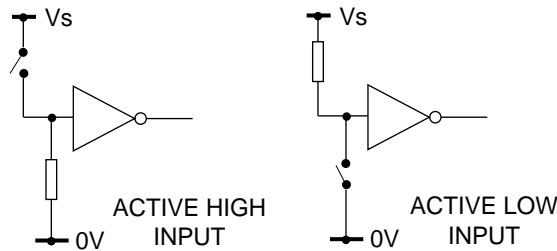


Figure 3-5. Input Circuit Configurations

In either case, the input is OFF (i.e. inactive) when in the open circuit condition. This condition is described as the logic 0 state and will return a '0' in response to the input status request IS.

Signal Type A

Apply to all dedicated and user definable inputs. Signal type A inputs can be operated at 5V or 24V and can be configured, by software, for operation as active high or active low inputs. The input circuit for "A inputs" is shown in Figure 3-6.

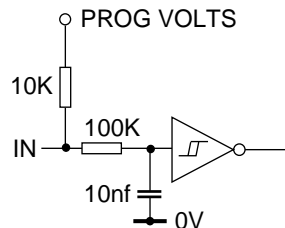


Figure 3-6. Signal Type A Input Circuit

Inputs can be programmed to operate as pull-down (sink) inputs or pull-up (source) inputs. The pull-up voltage may also be programmed as 5V or 24V. This is achieved by using the circuit arrangement shown in Figure 3-6, where PROG VOLTS can be programmed to 0V (pull-down), 5V or 24V (pull-up).

Table 3-8 defines the required settings for 5V and 24V operation and the different input characteristics between the two settings.

	5V Operation		24v Operation	
Signal type	B		A	
Input Characteristics	Active high	Active low	Active high	Active low
Logic 1 level (Input ON)	>3.0v	<2.5v	>9.0v	<5.7v
Logic 0 level (Input OFF)	<2.5v	>3.0v	<5.7v	>9.0v
Hysteresis	0.5v	0.5v	3.3v	3.3v
Max. input voltage range	0-30v	0-30v	0-30v	0-30v

Table 3-8. 5V and 24V Operation for Signal Type A Inputs

Signal type A inputs may be configured as Pull down (sink) inputs or as Pull up (source) inputs. The inputs are programmed using the ICON command. ICON is also used to set the pull up voltage level and the value of Vs supplied to the customer.

Signal Type B

Signal type B outputs can also be defined in software, using the OCON command. Outputs can be programmed as NPN or PNP.

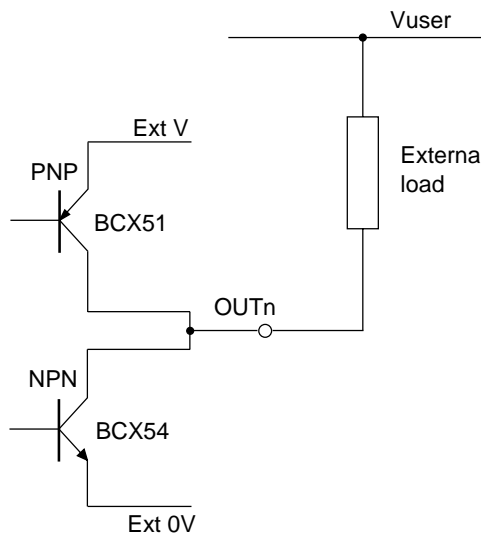


Figure 3-7. NPN or PNP Output Configuration

Output voltage levels will be determined by the value of the external voltage (V_{user}) and the value of the connected load.

Caution - Possibility of equipment damage

The output circuit uses a connected pair of output transistors, consequently when the NPN transistor is used, but is turned OFF, the external user voltage (V_{user}) must be no greater than the external voltage (V_s).

The characteristics of each output type are listed in Table 3-9.

	NPN	PNP
Output Characteristics		
Circuit configuration	Common emitter	Common emitter
Output current max.	300mA at $1V_{sat}$	100mA at $(V_s-2)V_{sat}$
Max. OFF signal voltage	30V	30V
Mode	Current sinking	Current sourcing

Table 3-9. Signal Type B Output Characteristics

Signal Type C

Signal type C inputs are used for differential, optically isolated, encoder TTL level inputs. The maximum frequency handled by these inputs is 100KHz.

Signal Type D

Encoder supply of +5V DC at 150mA.

Signal Type E

RS232 data signals.

Signal Type F

RP240 RS232 data signals.

Signal Type G

RP240 +5V DC supply (150mA max).

Signal Type I

Signal ground.

Signal Type J

RS485 data signals.

Address Switch

The address of the drive is set using an internally mounted bit switch. The switch may be accessed via the ventilation slots on the top of the drive - see Figure 3-8. Address selection is described in *Communicating With The Positioner*.

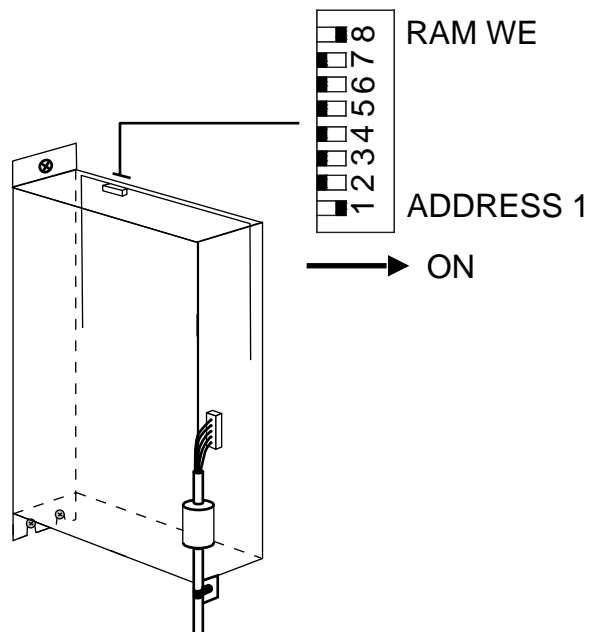


Figure 3-8. Connector and Switch Positions

Mechanical/Environmental

Enclosure Considerations The drive, its switch mode power supply and positioner are contained in a single case measuring 292mm high, 75mm wide and 224mm deep.

Note: Enclosure depth does not take connector dimensions into account. These need an additional 60mm.

Environmental Specifications

Digiplan recommends you operate and store your PDHX Drive system under the following conditions:

- Operating Temperature: 0° to 40°C (32° to 104°F), or 0° to 50°C (32° to 122°F) if there is no user access to the case
- Relative Humidity: 0% to 95% (non-condensing)
- Storage Temperature: -40° to 85°C (-40° to 185°F)

The recommended orientation of the drive enclosure is back panel, vertical mounting.

In exceptional circumstances, such as running the motor continuously at maximum current, forced-air cooling may be needed to maintain the local ambient temperature within specification.

Installation Considerations The drive should be installed vertically. Air vents on the top and bottom panels allow convection cooling. At least 50mm minimum clearance around the air vents is recommended for unobstructed ventilation and reliable operation.

The drive is designed for Installation Category II (see IEC 664). This means that transient voltages on the local mains supply are not expected to exceed 2,500V. The environment should conform to Pollution Degree 2, i.e. no conductive foreign matter (either solid or liquid) should be allowed to enter the case.

Setting up

Drive Switch Settings

The switch for setting the drive operating conditions is at the top left of the front panel.

SWITCH NUMBER	FUNCTION	COMMENTS
1	Selftest	Default OFF
2	Standby current reduction	Default ON
3	Not used	-
4, 5	Step resolution	Default all OFF
6, 7, 8	Peak current setting	Default all ON

Table 3-10. Drive Switch Settings

Selftest Switch1

The selftest switch is used to check the operation of the drive. Set to the ON position to cause the motor to rotate at slow speed. The default setting of selftest is OFF i.e. not selected.

Standby Switch 2

Switch 2 determines the level of standby current. With switch 2 ON, the current will reduce by 50% at standby. With switch 2 OFF, current will be reduced to 80% of the programmed value at standby.

Step Resolution Switch 4, 5

DIP Switches 4 and 5 determine the step resolution of the drive, as defined in Table 3-11. Note: cycle the power for switch settings to take effect.

SWITCH SETTINGS		RESOLUTION IN STEPS/REV
4	5	
ON	ON	400
ON	OFF	1000
OFF	ON	2000
OFF	OFF	4000

Table 3-11. Step Resolution Settings

Peak Current Setting Switch 6, 7, 8

DIP Switches 6, 7 and 8 determine the peak current setting of the drive, as defined in Table 3-12.

SWITCH SETTINGS			PEAK CURRENT
6	7	8	
ON	ON	ON	5.0A
OFF	ON	ON	4.6A
ON	OFF	ON	4.3A
OFF	OFF	ON	3.9A
ON	ON	OFF	3.6A
OFF	ON	OFF	3.2A
ON	OFF	OFF	2.9A
OFF	OFF	OFF	2.5A

Table 3-12. Peak Current Settings

Thumbwheel Interface

This section assumes that you are using Parker's TM8 thumbwheel module.

You can use up to 16 digits of the thumbwheel. The controller uses a multiplexed BCD input scheme to read the thumbwheel data. The commands and format that allow for the thumbwheel data entry are :

DRDxyz	Read distance via thumbwheel.
VRDxyz	Read velocity via thumbwheel.
LRDxyz	Read loop count via thumbwheel.
TRDxyz	Read time delay via thumbwheel.
VARDn,xyz	Read variables via thumbwheel.
XRDxyz	Read sequence count via thumbwheel.
FRDxyz	Read following ratio via thumbwheel.

To request 1 digit $x=y$ =the desired digit number.

To request all digits $x=0$ and $y=7$ (or do not set xyz fields).

To request a block of digits $0 < x < y < 7$.

The Z field scales the thumbwheel value by 10. When reading digits from the thumbwheel, the least significant digit will be filled first. The z field allows you to position the decimal point were needed.

Note : Either all the fields (xy and z) or none of the fields must be used. Refer to the software section for further explanation.

Caution - Possibility of damage to the TM8 module

THE TM8 REQUIRES A 5V SUPPLY. THE ICON COMMAND MUST BE USED TO SELECT A PULL-UP LEVEL OF +5V OTHERWISE DAMAGE WILL OCCUR. DO NOT CONNECT THE TM8 MODULE TO THE DRIVE UNTIL YOU ARE SURE THE SUPPLY IS SET TO +5V.

Note: The TM8 module is not EMC compliant, consequently when it is used within a permanent installation EMC screening precautions must be taken. Generally, this will require the TM8 module to be mounted within the equipment cabinet housing the drive.

1. Ensure that the controller is configured with NPN outputs using the OCON command.
2. Using the ICON command, set the following conditions:
 - Pull-up level of 5V
 - Function set to pull-up
 - VOL=0 (5V DC operation)
 - ENC set to 0
3. You can define any block of 5 inputs for use with the thumbwheel. Therefore you must decide which inputs you intend to use for data (4 inputs required) and sign bit (1 input required).
4. Configure the defined inputs for TM8 operation using the INnN command.
5. Configure the defined input for the TM8 sign bit using INnW command.
6. Define appropriate outputs for TM8 operation using the OUTnJ command.

The TM8 is now ready for operation.

Example

The TM8 is wired as shown in Figure 3-9.

Inputs 6 to 9 are to be used as data inputs.

Input 10 is to be used as a sign input.

Outputs 3 to 5 are to be used as strobe outputs.

Set up as follows:

1. Set **1OCON 000000** all NPN outputs
2. Set **1ICON 00000100** bank 3 selected as pull-up
3. Set
 - 1IN6N** Input 6 is defined as data input.
 - 1IN7N** Input 7 is defined as data input.
 - 1IN8N** Input 8 is defined as data input.
 - 1IN9N** Input 9 is defined as data input.
 - 1IN10W** Input 10 is defined as sign bit.
4. Set
 - 1OUT3J** Output 3 is defined as data strobe.
 - 1OUT4J** Output 4 is defined as data strobe.
 - 1OUT5J** Output 5 is defined as data strobe.

The thumbwheel is now ready for use. Set the thumbwheel to the desired value and enter the information using one of the data entry commands.

For example set the thumbwheel to +12345678

Command	Description
1DRD	Request distance data from all TM8 digits
1D	Display the distance read (D+12345678). If you do not receive this response, return to step 1 and retry

For further information relating to Data entry commands refer to the software section.

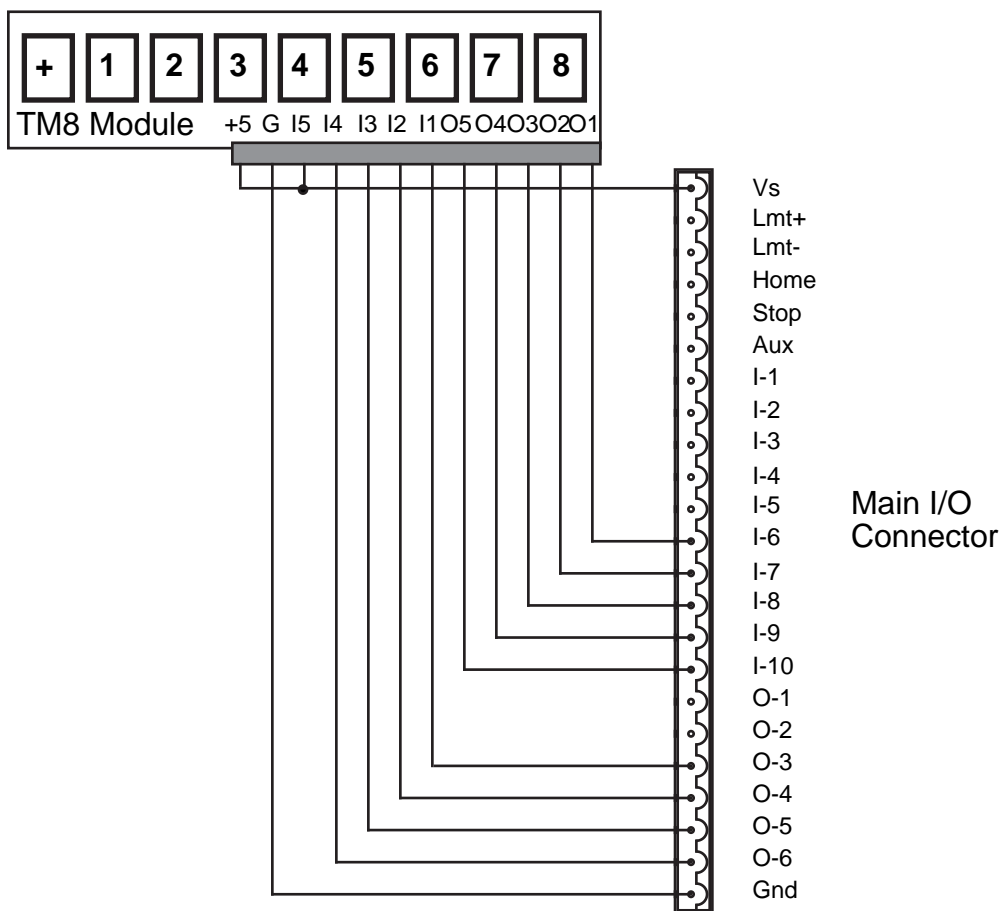


Figure 3-9. Connections to TM8 Thumbwheel Module

Using two TM8 Thumbwheels

Wire the TM8s as shown in Figure 3-10.

Configure as previously described.

Output 6 is used to select which thumbwheel is to be read.

SET **1OUT6A** Programmable output.

Enter the following commands.

Command	Description
OXXXXX0	Output 6 is low TM8 module #1 is disabled, TM8 module #2 is enabled.
DRD	Request distance data from thumbwheel #2.
1D	Display the distance read.
OXXXXX1	Output 6 is high TM8 module #1 is enabled, TM8 module #2 is disabled.

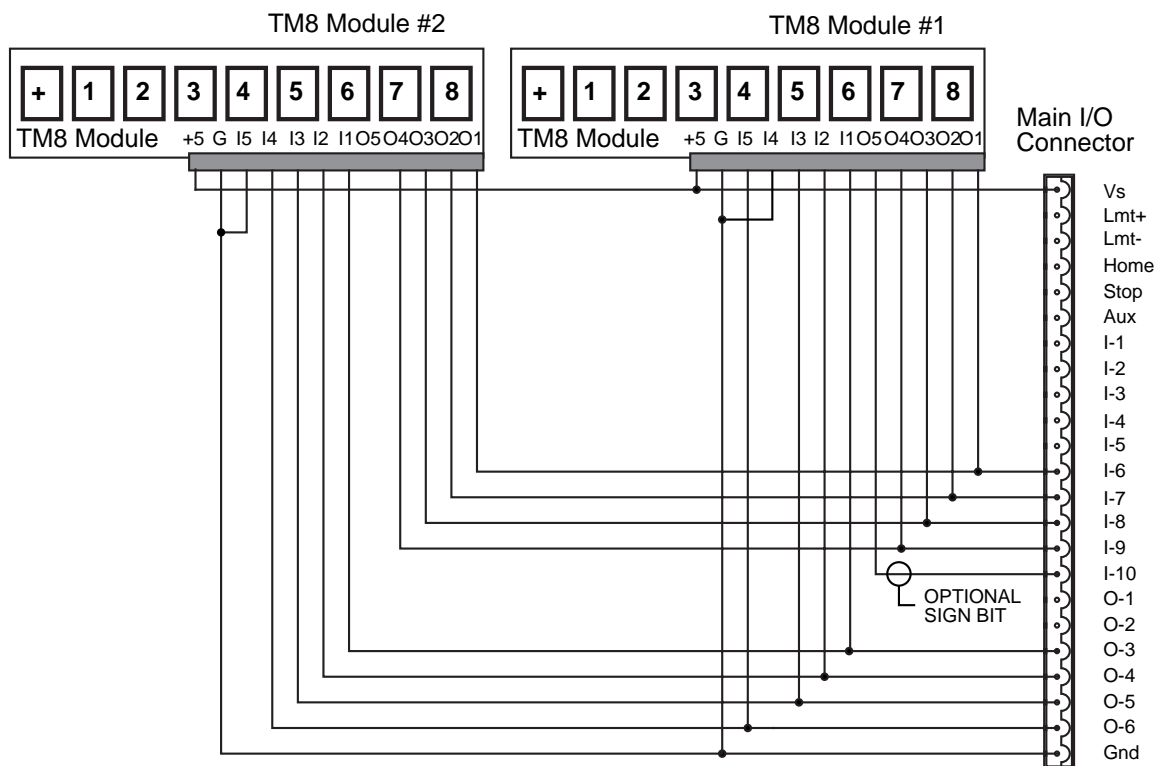


Figure 3-10. Connections to Dual TM8 Thumbwheel Modules

