

World Class Design | World Class Function | 30 Years Expertise in Industrial Motor Control

# DC MOTOR DRIVE

## PL / PLX



**SPRINT ELECTRIC**

## Please read this information before installing or using the product.

### **Install, use and maintain this product following the procedures provided.**

The manual(s) cannot provide all details, variations and contingencies required for your installation, operation and maintenance of this product or the apparatus with this product installed. For further help or information, refer to your local Supplier sales office.

### Application area

The equipment described is intended for industrial (non-consumer) motor speed control.

### Intended users

To safely enable the user to obtain maximum benefit from the equipment:

- Ensure this information is available to all persons required to install, configure or service the described equipment or any other associated operation.
- Always store the manual in a conveniently accessible area for quick reference.
- Make it available for the next user/owner of the product.

This product is of the restricted sales distribution class according to IEC 61800-3 and has a "professional equipment" designation as defined in EN 61000-3-2.

### Safety

**Ensure all users and operators understand the included WARNINGS, CAUTIONS and NOTES, which alert the user to safety issues. COMPLY WITH WARNINGS AND CAUTIONS AT ALL TIMES.** Each of these carries a special meaning and should be read carefully:



#### **WARNING!**

A WARNING is given when non-compliance with the warning may result in personal injury and/or equipment damage.



#### **CAUTION!**

A CAUTION is given when non-compliance with the caution may result in permanent equipment damage.

**NOTE** A note provides specific information to make important instructions clear.

### Symbols

 <b>Attention</b>	 <b>Electrostatic Discharge (ESD)</b>	 <b>Electric Shock Hazard</b>
See the instructions for use. Specific warnings not found on the label.	This equipment contains ESD sensitive parts. Observe static control precautions when handling, installing and servicing this product.	Disconnect the mains supply before working on the unit. <b>Do not touch presets, switches and jumpers!</b> Always use the correct insulated adjustment tools.



### WARNING!

**Only qualified personnel must install, operate and maintain this equipment.**

A qualified person is someone technically competent and familiar with all safety information, established safety practices, installation, operation, maintenance and the hazards involved with this equipment and any associated machinery.

## Hazards

**This equipment can endanger life through rotating machinery and high voltages.**



### WARNING!

#### PERSONAL INJURY AND/OR ELECTRICAL SHOCK HAZARD

- Always isolate all power supplies from the equipment before starting any work.
- Never perform high voltage resistance checks on the wiring without first disconnecting the product from the circuit under test.
- Use guarding and additional safety systems to prevent injury and electric shock.
- Metal parts may reach 90°C during operation.



### CAUTION!

#### EQUIPMENT DAMAGE HAZARD

- We thoroughly test our products. However, before installation and start-up, inspect all equipment for transit damage, loose parts, packing materials, etc.
- Installation must observe the required environmental conditions for safe and reliable operation.
- In a domestic environment, this product may cause radio interference, requiring adequate measures to be taken. Obtain the permission of the supply authority before connecting to the low voltage supply.

## General risks

### Installation

- Ensure mechanically secure fixings are in use as recommended.
- Ensure cooling airflow around the product is as recommended.
- Ensure cables/wire terminations are as recommended and are torqued correctly.
- Ensure the product rating is correct - do not exceed the rating.

### Application risk

**Electromechanical safety is the responsibility of the user.** The integration of this product into other apparatus or systems is not the manufacturer's or distributor of the product's responsibility. It is the user's responsibility to ensure the compliance of the installation with any regulations in force.

### Health and safety at work

**Electrical devices can constitute a safety hazard.** Thorough personnel training is an aid to SAFETY and productivity. SAFETY awareness not only reduces the risk of accidents and injuries in your plant but also has a direct impact on improving product quality and costs. If you have any doubts about the SAFETY of your system or process, consult an expert immediately. Do not proceed without doing so. If in doubt, refer to the Supplier.

## Weight

Consideration should be given to the weight of our heavier products when handling.

## Risk assessment

Under fault conditions or conditions not intended: the motor speed may be incorrect; the motor speed may be excessive; the direction of rotation may be incorrect; the motor may be energised.

In all situations, the user should provide sufficient guarding and/or additional redundant monitoring and safety systems to prevent risk of injury.

**NOTE:** During a power loss event, the product will commence a sequenced shut-down procedure. Therefore, the system designer must provide suitable protection for this case.

## Maintenance

Only qualified personnel should maintain and effect repair using only the recommended spares, alternatively return the equipment to the factory for repair. The use of unapproved parts may create a hazard and risk of injury.



### WARNING!

#### PERSONAL INJURY AND/OR EQUIPMENT DAMAGE HAZARD

When replacing a product, all user-defined parameters that define the product's operation must be installed correctly before returning to use. Failure to do so may create a hazard and risk of injury.

The packaging is inflammable and incorrect disposal may lead to the generation of lethal toxic fumes.

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## Repairs

Repair reports can only be given if the user makes sufficient and accurate defect reporting. Remember that the product without the required precautions can represent an electrical hazard and risk of injury, and that rotating machinery is a mechanical hazard.

# Protective insulation

## Isolated product



### WARNING!

**The drive and motor must be connected to an appropriate safety earth.** Failure to do so presents an electrical shock hazard. Exposed metal work in this equipment is protected by basic insulation and bonding to a safety earth.

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**This product is classified as a component and must be used in a suitable enclosure.**

1. This is achieved through basic insulation and protective earth grounding, or double-insulation to provide SELV Control Circuits.
2. This protection allows a safe connection to other low voltage equipment.
3. **Earth bonding is the responsibility of the installer.**

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# 1 PL/X DC Motor Drive

## 1.1 Introduction

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Follow the steps outlined in this guide to install and initiate the PL/X as a **basic** speed controller, employing ARMATURE VOLTAGE feedback mode for optimal safety.

The PL/X drive displays user-friendly menus and parameter names. Use the key sequences we provide at each step to navigate and edit parameter values with no knowledge of the menu system required.

When finished:

- Refer to the Product Manual for further information, including alternative power wiring and control wiring methods.

**NOTE:** The simple installation provided by this QuickStart Guide is described by the Basic Application wiring diagram - refer to the Product Manual.

### 1.1.1 Important safety notes

Pay particular attention to all safety warnings in this guide.

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**WARNING!**  
**PERSONAL INJURY AND/OR**  
**EQUIPMENT DAMAGE HAZARD**

**Electric shock risk! Electrical devices constitute a safety hazard.**

Do not attempt to commission the PL/X unless you:

- are qualified and have the knowledge and skills to use it safely.
  - thoroughly understand the operation of the machine having the PL/X installed.
  - have read and understood this document, and are familiar with electrical wiring and safety standards.

Only use qualified personnel to design, construct, operate and maintain your systems.

Ensure personnel who use or maintain the equipment know of all hazards involved in your equipment and processes.

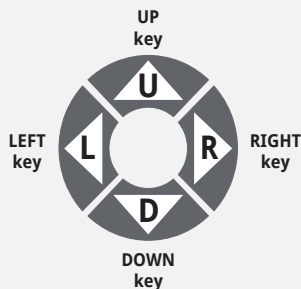
If you have any doubts about the safety of your system or process, do not proceed without first consulting an expert.

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## Entering key sequences

Use the PL/X keypad to enter the key sequences in the order given. This will navigate the menus in the fewest key presses.

Several sequences reset at the Diagnostic Summary screens, located at the top of the menu system. This reset is used as a helpful reference point in case you lose your way.



<b>L</b>	Press the <b>LEFT</b> key once	<b>R</b>	Press the <b>RIGHT</b> key once
<b>U</b>	Press the <b>UP</b> key once	<b>D</b>	Press the <b>DOWN</b> key once
<b>Nx</b>	Press the indicated key <b>N</b> times. <b>N</b> specifies the number of times to press the key. For example, <b>8xD</b> means press the <b>DOWN</b> key <b>8</b> times.		
<b>U/D</b>	Use the <b>UP</b> and <b>DOWN</b> keys to increase/decrease values		

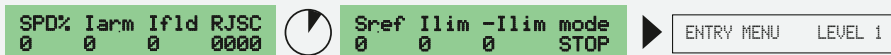
With the Diagnostic Summary screens displayed, an example key sequence is:

**R-R-U-R-8xD-R-R-U/D** (navigates to PIN 10, **U/D** changes the parameter value)

**NOTE:** Hold a key down to advance rapidly to a distant selection or value.

## About Diagnostic Summary screens

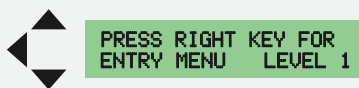
To quickly return to the Diagnostic Summary screens from any point in the menu, hold down the **LEFT** key, releasing the key to remove the ENTRY MENU reminder screen.



At the top of the menu system are two alternating Diagnostic Summary screens. To access the ENTRY MENU from this point, press the RIGHT key.

### ENTRY MENU reminder screen

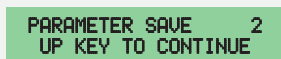
This screen reminds you to press the **RIGHT** key to view the ENTRY MENU. It displays when you press the **LEFT**, **UP** or **DOWN** key while viewing the Diagnostic Summary screens.



## How to save parameters

Hold down the **LEFT** key to display the Diagnostic Summary screens. Release the key. Enter the sequence **R-U-R-U**.

Key	Action
<b>R</b>	
<b>U</b>	Display the PARAMETER SAVE screen
<b>R</b>	
<b>U</b>	Press the <b>UP</b> key to continue and save



## 1.2 Record your CALIBRATION parameter data

Measure the supply voltage and record it below. Also, record the parameter values from the motor and feedback device nameplates for entry into the Calibration menu later.

Description	Example values	Record your value	Units	Property "S"
<b>2)RATED ARM AMPS</b> Rated armature current	35		Adc	S
<b>3)CURRENT LIMIT(%)</b> Current limit	your setting:		%	-
<b>4)RATED FIELD AMPS</b> Field current @ base speed	1.35		Adc	S
<b>5)BASE RATED RPM</b> Base speed	1750		rpm	S
<b>6) DESIRED MAX RPM</b> Maximum speed	2300		rpm	-
<b>9)SPEED FBK TYPE</b> Speed feedback type		<b>ARMATURE VOLTAGE</b>		S
<b>18)RATED ARM VOLTS</b> Rated armature volts	500		Vdc	S
<b>19)EL1/2/3 RATED AC</b> Supply voltage	480		Vac	S
Field volts (refer to PIN 4)	used to calculate field current if not known		Vdc	
<b>ENCODER / TACHO information</b>				
<b>8)MAX TACHO VOLTS</b> DC tachogenerator	60		V/1000 rpm	S
<b>11)ENCODER LINES</b> Encoder lines	1024		PPR	S
Encoder volts	5 - 24		Vdc	
<b>Field weakening information</b>				
Field current @ maximum speed			Adc	

### 1.2.1 Property "S" parameters

Refer to the "PIN tables" in the Product Manual to identify all parameters with property "S".

- The PL/X keys will not change the values of property "S" parameters while the motor is running.

This functionality provides an extra level of safety during motor running while allowing dynamic alteration of important parameters.



## 1.3 Installation

### 1.3.1 Connect the drive



**WARNING!**  
**PERSONAL INJURY AND/OR**  
**EQUIPMENT DAMAGE HAZARD**

Before beginning to connect the drive, ensure that all power is OFF.

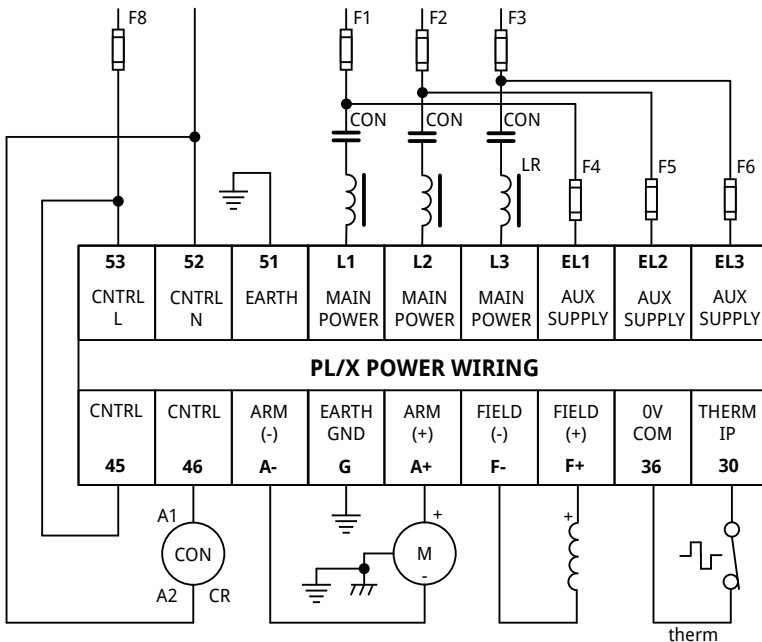
Make sure that you route power and control wiring in separate conduit/cable trays. Wiring must meet all applicable national and local electrical regulations.

Make sure that the voltages on the EL1/EL2/EL3 terminals are in-phase with the voltages on L1/L2/L3.

For reliable operation, the PL/X must control the supply side or dc side contactor through its CON1 and CON2 terminals (T45 and T46).

#### 1.3.1.1 Wiring diagrams

**NOTE:** Refer to the Product Manual for fuse specifications.



UL Requirement:  
a thermistor **must** be fitted.

If not fitting a thermistor to  
the motor, short together  
terminals 36 and 30.

**Figure 1 Power wiring diagram**

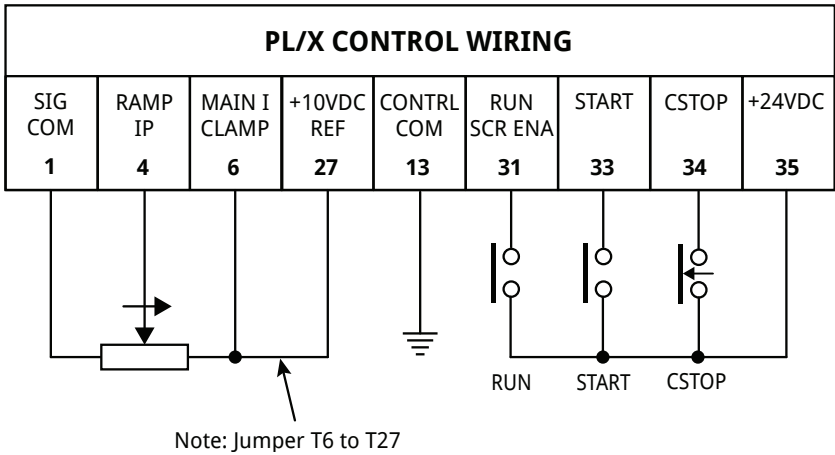
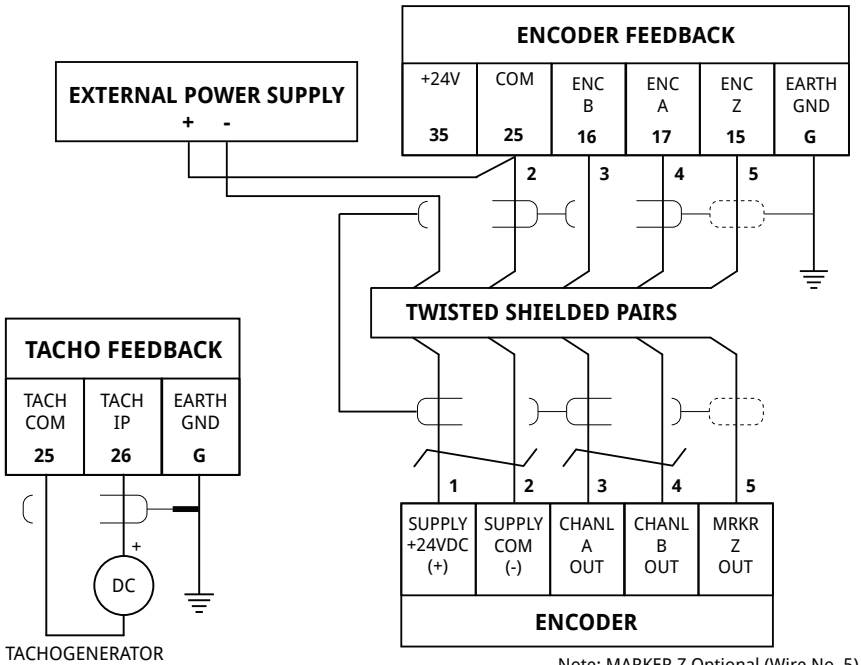


Figure 2 Control wiring diagram

### 1.3.1.2 Optional feedback devices



Note: MARKER Z Optional (Wire No. 5)

Figure 3 DC tachogenerator

Figure 4 Encoder

# 1.4 Essential pre-start checks

**Make the essential mechanical and electrical pre-start checks before applying power to the motor. You need to ensure that you can mark each item on the checklists as completed.**

Failing to comply with these requirements may cause incorrect functioning or damage to the drive and/or installation - **this will invalidate any Warranty.**

## 1.4.1 CHECK LIST: Mechanical

Tick each each item when complete.



1	Check that the motor, and load if fitted, are free to rotate without causing damage or injury even in the event of incorrect rotation direction or loss of control.	<input type="checkbox"/>
2	Blow clean, dry air over the commutator to clear it of extraneous matter. Check the brushes are correctly seated and that the brush tensions are correct.	<input type="checkbox"/>
3	Check the motor vent blower is free to rotate. Remember to re-check the airflow when the blower is operating.	<input type="checkbox"/>
4	Check the emergency stopping and safety procedure, including local and remote actuators, before applying power to the motor.	<input type="checkbox"/>
5	Check the installation is clean and free of debris, swarf, clippings, tools etc. Check the enclosure has adequate ventilation with clean, dry, cool, filtered air. Check the PL/X heatsink fans are operating and that the flow of air over the heatsink is unobstructed when the motor is running. Refer to "Technical Specifications" in the Product Manual for cooling airflow data.	<input type="checkbox"/>

## 1.4.2 CHECK LIST: Electrical

Tick each each item when complete.



1	Check that all external fuses are of the correct rating and type. The total clearing $I^2t$ ratings of the main fuse and auxiliary fuse must be smaller in value than the rating specified in the rating tables. Refer to "Technical Specifications" in the Product Manual - semiconductor fuse ratings.	<input type="checkbox"/>
2	Check the motor armature resistance, expected to be a few Ohms over a 360° rotation dependent upon the size of the motor, i.e. not a short-circuit. Check that the field resistance in Ohms = (field data plate volts) / (field data plate current). Check inside the motor terminal box to verify the correct wiring.	<input type="checkbox"/>
3	Check the 3-phase auxiliary supply phasing on EL1/2/3 equates to the phasing of the main stack supply on L1/2/3, and the 1ph control supply on T52/53 is correct.	<input type="checkbox"/>
4	Check that the drive and 3-phase supply current and voltage ratings are compatible with the motor and load requirements (both armature and field, current and voltage).	<input type="checkbox"/>
5	Check that the cables and termination are rated to carry the rated current, with no more than a 25°C temperature rise. Check all terminations are tight to the correct torque. Refer to "Terminal tightening torques" in the Product Manual.	<input type="checkbox"/>
6	Check that the main contactor operates by using the CON1/2 contact on terminals T45 and T46.	<input type="checkbox"/>
7	Check the wiring for short-circuit faults: <b>AC power</b> to ground, to signal and to control; <b>DC power</b> to ground, to signal and to control; <b>signal</b> to control and to ground. Disconnect the drive for wiring tests using a Megger (control terminals are a plug-in type).	<input type="checkbox"/>
8	Check that the engineering standards used will comply with any local, national, or international codes in force. Safety requirements take priority.	<input type="checkbox"/>
9	If the load regenerates or if regenerative braking is in use, then we highly recommend using a DC rated armature fuse with the correct $I^2t$ rating in series with the motor armature. Refer to "Fuses" in the Product Manual.	<input type="checkbox"/>
10	Check that a protective chassis earth connection, in accordance with the relevant codes, exists at the terminal bar provided at the bottom edge of the PL/X.	<input type="checkbox"/>
11	Check that a protective clean earth connection exists at the control 0 V on T13 to ensure that the installation complies with the protective Class 1 requirements.	<input type="checkbox"/>

## 1.5 Final checks BEFORE applying power

---

- Recheck all wiring, especially the drive's chassis ground.
- Use a multimeter to check the L1, L2, L3, F+, F-, A+, and A- terminals for short-circuits to ground. All readings should be greater than 1 M $\Omega$ .

If any resistances are lower than 1 M $\Omega$ , correct them before you apply power.

### 1.5.1 CSTOP/RUN/START control terminal functions

---



#### **WARNING!** **PERSONAL INJURY HAZARD**

The Safety Codes do not accept electronic control as a sole means of inhibition for the PL/X. Do not rely on any drive function to prevent the motor from operating when personnel are undertaking maintenance or when machine guards are open. Always isolate the power source before working on the PL/X or the motor or load.

---

#### **CSTOP    Coast Stop**

For correct sequencing, this must close before all other control signals. When opened, the drive immediately stops generating armature current, and the contactor drops out. The motor will coast to a stop.

#### **RUN        Run - NOT SAFETY RATED**

Electronic inhibit for all operation modes. May be connected to terminal T35 with a jumper in most applications, or preferably to an auxiliary normally-open contact on the main contactor. When closed, the drive may generate current. When opened, the drive generates no armature current.

#### **START     Start**

When closed, the drive's contactor operates, and the motor runs at the potentiometer's speed setting. When opened, the drive ramps to zero, and the contactor opens after a delay (default: 2 seconds).

## 1.6 Apply control power to the PL/X

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Is the PL/X being commissioned for the first time? If so, you must be able to complete "1.4 Essential pre-start checks" on page 6.

Now apply 110 - 240 Vac control power to terminal T53 (Line) and T52 (Neutral). After a short self-test, the PL/X will display the Diagnostic Summary screens at the top of the menu system.

## 1.7 QuickStart steps

Always commission the drive using ARMATURE VOLTAGE feedback, even if the motor has a dc tachometer or encoder. It allows verification of the feedback polarity, ensuring that the motor does not run out of control.



### WARNING! PERSONAL INJURY AND/OR EQUIPMENT DAMAGE HAZARD

Follow the QuickStart steps below as written and in the correct numerical order.

## Calibrate the drive to the motor

Enter your values from page 3.

**NOTE: U/D** means to use the **UP** and **DOWN** keys freely to change the values.

1 Hold down the **LEFT** key to display the Diagnostic Summary screens. Release the key.

2 Rated Armature Current      **R-R-U-R-R-U/D**      2)RATED ARM AMPS  
35.0 AMPS

3 Rated Field Current      **L-D-D-R-U/D**      4)RATED FIELD AMPS  
2.00 AMPS

4 Rated Base Speed      **L-D-R-U/D**      5)BASE RATED RPM  
1750 RPM

5 Required Maximum Speed      **L-D-R-U/D**      6)DESIRED MAX RPM  
1750 RPM

**NOTE:** The base speed is the same as maximum speed unless using field weakening to extend the speed range. ("1.8.2 Field weakening" on page 14).

6 Rated Armature Volts      **L-9xD-R-U/D**      18)RATED ARM VOLTS  
500.0 VOLTS

7 Supply Voltage      **L-D-R-U/D**      19)EL1/2/3 RATED AC  
460.0 VOLTS

Check the following have not been modified from their factory default settings.  
If necessary, correct the selections to those shown below.

8 Motor 1/2 Select      **L-D-R-U/D**      20)MOTOR 1,2 SELECT  
MOTOR 1

9 Speed Feedback Type      **L-8xU-R-U/D**      9)SPEED FBK TYPE  
ARMATURE VOLTS

10 **Save the parameters.** Refer to page 2.

## Check the control terminals

Complete these checks to ensure that the drive contactor is sequenced correctly before the 3-phase power is applied.

**NOTE:** The value under the letters TRJSC in the display indicates the actual Control input terminal status.

Letter	Terminal	Function
T	30	THERMISTOR
R	31	RUN
J	32	JOG
S	33	START
C	34	CSTOP

**11** Hold down the **LEFT** key to display the Diagnostic Summary screens. Release the key.

**12** Leave the CSTOP contact open (zero displays under the C) and close the other control contacts. **R-D-R-4xD-R-D-D-R**

```
164>DOP 123TRJSC CIP
      10101110
```

Check that the digit under the appropriate letter changes as you cycle the contact.

**NOTE:** Generally **1 = ON** and **0 = OFF** (however, for the thermistor T, **0 = 0k** while **1 = Motor Overtemp**).

When T, R and S control inputs are operating correctly, leave R and S **OFF** and check the C control input for correct operation.

```
164>DOP 123TRJSC CIP
      10100000
```

## Apply main 3-phase power to the PL/X

**13** Apply main 3-phase power.



## Autotune the PL/X

Before running the motor, you **must** perform the Autotune. This procedure automatically tunes the drive's current loop by adjusting parameters 93, 94, and 95.

**14** Set RUN and CSTOP high but leave START low. The control inputs should match TRJSC opposite. **Continuing from "Check the control terminals" on page 10 above.**

```
164>DOP 123TRJSC CIP
      10101001
```

**15** Hold down the **LEFT** key to display the Diagnostic Summary screens. Release the key.

**16** Enable the autotune mode. **R-R-6xD-R-7xD-R-U**

```
92>AUTOTUNE ENABLE
      ENABLED
```

**17** Hold down the **LEFT** key to display the Diagnostic Summary screens. Release the key.

**18** Start the drive by energising the Start input (T33). **RJSC can also be seen on the Diagnostic Summary screens**

```
SPD% Iarm Ifld RJSC
  0    0    0    1011
```

**19** The contactor closes, and the drive Autotunes (it takes 10 - 60 seconds). When complete, the drive's contactor opens. Turn off the Start input (T33).

- Autotune is a static test.
- There is no need to disconnect the motor from the load.
- The motor field is automatically disabled.
- If the motor back emf is detected to be above a certain level implying excessive rotation, Autotune aborts.
- Completing the Autotune routine forces the main contactor to drop-out, and AUTOTUNE ENABLE to reset to DISABLED.

Should Autotune fail, refer to "92)AUTOTUNE ENABLE" in the Product Manual, or contact your Supplier.

## Motor rotational checks

Disconnect the motor from the gearbox and machine before commencing these checks.

**20** Hold down the **LEFT** key to display the Diagnostic Summary screens. Release the key.

**21** Reduce the current limit.

As an added precaution, restrict the available current to the drive by reducing the Current Limit to provide just enough current to turn the motor (usually 5 to 10%).

**R-R-U-R-D-R**

3)CURRENT LIMIT(%)  
5.00 %

**22** Check the speed potentiometer operation.

Monitor the Ramp input to check the operation of the speed potentiometer. Leave the reference at zero when operating correctly.

**L-L-D-R-5xD-R**

26)RAMP INPUT  
75.14 %

**23** **Save the parameters.** Refer to page 2.

Reconnect the motor to the gearbox and machine.

**24** Start the drive.

Energise the START input (T33) to start the drive. Check the field voltage at the F+ and F- terminals. When the motor is cold, you will measure less than the rated field voltage.

**25** Hold down the **LEFT** key to display the Diagnostic Summary screens. Release the key.

**26** Confirm the field current matches the nameplate data.

**R-D-R-D-D-R-D-D-R**

145)FLD CUR AMPS MON  
1.35 AMPS



**27** Hold down the **LEFT** key to display the Diagnostic Summary screens. Release the key.

**28** Increase the potentiometer setting until the motor turns slowly.

Check motor rotation. If it is turning backwards, stop, turn off ALL power to the drive and swap the armature leads (A+ and A-). Recheck after changes.

**L-L-D-R-5xD-R**

```
26>RAMP INPUT
    75.14 %
```

**29** Slowly bring the motor to full speed.

Check the voltage on the A+ and A- terminals as you slowly bring the motor up to full speed.

**R-D-R-R-3xD-R**

```
126>ARM VOLTS MON
    500.0 VOLTS
```

**30 Save the parameters.** Refer to page 2.

## Increase the current limit to rated value

**31** Hold down the **LEFT** key to display the Diagnostic Summary screens. Release the key.

**32** Return the current limit to 150%.

**R-R-U-R-D-R-U**

```
3>CURRENT LIMIT(%)
    150.00 %
```

**33 Save the parameters.** Refer to page 2.

**The PL/X Digital DC Drive is now successfully commissioned.**

## 1.8 Options

### 1.8.1 Feedback

#### 1.8.1.1 Feedback calibration

Enter your values from page 3 for DC Tachogenerator or Encoder:

**1** Start the drive.

Energise the START input (T33) to start the drive. Check the field voltage at the F+ and F- terminals. When the motor is cold, you will measure less than the rated field voltage.

**2** Hold down the **LEFT** key to display the Diagnostic Summary screens. Release the key.

**3 DC Tachogenerator**

For a dc tachogenerator, calibrate the drive to the expected dc voltage for base speed.

Base Tacho Voltage = (Base Speed/1000) x Tacho Volts per 1000 rpm.

The tacho voltage must **R-R-U-R-6xD-R-U/D**  
not exceed 200 Vdc.

```
8>MAX TACHO VOLTS
87.50 VOLTS
```

**4 Encoder/PPR**

If the encoder is a quadrature type, enable 10)QUADRATURE ENABLE as below. For a pulse and direction type encoder, the parameter must be DISABLED.

**R-R-U-R-8xD-R-R-U/D**

```
10>QUADRATURE ENABLE
ENABLED
```

**NOTE:** On PL models only, it is also possible to operate with a pulse-only encoder (no direction signal).

In both cases (4), set **L-D-R-U/D**  
the number of encoder  
lines (PPR: pulses per  
revolution).

```
11>ENCODER LINES
1024
```

**5 Save the parameters.** Refer to page 2.

### 1.8.1.2 Preparing for Tacho/Encoder use

6 Hold down the **LEFT** key to display the Diagnostic Summary screens. Release the key.

7 Check to ensure the speed reference is positive (+):

R-D-R-R-R

123>TOTAL SPD REF MN  
26.50 %

8 Check the sign of the feedback:

DC tachogenerator: 6xD

129>TACHO VOLTS MON  
23.19 AMPS

If positive (+), continue to step 9 below. If negative (-), stop and power-off the drive. Exchange the tachogenerator leads on T25 and T26 and recheck.

Encoder: 2xD

132>ENCODER RPM MON  
464 RPM

If positive (+), continue to step 9 below. If negative (-), stop and power-off the drive. Exchange the encoder leads on T16 and T17 and recheck. Alternatively, check and adjust

13>ENCODER SIGN:

3xL-U-R-U-R-8xD-R-  
3xD-R-U/D

13>ENCODER SIGN  
INVERT

### 1.8.1.3 Selecting Tacho/Encoder feedback type

9 Hold down the **LEFT** key to display the Diagnostic Summary screens. Release the key.

10 Stop the drive and select the appropriate feedback type as follows:

DC tachogenerator: R-R-U-R-7xD-R-U/D

9>SPEED FBK TYPE  
ANALOG TACHO

Encoder: R-R-U-R-7xD-R-U/D

9>SPEED FBK TYPE  
ENCODER

11 **Save the parameters.** Refer to page 2.

12 Hold down the **LEFT** key to display the Diagnostic Summary screens. Release the key.

13 Start the drive and make sure the maximum speed is achievable and the armature voltage does not exceed the nameplate armature voltage.

14 Stop the drive.

## 1.8.2 Field weakening

When using either tacho or encoder feedback, you can enable field weakening for a motor which supports an extended speed range. Refer to the Product Manual: "CHANGE PARAMETERS / FIELD CONTROL / FLD WEAKENING MENU".

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