

# C4

— DRIVE STARTUP MANUAL —

HPV900-PM

VERSION 3.0



SMARTRISE

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## Document History

Date	Version	Summary of Changes
October 23,2018	1.0	Initial Submittal
August 23, 2019	2.0	Changed cover page New document format Added secondary brake wiring
October 7, 2019	3.0	Changed Table 2 name to Parameters for Basics U9

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## HPV900-S2 PM Drive

The HPV900-S2 drive is a permanent magnet AC drive.



Figure 1: HPV900-S2 PM Drive

## Equipment/Settings Verification

Set and verify the equipment matches the job specific parameters for proper operation. See *C4 Controller sheet 01 Getting Started Parameter Table* for more information.

Sample: Sheet 1: - Getting Started

Job Specifications:																
Car	Group #	Group Car ID	Contract Speed	Floors	Capacity	Main Line Voltage	Motor Volts	Motor HP	Motor FLA	Motor Poles	Motor RPM	Motor Freq	Drive AMG	Motor AMG	Disc. Size	Drive
1	N/A	N/A	200	2	3500	480	328	12.3	21.1	20	96	16	10	10	40	HPV900-4021-2E1-01

Car	Doors	DR Voltage	Brake Pick	Brake Hold	Brake Ohm	Brake Amp	M. Cont. P/N	S.1 Cont. P/N	Encoder PPR	EBrake	S.2 Cont. P/N	EBrake Pick	EBrake Hold	EBrake Ohm	EBrake Amp	DBR Ohm	DBR Watts
1	2	240	90	45	84	1.08	CA7-37	CA7-12	2048	Sheave	CA7-12	90	45	84	1.08	20	6800

Motor Volts

Motor Amps

Motor RPM

Motor Frequency

Main Line Volts

Motor HP

Motor Poles

Motor Freq

Brake Volts Pick/Hold

Encoder PPR

Figure 2: Example of Parameter Table

## Magnetek Parameter Location Reference

### Adjust A0

- **Drive A1**
  - Encoder Pulses (Encoder PPR – 1024/2048)
- **Power Convert – A4**
  - Input L-L Volts
- **Motor – A5**
  - Rated Mtr Power (Kw)
  - Rated Mtr Volts (VAC)
  - Rated Exit Freq (60Hz)
  - Rated Motor Curr (FLA – Amps)
  - Motor Poles
  - Rated Mtr Speed (RPM)

### Configure C0

- User Switches – C1
  - Motor Rotation
    - Forward/Reverse
- Encoder Connect
  - Forward/Reverse

## Grounding Requirements

NOTE: A proper and effective building ground connection is required for the safe and successful operation of the controller.

Examples of a proper building-to-controller ground is as follows:

1. Attach the ground wire to the street side of a water main.
2. Attach the ground wire to a grounding rod in the pit.

The controller has a common ground bus terminal connection.



*Figure 3: Ground Bus Terminal*

- The building, motor, transformer, and filter(s) must all share a common ground. This removes ground loops, limits impedance, and routes noise into the ground.

## Wiring

A checklist must be completed during the drive wiring process. See Appendix for terminal location.

### Power

Perform the following to connect power. See *C4 Controller sheet 03 Machine Room* for job specific information.

- Connect main line power to terminal blocks L1/L2/L3.
- Connect the ground wire to the yellow/green terminal block next to L1-L3.

### Brake

Perform the following to connect the brakes. See *C4 Controller sheet 05 Brakes* for job specific information.

- Connect the main brake wiring to terminal K1 / K2 and the secondary brake wiring (if equipped) to terminals J1 / J2 located on the terminal block next to the M Contactor.

### Motor / Encoder

Perform the following to connect the drive to the motor and encoder cable. See *C4 Controller sheet 04 Motor and Drive Connections* for job specific information.

- Connect motor leads to the M contactor at T1/T2/T3.
- Connect the encoder cable to the terminal block TB2 on the EnDat Card. See Figure 7.

The table below lists the Wiring References for Common Encoders. Record the encoder wire color code for future release.

*Table 1: Wiring References for Common Encoders*

Encoder	HPV900 S2 Endat Termination		Cable Color				
			Black Heidenhain	Ziehl	Green Encoder Cable	Torin Encoder Cable	On-Site Color
/A	A-	TB2-1	Yellow and Black	Red and Blue	Yellow	Brown	
A	A+	TB2-2	Green and Black	Gray and Pink	Green	Green	

Encoder	HPV900 S2 Endat Termination		Cable Color				
			Black Heidenhain	Ziehl	Green Encoder Cable	Torin Encoder Cable	On-Site Color
/B	B-	TB2-3	Red and Black	Red	Red	Yellow	
B	B+	TB2-4	Blue and Black	Blue	Blue	Blue	
DATA/	DAT-	TB2-5	Pink	Brown	Pink	Silver	
DATA	DAT+	TB2-6	Gray	White	Gray	Gray	
CLOCK/	CLK-	TB2-7	Yellow	Black	Violet	White	
CLOCK	CLK+	TB2-8	Violet	Violet	Black	Violet	
0V com	COM	TB2-9	Green and White	Pink	White	Black/Red and White	
+5V	+5V	TB2-10	Green and Brown	Gray	Brown	Red and Pink	
0V Sense (If Present)	SEN-	TB2-11	White	Yellow			
+5V Sense (If Present)	SEN+	TB2-12	Blue	Green			
Cable Shield	Shield	TB2-13	Encoder Cable Shield	Encoder Cable Shield	Encoder Cable Shield	Red	
EnDat Board Ground (Magnetek GRN factory wire tied to ground stud)	Shield	TB2-13					

## Construction

All safety inputs are functional during Construction mode on the C4 product. When these safety devices are installed, they are connected per *C4 Controller sheet 02 Machine Room I/O* of the prints, even if still on Construction mode. The following includes instructions for when none of these devices have been installed prior to beginning on Construction mode.

Perform the following to wire the Construction Box. See *C4 Controller sheet 01 Getting Started* for job specific information.

1. Connect a jumper from L120 to terminals LFT, LFM, and LFB. If rear doors are used, connect LRT, LRM, and LRB.

2. Connect a jumper from H120 to PIT, BUF, BFL, and TFL.
3. If secondary brake is present, connect M120 to SFM.
4. Connect H120 through your machine room Run/Stop switch and connect it to SFH. A closed switch indicates run; an open switch indicates stop. If no Run/Stop switch is being used, connect H120 to SFH.
5. Connect your run bug. Wire the UP button to input CUP and the DOWN to input CDN. Wire the Enable to CEN, jump high if not available. If no run bug is being used, leave the inputs unwired.
6. Connect a jumper from 24VDC to MM.
7. Verify the Car Door Bypass and Hoistway Bypass switches are in the OFF position.
8. Place the Inspection switch to INSPECTION.

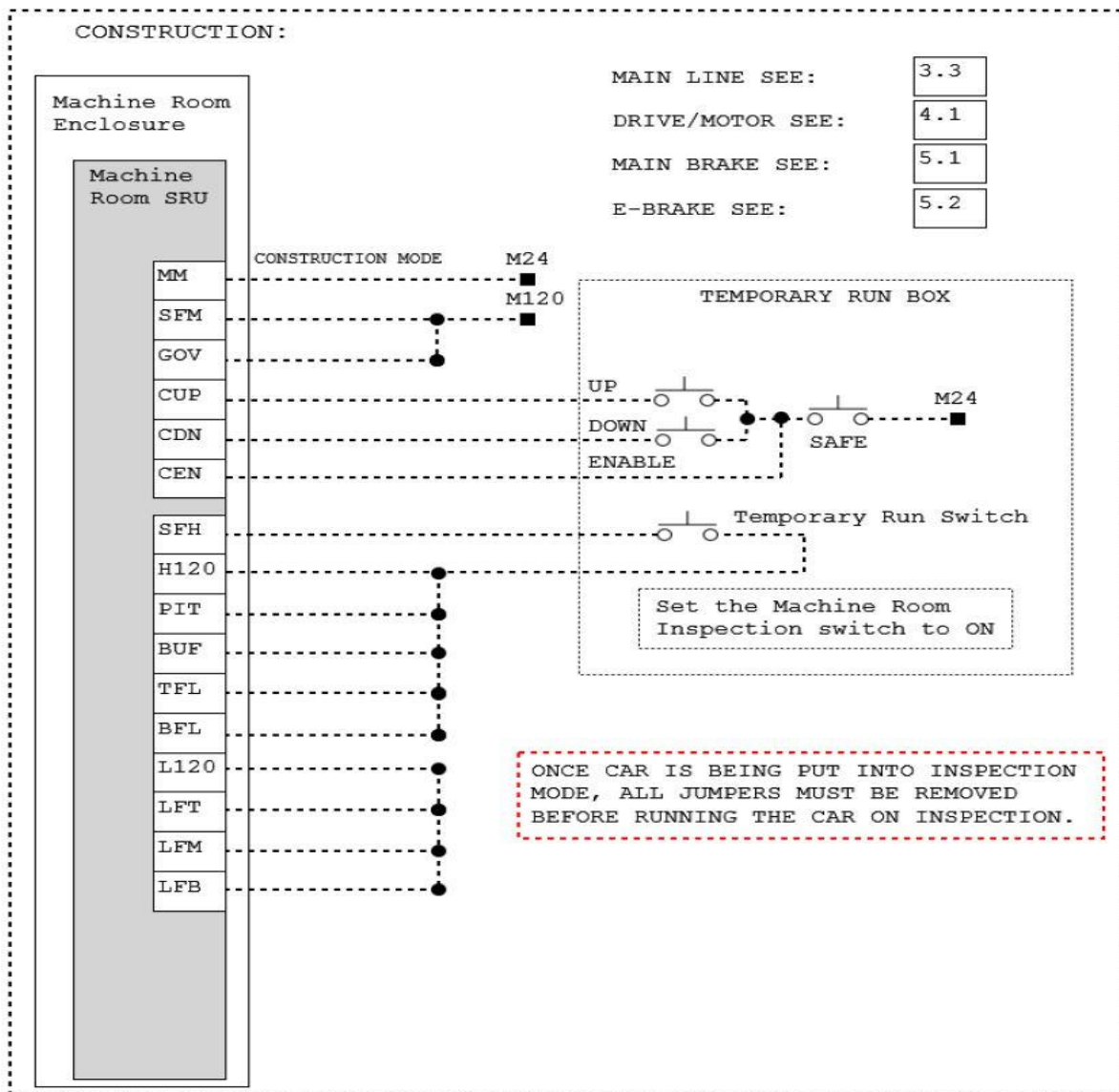


Figure 4: Example of Construction Wiring

## Powering Up

Perform the following to power up the drive.

1. Apply external power by closing the main disconnect.
2. Close the two-pole breaker and all pushbutton breakers.
3. Verify the LCD on the Smartrise board and the Magnetek Drive powers up.

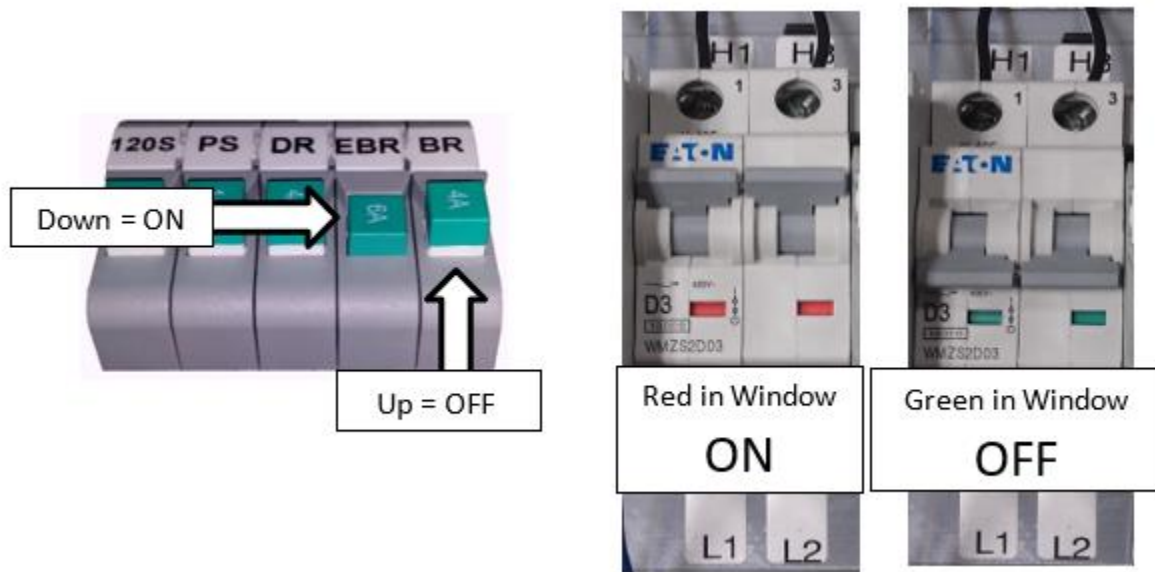


Figure 5: Breakers

## Auto Tuning

The auto tune function must be performed for a PM motor to properly operate. The two functions are Encoder Alignment and Motor Alignment. Complete the checklist during the verification process.

**NOTE:** During the alignment process, the Smartrise SRU board may display several faults. These are normal and won't affect the alignment procedure.

### Motor Alignment

Perform the following to align the motor.

1. Use the Left|Right arrow buttons to select the AUTOTUNE SEL U12 menu.
2. Use the Up|Down arrow buttons to change AUTOTUNE SELECT to YES but **DON'T PRESS THE ENTER BUTTON.**
3. Turn on DIP 6A. The M contactor automatically engages, and the screen displays TUNE command.
4. Press the Enter button on the drive to start the alignment.

## Encoder Alignment (Non-Rotational)

Perform the following to align the encoder.

1. On the drive – In the ROTOR ALIGN U10 menu change the following parameters:
  - Set the alignment method to either HF INJECT or AUTO ALIGN and press Enter. See Table 4 HF INJECT Note to verify if the HF INJECT method can be used.
  - Change alignment from disabled to enable.
  - Select BEGIN ALIGNMENT to Yes but **DON'T PRESS THE ENTER BUTTON**.
2. Turn on DIP 6A. The M contactor automatically engages, and the screen displays TUNE command.
3. Press the Enter Button on the drive to start the alignment.
 

**NOTE:** If the drive displays the error message “CAN NOT CHANGE AT THIS TIME”, verify U10 ROTOR ALIGN – ALIGNMENT is set to Enable. If there are other faults during this process, see *Magnetek HPV900* for diagnostic information.

The table below lists the Parameters for BASICS U9.

Table 2: Parameters for BASICS U9

Parameter	Description	Choices
Drive Mode	Drive Operation	Open Loop Closed Loop PM

The table below lists the Parameters for AUTOTUNE SEL U12.

Table 3: Parameters for AUTOTUNE SEL U12

Parameter	Description	Choices
Autotune Select	Allows autotune to run	Disable On Run Yes

The table below lists the Parameters for ROTOR ALIGN U10.

Table 4: Parameters for ROTOR ALIGN U10

Parameter	Description	Choices
Alignment	Allows alignment to be performed	Enable Disable
Begin Alignment	Determines when to perform alignment	Yes On Run No



Parameter	Description	Choices
Alignment Method	How alignment will be performed	Open Loop Auto Align HF INJECT *

**\*NOTE:** HF INJECT only works if the drive version is A4810-xxxx**15**.xx or above. Navigate to U6 DRIVE INFO and check the drive version. If the drive is not version 15 or above, then use AUTO ALIGN.

The table below lists the Parameters for DRIVE INFO U6.

*Table 5: Parameters for DRIVE INFO U6*

Parameter	Description	Choices
Drive Version	Shows the software version of the drive software	A4810-xxxx <b>15</b> .xx

## Operation

Run the car and complete the checklist during the verification process.

### No Faults

Make sure the car is moving without triggering a fault either on the Smartrise SRU Board or the drive. If the SRU Board displays a drive fault, look at the drive to see what the fault is. See Drive Fault / Encoder Fault for troubleshooting drive fault.

### Proper Direction

Make sure the car is moving in the same direction as the control switch on the Run Bug. See Wrong Direction for troubleshooting proper direction faults

### At Speed

Make sure the car is moving at the proper inspection speed (approximately 50 fpm). See Car Moving to Slow or Rough for troubleshooting at speed faults.

### Under Control

Make sure that the car is moving under full control. The car should stop when commanded from the Run Bug. Verify that the car runs with no faults for 10 seconds or more. See Brake Not Lifting for troubleshooting under control faults.

## Troubleshooting

The following sections list troubleshooting procedures.

### Drive Fault / Encoder Fault

The most common fault at startup with a Magnetek drive is the Encoder fault.

Perform the following checks to correct this fault:

- Check for a solid shield-to-ground connection at the motor and drive.
- Check for correct colored encoder wires to the terminals.
- Swap A+ / A- on terminal TB2 – #1 (A+) and #2 (A-).
  - After swapping the A signal wires it may be necessary to change the direction of the C1 – Encoder Connect.
- If any encoder wiring has been changed, the Encoder Alignment must be run again. See Encoder Alignment.

### Brake Not Lifting

If the brake is not picking, make sure that the brake is wired according to *C4 Controller sheet 05 Brake Connection* and if there is a second brake installed, verify that the EB terminal is jumpered to the terminal. See *C4 Controller sheet 01 – Getting Started* for more information.

If the brake has the proper voltage check the following:

- During a run command, check the DC voltage between points K1 / K2 and J1 / J2 if secondary brake is installed. Verify the voltages are also at the brake coil(s) when commanded to pick.
- Verify that the actual brake voltage matches the brake coil voltage shown on the *C4 Controller sheet 01 – Getting Started* Parameter table.

### Wrong Direction

If the car is moving in the wrong direction check the following:

- On the Smartrise controller board make sure that IO CUP comes on when commanding the **UP** direction and IO CDN comes on when commanding the **DOWN** direction.
- Change the direction of the motor in the drive by navigating to C1 – Motor Rotation and toggling between Forward and Reverse.
- Swap two of the motor leads (T1 with T2).
  - After swapping the motor wires, it may be necessary to change C1 – Motor Rotation again.

## Car Moving to Slow or Rough

If the car is moving to slow or rough perform the following:

- Swap A- and A+ on terminal TB2 – #1 (A-) and #2 (A+).
  - After swapping the A signal wires it may be necessary to change the direction of the C1 – Encoder Connect.
- Verify the brakes are lifting fully.

## Setup Fault One

This fault is caused when the HPV900 is programmed with motor data (A5) that conflicts with the drive software.

1. Unplug the drive COM cable from the MR board. This will restore access to the HPV LCD screen.
2. Navigate to A5 – Motor Parameters – Motor Poles and verify that you have the correct number of poles listed.
3. Navigate to A5 – Motor Parameters – Rated Motor Speed and lower the RPM by 15-20 rpms and save.
4. Plug the COM cable back into the MR board.

## Appendix

The figures below shows the terminal locations for the main line and EnDat card.

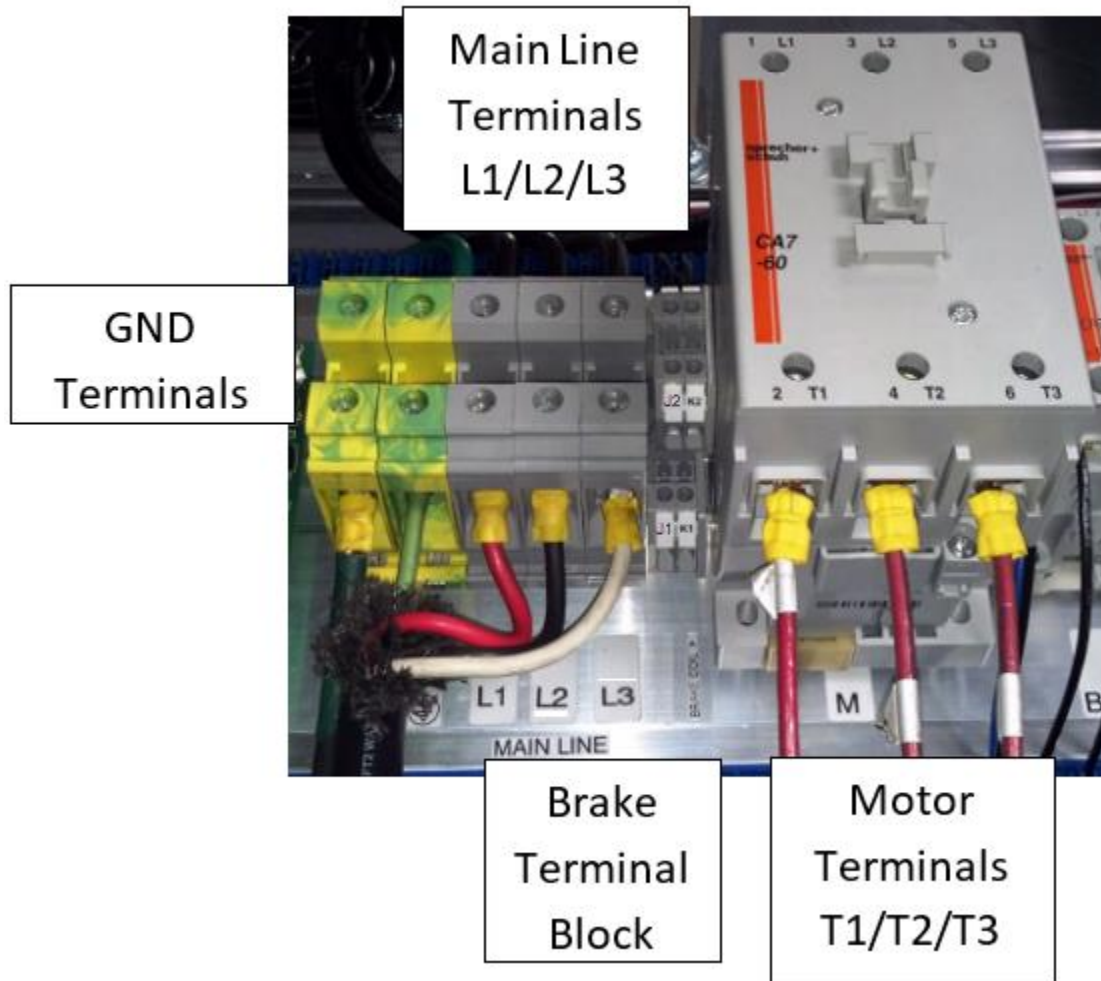


Figure 6: Main Line Connections

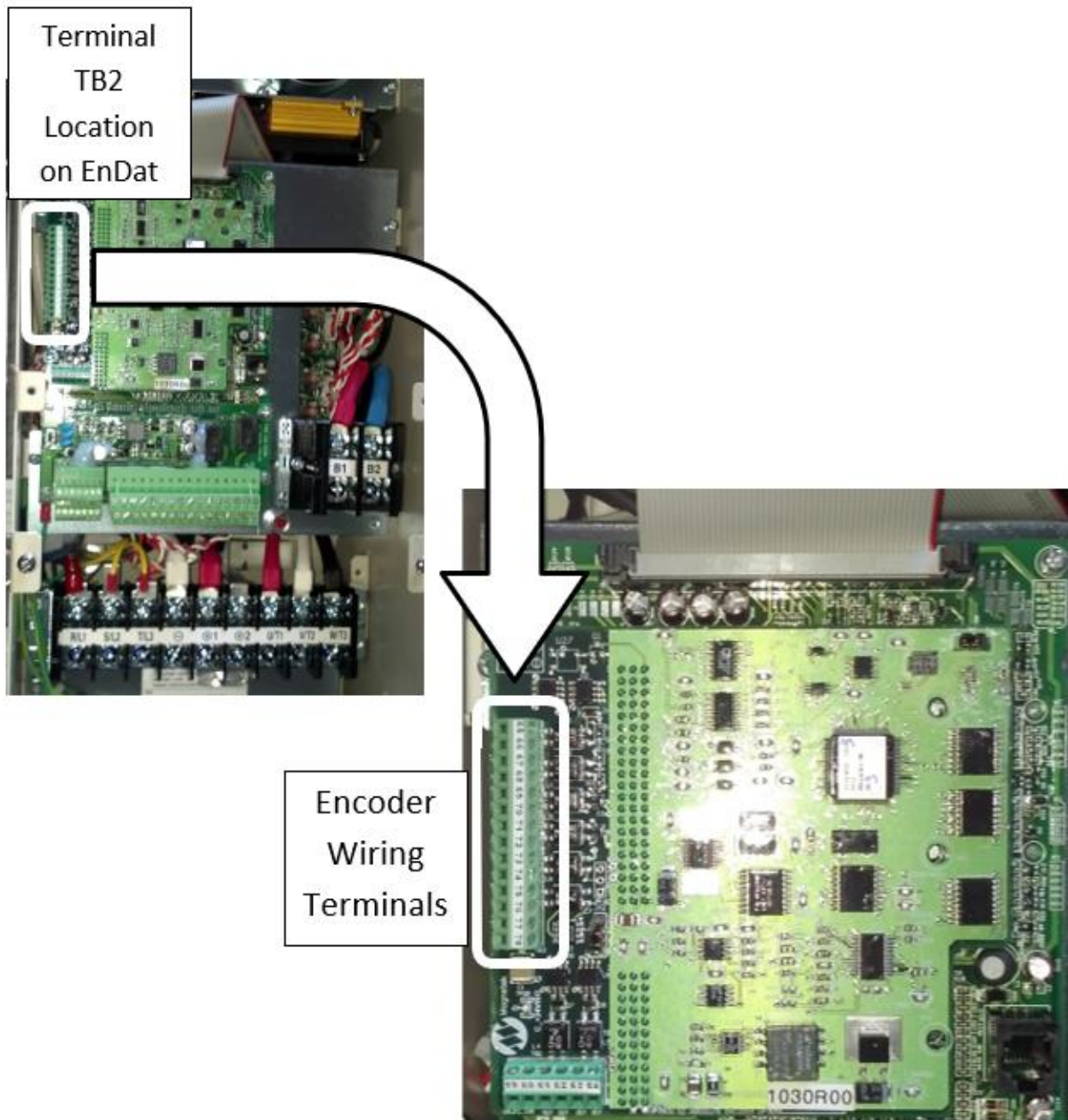


Figure 7: EnDat Card

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