MAGNETEK

ELEVATOR

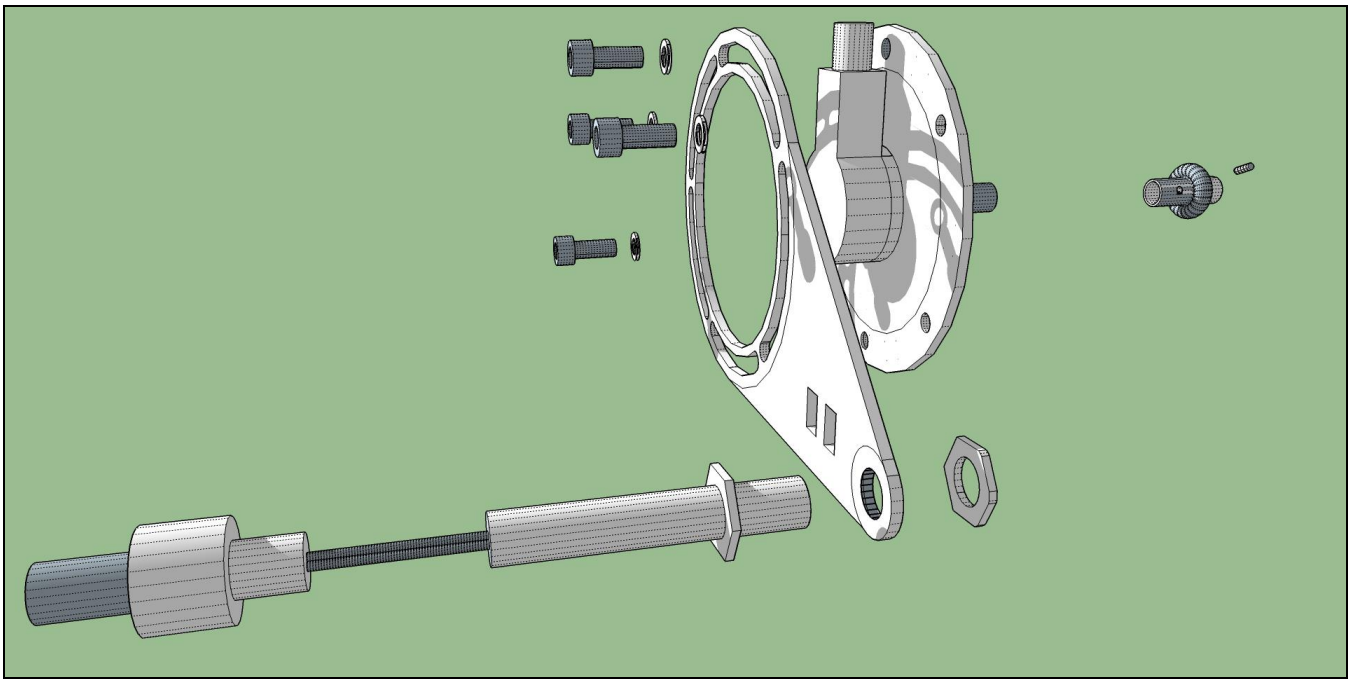
Axial Flux Start Guide

Guide to set up 900S2 Axial Flux drive

This is a quick setup guide to commission the HPV900 Series 2 Axial Flux drive.

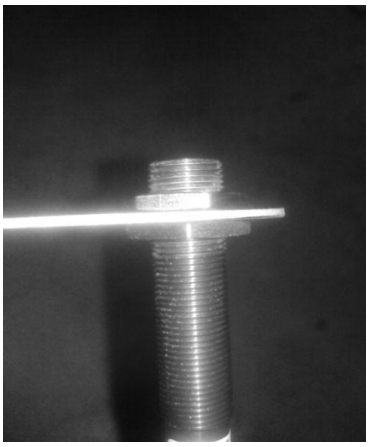
Step 1 – Mechanical Mounting

First the encoder, proximity switch, and rider wheel must be mounted as follows:

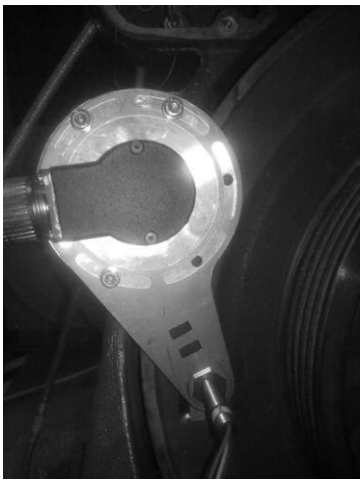


1. Fit the Rider wheel (05P00066-0622) to the encoder (Box 05P00057-0112) using the set screw (05P00302-6208).

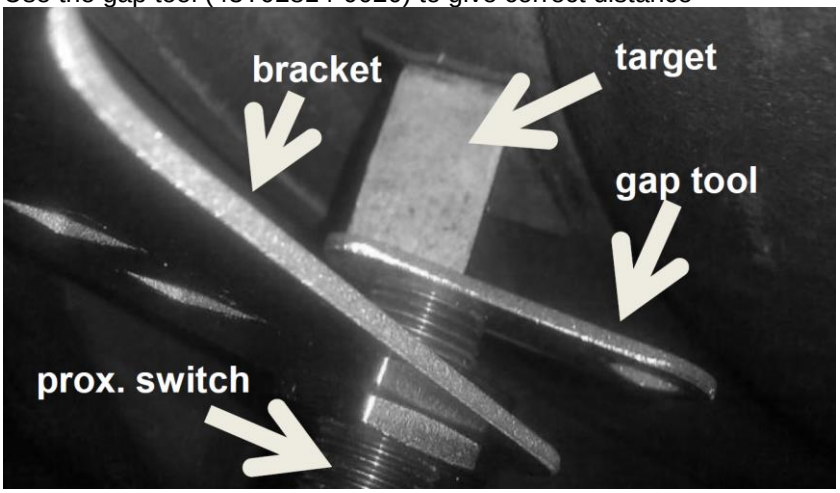
2. Connect Proximity sensor (46S04441-0010) to proximity bracket (43T02814-0030) with the two M12 nuts on the sensor



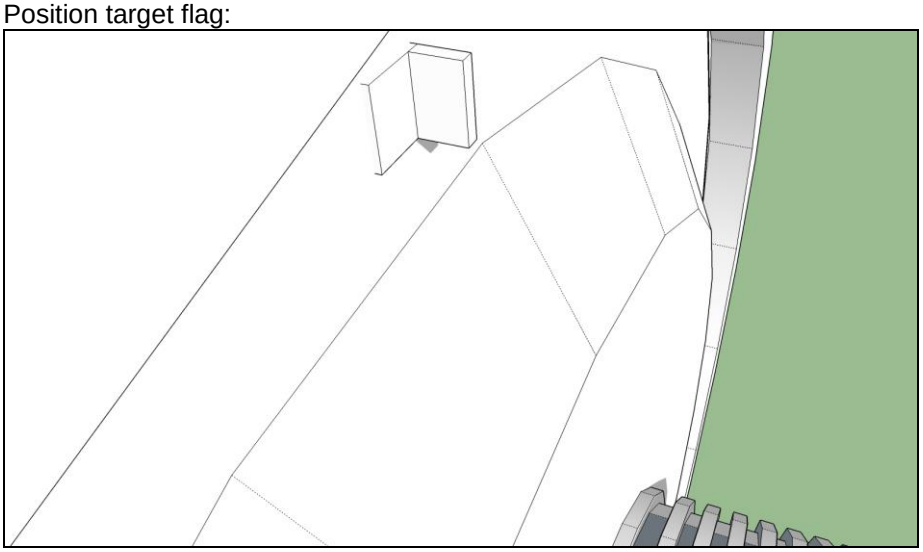
3. Remove old tachometer or encoder from the machine, and attach the new bracket and encoder to the motor as shown below. The proximity bracket can be rotated to align with target flag



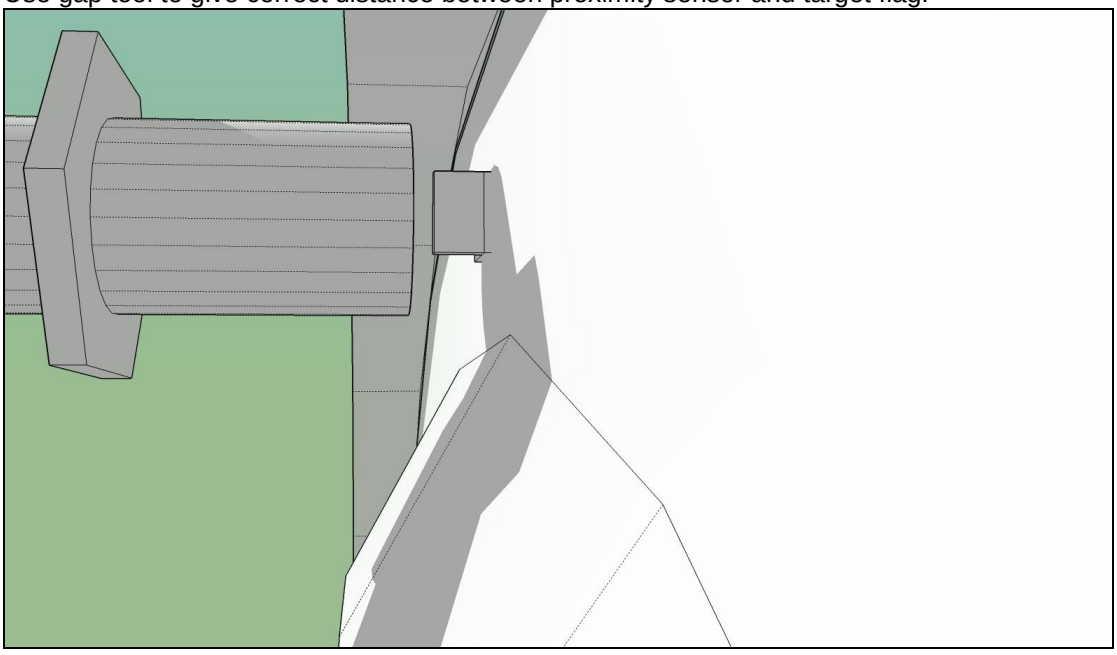
4. The target flag (43T02814-00XX based on which flag best fits) should be positioned on the sheave so that the short edge will face the proximity sensor. Use the alcohol wipe (05P00100-0064) to clean the surface, then fix target using the adhesive pad (05P00531-0025)
Use the gap tool (43T02814-0020) to give correct distance



Position target flag:

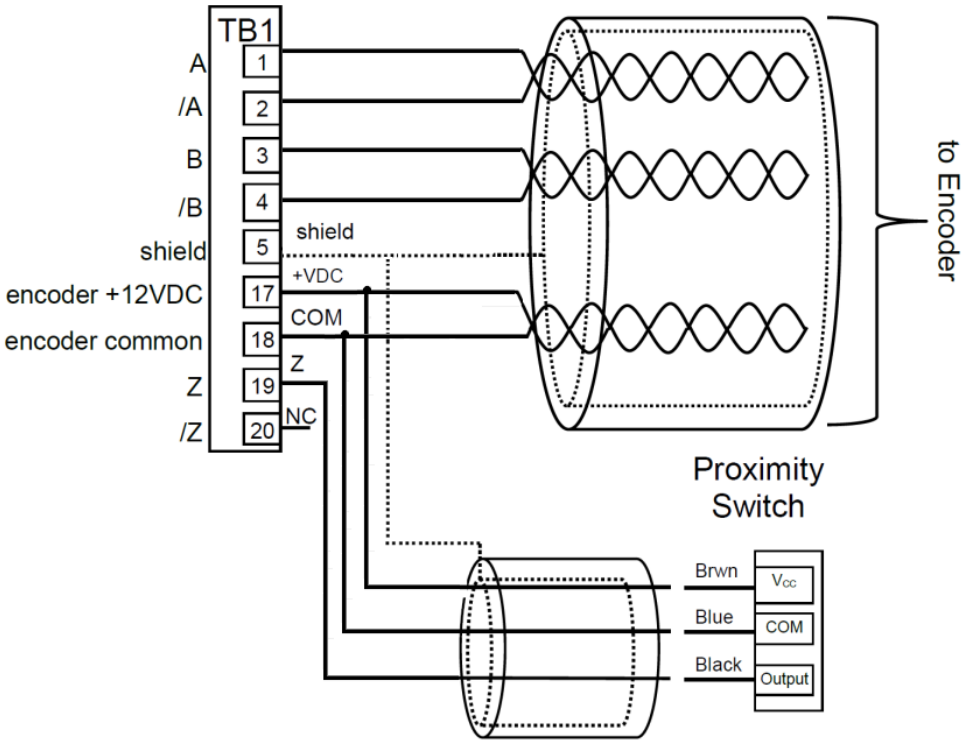


Use gap tool to give correct distance between proximity sensor and target flag:



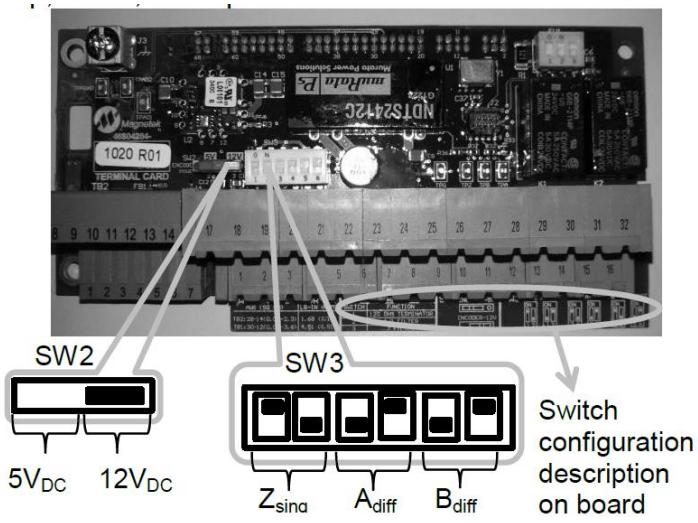
Step 2 – Electrical Connection

Connect the encoder and proximity sensor wires to the drive as follows:



The wires are labelled, and should be connected into the terminals with the matching numbers in the **long** green terminal blocks.

Make sure the switches on the TerMag board are set correctly as follows:



Step 3 – Drive Parameters

The following drive parameters should be entered for the Axial Flux drive:

Menu	Parameter	Correct Setting
U9	Drive Mode	"PM"
C1	Encoder Select	"Axial-Flux"
	Motor Rotation	*See table below*
A4	Input L-L Volts	*Enter Line to Line Voltage*
A5	Rated Motor Power	*From Motor Dataplate*
	Rated Motor Voltage	*From Motor Dataplate*
	Rated Motor Current	*From Motor Dataplate*
	Motor Poles	*From Motor Dataplate*
	Rated Motor Speed	*From Motor Dataplate*
A1	Encoder Pulses	*See table below*

Motor Rotation (C1)

Ensure the motor is wired to the drive with U to U, V to V and W to W

If the motor sheave will rotate in a **Clockwise** direction for the car to travel up, set Motor Rotation (C1) to **FORWARDS**
If the motor sheave will rotate in an **Anti-clockwise** direction for the car to travel up, set Motor Rotation (C1) to **REVERSE**

Encoder Pulses (A1)

The encoder pulses in the A1 menu should be picked from the table below:

PM Motor Frame Types	Encoder Pulse (A1)
MX05/10	14395 PPR
MX05/16	14452 PPR
MX06/05	17067 PPR
MX06/10	17067 PPR
MX06/16	17067 PPR
MX10/05	19819 PPR
MX10/08	19735 PPR
MX10/10	19819 PPR
MX10/15	19680 PPR
MX18	26050 PPR
MX20	12950 PPR (75mm Rider Wheel)

These values are simply a starting point. The final encoder PPR value will be entered once the motor can be run at full speed as detailed in step 5.
If the motor does not conform to any of the types listed above, the PPR can be calculated using the diameter of the sheave where the encoder rider wheel is running (This may differ from the sheave diameter on the motor dataplate), and the diameter of the rider wheel supplied (37mm or 75mm).

$$Entered\ PPR = \frac{Motor\ sheave\ diameter}{Encoder\ Rider\ Wheel\ diameter} * 1024$$

Step 4 – Alignment and Autotune

HF Inject Procedure

The drive must determine an encoder offset value before it can turn the motor.

The drive will automatically perform a HF inject alignment when it is given a run command and all parameters are entered with no active faults.

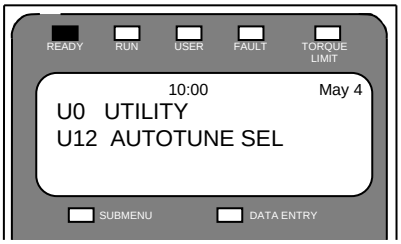
During Alignment, a slight buzzing noise should come from the motor for approximately half a second and the RUN light will be lit for the duration of the procedure.

- If the fault **AT CONTACT FLT** is displayed, verify the motor contactor closes during this process
- If the fault **BRAKE IS OPEN** is displayed, the drive has detected motion - verify the brake does NOT lift. If brake doesn't lift and minimal movement has occurred, increase BRK FLT LEVEL (A4).

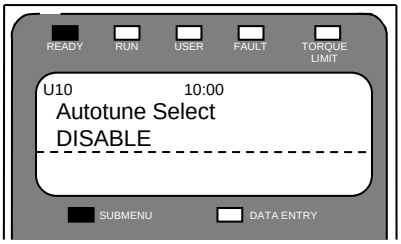
The drive should now be able to run the motor, however an autotune should also be performed as follows:

When the alignment is complete, move to the U12 menu and perform an Autotune. The Autotune procedure is similar to the Alignment procedure:

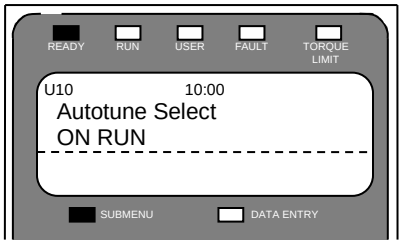
1. Move to the (U12) menu.



2. Press Enter to display:

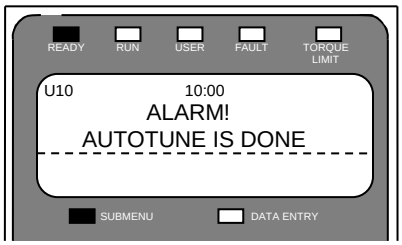


3. Press Enter, and change Autotune select to ***YES*** or ***ON RUN***. ("Yes" will begin the alignment immediately, and "On Run" will wait till the drive is asked to run)



If "On Run" was selected for Autotune select, you will have to press and hold test control buttons while autotune is carried out.

During Autotune, a slight buzzing noise should come from the motor for approximately half a second and the RUN light will be lit for the duration of the procedure.



- If the fault **AT CONTACT FLT** is displayed, verify the motor contactor closes during this process
- If the fault **BRAKE IS OPEN** is displayed, the drive has detected motion, verify the brake does NOT lift. If brake doesn't lift and minimal movement has occurred, increase BRK FLT LEVEL (A4).

Step 5 – Running

When the above steps have been completed, the drive should be ready to run the motor.

If any faults are displayed whilst running, refer to the troubleshooting section at the end of this guide.

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- If the motor turns, but is running in the wrong direction, change MOTOR ROTATION parameter in C1.
- If the motor turns halfway, then stops, check encoder ENCODER PULSES in the A1 menu. This should match the value in the table above (14,000 to 26,050PPR).

Finally, once running correctly and the installation is close to completion, you can perform full speed runs in both directions, and check "MEASURED PPR" and "EST INERTIA" in the D1 menu. Monitor these values in both directions, and take an average of each.

This average value for "MEASURED PPR" should be entered in "ENCODER PULSES" in the A1 menu.
The average value for "EST INERTIA" should be entered in "INERTIA" in the A1 menu.

Troubleshooting

If any issues are experienced which are not covered by this guide, please refer to the technical manual (TM354) which is available on the Magnetek website.

Faults/Alarms/Difficulties	Description	Solutions
Encoder Flt	The drive is in a run condition and the encoder is: not functioning or not connected or phasing is not proper with motor phasing	**Incorrect Encoder Phasing** ⇩ Verify that the encoder phasing is correct ⇩ Swap encoder A and /A channel on TB1-1 and TB1-2 ⇩ Perform an Open-Loop Alignment **Encoder Power Supply** ⇩ Check that the encoder power supply on TB1-17 and TB1-18 is $12V_{DC}$ ⇩ Verify that SW2 is switched to the 12V position (at right). Verify that the voltage between TB1-17 and TB1-18 is 12 volts DC **Parameter Settings** ⇩ Verify that the Encoder Connect (C1) is set to axial flux ⇩ Verify that the Encoder Pulses (A1) is set to a reasonable number **Encoder Mechanical Setup** ⇩ Verify that the rider wheel is firmly on the rotor and that the encoder spins as the rotor is spinning

Faults/Alarms/Difficulties	Description	Solutions
HIT TORQUE LIMIT *(alarm)*	The drive has reached its torque limit as defined in the A1 menu.	**Incorrect Encoder Phasing** ⇩ Verify that the encoder phasing is correct. ⇩ Swap the A and /A wires in TB1-1 and TB1-2 ⇩ Perform an Open-Loop Alignment **Proximity Switch** ⇩ Verify that the target sensor is being seen by the proximity switch every time the target is lined up with the proximity switch using the Z Edge Count (D1) ⇩ Verify that there is no noise on the proximity switch channel by verifying that the Z Edge Count (D1) isn't incrementing/decrementing more than once per motor rotation ⇩ Check that the proximity switch power supply on TB1-17 and TB1-18 is $12V_{DC}$ ⇩ Verify that SW2 is switched to the 12V position (at right). Verify that the voltage between TB1-17 and TB1-18 is 12 volts DC **Parameter Settings** ⇩ Verify that the Encoder Connect (C1) is set to axial flux incremental ⇩ Verify that the Encoder Pulses (A1) is set to a reasonable number **Rotor Alignment** ⇩ Perform a rotor alignment in the U10

Faults/Alarms/Difficulties	Description	Solutions
Once Per Revolution Bump	The motor would jerk every time the target sensor goes pass the proximity switch NOTE: for MRL setup, use the Z Edge Count (D1) to see when the target is being seen by the drive if you can't see the motor	**Parameter Setting** ⇩ Verify that the Encoder Pulses (A1) matches the number for Measured PPR (D1) while the motor is rotating at high speed ⇩ If they don't match, enter measured PPR in Encoder Pulses (A1).
RTR NOT ALIGN	*Run command given before aligning the rotor.* The drive does not have a good fix on the motor's magnets.	**Alignment Failed** ⇩ Perform a Rotor Align (U10) ⇩ Verify the motor is connected properly ⇩ Verify that the motor isn't bad ⇩ Verify that the contactor is picked while the drive is performing the alignment

Faults/Alarms/Difficulties	Description	Solutions
Spd Dev Flt **or** **Spd Dev Alm**	The speed feedback is failing to properly track the speed reference	**Encoder Cable not properly grounded** ⇩ Verify encoder cable is properly grounded **Motor Runaway Condition – (PM)** ⇩ Verify that the rider wheel is firmly connected to the rotor and that the encoder spins as the rotor is spinning **Drive and/or Motor is Undersized** ⇩ Usually drive's "HIT TORQUE LIMIT" alarm message is displayed (depending on setting of TRQ LIM MSG DLY (A1) parameter) ⇩ Verify drive and/or motor sizing. May need a larger capacity HPV 900 S2 and/or motor. **Check Parameter Settings – PM** ⇩ Usually drive's "HIT TORQUE LIMIT" alarm message is displayed (depending on setting of TRQ LIM MSG DLY (A1) parameter) ⇩ Check speed regulator parameters RESPONSE and INERTIA (A1) ⇩ Fault/Alarm sensitivity – SPD DEV FLT LVL or SPD DEV ALM LVL (A1) parameter is set too low for required acceleration/deceleration rate. **NOTE:** Setting SPD DEV FLT LVL too high will reduce drive's sensitivity runaway conditions!

Faults/Alarms/Difficulties	Description	Solutions
Z Marker Loss	The drive is expecting a signal back from the proximity switch but doesn't see any within the expected window.	**Proximity Switch** ⇩ Verify that the target sensor is being seen by the proximity switch every time the target is lined up with the proximity switch using the Z Edge Count (D1) ⇩ Verify that there is no noise on the proximity switch channel by verifying that the Z Edge Count (D1) isn't incrementing/decrementing more than once per motor rotation ⇩ Check that the proximity switch power supply on TB1-17 and TB1-18 is $12V_{DC}$ ⇩ Verify that SW2 is switched to the 12V position (at right). Verify that the voltage between TB1-17 and TB1-18 is 12 volts DC