HX Nitro Encoder Connection

Encoders are usually installed in automated or controlled systems that can send feedback to the controller and specify speed, position or direction of the product. In most production lines, the product's speed is not consistent. It often stops after printing and then moves again. In this case, encoder should be used to remove the time parameter from the printer settings.

Normally, the distance and position of the product depends on time. However, by attaching an encoder, it will depend on the output pulses that the encoder specifies. When activating the encoder option in print parameter setting, the delay and position of the product are adjusted by the pulse.

Figure 1. Encoder

Encoder Wiring

In general, there are many market encoders that have different wires/wiring:

1. Voltage wire (VCC) encoder
2. GND (Encoder)
3. Wire A for the first pulse
4. Wire B for the second pulse with a phase difference of 90 degrees relative to pulse A
5. The Z-wiring, which produces a pulse for each complete round of an encoder (from its moment of movement, to a full circle).
6. Shielded wire for noise reduction

Note: the incremental rotary encoders with 24 volt working ranges can be connected to the printer

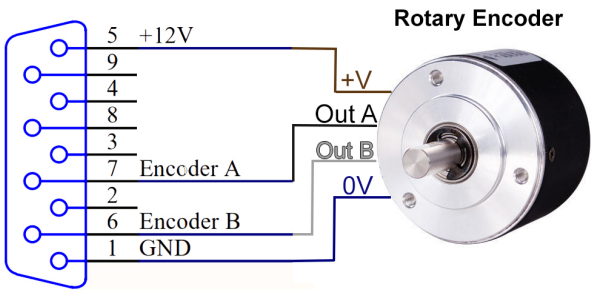


Figure 2. Encoder Wiring

Encoder Installation

In the production lines, encoder must be placed using a roller and an encoder base. The placement depends on its physical condition.

Encoder Roller

The encoder is connected to the conveyor or the product using the roller. The diameter of the encoder has a direct impact on the output accuracy of the encoder.

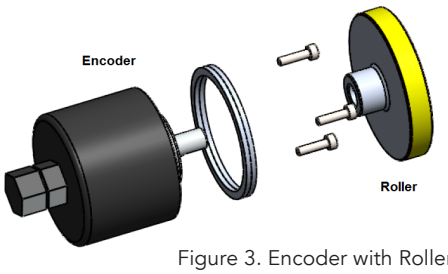


Figure 3. Encoder with Roller

Encoder Base

The encoder must be connected to the conveyor to control the pressure of the shaft and encoder base.

A spring is used to keep the encoder, in any condition, connected to the conveyor belt without extreme pressure on the shaft.

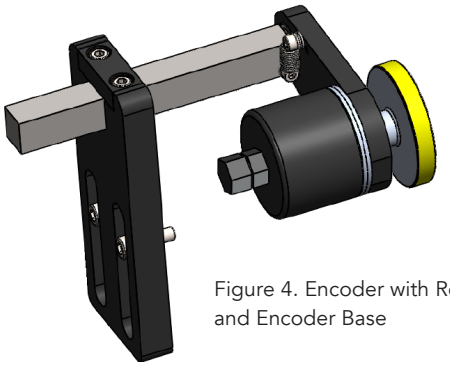


Figure 4. Encoder with Roller and Encoder Base

Installation

The correct area to install the encoder is where the speed of the product is measured. The encoder must be connected to the conveyor belt to refrain from any unnecessary movements.

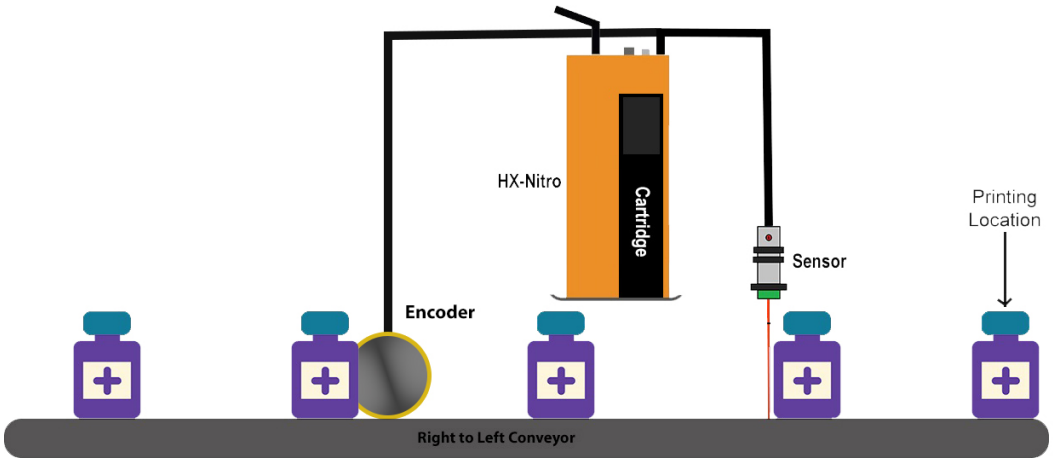


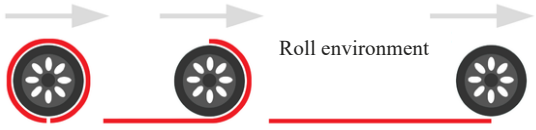
Figure 5. Sample Encoder installation

If the product is sequential or in roll, the encoder must be connected directly to it or its rotating body such as in the packaging or pipe industry.

Installation Note

- Avoid extreme pressure on the encoder shaft (use encoder base).
- Encoder has two output signals, A and B, which issue pulses when the device is moved. The printer recognizes the direction of movements via these two outputs.
- For higher accuracy, the number of pulses per round should be higher than 5000 PPR. The distance between the print position and the nozzle is based on the number of pulses .Therefore, each pulse represents a certain distance. The smaller the distance, the more precise.

$$\text{Accuracy (mm)} = \frac{\text{Roll environment (mm)}}{\text{number of pulses per round}}$$



Software Configuration

Once the encoder is connected to the printer, the next step is to enable the print parameters to locate the accurate area to print. Notice that after the encoder is activated, time parameter changes the pulse.

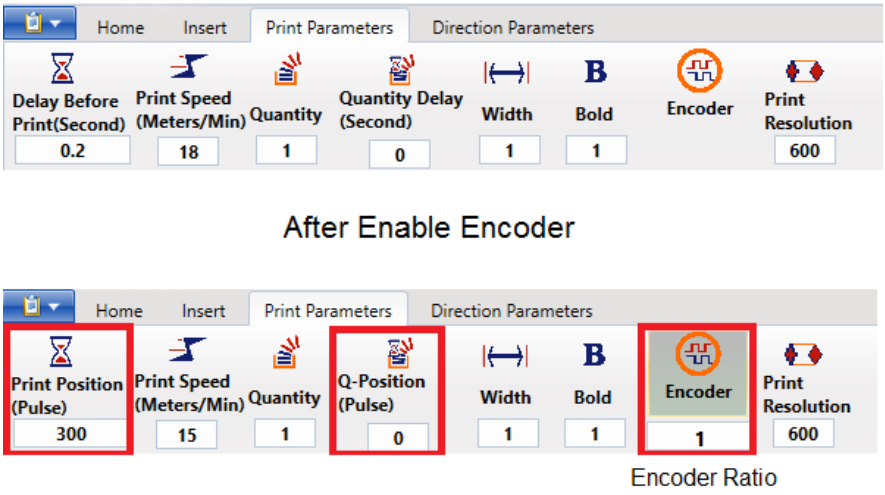


Figure 6. Print Parameter display changes when Encoder is enabled

Print Position

The distance between the print position and the nozzle per pulse (refer to calculation method below).

$$\text{Print Position (Pulses)} = \frac{\text{distance between the print position and the nozzle (mm)}}{\text{Accuracy (mm)}}$$

Subsequently after detecting the product, the printer resumes per amount of pulses and resumes printing, similar to the delay of time parameter operation.

Q-Position

If there is a need to print the messages several times using the same space on a product, the parameter must be set in the setting. Below is the method of calculation.

$$\text{Q} - \text{ Position (Pulses)} = \frac{\text{space bitween messages (mm)}}{\text{Accuracy (mm)}}$$

Example:

Printer settings can be obtained using the following physical specifications and calculations.

Encoder: 5000 PPR Roll Environment: 200 mm Dprint: 50 mm Dproduct: 15 mm

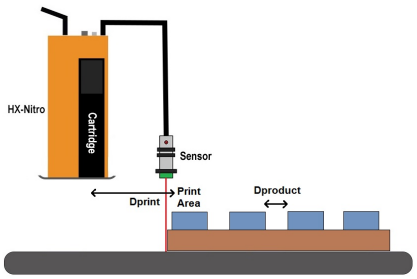


Figure 7. Example printing set up with a given specifications

Calculations:

$$\text{Accuracy (mm)} = \frac{200}{5000} = 0.04\ mm \qquad \text{Print Position (Pulses)} = \frac{\text{D.print}}{\text{Accuracy (mm)}} = 1250$$

$$\text{Q} - \text{ Position (Pulses)} = \frac{\text{D.product}}{\text{Accuracy (mm)}} = 375 \qquad \text{Quantity} = 4$$