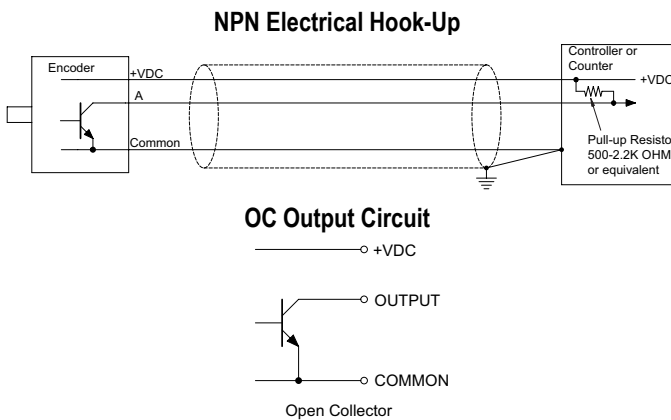**ENCODER**
PRODUCTS COMPANY

Specifying Output Types

The output circuit configuration for an Accu-Coder™ is usually determined by the counter, PLC, drive, or other device the Accu-Coder™ is to be used with.

There are four common output types to select from, and most of the Accu-Coder™ models can be obtained with any of these four types:

1) "OC" NPN Open-Collector It is a current sinking output and is useful for doing what is called level shifting. This is when the Accu-Coder™ is powered with one voltage level, and the output is pulled up externally to a different voltage level. For example, the Accu-Coder™ can be powered with 5 volts DC and the output can be pulled up to a 24 volt DC level.

NPN Electrical Hook-Up

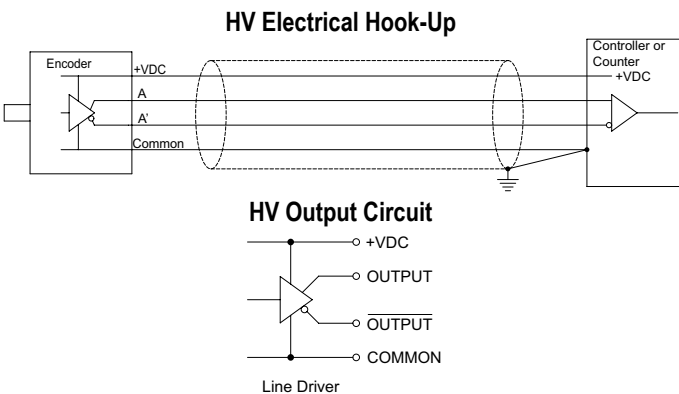### OC Output Circuit

Open Collector

2) "PU" Pull-Up It is the same as the open-collector, but, as the name implies, it also contains an internal pull-up resistor to the positive supply voltage supplied to the Accu-Coder™. Do not confuse this with a "sourcing" type output. The amount of current that can be sourced with the output transistor in the off state is limited by the supply voltage and the value of the internal pull-up resistor. Common values for the internal pull-up resistor used in Accu-Coder™ is between 1,500 and 2,200 ohms. This type of output is used when the counter, or PLC does not have built in provisions to pull up the input circuitry.

PU Electrical Hook-Up

PU Output Circuit

Pull Up Resistor2   Pull Up Resistor1
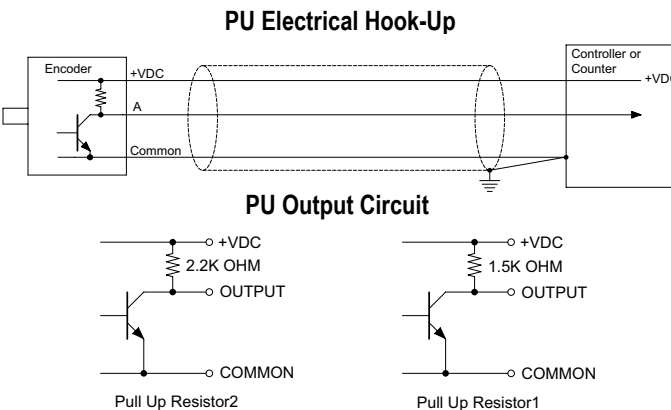
3) "PP" Push-Pull It is sometimes referred to as a "totem-pole" type of output circuit. For our discussion here, we will treat them equally. This is a combination of sinking and sourcing outputs. When the output is in the logic high state, current is sourced to the load. When the output is in the logic low state, current is sinked from the load. This is a popular output type in Europe and is catching on in the Americas. However, it suffers from lack of noise immunity because when the output is high (sourcing) whatever noise, ripple, etc. that is on the DC supply lines to the Accu-Coder™ is directly dumped into the input circuitry of the counter, PLC, or whatever the load. When the output is sinking (low state), the noise immunity is the same as if the open-collector was used.

PP Electrical Hook-up

PP Output Circuit

Push Pull
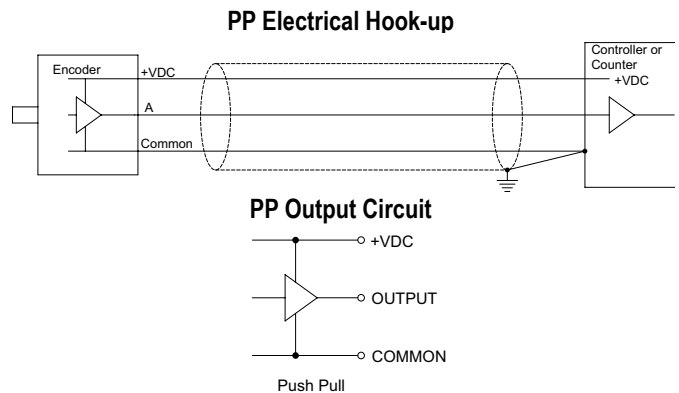
4) "HV" Differential Line Driver It provides differential outputs, or complementary signals for noise immunity. It meets RS-422 standards when operated at 5 volts DC. This type of output should be selected if the load device is set up to receive differential signals. The output lines are electrically balanced and if the proper balance between them is not maintained, ringing and spurious oscillations can occur on the lines. At higher frequencies it may cause false counting in the load device. Noise immunity is obtained by the nature of what is called "common mode" rejection. Please refer to Technical Bulletin TB-105 for further discussion. Remember that for each output channel the Accu-Coder™ has, one additional wire in the cable must be used for the complement signal.

HV Electrical Hook-Up

HV Output Circuit

Line Driver

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by **Encoder Products Company**

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Specifying Output Types   (Continued)

Specialty Output Types

The following output types are available on select encoder models:

"OD" Open Collector/Differential An open collector output with complimentary channels similar to a line driver.

"LO" Line Driver on ABZ and Open Collector on UVW Complimentary line drivers outputs for the clock channels A, B, and Z. Open collector outputs for the commutation channels U, V, W.

"H5" Line Driver at +5VDC Regardless of the input voltage, the outputs will be limited to +5VDC complimentary line driver. Input voltage is limited to 8-28 VDC for Models 702, 725, 758, 802, and 755.

"P5" Push-Pull at +5VDC Regardless of the input voltage, the outputs will be limited to +5VDC Push-Pull. Input voltage is limited to 5-28 VDC for Model 25T/H.

Other Common Industry Terminology

Output types are also referred in the industry as "HTL", "TTL", "PNP", and many others. Sometimes the output IC (7272, 4469, 8830, 7406, 3904, 26LS31, etc.) is all that is used to define the output type. Consult EPC Technical Support for assistance if the output type you need is not mentioned here or otherwise unclear.

Determining What Output Types You Need

Choosing the correct number of channels and the correct output type for an encoder can be the determining factor in whether or not a feedback system will function properly. One type of output is really no better than the other for situations. It all depends on the individual application and what is being used with the Accu-Coder^{TM}.

Quite often we are asked what type of output circuit to specify by the customer. Without knowing the input characteristics of what the customer is using, we have no real idea what to specify. If you have a question like this, the first thing to do is to look at the counter, PLC, or whatever the Accu-Coder^{TM} is going to be used with and determine from its specs, just what it is looking for concerning the input encoder signal. Remember, it is the receiving device that determines the correct configuration of the encoder's outputs.

Line Lengths: The Accu-Coder^{TM} does not care how long the interconnecting cables are. It only produces pulses. As the length of the cable is increased, the signal quality is degraded. The amount of signal degradation that is allowable depends on the input circuitry of the load.

Please refer to Technical Bulletin TB-104 for more information.

If you have additional questions please contact:

EPC Customer Service at 800-366-5412 or email sales@encoder.com

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