

Choosing PNP vs NPN and NO vs NC Basic electrical wiring in typical automation sensor applications

PNP or NPN? How does the sensor provide its signal to the controller?

	PNP (sourcing)	VS	NPN (sinking)
What is it?	Sensor delivers (sources) positive 24V DC to the load or input		Sensor connects (sinks) Negative or 0V DC common to the load or input
Benefits and Info	<ul style="list-style-type: none"> More widely stocked in North America and European component suppliers More commonly used in North American and European automation equipment 		<ul style="list-style-type: none"> More widely stocked in Asia and Asian transplant component suppliers More commonly used in Asia and Asian transplant automation equipment
Gotchas	<ul style="list-style-type: none"> Sensors are more vulnerable to short circuit states Sensor vs PLC perspective: Ambiguity Sensor: Sourcing PLC: Sinking 		<ul style="list-style-type: none"> An unintentional grounded load can cause false signal detection at PLC Sensor vs PLC perspective: Ambiguity Sensor: Sinking PLC: Sourcing

Why NO or NC? Selecting the state of the unpowered device.

	Normally Open (NO, N/O)	VS	Normally Closed (NC, N/C)	VS	Complimentary (NO+NC)
What is it?	Sensor provides signal when target is present		Sensor provides signal when target is absent		Sensor provides both signals when target is absent or present
Benefits and Info	<ul style="list-style-type: none"> Typically pin 4 of sensor (BK) Most common usage for automation sensors Positive detection (signal with target) 		<ul style="list-style-type: none"> Typically pin 2 of sensor (WH) Broken wire detection Negative detection (signal when target missing) 		<ul style="list-style-type: none"> Provides status on sensor presence Used for logic decisions made later, can require more wiring and inputs
Gotchas	<ul style="list-style-type: none"> Can be software designed to be normally closed in PLC logic No signal if target present but broken wire (signal can't pass broken wire) False detection if short circuit 		<ul style="list-style-type: none"> Can be designed around with PLC logic False detection of target if broken wire (looks like target present) 		<ul style="list-style-type: none"> Some vendors offer sensors with normally closed on pin 4 (BK) Requires 4-wire cable