The Application Note is pertinent to the Quantum III Family

Zero Speed Reference Start Interlock

Background

For many applications it is desirable to prevent the drive from being started if the speed reference (typically a Speed Pot) is not at 0 or its minimum setting. In the old days this was accomplished by purchasing a pot that had a switch built into it. In this manner, the drive Start button would not make it through to the drive Start input unless this switch on the pot was closed (which would occur if the pot was turned down to zero).

A similar function can be configured within the Quantum III by employing some of the free programmable functions. This application note will discuss how to achieve the Zero Speed Reference Start Interlock function.

Implementation

The first thing we must do is create a logic bit that will become active when the Speed Reference is near zero. This can be accomplished by using one of the built-in Magnitude Comparators located in menu 12.

The Speed Reference can be read at location #1.01.
So we would set one of the Magnitude Comparators to watch #1.01 and change its state (which can be observed in #12.01) when #1.01 exceeds the % amount placed into the Threshold Level set point.

This output (#12.01) can be used to control the zero speed relay whose contacts can be used to lockout the start circuit from starting the drive if the speed potentiometer (or reference voltage) is not “near” zero speed. The relay will be configured such that relay will be picked up if the speed potentiometer is greater than zero (or minimum).

Terminals #34 and #35 of the “zero speed” relay will be used to lockout the start circuit.
Below, both a three wire and a two wire connection diagrams are shown to accomplish the “Zero Reference Start Interlock”.

![Diagram of Three Wire Start / Stop Circuit]

**Three Wire Start / Stop Circuit**

The three-wire circuit above operates in the following manner;

If the speed reference (or speed potentiometer) is set below the threshold (set in menu #12) the Zero Reference Start Interlock Relay Contact will be closed. This allows the run relay to be picked up through the start switch. Once the run relay picks up (and picks up the motor contactor) the run, R, and the MCA contacts will close and “seal-in” the run relay. If the speed reference is now turned up, causing the threshold comparator to toggle, the Zero Reference Start Interlock Relay Contact opens. The run relay will stay energized until the stop button is pressed since it is still “sealed-in”. The nice feature of this set up is that the start switch has no ability to start the drive unless the speed pot is set to zero.
The two-wire circuit above operates in the following manner;

If the speed reference (or speed potentiometer) is set below the threshold (set in menu #12) the Zero Reference Start Interlock Relay Contact will be closed. This allows the run relay to be picked up through the external run contact. Once the run relay picks up (and picks up the motor contactor) the run, R, and the MCA contacts will close and “seal-in” the Zero Reference Start Interlock Relay Contact. If the speed reference is now turned up, causing the threshold comparator to toggle, the Zero Reference Start Interlock Relay Contact opens. The run relay will stay energized until the external Run relay contact is opened.

Warning !

This mode of control (two-wire control) can in some instances be unsafe. If the speed potentiometer were turned up (causing the Zero Reference Start Interlock Relay Contact to be open) an operator could close the run relay contact, not see the drive start, leave the contact closed and walk away. Someone could then turn the speed potentiometer down to zero and up again causing the Zero Reference Start Interlock Relay Contact to momentarily close allowing the drive to start and run. If the Machine Designer elects to use this mode of control, he must insure that it is Safe for both plant personnel and the machine itself. A three-wire setup does not have this deficiency.

Questions:  Ask the author ??
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