

Special Functions to simplify User Programming and Improve Execution Time

COMPARISON T1-T6

DESCRIPTION

The special functions T1-T6 compare two input values and give a logic output dependent on whether a required condition is met. That is, they each provide a 16-bit word output that consists of:

- 16 0's if the condition is **NOT** met, or
- 16 1's if the condition **IS** met.

On controllers that have floating point facilities, they work in exactly the same way except that, if either rung input is a floating point value, then the other input value is first converted to floating point before the two values are compared. The output, however, is always a 16-bit word as given above.

FEATURES

- Considerable improvement in execution time and complexity over other techniques that achieve the same result
- More readable than other techniques
- Simple to use
- No possibility of fault conditions

T1 EQ (equals)

Equation: $Q = -1$ if $X = Y$
 $Q = 0$ if $X \neq Y$

T2 NE (not equals)

Equation: $Q = -1$ if $X \neq Y$
 $Q = 0$ if $X = Y$

T3 GT (greater than)

Equation: $Q = -1$ if $X > Y$
 $Q = 0$ if $X \leq Y$

T4 LT (less than)

Equation: $Q = -1$ if $X < Y$
 $Q = 0$ if $X \geq Y$

T5 GE (greater than or equals)

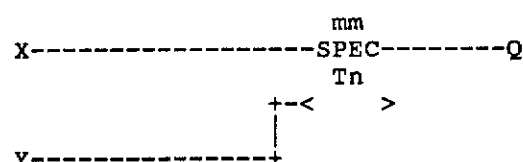
Equation: $Q = -1$ if $X \geq Y$
 $Q = 0$ if $X < Y$

T6 LE (less than or equals)

Equation: $Q = -1$ if $X \leq Y$
 $Q = 0$ if $X > Y$

SPECIFICATION

Control language:-



where mm = the mnemonic of the function; for example GT
n = the number of the function; for instance, 3.

APPLICATION NOTES

Consider Q20 contents as being fixed and Q10 contents varying. Then, when Q10 is much less than Q20, the "less than" condition used by the LT special function is met, and LT provides a -1 output. On the other hand, the "greater than" condition is not met, and so the GT special function provides zero output. When these two outputs are ANDed together, the resultant output to G343 is zero.

Similarly, if Q10 is much greater than Q20, GT gives a -1 output but LT gives zero output, so that again the AND provides zero output to G343.

However, when Q10 and Q20 are equal, both the GT and LT special functions give -1 outputs because of the bias provided by Q100. The AND will then also give -1 output to G343.

In general, G343 will in fact operate when:

$$\begin{matrix} \text{the contents} & & \text{the contents} & & \text{the contents} \\ \text{(of Q10)} & = & \text{(of Q20)} & \pm & \text{(of Q100)} \end{matrix}$$

By making Q100 a very small number (but not too small), you get G343 contents reliably set to -1 when Q10 and Q20 are to all intents equal, regardless of rounding inaccuracies in floating point calculations contained elsewhere in the program.

SPECIAL FUNCTION 'COMPARE' T0

Special functions T1-T6, with their short mnemonics, are easy to remember and program. However, there is also a COMPARE special function, T0 that provides flag bits equivalent to all the conditions used individually by the functions T1-T6. In those cases where you want to test a number of conditions at once, it may be useful to use COMPARE. Where you only want to test one condition at a time, then the functions T1-T6 given on this data sheet are simpler to program and execute faster.



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