

## Using the CTC Model 5200 Optional High-Speed Inputs

# 39



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CTC's Model 5200 controllers offer an optional high-speed input option. These inputs allow you to have up to two high-speed counters and two registration inputs or to use them as general purpose inputs.

The Model 5200 allows you to select from several input configurations as shown below.

On the Model 5200, these inputs are accessed using the leftmost terminal blocks where the input power and 5V output are located.

### Part Numbers: XXnnnn – P H C M cc

XXnnnn	P		H		C		M		cc
Rack Type	Power		High Speed Inputs <sup>(1,2)</sup>		Communications		Memory		Custom Code
<b>CPU Rack</b>									
<b>BC5220</b>	<b>0</b>	18-32V	<b>0</b>	None	<b>1</b>	Two RS-232	<b>0</b>	1.5MB NVRAM 1 MB Flash	<b>00</b>
	<b>1</b>	10-32V	<b>1</b>	Two D.E. Inputs (5V) <sup>(1,2,3)</sup> Two S.E. Inputs (24V) <sup>(1,2,4)</sup>	<b>2</b>	One RS-232 One RS-485	<b>1</b>	3.5MB NVRAM 5 MB Flash	
			<b>2</b>	Two S.E. Inputs (5V) <sup>(1,2,3)</sup> Two S.E. Inputs (24V) <sup>(1,2,4)</sup>			<b>2</b>	3.5MB NVRAM 9 MB Flash	
			<b>3</b>	Two S.E. Inputs (24V) <sup>(1,2,3)</sup> Two S.E. Inputs (24V) <sup>(1,2,4)</sup>			<b>3</b>	5.5MB NVRAM 17 MB Flash	

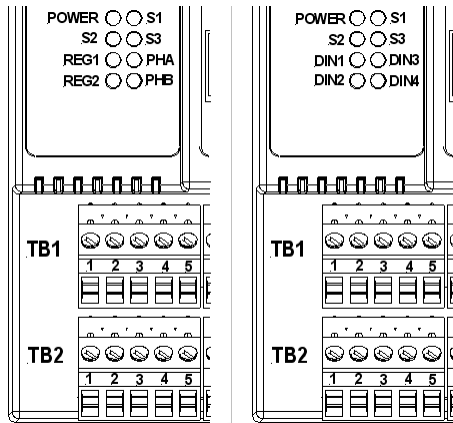
(1) S.E. Refers to single ended inputs, D.E. refers to differential ended inputs.

(2) All high speed inputs can operate as Encoders with Registration inputs, as Counters with Direction inputs, or as standard digital inputs.

(3) Voltage ratings and input type refers to Encoder #1 and #2 / Counter Trigger #1 and #2 / Digital Inputs #3 and #4 only.

(4) Voltage ratings and input type refers to Registration #1 and #2 / Counter Direction #1 and #2 / Digital Inputs #1 and #2 only.

On the 5200, these inputs are accessed using the leftmost terminal blocks where the input power and 5V output are located:



Option H = 1

Option H = 2 & 3

Power and input terminations<sup>2</sup>

	Option H = 1	Option H = 2 and 3
TB1-1	+VS input	+VS input
TB1-2 <sup>3</sup>	REG1/DIN3	REG1/DIN3
TB1-3 <sup>3</sup>	+PHA/+CNT1/+DIN1	PHA/CNT1/DIN1
TB1-4 <sup>3</sup>	+PHB/+CNT2/+DIN2	PHB/CNT2/DIN2
TB1-5	+5 VDC output	+5 VDC output
TB2-1	VS return	VS return
TB2-2 <sup>3</sup>	REG2/DIN4	REG2/DIN4
TB2-3 <sup>3</sup>	-PHA/-CNT1/-DIN1	VS return
TB2-4 <sup>3</sup>	-PHB/-CNT2/-DIN2	VS return
TB2-5	VS return	VS return

## Using the High-Speed Inputs in Your Program

If you are using these as standard inputs in your program, you can use the symbol browser to define them as inputs 997 through 1000 as follows.

### Standard Input Usage

PHB +/-	Input 997
PHA +/-	Input 998
Reg1	Input 999
Reg2	Input 1000

When using the high-speed inputs as counter(s) or registration inputs, use the following registers:

## High-speed Counters and Registration

### High-speed Counters

Register	Function
5001	Internal High-speed Counter 1 (for Dual counters, only Counter for Quadrature mode): R/W
5002	Internal High-speed Counter 2 (for Dual counters, not used in Quadrature mode): R/W
5011	Internal High-speed Counter 1 Speed: R
5100	Internal High-speed Counter Mode, 0 = Quadrature, 1 = Dual Counters: R/W
5101	Internal High-speed Counter Frequency Period: R/W
5102	Internal High-speed Counter Frequency Value: R

### Registration

Register	Function
5103	Internal Registration 1 Start Value (Compare to counter 1): R/W
5104	Internal Registration 1 Window Size: R/W
5105	Internal Registration 1 Capture Value (from Counter 1): R
5106	Internal Registration 1 Status, 0 = Armed, 1 = Captured: R/W
5107	Internal Registration 2 Start Value (Compare to counter 1): R/W
5108	Internal Registration 2 Window Size: R/W
5109	Internal Registration 2 Capture Value (from Counter 1): R
5110	Internal Registration 2 Status, 0 = Armed, 1 = Captured: R/W

Register 5100 allows you to set the counter inputs as either quadrature (standard encoder inputs) or as dual counters. When register 5100 is set to a value of 0, your encoder value will be available for R/W in register 5001. If you set

register 5100 to a value of 1 (dual counter mode), the count value of the first input (channel PBA, CNT1, or DIN1) will be available in register 5001. The count value of the second input (channel PHB, CNT2, or DIN2) will be available in register 5002.

Both registration inputs 1 and 2 will take a snap shot of register 5001 and store it in Capture Value Registers 5105 and 5109 respectively once the inputs are armed. Storing a value of 0 in Internal Registration 1 Status Register 5106 will arm Reg1 while storing a value of 0 in Internal Registration 2 Status Register 5110 will arm Reg2.

*Note that both registration inputs take a snap shot of the current count value of 5001 only (even when dual count mode is enabled).*

Once the armed registration inputs have been triggered, their status registers  5106 and  5110 will read a value of 1 and will need to be armed again to enable Reg1 and Reg2 inputs.

You can limit the window of when the Reg1 will be allowed to trigger based on the value of 5001. This is done using the Internal Registration Start Value Registers 5103 and 5107 and the Internal Registration Window Size Registers 5104 and 5108.

### **Example**

The following code is a web example used to determine material stretch. It uses the counter inputs as a quadrature counter. Both Registration inputs are armed and allowed to trigger when the encoder is between count values 50000 and 100000 for Reg1 and between 60000 and 110000 for Reg2. The values are then subtracted and compared to an expected value to determine how much the material has stretched.

```

[1] Initialize
    ::: Set the Counter Mode to quadrature (store 0 to Reg 5100)
    ::: Reset the Counter to 0 (store 0 to Reg 5001)
    ::: Set the Registration Window between 50000 and 100000 for Reg1
    ::: (store 50000 to Reg 5103 and 50000 to Reg 5104)
    ::: Set the Registration Window between 60000 and 110000 for Reg2
    ::: (store 60000 to Reg 5107 and 50000 to Reg 5108)
    ::: Arm both Registration Inputs
    ::: (store 0 to both Reg 5106 and 5110)
-----
<NO CHANGE IN DIGITAL OUTPUTS>
-----
store 0 to Counter_Mode_R5100
store 0 to Internal_Counter1_R5001
store 50000 to Registration1_Window_Start_R5103
store 50000 to Registration1_Window_Size_R5104
store 60000 to Registration2_Window_Start_R5107
store 50000 to Registration2_Window_Size_R5108
store 0 to Reg1_Status_Reg_5106
store 0 to Reg2_Status_Reg_5110
goto Wait_for_Trigger

[2] Wait_for_Trigger
    ::: Wait for both Registration inputs to trigger and then goto Calculate_Stretch.
    ::: If the counter goes to far without seeing the registration inputs goto the
    ::: Error step to handle the error.
-----
<NO CHANGE IN DIGITAL OUTPUTS>
-----
store Reg1_Status_Reg_5106 and Reg2_Status_Reg_5110 to Both_Triggered_R1
if Both_Triggered_R1=1 goto Calculate_Stretch
if Internal_Counter1_R5001 >=120000 goto Error
goto Wait_for_Trigger

[3] Calculate_Stretch
    ::: Subtract the two Registration inputs and then continue
    ::: your process after that.
-----
<NO CHANGE IN DIGITAL OUTPUTS>
-----
store Reg2_Capture_Value_R5109 - Reg1_Capture_Value_R5105 to Calculated_Stretch_R2
store Expected_Stretch_R701 - Calculated_Stretch_R2 to Stretch_Error_R3
goto Continue_Process

[4] Error
    ::: Here is where you would set any alarms and deal with the error.
-----
Alarm_Out_15
-----
store 5 to Error_Tracking_R100

```