

Module Overview

The AMCI 8523 module is an incremental encoder based Programmable Limit Switch module that resides in the Allen-Bradley SLC 500 rack system. The 8523's functions and programming are almost identical to those of the 8513 resolver based Programmable Limit Switch module and most of the programming and setup information can be found in the 8500 module's manual.

Power Requirements

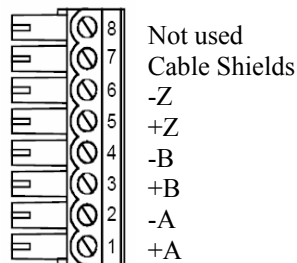
Backplane Current Requirements: 425mA @5Vdc
0mA @24Vdc

Encoder Input Requirements: 10mA per encoder channel

Wiring

The following diagram shows how to wire an incremental encoder to the connector 8523 module. Please note that when plugged into the module, pin 1 will be located towards the bottom of the module. Only 5V encoders should be used with the 8523 module.

MS-8P Connector

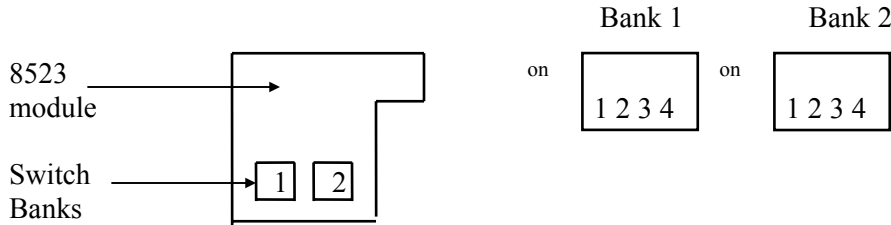


Wiring Notes:

- The MS-8P connector is included with the 8523 module.
- The 8523 module will only operate with Quadrature encoders. The module will not count without the presence of both the A and B pulses.
- Encoder signals are low voltage, low power signals. If you are using A-B guidelines for cabling installation, treat the cable as a Category 2 cable. It can be installed in conduit along with other low power cabling such as communication cables and low power ac/dc I/O lines. It cannot be installed in conduit with ac power lines or high power ac/dc I/O lines.
- To reduce or eliminate the influence of electrical noise on the system, the cable shields must be connected to shield pin 7. Also, the shields must be connected to only one end of the cable run and treated as conductors at any junctions. Do not ground the shields at the junction box.
- If the signal cable must cross power feed lines, it should do so at right angles.
- Route the cable at least five feet from high voltage enclosures, or sources of "rf" radiation.
- The Cable Shields pin is connected to the PLC's chassis ground.

Filter Switches

The 8523 module contains filter switches that can be used to reject any noise on the A, B, and Z inputs. The following drawing and table explain how the filter switches are used.



Switch Bank	Switch on	Function
1	1	A signal filtered above 15KHz
	2	A signal filtered above 5KHz
	3	A signal filtered above 1KHz
	4	B signal filtered above 15KHz
	5	B signal filtered above 5KHz
2	1	B signal filtered above 1KHz
	2	Z signal filtered above 15KHz
	3	Z signal filtered above 5KHz
	4	Z signal filtered above 1KHz
	5	Not used

Note 1: If any of the filtering switches are set on, the module will ignore any signals above the ones selected by the switches.

Note 2: To select no filtering, set all of the switches off position.

Note 3: If more than one switch is set, the module will filter at the lower selected frequency.

Module Functionality

The following list describes the basic functionality of the 8523 module.

1. The 8523 module will only operate with Quadrature Encoders. The module will not count without the presence of both the A and B pulses.
2. The 8523 module has a maximum input frequency of 1MHz and the module will always correctly count the number of pulses up to this frequency. However, in order to have the module activate an output based on every count, the input frequency should not exceed 10KHz. This is due to the module's 100µs throughput time.
3. Regardless of whether the count value is increasing or decreasing, the 8523 module's rate value is always positive.
4. Timed outputs do not start timing until the output's corresponding input is active. The 8523 module now waits for both the input to be active, and for the position data to be in the range specified by the programmed ON-OFF setpoints, before the timing operation will begin.
5. To keep the counts per rotation exactly equal to the encoder counts per turn, the Scale Factor must be set to one more than the encoder counts per turn. This is true even if X2 or X4 decoding is being used. For example, if a 1000 line encoder is used with X1 decoding, set the Scale Factor Parameter to 1001. If a 1000 line encoder is used with X2 decoding, set the Scale Factor Parameter to 2001.

Programming

The following list describes the programming differences between the 8523 and the 8513 modules. Please note that the “X” used in the following descriptions indicates the slot location of the 8523 module.

1. The default mode of operation of the 8523 module is *Independent Mode*, not *Group Mode* as it is on the 8513 module. To use the 8523 module in Group Mode, set bit M0:X.0/9 when sending the Setup Data to the module
2. Direction programming bit M0:X.0/4, should be reset to “0” to have increasing counts when the A pulses lead the B pulses, or set to “1” to have increasing counts when the B pulses lead the A pulses.
3. Configuration bits M0:X.0/6 and M0:X.0/7 determine the type of decoding used on the encoder signals. There are three options, X1, X2, or X4. The following table shows the bit configuration patterns for selecting the various decoding types.

Bit 7	Bit 6	Decoding
0	0	X1
0	1	X2
1	0	X4
1	1	Fault

3. The maximum Scale Factor that can be programmed into configuration word M0:X.1 is 8192. The Scale Factor determines how many encoder counts must occur before the position data rolls over to zero and starts counting again.
4. 8523 modules with version 1 or higher firmware (that is units sold after 2/99) allow the user to scale the encoder’s actual count to any count value less than or equal to the encoder’s actual count. Configuration addresses M0:X.12 and M0:X.13 are used for this function. M0:X.12 is the actual encoder counts/turn and M0:X.13 is the desired encoder counts/turn. The following is the limitation of this setup function.

$$((\text{Actual encoder counts} / \text{Desired encoder counts}) * \text{Scale Factor}) \leq 8192.$$

If the result of this calculation is greater than 8192, than a Scale Factor error will be indicated by setting bit M0:X.100/0. If the data contained in words M0:X.12 and M0:X.13 is invalid, for example if the desired encoder counts parameter is greater than the actual encoder counts parameter, then bit M0:X.100/6 will be set, indicating that the position scalars are invalid.

5. Two new modes have been added to the group functionality.

The first mode, Mode 6, is similar to Mode 1, except the preset operation is based on the encoder’s Z pulse signal, not on an external input. Outputs operating in Mode 6 are always enabled to turn on at their programmed setpoints. When the encoder’s Z input transitions from 0 to 1, the group’s position is preset to the group’s preset value. The marker pulse input is ignored until the group channel position is reached.

The second mode, Mode 7 is similar to mode 5, expect that any programmed outputs are disabled when the group’s count value rolls over to zero.