



# TSM-4INC

## 4 channel quadrature decoder/counter

TSM-4INC provides four 24 bit counters for quadrature (incremental) encoders. These provide 90° phase shifted pulses (tracks A and B) to permit up/down counting. Some encoder models generate an index pulse for each revolution.

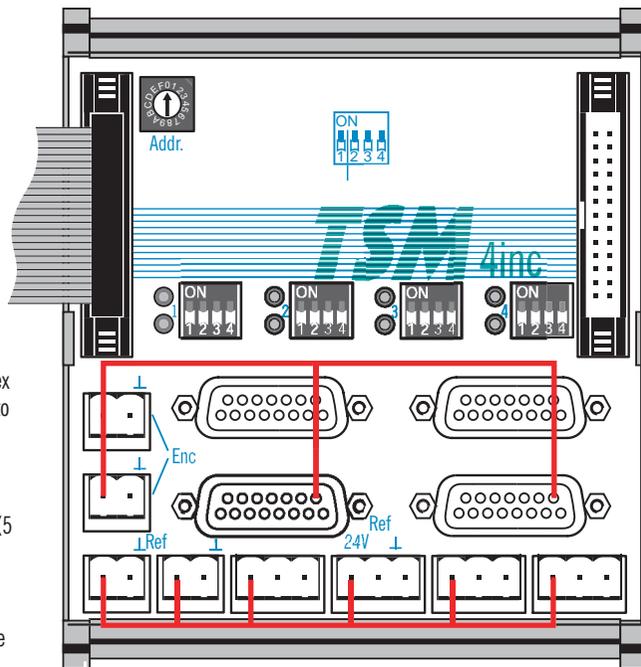
Usually, an application will provide a reference initiator for calibration. If selected, this initiator will, together with the encoders index pulse, reset the respective counter to zero.

For each channel a 15 pin sub-D connector provides encoder supply (5 or 24V ext.) and takes the encoder signals.

A 4-lever dip switch allows settings and a 3-pin terminal connects to the reference initiator or switch.

Two 2-pin terminals are provided for a properly filtered 24V encoder supply (which is passed to pin 15 of all the sub-D-15s), the second connector facilitates cascading to more TSM-4INCs.

Two other 2-pin (cascaded) terminals are for the reference initiator supply, passed to all of the four 3-pin terminals.



### Set the modules address (SW1):

A screwdriver is used to set the modules address. The position set in the drawing is address "0". **Set the addresses according to the specifications of your software engineer.** Numbers 0..9 and letters A..F are marked on the rotary switch. The letters A..F correspond to numbers 10 to 15, i.e. A-10, B-11, C-12, D-13, E-14, F-15. 0 is a valid value, hence the 16 possible addresses are in the range of 0..15. When changing a module it is a good idea to set the address of the new module to the same that it is going to replace. You might secure a set position with sealing wax.

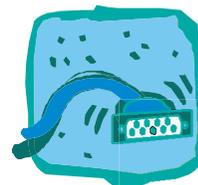


### Set counter reset enable and encoder output voltage

For each of the encoders 1..4 you may select at the corresponding switches 1..4 whether a high signal on the respective reference "Ref" input 1..4 should reset the counter (AND gated with the encoders index pulse). The leftmost switch will provide RESET if OFF.

The remaining 3 switches allow the single ended encoder outputs to be on 5V or 24V level.

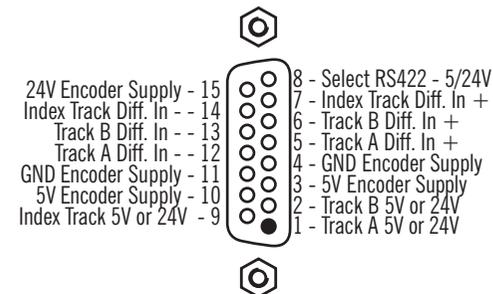
**Applying 24V to an input set by these switches to 5V will destroy the circuitry.**



### Encoders

Each encoder is connected using a separate 15-pin D-plug. By connecting pin 8 to ground in the individual plug you may select between differential inputs or 5V(TTL)/24V. Provide RS422 compatible signal pairs for the differential inputs or ground (4, 11) referenced 5V or 24V for the single ended inputs. Make sure all the three relevant switches are set to 24V for each channel when using 24V signals, otherwise, the inputs will be destroyed!

The encoders can be supplied with 5V which are drawn from the raw TSM bus supply and hence load the CPUs power supply. This might reduce the number of possible I/O modules on the TSM bus. Preferably you would supply the encoders with 24V that are connected to either one of the two-terminal-connectors to the left of the Sub-D-15s.



### Reference initiator inputs

The bottom line of connectors is for reference initiator inputs. The two cascaded 2-pin-connectors on the left are used to feed the supply voltage for the (optoisolated) reference inputs: 24V+ left, ground right terminal.

The individual initiators are connected to the four 3-pin-connectors to the right. The inputs have a nominal input voltage of 24V DC. Pin assignment ist 24V+, input high signal, ground (left to right). A high on an input will reset the channels counter if the corresponding dip switch 1 for the channel is set OFF for RefReset and the encoders null/index track gets active. This provides an accurate and narrow zero position.

Two LEDs for each channel signal the encoders index pulse activity (LED "E") once for each revolution while LED "R" shows the state of the reference initiator.



### Software Setup

4INC is available as a device of class "CLASS\_POS" under mCAT. An IN(device) returns a value between -8.388.608 and 8.388.607.

It can be configured with CFG\_POS\_SET\_DIR = 1 to invert the count direction and CFG(device,INFO\_GET\_INDEX\_STATUS) returns a 1 if the counter has been reset since the last call.

A typical i/o object creation for counter 1 on a module addressed to 7 would read:

```
err = IOObjCreate(&ipos0,"IncCtr1",BUS_TYPE_TSM,7, 0,CLASS_POS,NULL);
```