MODS Front AGW Filter Wheel Data Sheet

General Description
The MODS Front AGW Filter Wheel places one of four possible filters into the guide camera beam. The 50mm or 2 inch filters are mounted in cells with RTV. The mechanism is a 4 position indexed rotary device which can be driven to any position in any direction (CW or CCW). When the Filter Wheel reaches its selected destination the drive current is turned off and the Filter Wheel is held in place by a spring loaded detent roller. The position of the Filter Wheel is identified by means of a “Position Valid” bit which is TRUE when the wheel is in a detented position and “Binary Code” bits which indicates the filter wheel position with a binary number. The “Position Valid” bit and “Binary Code” bits are produced by inductive proximity sensors activated by dowel pins.

Topology
Indexed Rotary

Rendering of Front AGW Filter Asm.
Drive Motor
Motor Type: 17 Step motor, 200 steps per revolution, double ended shaft
Part #: Applied Motion # HT17-075-D
Rated Current: 1.7 amps/phase parallel (RMS)
Rated Holding Torque: 62 in*oz
Rated Torque at operating Speed: 35 in*oz @ 70 volts

Motor Connections
A Orange & Black/Wht (pin13)
A Orange/Wht & Black (pin12)
B Yellow & Red/Wht (pin10)
B Red & Yellow/Wht (pin11)

Motor Controller Specifications
Manufacturer & Model: IMS MicroLYNX 7 (#MX-CS100-701)
Rated Current: 5 amps RMS/phase, 7 amps peak/phase
Rated Voltage: 24 to 75 VDC
Daughterboards: None

Motor Controller Settings
MSEL = 10 10 usteps/fullstep = 2000 microsteps/rev
MUNIT = 2000 sets units to (2000 usteps/rev) gives velocity and accelerations in rev/sec
MAC = 50 Acceleration Current = 50% = 3.5 amps peak
MRC = 34 Run Current = 1.7 amps RMS * 1.4 = 2.4 amps peak (2.4/7 = 34%)
MHC = 0 Motor Hold Current is zero
ACLT=1 linear acceleration (default
ACCL=DECL = 50 acceleration rate (rev/sec^2)
LDECL = 500 limit deceleration rate (rev/sec^2)
VM= ??? running speed (rev/sec)
VM= 0.5 Homing speed to assert limit

Motor Controller I/O Connections
Vpull: not used
GND: 24 volt Gnd
I/O 21: 1’s LSB of Position code bit
I/O 22: 2’s MSB of Position code bit
I/O 23: not used
I/O 24: not used
I/O 25: not used
I/O 26: “Position Valid” bit

Input Sensors
Model P&F # NBB1.5-8GM50-E0-V3
8mm Inductive proximity sensor, Normally Open Sinking output (Type E0), 24 VDC supply
Used for detecting “In Position” hole and “Code Position” slots.

***Sensor faces should be positioned 0.010” from dowel pins in gear face.
Connection for P&F E0 Sensors (3 wire)
Brown  +24 volts
Blue  24 volt ground
Black  to input of controller

Output Devices
None

Drive Mechanics
Gear Ratio =

Performance
Maximum Travel Time (2 indexes)  ?? seconds
**Drive Mechanics**
The motor for the Filter Wheel was chosen for its ability to overcome the holding force of the detent and drive the filter wheel to its next position. The spring for the detent was chosen for its ability to overcome the cogging torque of the motor and back-drive the filter wheel into its docked position.

Pinion = 15 teeth  
Gear = 144 teeth  
Gear Ratio = (144/15) = 9.60  
Fullsteps Between Filter Positions = (1/4 rev)* (144/15)* 200steps/rev = 480 Fullsteps

**Performance**
Rated Torque at Operating Speed  24 in*oz
Maximum Travel Time  ?? seconds
Typical Travel Time for move of ~ 50mm  ?? seconds
Overtravel at Limit  ??mm
Position Repeatability  ?? micron error
Position Hysteresis  ?? micron

**Software Notes**