MODS Front AGW X-Y Stage Data Sheet

General Description
The MODS Front AGW X-Y Stage places a pickoff mirror for guiding and/or wavefront sensing in the off-axis guide field or in ½ of the science field. The pickoff mirror is placed at its commanded position by two orthogonally mounted linear stages. Each linear stage is guided with linear ball bearings and driven by a step motor through a belt reducer and ballscrew. Limit sensors are placed at both extremes of travel. The limit sensor at one end of travel is also used as a position datum sensor (HOME sensor). A “failsafe” brake is used to lock the stages in position while stationary.

Rendering of Front X-Y Stage Asm.
**Drive Motor**
Motor Type: Size 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: 5amps RMS/phase, 7 amps peak/phase
Rated Voltage: 24 to 75 VDC
Daughterboards: None

**Motor Controller Settings**
MSEL = 10 10usteps/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)
Overtravel at Limit = ScrewPitch * VM^2/(2*LDECL) = 0.10mm (pitch =1mm and VM=10 rev/sec, LDECL=500 rev/sec^2)
Beware overtravel when seeking limits, must not decelerate hard into limits
Maximum Permitted Overtravel ~ 0.5mm ~ 0.020"
VM= 10 running speed (rev/sec)
VM= 0.5 Homing speed to assert limits

**Motor Controller I/O Connections**
Vpull: not used
GND: 24 volt Gnd
I/O 21: CW LIMIT sensor (CW shaft rotation as viewed from motor front)
I/O 22: CCW LIMIT sensor
I/O 23: not used
I/O 24: not used
I/O 25: not used
I/O 26: Brake Relay Coil (internal pull-up switch opened)

**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 CW Limit, CCW limit

Connection for P&F E0 Sensors (3 wire)
Brown +24 volts
Blue 24 volt ground
Black to input of controller

Output Devices
Failsafe Brake directly on ballscrew

Drive Mechanics
The Front AGW X-Y stages use HSR15 rails with recirculating ball linear pillow blocks to guide the stage motion. A series BNK 10mm ballscrew with a 2mm pitch drives the stage. This ballscrew is coupled to a 200 fullstep/rev motor through a 2:1 HTD timing belt reducer.

X Axis
X Position Datum Toward motor end of actuator, CW End of Travel
X Range of Motion 180mm
X Axis Resolution 5 microns per motor fullstep = (2mm)*(1/2)*(1/200)

Y Axis
Y Position Datum Toward motor end of actuator, CW End of Travel
Y Range of Motion 200mm  (180.5mm motion plus 19.5mm of “focus compensation”)
Y Axis Resolution 5 microns per motor fullstep = (2mm)*(1/2)*(1/200)

Performance
Maximum Travel Time 20 seconds (200mm/10mm/sec = 20sec)
Typical Travel Time for move of ~ 50mm 5 seconds
Position Repeatability ?? micron error
Position Hysteresis ?? micron

Software Notes
Interlock between Y axis and calibration tower.
Y axis must be fully retracted to the HOME position (CW Limit asserted) or calibration tower motion is inhibited.

- The mechanism position register is set to Zero