MDT-4000 Turntable

RS232 and USB Serial Command API

Revision 2
1-Jun-2024

1. Serial port configuration

The RS-232 port is configured to use the following parameters:

- Baud: 9600
- Parity: None
- Data Bits: 8
- Stop Bits: 1

When sending commands to the turntable, each command string must be terminated by a single carriage-return '\r' or null '\0' character.

Strings generated in response to commands are terminated with a single null '\0' character.

The serial commands are not case sensitive.

The serial commands are grouped into three categories:

- ACTION type commands. These commands cause the turntable to start or stop moving.
- SET <parameter> commands. These commands are used to configure various system parameters.
- GET <parameter> commands. These commands can be used to discover the current state or value of the system parameters.

2. ACTION type commands.

2.1. GOTO <direction> <absolute position>

Parameters:

<direction> can be either CW, CCW, SHORT, HOME.

<absolute position> in range of [-359.9 to 359.9] degrees.

Return String:

"OK" if command is accepted or error string if command is rejected or parameters are not valid.

Action:

This command causes the turntable to start moving towards the specified absolute position with respect to the current origin position.

If the absolute position value is negative, the system will interpret the command as a request to move in the opposite direction.

The SHORT "direction" will cause the turntable to take the shortest path to reach the target position.

The HOME "direction" will cause the turntable to unwind to return to the current system zero position. This can be useful if the turntable has made more than one full revolution in either direction and there are cables routed to the device under test.

For example, the command "GOTO CW -90", will cause the system to rotate in the CCW direction and the final absolute position will be 90 deg.

The acceleration is controlled by the STEP_ACC setting.

The maximum speed is controlled by the VELOCITY setting.

2.2.   STEP <direction>

Parameters:

<direction> can be either CW or CCW.

Return String:

"OK" if command is accepted or error string if command is rejected or parameters are not valid.

Action:

This command causes the turntable to move in the specified direction from the current position. The relative distance to move is specified by the STEP_SIZE parameter.

3.   SET type commands.

3.1.   SET ORIGIN

Parameter: none

Return String: "OK"

This command changes the system origin type to USER and sets the current position as the new zero reference position. The new zero reference position is saved across power cycles.

3.2.   SET STEPSIZE <deg>

Parameter:

<deg> [0.1 to 360.0]

Return String:

"OK" if specified step size is valid.

Action:

This command sets the step size that will be used when the STEP <dir> command is received.

3.3. SET VELOCITY <RPM>

Parameter:

<RPM> [0.01 to 3.00]

Return String:

"OK" if the specified RPM value is valid.

Action:

This command sets the velocity of the platter when the system is executing either a GOTO or STEP type command.

3.4. SET STEP_ACC <degPerSec^2>

Parameter:

<degPerSec^2> [1 to 45]

Return String:

"OK" if the specified acceleration value is valid.

Action:

This command sets the acceleration value that will be used when the system executes either a GOTO or STEP type command.

3.5. SET TORQUE <percent>

Parameter:

<percent> [10 to 100]

Return String:

"OK" is specified torque percent is valid.

Action:

This command sets the maximum torque generated by the turntable. Higher torque values will allow heavy objects to be accelerated at a faster rate without stalling the motor. Lower torque values will lead to lower motor temperatures and less wear on the movement mechanism and greater safety to anyone working near the turntable. In general, use the lowest torque value that allows the device under test to be accelerated without stalling.

3.6. SET MoveAbort

Parameter: none

Return String: "OK"

Action:

> This command will stop any current motion regardless of which interface was used to initiate the motion.

3.7. SET MotionEnable

Parameter: none

Return String: "OK"

Action:

> This command can be used to re-enable motion after a motor stall event or after the system has stopped in response to the activation of the emergency stop switch.

3.8. SET NAME <string>

Parameter:

> <string> [21 chars max, no spaces]

Return String: "OK"

Action:

> This command can be used to assign a user defined name to the system. The name will be saved across power cycles. The serial parser will stop reading the specified name string at the first space it encounters. To specify long names, replace spaces with underbar characters.

4. GET type commands.

4.1. GET STEP_SIZE

Return String: The current step size in degrees.

4.2. GET VELOCITY

Return String: The velocity setting for GOTO and STEP commands in units of RPM. This does not report the current platter velocity.

4.3. GET STEP_ACC

Return String: The acceleration setting for GOTO and STEP commands in units of DegreesPerSecond^2.

4.4. GET TORQUE

Return String: The maximum generated torque in units of PercentMaxTorque.

4.5. GET MOVING

Return String: "NO" if the system is at standstill. If the system is currently moving, a string describing the current motion will be returned.

4.6. GET POSITION

Return String: The current platter position with respect to the current system zero reference position. If the platter has moved more than 1 revolution, the returned value will be larger than +/- 360 degrees.

4.7. GET NAME

Return String: The friendly name of the system.

4.8. GET TITLE

Return String: The model number of the system.

4.9. GET FirmwareVersion

Return String: A string representation of the current system firmware.

4.10. GET ProductionDate

Return String: The date of manufacture for this system. The date is formatted as "mmm-dd-yyyy".

5. Revision history

Rev	Date	Changes
1	14-Jul-2022	Initial document.
2	2-Jun-2024	Update the "GOTO" command to support the new SHORT and HOME options. These new options were added in fw v1.3.