Interface

UART

Bit Rate	:115.2 Kbps
Parity	:None
Data Bit	:8
Stop Bit	:1
Flow Control	:None

Measurement Direction and Data Points

Rotation Direction	:Counterclockwise
Detection Range	:360 degrees
Angle Resolution	:1.6 degrees(360/225) at 2.25Hz

Data Encoding and Decoding

All characters used for commands are ASCII code in addition to CR, LF

Responses with float values are sent as 16bit integer values
example conversion:

```
angle_f = 1.0f * ((float)(angle_i >> 4) + ((angle_i & 15) / 16.0f));
```

Communication Format

115200/10(8 bits for byte + start & stop) = 11520 bytes/sec
6 byte packet max for continuous transmit
1920 packets/sec

(HOST -> SENSOR)

Command Symbol | Parameter | Line Feed(LF) or Carriage Return(CR) or Both

(SENSOR -> HOST)

Command Symbol | Parameter | LF | Status | Sum | LF | Data | Sum | LF | LF

- **Command Symbol**
  - 2 bytes code at the beginning of every command
- **Parameter**
  - information that is needed to change sensor settings or to request additional data
- **Line Feed (LF) or Carriage Return (CR)**
  - terminating code. Command can have LF or CR or both as termination code buy reply will always have two continuous LF as its termination code.
- **Status**
  - 2 bytes of data in reply that informs normal processing if command is authenticated or errors if undefined, invalid or incomplete command is received by sensor. Status other than 00 and 99 are error codes.
- **Sum**
  - 1 byte of data used in authentication. Calculated by adding data between two linefeeds, taking lower 6 byte of this sum and finally adding 30H to this sum.
  - Sum = 111111 = 3fH+30H = 6fH = o
  - Example: [LF] 0 0 [LF] = P
- **Data**
  - main information related to the command. It is separated by LF and sum after every 64 bytes if exceeds 64 bytes.

Sensor Commands

SD - Start data acquisition
SX - Stop data acquisition
MS - Adjust Motor Speed
MI - Motor Information(rotation frequency)
IV - Version Details

SD - Start data acquisition

- turns laser on
- responds with header containing status
- next responds with measurement packets indefinitely until commanded to stop

(HOST -> SENSOR)

S(53H) | D(54H) | LF

Command Symbol is SD

(SENSOR -> HOST)
Unsuccessful Request

S(53H) | D(54H) | LF | Status | SUM | LF | LF

Successful Request - Continuous Output
Header

S(53H) | D(54H) | LF | Status | SUM | LF

Data Block (5 bytes)
Data Block

Azimuth is a float value - needs to be converted from 16bit int to float, use instructions at the top

sync (1 byte) | Azimuth - degrees(float) (2 bytes) | Distance - cm(int) (2 bytes) | Signal Strength (1 byte) | Error Code (1 byte)

Status

00 -- Command received without any Error
22 -- Stopped to verify error
55 -- Hardware trouble
99 -- Resuming operation

SX - Stop data acquisition

- turns laser off
- stop outputting measurement data

(HOST -> SENSOR)

S(53H) | X(58H) | LF

Command Symbol is SX

(SENSOR -> HOST)

S(53H) | X(58H) | LF | 0 | 0 | P | LF | LF

MS - Adjust Motor Speed

- Default Speed - 2.25Hz
- 02 ~ 10 -- 8 different speed levels (not in Hz)

(HOST -> SENSOR)

M(4DH) | S(53H) | Speed Parameter (2 bytes) | LF

Command Symbol is MS

Speed Parameter:

- 00 -- Default speed - 2.25Hz
- 02 ~ 10 -- 8 different speed levels according to Hz

(SENSOR -> HOST)

M(4dH) | S(53H) | Speed(Hz) (2 bytes) | LF | Status | Sum | LF | LF

MI - Motor Information

- Returns current rotation frequency in Hz (float value - needs to be converted from 16bit int to float, use instructions at the top)

(HOST -> SENSOR)

M(4DH) | I(49H) | Speed Parameter (2 bytes) | LF

Command Symbol is MI

(SENSOR -> HOST)

M(4dH) | I(49H) | Speed(Hz) (2 bytes) | LF | Status | Sum | LF | LF

IV - Version Details

- Vendor
- Product
- Firmware
- Protocol Version
- Serial Number

(HOST -> SENSOR)

I | V(56H) | LF

Command Symbol is VV

(SENSOR -> HOST)

I | V(56H) | Status | Sum | LF

Vendor Information | ; | Sum | LF

Product Information | ; | Sum | LF

Firmware Version | ; | Sum | LF

Protocol Version | ; | Sum | LF

Serial Number | ; | Sum | LF | LF

Example:

IV [LF] 0 0 P(sum) [LF]
VEND: Scannable LLC;(sum)[LF]
PROD: Scannable Sweep 01;(sum)[LF]
FIRM: 1.0.00, 09/22/15;(sum)[LF]
PROT:SCP 1.0;(sum)[LF]
SERI: SW000001;(sum)[LF][LF]

Responses to Invalid Commands

11 -- Invalid parameter