USB (Virtual Serial Port) Communication Protocol

Connecting the computer through the USB interface on the rear of the instrument, the computer will prompt to install the driver (FT232R). After successful installation, it will be a virtual serial port. The baud rate of serial port is set to 115200 bps. For the main computer (upper computer), **it sends a string command, ending a line with a carriage return (\r\n),** and the lower computer returns information after execution.

All the following functions can be accessed through the supporting software. It is recommended to save the parameters to the lower computer and then transfer them to other clients for control after setting the supporting TDLAS software and get the correct waveform.

The operation mode is as follows:

1	**Automatic Demodulation Mode (the demodulation results are viewed by the analog output port)** ＞＞＞＞＞＞ Start with auto on and return (1) Auto run started. [[OK]] \r\n ＞＞＞＞＞＞ Keep scanning and don't return anything else. In the meantime, you can respond to other commands, and delay up to a scanning period. ＞＞＞＞＞ Stop with auto off and return (0) Auto run stopped. [[OK]] \r\n
2	**Single Run Mode (USB returns digital results)** ＞＞＞＞＞ Send start and return (1) Simple scan started[[OK]] \r\n ＞＞＞＞＞ Returns an array of demodulated waveforms after one scan. It contains 1f, 2f amplitudes, and 2f in-phase and 2f quadrature components.
3	**Single WMS Measurement** Send wms ＞＞ The lower computer returns: wms start[[OK]] \r\n, that is, it starts a single WMS gas concentration calculation. After the instrument performs a certain number of scans (determined by the decimation parameter), it takes the average value and outputs the results. ＞＞ Return after about 1 -8 seconds:' XXXXXX'\r\n r\n. Xxxxxx is the calculated result, ranging from 0 to 50,000, and if it exceeds 50,000, it is an error message. The value reflects the peak height of the 2f demodulated signal. The numerical magnitude is based on the 1653.7nm methane absorption peak in ppm * m. However, it is still affected by the various modulation parameters. Other gases and wavelengths are theoretically proportional to this value.
4	**Continuous WMS Measurement** Send meas on ＞＞ The lower computer returns: wms start[[OK]] \r\n, that is, it starts the continuous WMS gas concentration calculation, and the average number of each execution is determined by the decimation parameter. After each execution and the output result, the next execution will be performed immediately. Send meas off to stop the above measurement.

Parameter Settings:

(Send instructions all end with \r\n)

send	Function and return value
about	Return the currently saved parameters of the lower computer. Return four lines of parameters: >> the first line (%f) TEC.\r\n >> (floating point number, consistent with the issued parameters) >> the second line (%d,%d,%d) PGA,freq,amp.\r\n >> (PGA is 0~7, and 1x~ 128x, freq and amp of the corresponding device are consistent with those issued) >> the third line (%d, % d, % d) bias. \ r \ n >> (the value is consistent with the issued command bias a,b,c) >> the fourth line (%d,%d) dm,phase.\r\n >> (the first parameter 1 is 1f, 2 is 2f, and the second parameter is the angle consistent with that issued)
dac 1f	Select the analog output as 1f demodulation output Return (1f): DAC output [[OK]]. \r\n
dac 2f	Select the analog output as 2f demodulation output Return (2f): DAC output [[OK]]. \r\n
phase x	x is the angle (0~360 integer), set the phase of 2f demodulation. Returns (%d) 2F lock-in phase is set to% d degree. [[OK]] \ r \ n
tec x	x is the temperature of Celsius, set the target control temperature of the laser
temp	Return current laser temperature
pga x	x is 0~7, corresponding to 1x~ 128x of PGA devices, and with a variable gain amplifier set
amp x	Set the positive modulation amplitude
bias a,b,c	Set the start point, end point and slope of triangular wave scanning
deci x	The down sampling rate of the WMS algorithm, decimation, can be understood as the average number of times 1~99
save	Save the current parameters. It is still valid after power outage restart