



# FIBER OPTIC GYROSCOPES

## DIGITAL RS232/RS422 OUTPUT

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Fizoptika fiber optic gyroscopes measure rotation using precise optical signal filtering and synchronous detection at 80 kHz modulation frequency. The analog rotation signal is next digitized by a 24-bit AD converter and delivered to an RS232 (RS422) transmitter. The ADC board is installed behind the gyroscope's analog processing board. Its powering (+5 V, 35 mA) and input voltage range ( $\pm 2V$ ) are compatible with the analog processing board. The ADC board additionally integrates several 10-bit AD converters to collect some extra (X) data such as temperature, supply voltage, etc. The digital data are sent via an RS232 (RS422) serial interface. The ADC board start-up period is 1 sec after power-on, whereas the analog processing board is ready within 0.01-0.1 sec.

Due to low consumption, a conventional USB port may be used as a power source and data line (with RS232 (RS422) to USB converter). [Software for primary data acquisition](#) is available.

### 1. Power Source Requirements

The system requires a clean and stable, low noise 5Vdc power source or battery supply. Excitation voltages greater than 5.5 volts (or reversing polarity) can cause some components to heat and eventually fail.

Short (ns-scale) pulses from power transients or from accidental shorting to grounds or to the objects under potential may cause irreversible damage to the super luminescent diode (SLD). Voltage pulses may reach the SLD via capacitive bridges existing for spatially separated objects. It is recommended to ensure smooth voltage transient at power-on (1-5 msec).

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<sup>1</sup> The information contained in this document is believed to be correct, but Fizoptika accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

## 2. Electrical Interface

Definition	Contacts	Comments
Power supply	Power supply (+5 V) Power ground (GND)	+5 VDC (0.5 A max) regulated from 4.90 to 5.25. Ripple (0...1MHz) < 10 mV
Digital output	Tx of RS232 (TA, TB of RS422) Digital ground (DGND)	Asynchronous, 8 data bits, 1 stop bit, no parity control. <b>Digital ground may be combined with power ground (GND).</b>

## 3. Operating Mode

The sensor with RS232 sends digital data continuously at a 115 kBd transmission rate, 1200.0 Hz  $\pm$  100 ppm repetition rate (default mode). The operating mode can be factory set to “**slow mode**” with a 38 kBd transmission rate, 300 Hz  $\pm$  100 ppm repetition rate.

The sensor with RS422 has only 920 kBd mode, 4800 Hz repetition rate.

## 4. Digital Data Content

Angular Rate Data (RATE) - a binary complementary 24-bit word.

**Xdata** – temperature, supply voltage, consumption current and diagnostics signal. These data (10-bits each) are transmitted completely in series of 16 sendings by 2 bytes (16 bits) each.

### Data content (transmitted via RS232 (RS422) output)

DATA	INDICATION	NUMBER OF BITS	ANALOG SIGNAL	RANGE	LSB
VG OUTPUT VOLTAGE	U $\Omega$	24	U( $\Omega$ ) · (2.5/2 <sup>23</sup> ) [V]	+2.5V...-2.5V	2.5/2 <sup>23</sup> [V]
TEMPERATURE	T	16	T · (250/2 <sup>15</sup> -50) [°C]	+200...-300 °C	250/2 <sup>15</sup> [°C]
SUPPLY VOLTAGE	U	16	U · (10/2 <sup>15</sup> ) [V]	+10V...-10 V	10/2 <sup>15</sup> [V]
CONSUMPTION CURRENT	I	16	I · (0.25/2 <sup>15</sup> ) [A]	+0.25A...-0.25 A	0.25/2 <sup>15</sup> [A]
DIAGNOSTIC SIGNAL	KS	16	KS · (2.5/2 <sup>15</sup> ) [V]	+2.5V...-2.5V	2.5/2 <sup>15</sup> [V]
RESERVED	R1	16	-	-	-
RESERVED	R2	16	-	-	-
RESERVED	R3	16	-	-	-
RESERVED	R4	16	-	-	-

## Data content of a single sending

BYTE NUMBER	0	1	2	3	4	5	6	7
DATA	SYNCHRONIZATION BYTE (0xdd)	VG OUTPUT VOLTAGE - U( $\Omega$ ) BYTES: LOW HIGH MIDDLE			SENDING COUNTER	HIGH OR LOW BYTE OF X-DATA	CHECK SUM BYTES: HIGH LOW	
BYTE SYMBOL	Sinx	U $\Omega$ (L)	U $\Omega$ (H)	U $\Omega$ (MDL)	Count	T, U, I, KS, R1...R4 (H/L)	CS(H)	CS(L)

CHECK SUM IS THE **SUM** OF BYTES 1...5. SYNCHRONIZATION BYTE IS **0xdd**. VALUE OF **Count** IS +1 FOR ANY SEQUENT SENDING.

## Complete Cycle of 16 8-byte Sendings

when U( $\Omega$ ) data are updated 16 times per cycle and T, U, ...R4 data are updated once per cycle

SENDING NUMBER	BYTES							
	Sinx	U $\Omega$ (L)	U $\Omega$ (H)	U $\Omega$ (MDL)	Count	T,U,I,KS,R1...R4 (H/L)	CS(H)	CS(L)
0	0xdd	U $\Omega$ (L)	U $\Omega$ (H)	U $\Omega$ (MDL)	0x00	T(H)	CS(H)	CS(L)
1	0xdd	U $\Omega$ (L)	U $\Omega$ (H)	U $\Omega$ (MDL)	0x01	T(L)	CS(H)	CS(L)
2	0xdd	U $\Omega$ (L)	U $\Omega$ (H)	U $\Omega$ (MDL)	0x02	U(H)	CS(H)	CS(L)
3	0xdd	U $\Omega$ (L)	U $\Omega$ (H)	U $\Omega$ (MDL)	0x03	U(L)	CS(H)	CS(L)
4	0xdd	U $\Omega$ (L)	U $\Omega$ (H)	U $\Omega$ (MDL)	0x04	I(H)	CS(H)	CS(L)
5	0xdd	U $\Omega$ (L)	U $\Omega$ (H)	U $\Omega$ (MDL)	0x05	I(L)	CS(H)	CS(L)
6	0xdd	U $\Omega$ (L)	U $\Omega$ (H)	U $\Omega$ (MDL)	0x06	KS(H)	CS(H)	CS(L)
7	0xdd	U $\Omega$ (L)	U $\Omega$ (H)	U $\Omega$ (MDL)	0x07	KS(L)	CS(H)	CS(L)
.....								
14	0xdd	U $\Omega$ (L)	U $\Omega$ (H)	U $\Omega$ (MDL)	0x0E	R4(H)	CS(H)	CS(L)
15	0xdd	U $\Omega$ (L)	U $\Omega$ (H)	U $\Omega$ (MDL)	0x0F	R4(L)	CS(H)	CS(L)

## 5. Data Acquisition Program

The data acquisition program Gyro Monitor has been designed to display real time data of a connected to a PC digital or analog gyroscope on a computer monitor and store data in an output file. The time resolution is up to 0.836 msec (if the fast mode is set). The output data file contains gyro output voltage (mV), consumption current (A), supply voltage (V) and internal temperature (°C). Averaging periods for the display and for the data file may be selected separately.

For more information regarding the program, refer to [Gyro Monitor Program and USB Adapter Info Notes](#).

## Quick Links

<p>Info Notes:</p> <ul style="list-style-type: none"> <li>• <a href="#">ADC Board OE141-D02</a></li> <li>• <a href="#">Gyro Monitor Program and USB adapter</a></li> </ul>	<p><a href="#">Technical Support</a></p>
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