EX03 module of the BITREK CONNECT system

Device Purpose

The EX03 module of Bitrek Connect is designed to work with various external sensors that have analog and discrete outputs. The data received from the sensors are processed and translated by the module to the Connect-Bus.

Scope of delivery

The EX03 module of the Bitrek Connect system comes in the following package:

- EX03 module - 1 pc;
- Data sheet - 1 pc;
- Warranty card - 1 pc;
- Packing Box - 1 pc;
- Micro Fit 4-pin cable - 1pc;
- Micro Fit 16-pin cable - 1pc;
- Rubber gasket - 3pc.

Technical specifications of the device

Technical characteristics of the device are presented in the table.

Table 1: Technical specifications of the device

№	Parameters	Characteristics
1	Power supply voltage	from 9 V to 36 V
2	Consumption current	40mA
3	Number of analog inputs	3
4	Number of discrete inputs with active "0"	4 pcs
5	Number of discrete inputs with active "1"	4 pcs
6	Input voltage range of analog inputs	from 0V to 24V
7	Input voltage range of digital inputs	from 0V to 30V
8	Maximum allowable input frequency for the digital inputs	20Hz
9	Maximum allowable input frequency for high frequency digital inputs	10 kHz
10	Operating temperature range	from -30°C to +80°C
11	Maximum allowable humidity	80 ±15%.
12	Dimension (W × D × H)	78 × 83 × 30 mm
13	Weight	140 g
14	Protection rating	IP44

Appearance and dimensions of the device
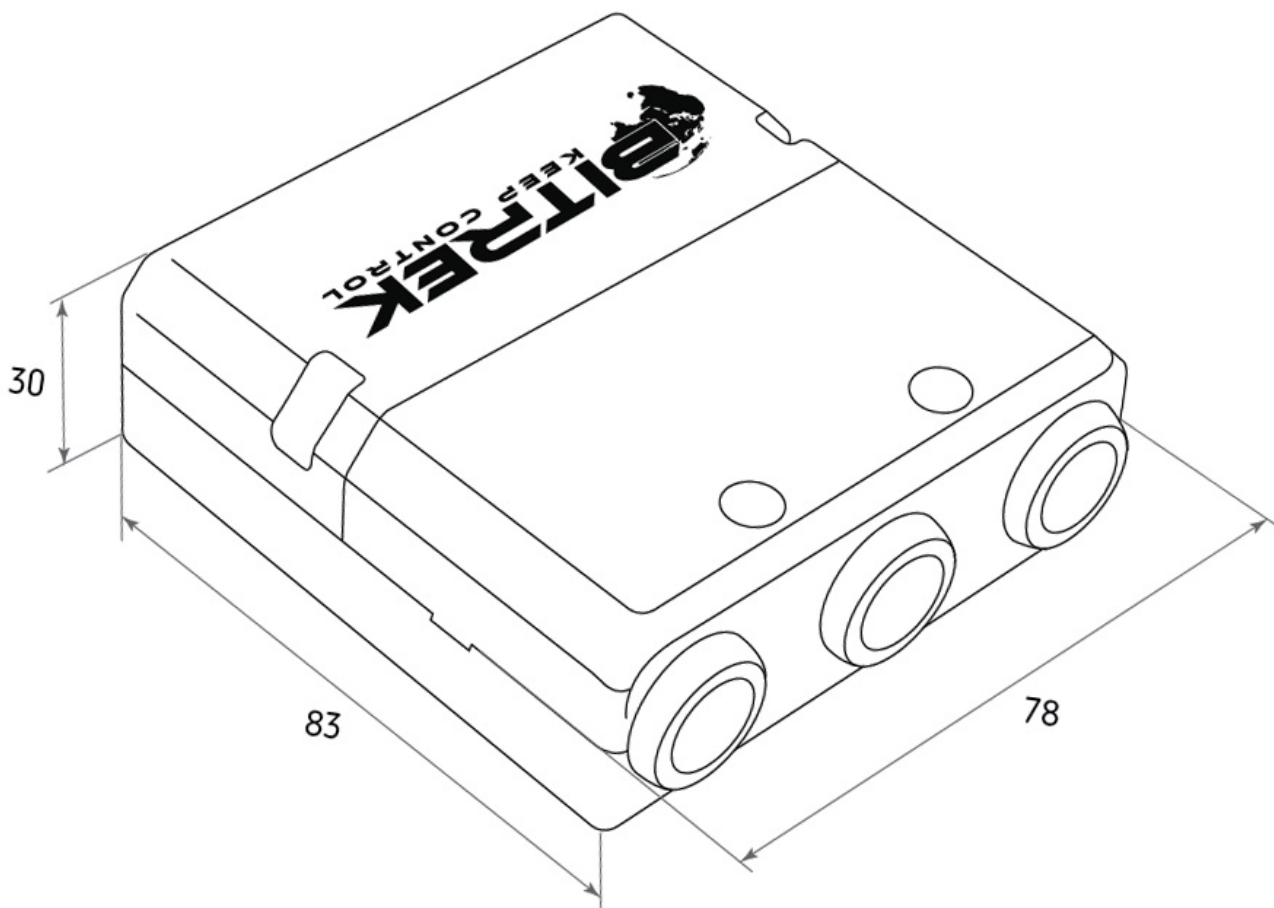
Pin assignment

The EX03 module has three Micro-Fit connectors. These are two 4-pin connectors for connecting the Connect-Bus, and one 16-pin connector for connecting external sensors.

The four-pin connectors (Fig. 2) are Connect-Bus connectors, which have power outputs of the module and outputs of the bus signal lines.
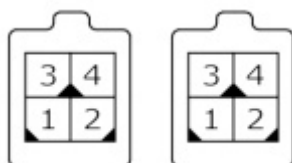

Fig.2. Connect-Bus connectors #1 and #2

The pinout of the Connect-Bus connectors is shown in Table 2.

Table 2 The pin-out of the Connect-Bus connectors No.1 and No.2

№	Contact name	Signal type	Pin assignment
1	GND	Power supply	General line (ground)

№	Contact name	Signal type	Pin assignment
2	CAN L	Input/output	Signal "CAN_L" of the CAN bus
3	+ Vin	Power supply	"+" On-board power supply (nominal voltage 12 V or 24 V)
4	CAN H	I/O signal	"CAN_H" on the CAN bus

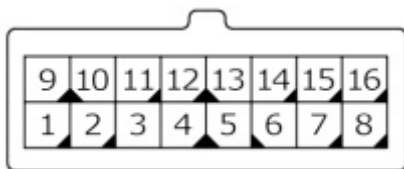The 16-pin connector (Fig.3) is the connector for external sensors.

Fig.3. Connector for connecting external sensors.

The connector for external sensors connection is shown in table 3.

Table 3: Connector pin-out for external sensors

Pin number	Pin assignment
1	Analog input 1
2	Analog input 3
3	Discrete input d_High1 (10 kHz)
4	Discrete input d_High3 (20 Hz)
5	Binary input d_Low1 (10 kHz)
6	Binary input d_Low3 (20Hz)
7	Backup
8	Backup
9	Minus power supply (GND)
10	Analog input 2
11	Discrete input d_High2 (10 kHz)
12	Discrete input d_High4 (20 Hz)
13	Binary input d_Low2 (10 kHz)
14	Binary input d_Low4 (20Hz)
15	Backup
16	Backup

Description of indication organs

On the front panel of the module on the connectors side there is one **red** LED, designed for indication of the connection status of the module to the Connect-Bus. If the connection is active, the LED is lit.

Description of module operation

The EX03 module of the Bitrek Connect system has three analog inputs and eight digital inputs. The digital inputs are divided into two groups: d_High, which become active when "+" power is applied,

and d_Low, which becomes active when "-" power is applied.

In turn, each group of digital inputs has 2 high-frequency inputs, capable of processing the incoming signal frequency up to 10 kHz and 2 standard inputs, capable of processing the incoming signal frequency up to 20 Hz.

Description of the inputs is given in Table 3 of this manual.

The analog inputs are able to measure the voltage applied to them and transfer it to the Connect-Bus.

Discrete inputs process the signals connected to them and give the following information to the Connect-Bus:

- the current state of the input. Displays the current state of the input - active (1) or inactive (0). This type of information can be used to control the ignition signal, alarm buttons, various limit switches, etc.

-Trigger input. Trigger has two stable states - on and off.

-frequency input. Displays the frequency value of the signal connected to the input. It can be used to control the engine speed, or to connect the frequency remote control.

- accumulation counter. Displays information about the number of pulses applied to the input. This counter is accumulative with the function of saving values to the module's non-volatile memory. Saving of counter values is performed once per second. Can be used for connection of pulse fuel flow meters.

Setting up the EX03 module

The EX03 module has a number of configurable parameters, the list of which is presented in Appendix 1.

The module is configured using the Bitrek Connect configurator module and Connect Configurator software. How to work with the configurator module and the software is described in detail in the document "General guide to organizing and configuring the Bitrek Connect system".

The main settings of the module:

1. Type of used filter for ADC signal post processing (parameter 0400). The selected value of this parameter will determine the type of ADC filter to be used. the selected value of this parameter will determine the type of ADC filter to be used (absolute value, The selected value of this parameter determines the type of used ADC filter (absolute value, average value, median filtering).

2. The switching timeout of the digital inputs (parameter 0401). On . the value of this parameter determines the minimum length of the incoming pulse, which this input can pass.

Module operation in the mode of concrete drum counter

The EX03 module of Bitrek Connect can operate as concrete mixer drum speed counter mode. In this mode, the module is able to determine the drum's movement status, direction of movement (fixation of mixing and dumping modes), as well as the total number of revolutions made by the drum.

To operate in this mode, you must connect to the module two sensors for the position of the drum of the concrete mixer. These can be inductive sensors. The main electrical requirement for the sensors is - Two stable states - a logical zero and a logical one on the output.

The sensors are placed at a certain distance from each other. If the barrel rotates in one direction, the first sensor will be triggered at the beginning of the movement. the first sensor is triggered, then the second one. In the opposite direction respectively first the second sensor, then the first. This the direction of the barrel movement is determined by this principle. The speed of the barrel movement is determined by the amount of time between between the two sensors.

The sensors are connected to the following inputs:

Table 4: Connection of concrete truck drum speed sensors

Sensor number	Input used	Pin number in 16-pin connector
1	Discrete input d_High1 (10 kHz)	3
2	Discrete input d_High2 (10 kHz)	11

Appendix 1 . Device parameters

№	Parameter name	ID when configured	Parameter bit	Parameter assignment	Default value
1	CANSlaveAddr	0200	1 byte	Device address on Connect-Bus	9
2	DeviceName	0510	string	Full device name	-
3	ADC_Period	0181	1 byte	ADC channel sampling period	33 (ms)
4	ADC_Digit_Period	0281	2 bytes	Sending period of ADC and digital inputs data	993 (ms)
5	Counter_Period	0381	2 bytes	Period of sending counters of discrete inputs	1001 (ms)
6	ADC_Filt_Type	0400	1 byte	ADC post processing filter (0 - absolute value;\\1 - average value;\\2 - median filtering)	2
7	Device_Identificator	0121	4 bytes	Device ID	0
8	Device_PIN	0910	2 bytes	Device access password	11111
9	DigIN_set_timeout	0401	1 byte	Digital input switching timeout (X*100 µs)	0
10	Frequency_tracking_per	0402	1 byte	Frequency tracking period (X*60 sec)	2
11	Actual_frequency_mult	0403	2 bytes	Multiplication factor of the actual mixer drum frequency	60

Addendum 2. List of variables broadcast to Connect-Bus

№	Parameter name	Width	PGN	StartBit	Bit Total	Timeout
1	Device model	4	18F713	0	32	10
2	Software version	4	18F713	32	32	10
3	Module runtime	4	18F712	0	32	10
4	Number of module starts	4	18F712	32	32	10
5	Device ID	4	18F711	0	32	5
6	Analog input 1	2	18F720	0	16	5
7	Analog input 2	2	18F720	16	16	5
8	Analog input #3	2	18F720	32	16	5
9	Trigger input d_High1	1	18F720	48	1	5
10	Input trigger d_High2	1	18F720	49	1	5
11	Input trigger d_High3	1	18F720	50	1	5
12	Input trigger d_High4	1	18F720	51	1	5
13	Input trigger d_Low1	1	18F720	52	1	5
14	Input trigger d_Low2	1	18F720	53	1	5
15	Input trigger d_Low3	1	18F720	54	1	5
16	Input trigger d_Low4	1	18F720	55	1	5
17	Current state of input d_High1	1	18F710	0	8	5
18	Current state of input d_High2	1	18F710	8	8	5
19	Current state of input d_High3	1	18F710	16	8	5
20	Current state of input d_High4	1	18F710	24	8	5
21	Current state of input d_Low1	1	18F710	32	8	5
22	Current state of input d_Low2	1	18F710	40	8	5
23	Current state of input d_Low3	1	18F710	48	8	5
24	Current state of input d_Low4	1	18F710	56	8	5
25	Frequency input d_High1	2	18F730	0	16	5
26	Frequency input d_High2	2	18F730	16	16	5
27	Frequency input d_High3	2	18F730	32	16	5
28	Frequency input d_High4	2	18F730	48	16	5
29	Frequency input d_Low1	2	18F740	0	16	5
30	Frequency input d_Low2	2	18F740	16	16	5
31	Frequency input d_Low3	2	18F740	32	16	5
32	Frequency input d_Low4	2	18F740	48	16	5
33	Cumulative counter d_High1	4	18F741	0	32	5
34	Cumulative counter d_High2	4	18F741	32	32	5
35	Cumulative counter d_High3	4	18F742	0	32	5
36	Cumulative counter d_High4	4	18F742	32	32	5
37	Cumulative counter d_Low1	4	18F743	0	32	5
38	Cumulative counter d_Low2	4	18F743	32	32	5
39	Stack counter d_Low3	4	18F744	0	32	5
40	Accumulation counter d_Low4	4	18F744	32	32	5
41	Mixer drum movement status*	1	18F750	0	8	10
42	Mixer drum speed	2	18F750	16	16	10
43	Cumulative mixer drum speed counter	4	18F750	32	32	10

* Variable automatically determines the condition of the mixer drum:

0 - indeterminate state

1 - one way movement

2 - movement in the opposite direction

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