User's Manual

(Preliminary)

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IOboard system is a modular DIN rail mounted interface for I/O signals over RS-422 (Fig 1). In addition to the serial RS-422 (a) the system can be accessed via Ethernet (b) and USB (c). The Ethernet link uses the TCP/IP protocol. The system is composed of required combination of analog and digital IO boards and may contain one Basic Module for TCP/IP or USB Controller interface.



Fig 1: IOboard system

Controller

Controller is a software concept defined by a protocol described in a document "IO Board System - Chain Protocol.pdf". The Controller may be located at any place; in many cases it will be a PC. The Controller may communicate with the IO Board System in one of three ways: TCP/IP, USB or RS422:

- The native RS422 communication does not require any hardware (Basic) interface boards.
- The TCP/IP communication requires the BasEth interface board.
- The USB communication requires the Basic22 interface board.

Boards

System interfaces

There are two Basic boards for TCP/IP and USB system interface:

- The board BasEth which is a TCP/IP to RS-422 interface.

- The board BasUSB which is a USB to RS-422 interface (in design).

Board BasEth

General

The BasEth board is the interface between a Controller and input/output (I/O) boards in the IO Board system. The board can be connected with the Controller via Ethernet (TCP/IP.) The BasEth board connects to other I/O boards via RS422 bus.

The BasEth board organizes the communication between Controller and I/O boards. It passes the TCP/IP messages coming from Controller to the RS422 bus where they are catched by I/O boards. It passes the RS422 messages coming from the I/O boards to the TCP/IP channels going to Controller.

The board is supplied in a DIN Rail enclosure.

Only one BasEth board can be connected to the RS422 bus.

Hardware

Ethernet: ISO 8802.3 100BASE-T or 10BASE-T

RS422 bus: 115200 baud.

Power supply: 24V

Enclosure size (WHD): 53x90x58 mm

Label: JSW-BASETH-01

Connectors:

- Power supply 24V: two screw terminals 24V and 0V.
- Ethernet: 1 x RJ45.
- RS422 bus: 2 x RJ-25.



Software

The communication protocol is defined for message exchange between a Controller and one or more I/O boards. The BasEth board passes only messages between the Controller and the I/O boards: it does not process them apart from media conversion..

The BasEth board has 2 TCP/IP ports:

- 58001 for communication with the BasEth board.
- 58003 for communication with I/O boards.

Communication speed on the TCP/IP side: 100 messages / sec.

The communication via the port 58001 covers the query of TCP/IP parameters like:

- IP address
- MAC address
- Software version
- Compilation time.

The communication via the port 58003 realizes the message exchange between the Controller and the I/O boards connected to the RS422 bus. It is a query channel where the IO boards respond to Controller requests. In addition this port conveys events generated in the IO boards to the Controller.

Digital boards

At the moment there are two digital boards:

- The board DI6 which is a 6 digital inputs interface.
- The board DO4 which is a digital outputs interface (in design).

Board Di6

General

The DI6 board is an i/o board in the IO Board system. It communicates with the Controller (possibly via the Basic board) using the RS422 bus. It can be used as a stand-alone board connected directly to the Controller via an RS422 interface. The board is supplied in a DIN Rail enclosure.

The inputs detect a voltage level (nominal value 24V).

The number of boards connected to the system bus is limited to 200 (addressing).

Hardware

Power supply: 3.3V (normally supplied by the Basic board via the RS422 bus), 20mA.

Number of inputs: 6

Input features:

- Inputs are isolated from the system and from each other (2500V)
- Input states are signaled by LEDs:
 - An input voltage below +9V (or negative) is signaled as low (LED switched off)
 - An input voltage above 9 V is signaled as high (LED green)

- A reverse input voltage is allowed (LED red)
- Max input voltage: +/- 31V

Enclosure size (WHD): 53x90x58 mm

Label: JSW-DI6-01

Connectors:

- Digital inputs: +, and *LED* are assigned to each input.
- RS422 bus: 2 x RJ-25.



Software

The digital inputs can be polled or can be set up for events. They are polled using the command *GetInput* whose response contains all digital inputs.

The "0" logic level corresponds to voltage above 9V and the "1" level to a low level below 9V, measured at the input connector. An erroneous connection on the input connector is signaled as a "0" level and signaled by the LED as red.

Analog boards

At the moment there is:

- The board Ai4Ao1 which is a 4 analog inputs and 1 analog output interface.

Board Ai4Ao1

General

The Ai4Ao1 board is an analog input/output board in the IO Board system. It communicates with the Controller (possibly via the Basic21 board) using the RS422 bus. It can be used as a stand-alone board connected directly to the Controller via an RS422 interface. The board is supplied in a DIN Rail enclosure.

Both the analog inputs and the analog output are of current type.

The number of boards connected to the system bus is limited to 200 (addressing).

Hardware

Power supply: 3.3V (normally supplied by the Basic board via the RS422 bus), 20mA

Mar 30, 2011

24V (for analog output)

Analog inputs:

- Number of inputs: 4
- Range: 0 to 20 mA
- Resolution: 24 bits (up to 23 bits noise-free)
- Accuracy: 0.1% (without calibration and correction) 0.01% (with calibration and correction)
- No missing code: 24 bits
- Input resistance: 250 ohm
- Max input current: 20 mA

Analog output:

- Number of outputs: 1
- Range: 0 to 20 mA
- Resolution: 12 bits
- Accuracy: LSB
- Guaranteed Monotonicity
- Max load resistance: 600 ohm
- The output is isolated from the inputs (2500V).

Enclosure size (WHD): 53x90x58 mm

Label: JSW-AI4AO1-01

Connectors:

- Analog inputs: to each input are assigned two screw terminals *Ain*+ and *Ain* where n = 0...3. In addition there is a common screw *AiCOM*. This should be wired to a suitable local analog ground or common potential, and also to unused inputs AIn- pins.
- Analog output: the output has two screw terminals *Ao* and *Ao ret*.
- RS422 bus: 2 x RJ-25.
- Power supply 24V: two screw terminals 24V and 0V.

```
Ai0+ 72458 24V
Ai0- 24V
Ai1- 5
Ai1- 5
Ai2- 10-10
Ai2- 10-10
Ai2- 10-10
Ai3- 75422 Aortet
Ai3- 75422 Aortet
```

Software

The analog inputs can be polled or can be set up for events. They are polled using the command *GetInput* whose response contains all analog inputs.

The analog output can be set using the command *SetOutput*.

We can provide additional functionality Ao = f(Ai), for instance the PID regulator.

Other boards

Any combination of digital and analog inputs and outputs interfaces can be combined on a board. This user specific boards are designed according to client specifications. Ask for conditions and deadlines.