⠿ 7bit   Synapse

Modbus TCP/8DI/8DO(R)/32x1-Wire/AC

Industrial digital input/output module for remote process control and data acquisition

Quick guide

Thank you for choosing our product. The 7bit Synapse module designed as a remote Ethernet DIO, counter and 1-Wire temperature input module for industrial automation and monitoring applications. Built-in AC power supply and 2-port Ethernet switch simplifiy installation and cabling, extending network length and allowing to install the module into existing network w/o extra equipment.

1. ⚠ Warning

- Module Synapse is an OPEN-TYPE device. It should be installed in a control cabinet free of airborne dust, humidity, electric shock and vibration

- The device is operating at dangerous voltage rating. High voltage also may occurs at output terminals during it work. Please do not touch these terminals when the device is powered on. DO NOT connect AC power to any of input terminals, otherwise serious damage may occur. Please double check all wiring before Synapse is getting powered up.

2. Electrical Specifications

Power supply	100 - 220 VAC, 50/60 Hz, Max power consumption: 3W
Communication	2 x Fast Ethernet switch, Modbus TCP

Input points	8xDI, 12 - 24 AWG Single group of common input ports

Type	24 VDC (SINK / SOURCE) or internal isolated DC supply
Counters	8 (Each DI), 32 bit capacity, static memory
Max. frequency	1 KHz
Jitter filter	Individual for each channel Adjustable, 0~20ms (Default: 20ms)

| Output points	8xDO, 12 - 24 AWG Two groups DO 1 - 4 and DO 5 - 8 (SSR or Relay or SSR + Relay)
SSRs	AC, 85 - 220V 2A, Zero-crossing switching. Max. frequency: 100 Hz
Relays	220 VAC / 30 VDC, 2A. Max. frequency: 1 Hz
Response time	~ 10 ms

| 1-Wire	Up to 32 digital thermometers DS18B20 Bus length up to 200m

3. Connection to device

Power the module on and connect to the Ethernet. Module will get address automatically via DHCP. Find a new device at DHCP table on your router and assign it a static IP. Reboot device. All data and control will be accessible via Modbus TCP, as shown in the table below.

4. Wiring

Ethernet. Synapse has an embedded switch which make easy to connect numerous modules simply, connecting them to each other in "daisy chain". As it is true Ethernet switch, each connection may be up to 100 m. It is also possible to connect the device at any breaking of existing Ethernet link.
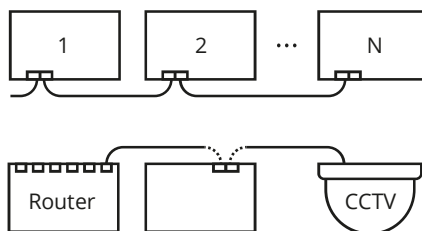
Digital inputs. Synapse has 8 Digital Input ports with a single common terminal. They may be powered by external 12 - 24V or internal isolated DC power supply, as sink or source inputs. Each Input may be simultaneously used as a 32 bit counter with maximum frequency 1KHz. To avoid jittering, each input has adjustable filter (20 ms default, the shorter impulse will not be affected). To disable filter please set 0 (Refer to Modbus data table).
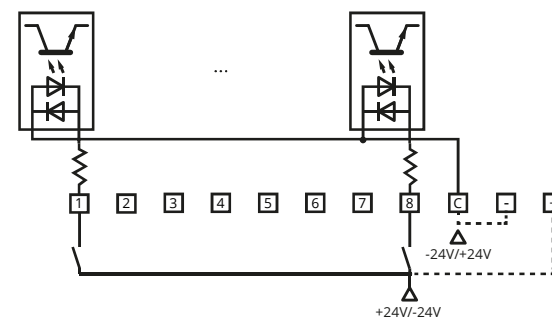

Digital outputs. Module Synapse has 8 Digital Outputs, which are separated in two isolated groups. There are few possible types of output circuits, such as triac (SSR) or relay (R), or their combination (4+4). Due to Zero-cross detection unit, SSR providing comfort switching any AC load in the range 85 - 220V, 2A. Relay outputs is commonly used for dry contacts and DC signals commutation.
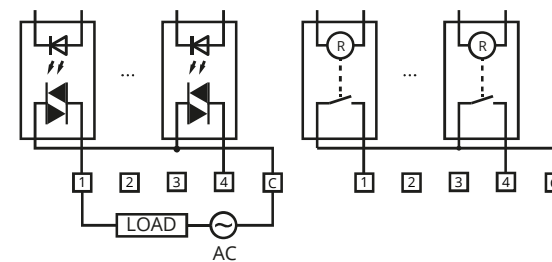
1-Wire connection. Module Synapse is providing connection up to 32 digital temperature sensors DS18B20 via 1-Wire bus with a maxim length 200 m, as shown at figure below.

Looking for 1-Wire sensors. Each DS18B20 have their own unical number. At first time there is no any sensors in system. Total sensors quantity parameter (HR33) will be 0, and

all temperature registers (IR0 - IR31) will show -1000, refer to Modbus Data table. Each booting, the system is looking for sensors and adding them to the list, increasing HR33 param. If the next time some sensors will not be found, they will not be deleted from the list. Their value will be displayed as -1000, and the new ones will be added at the end of the list. To refresh list and to find new sensors any time set HR 33 to 0. If at least one sensor is present 1-WIRE indicator should be blinking amber.

Bus topology. Total length up to 200 m
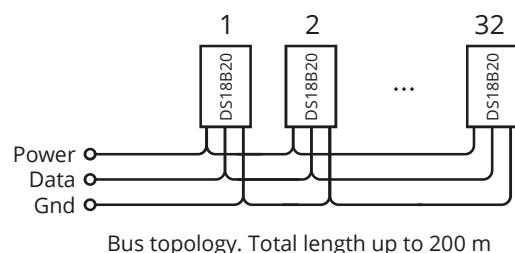
5. Modbus Data Table

The following abbreviations are used to indicate Modbus functions: C - **C**oils, DI - **D**igital **I**nput, HR - **H**olding **R**egisters, IR - **I**nput **R**egisters, **W** - Word (2 byte length), **DW - D**ouble **W**ord (4 byte length).

№	Description	Address	Data	Type	Def.
1	Input points	DI0 - DI7	Bit	R	-
2	Output points	C0 - C7	Bit	W	-
3	Counters 1-8	HR0 - HR15	DW	R/W	-
4	Input filters 1-8	HR20 - HR27	W	R/W	20
5	Reboot counter	HR30	W	R/W	-
6	System uptime (sec.)	HR31	DW	R/W	-
7	Total sensors quantity	HR33	W	R/W	0
8	Temperatures 1-32*	IR0 - IR31	W	R	-1000
9	User data area**	HR34-HR900	ND	R/W	-

* *-1000 is displayed if sensor not present or damaged*

** *Static memory registers for user applications*

6. General view. Dimensions

Operation / Storage	0°C - 55°C, 5 - 90% (w/o condensation) -25°C - 70°C, 5 - 95%
Weight	200 g
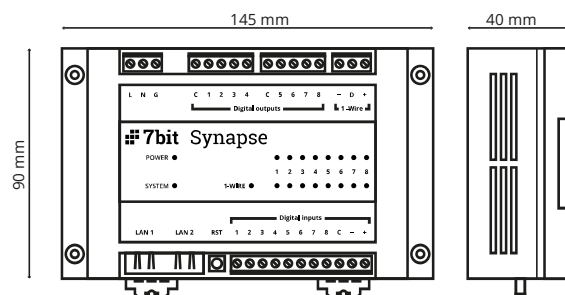
7. Troubleshooting

When the Synapse is powered, red POWER LED must be on. At normally working device, SYSTEM LED blinking green.

If there is no data from remote IO in your system, use "ping" command to get response from module, and to be sure that used IP address is correct and network working normally. If no respond, double check wiring and all settings.

Synapse has internal watchdog, which may reboot the device in case of accidental malfunction. Refer to internal registers HR30 (Reboot counter) and HR31 (System uptime) to check for any device failures occurred .

In a case the device doesn't working properly, please contact to your supplier.

In case of troubles with adding temperature sensors, the most probable cause is the length of 1-Wire bus or its topology (signal or power attenuation, caused too long line, interference due to side branches etc.). First of all try to connect sensors with a short wires. If ok, then check wiring (refer to general Maxim 1-Wire recommendations).

8. For more information

If you have any questions or problems related to the operation of the 7Bit™ products, please contact us by calling the unified support service +38 (056) 796-96-90, info@webhmi.com.ua

9. WARRANTY

The company of "Distributed Data Systems LLC", the manufacturer of 7Bit Synapse IO module (hereinafter referred to as the Manufacturer), expresses its great gratitude for your choice. We did our best to ensure that this product met your requirements, and the quality corresponded to the best standards.

The manufacturer sets the life of the Synapse IO module to 10 years in case of its proper usage. The service life is calculated from the date of manufacture of the product.

The manufacturer reserves the right to refuse to meet customer requirements for warranty obligations and for free repair (replacement of the product) in the case of failure to comply with the conditions set forth below. All the terms of the warranty and free repair (replacement) are in force under the law on consumer protection.

The manufacturer sets a warranty period, counted from the date of sale, and the period of free repair (replacement), subject to compliance with the rules of operation, 12 months. Replacement of defective parts (assemblies, assembly units) in the product during the warranty period does not lead to the establishment of a new warranty period for the entire product, or for replaced parts.

The manufacturer declines all responsibility for the possible harm, directly or indirectly caused by the Synapse device to people, animals, property in case event that this is the result of non-compliance with the rules and conditions of use of the product; Intentional or reckless actions of the buyer (consumer) or third parties. Also, the Manufacturer declines all responsibility for the possible damage, directly or indirectly caused by the Synapse device as a result of alteration, damage, loss of data and information.

Serial number of the product _____

Date of the manufacturer's exit control _____

Date of sale _____

Seller _____

Buyer's signature _____