Digital input/output device

IO100

Manual

IO100.423000.001 Rev. 05.2022

Table of contents

Introduction

The Manual contains information about functions, recommendations for use, technical support, maintenance, packing, transportation, storage, as well as wiring diagrams.

Read this manual carefully before using the device.

Typical users

Engineers, personnel involved in setting, operation and maintenance of the devices.

Validity range

This manual applies to all IO100 modifications.

Support

If you have any questions about the device, please, do not hesitate to contact technical support of TOO “Institute of Automation”:

Website: ains.kz

Phone: +7 (7172) 645757

E-mail: sales@ains.kz

ATTENTION:

- When using IO100, follow the rules and information set in this manual;
- Only qualified personnel are supposed to install, operate and maintain IO100;
- Do not use any cleaners except recommended by manufacturer;
- IO100 must be kept from impact;
- Before connecting IO100 to power supply, you must ensure that power supply’s voltage corresponds to the voltage set in the label on IO100.

NOTICE:

- Our software is being constantly developed and implemented with new functions and features;
- New features may be added to the devices and software without announcing.

Glossary and symbols

- AC – Alternating current
- DC – Direct current
- DI – digital input;
- DIO – Digital (binary) signal
- DO – digital output;
- EMC – Electromagnetic compatibility;
- EMR – electromagnetic relay;
- PE – Protective earth;
- RTU - remote terminal unit;
- SCADA – Supervisory Control and Data Acquisition
- SSR – Solid-state relay
- UTC – Universal Coordinated Time.

1 General information

IO100 is a series of binary input/output devices intended for operating at substations and power plants automated systems.

Together with M1000 measuring transducer and CM100 RTU, IO100 can be used for creating distributed remote control systems. Main purpose of IO100 is input and output digital signals and data transfer via galvanically isolated interfaces RS-485. IO100 may transfer data directly or through M1000, CM 100, or integrates with third parties automation equipment.

IO100 is configured by ConfigTool software. Config Tool allows to set required parameters for available interfaces and protocols and defining I/O configuration.

IO100 is multifunctional, repairable, restorable device. It designed for continuous operation in industrial conditions.

Manufacturer Institute of Automation
Address: Tanzharyk Zholdyuly, 16
Nur-Sultan, Astana, 010000, Kazakhstan
Phone: +7-7172-645757

2 Design, dimensions, product identification system

IO100 has plastic case housing for DIN-rail mounting.

The devices are manufactured in two modifications:

- IO100-24/0 – Standard housing (75x100x110 mm), 2 x RS-485, USB, 24 digital inputs.
- IO100-6/3R – Small housing (75x70x110 mm), RS-485, USB, 6 digital inputs and 3 digital outputs.

Figure 2.1 – IO100-24/0 and IO100-6/3R

IO100-24/0 dimensions see on fig. 2.2.

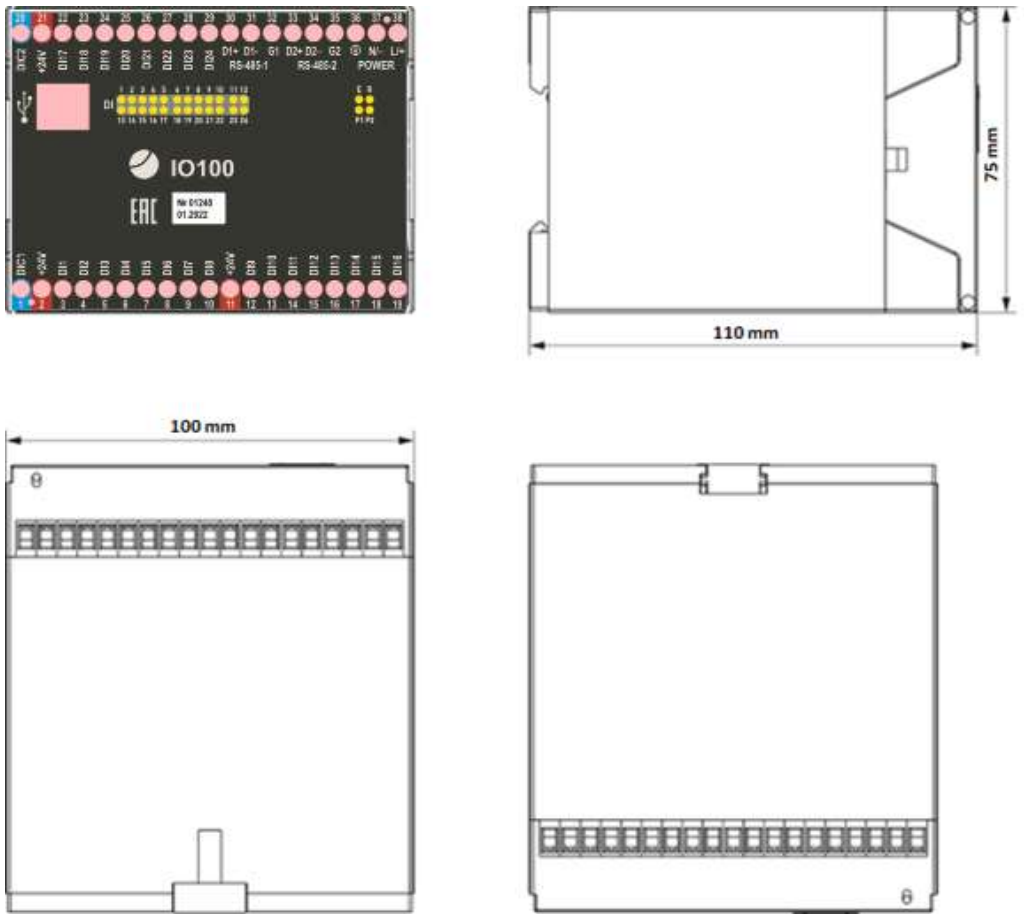


Figure 2.2. Dimensions of IO100-24

IO100-6/3R dimensions see on fig. 2.3.

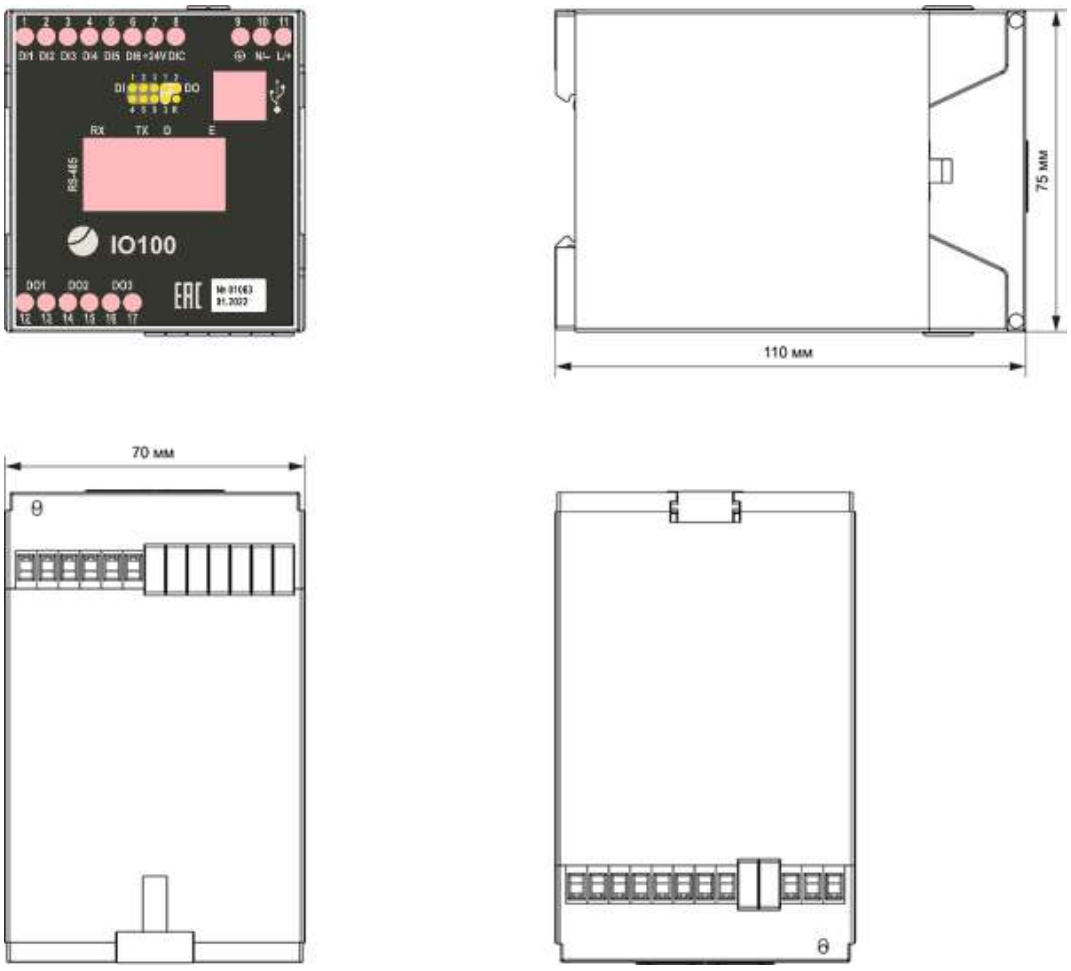


Figure 2.3. Dimensions of IO100-6/3R

Please use product identification system below to make an order.

IO100-_-_-_

I/O set

6(X)/3R — 6 × DI, 3 × DO EMR
24(X)/0 — 24 × DI

(X) - DI voltage:

(220) — 220 V DC wet contacts
(110) — 110 V DC wet contacts
(24) — 24 V DC wet/dry contacts

Interfaces

C1 — 1 × RS-485
C2 — 2 × RS-485

Power supply

220 — 120-370 V DC, 100-265 V AC (50 Hz)
110 — 40...160 V DC
24 — 18...36 V DC

For example, modification code for digital input module: 24 digital inputs, power supply 24 V=, 2xRS-485:

IO100-24(24)/0-24-C2

3 Specification

3.1 Digital inputs

IO100 are equipped with opto-isolated digital inputs with debounce filter respectively. Dry contacts are powered by built-in 24 V DC supply.

Modification	Input number
IO100-24(X)/0	24
IO100-6(X)/3R	6

Parameter	IO100-X(**24**)/X	IO100-X(**110**)/X	IO100-X(**220**)/X
Nominal voltage, V DC	24	110	220
Threshold, V	13…14.5	74…81	150…160
Max voltage, V	36	180	250
5 sec overvoltage, V	60	260	390
Max current, mA	10	1	1
Input type	«wet contact», «dry contact»	«wet contact»	«wet contact»
Built-in power	24 VDC	Not present	Not present

IO100 has events log of DI statuses. Each record of event log is marked with timestamp with 1 ms resolution.

DI statuses can be transferred over IEC 60870-5-101, IEC 60870-5-104 in Single point or Double point with or without timestamp and over Modbus using 0x01 or 0x02 Function codes.

Connection diagrams see in Appendix A.

3.2 Digital outputs

IO100-6/3R provides switchgear equipment control using built-in digital outputs. IO100-6/3R has 3 digital outputs of electromagnetic relay type.

DO specification:

Parameter	IO100 output
Nominal voltage, V	1..230 AC/DC
Max voltage, V	250 DC
Max current, A	15
Breaking current, A	8 at 250 V AC 0.25 at 250 V DC 8 at 30 V DC

Connection diagrams see in Appendix A.

3.3 Operating condition

Table 3.1

Condition	Value
Temperature, °C	-40…+70
Relativity humanity, %	5-95%
Atmospheric pressure, kPa	70-106
Turn-on time	<30 sec
MTBF	100000 h
Device life	15 year

3.4 Power supply

Table 3.2

	IO100-24(X)/0-**220**-XX	IO100-24(X)/0-**110**-XX	IO100-24(X)/0-**24**-XX
Voltage AC	100...265 V AC, 45...55 Hz	-	-
Voltage DC	120...370 V DC	40..160 V DC	18...36 V DC
Consumption	12 VA	12 W	12 W

Table 3.3

	IO100-6(X)/3R-**220**-XX	IO100-6(X)/3R-**110**-XX	IO100-6(X)/3R-**24**-XX
Voltage AC	100...265 V AC, 45...55 Hz	-	-
Voltage DC	120...370 V DC	40..160 V DC	18...36 V DC
Consumption	10 VA	10 W	10 W

3.5 Isolation

Table 3.4

Isolation to ground	1 min voltage, VAC
Digital interfaces	500
Input power	2000
DI	2000
DO	2000

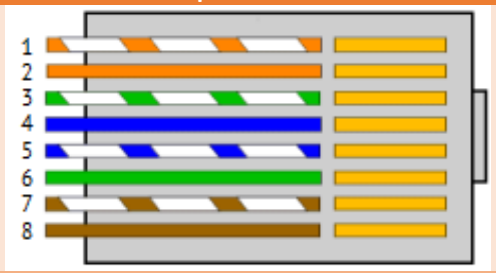
3.6 Interfaces

RS-485

Type	2-wire (D+, D-, GND)
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps
Parity	none, odd, even
Stop bits	1, 2
Response delay	0...25.5 ms
Protocols	Modbus RTU IEC-60870-5-101

Pinout

Signal	RJ45 pins
A (data+)	7
B (data-)	8
GND	5



4 Features

4.1 Protocols

Communication with control system is carried out through:

- Modbus RTU,
- IEC 60870-5-101;

All ports settings are configured by ConfigTool.

IEC 60870-5-101 description see in appendix B. Modbus description see in appendix C.

Default settings of IO100 (standard housing): Modbus RTU, baudrate 19200 bps, parity None, slave address 0x01.

Default settings of IO100 (small housing): Modbus RTU, baudrate 19200 bps, parity None, slave address 0x02.

4.2 Telecontrol

Digital outputs (designation "DO") of IO100-6/3R are designed to issue control actions to external objects (switching devices, intermediate relays, etc.).

IO100-6/3R supports the execution of TC commands according to the following protocols:

- IEC 60870-5-101 as Single command (<45>), Double command (<46>). The control is always performed by a pair of outputs: an ON command sent to any of the addresses belonging to the DO pair closes the first output, and an OFF command closes the second one.

  By default, two relays from the same pair cannot be closed at the same time; when the first is closed, the second will automatically open and vice versa. To enable simultaneous closing, the "Allow simultaneous DO activation" setting must be enabled.

  Output DO3, upon receipt of the ON command, closes for the specified time, the OFF command is ignored.

- Modbus RTU on command 05. On an ON command, the corresponding relay closes, and on an OFF command, it opens. The relay remains closed for the time specified during the setting (default is 5 seconds), and a permanent hold of the output is also available until a command to open is received.

  By default, two relays from the same pair cannot be closed at the same time, when the first is closed, the second will automatically open and vice versa. To enable simultaneous closing, the "Allow simultaneous DO activation " setting must be enabled.

For each output, a setting of a blocking signal is available. When the blocking signal turned on, the output control is not available. Any of the device's digital signals can be used as a blocking signal. Blocking is configured using the ConfigTool.

The digital output can be configured to trigger on a logical expression. In this case, remote control of this output is not available.

4.3 Real-time clock

IO100 has real-time clock. It allows to save event logging and to transmit data with timestamp over IEC 60870-5-101.

Synchronization is carried out by IEC 60870-5-101 commands.

Data timestamp may be transmitted via IEC 60870-5-101 with UTC or local time (with summer/winter time).

All settings, including time source, validity checking and time zone are configured by ConfigTool.

Time accuracy with synchronization is up to 500 µs. Without synchronization IO100 has up to 3 seconds error per day.

4.4 Event logging

IO100 saves in non-volatile memory the following log files:

- Event log (software update, configuration change, power supply on/off, diagnostic messages); up to 40 last events with timestamp are available.
- Digital signals log (status of digital inputs and outputs, logic); 1000 last events with timestamp are available.

You can read stored digital signals data from IO100 over IEC 60870-5-101. You may also read, erase or export to MS Excel log files using ConfigTool software.

4.5 Logic

IO100 has a feature to create and process logical expressions using internal DIO statuses. As a result of expressions new DI statuses adding to device data sets. Logic can be used for interlocking, ATS, and other tasks.

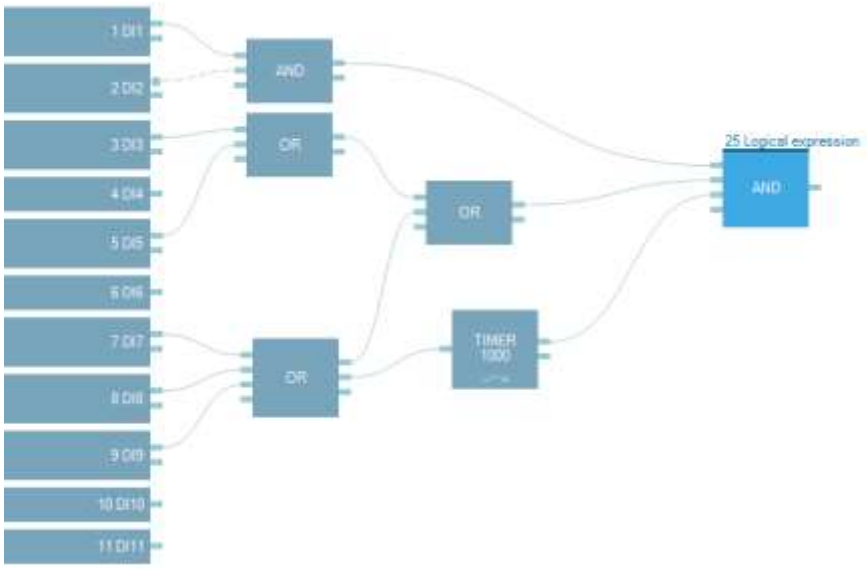


Figure 4.1. Example of a logical expression setting using ConfigTool software.

5 Operation

IO100 might be installed in protection compartments of enclosed switchgear, in panels and cabinets. Due to wide operating temperature range, IO100 can be applied in unattended and non-heated facilities.

Use wiring diagrams in the Appendix A to connect IO100 to power supply properly.

Make sure that selective main circuit breaker for power supply circuit is set near the IO100.

Attention! Before connect/disconnect IO100 to power supply make sure that all sources of power supply are disconnected.

5.1 Package contents

Digital input/output device IO100 - 1;

All documentation and software updates see on ains.kz

5.2 Before installation

After receiving IO100 from manufacturer, make sure that packing has no defects.

Unpack IO100, check the package contents.

Compare characteristics given in passport with the label on frontal side of the device.

When operating IO100, follow the rules set in the manual.

Before connecting/disconnecting IO100 to digital interfaces or digitals inputs make sure that all sources of power supply are disconnected.

When connecting IO100 to RTU (or SCADA) follow the manual of RTU (SCADA).

Do not use IO100 in an explosive or corrosive environment.

Save IO100 from heating above 70 °C, large temperature variations and strong electro-magnetic fields.

5.3 Mounting and connection

For safety, you must read the instructions in this manual before performing mounting and operation. Only qualified personnel should be allowed for installation.

IO100 is mounted on 35mm DIN-rail.

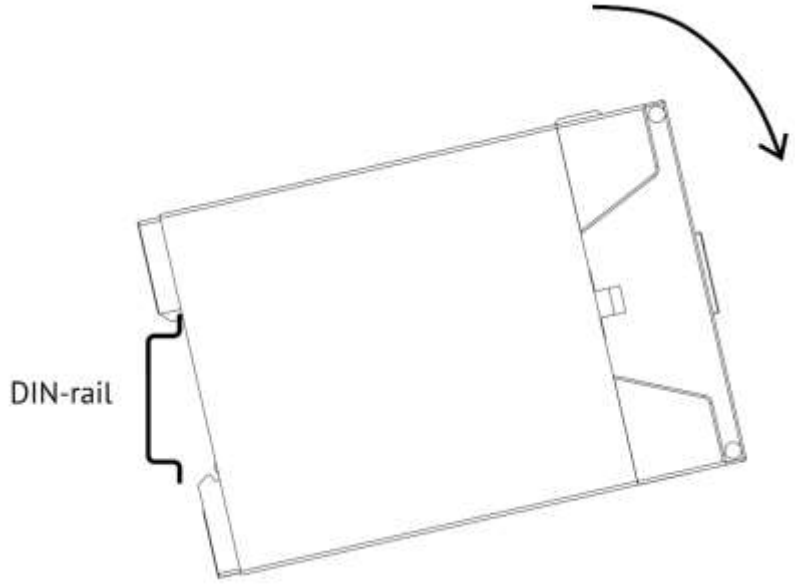


Figure 6.1. IO100 installation to 35 mm DIN-rail

Pull down the clip in bottom to remove IO100 from DIN-rail.

Recommendation for wires:

Tightening torque is 0.5 to 0.6 N·m.

Terminals	**IO100 recommended wires**
Power supply	2.5 mm^2 wires (AWG 14)
DI, DO	2.5 mm^2 wires (AWG 14)
Digital interface	0.5 mm^2 wires (AWG 24) or shielded patch cord Cat5 cables using 8P8C (RJ-45)

Recommendation for protection:

Use surge protection for the safe operation of the power supply and the interface ports of IO100.

6 Maintenance and repair

When performing the maintenance, follow the rules set in the manual. Maintenance is supposed to be performed by qualified personnel only.

Do not open the housing during operation. Opening the IO100 voids the warranty.

IO100 does not need special maintenance operations.

For cleaning use non-abrasive detergent or 70% ethanol-water solution.

7 Self-diagnostics of IO100

Errors codes of IO100

Errors
ADC failure
Internal clock error
Low battery voltage
Authorization error
Time sync failure
FRAM failure
No link on LAN 1 port
No link on LAN 2 port

When necessary, diagnostic information can be transmitted via interfaces. There is an option of receiving an error using Modbus RTU, IEC 60870-101 protocols. It is possible to transmit the self-diagnostic information in form of DI, choosing which specific parameter or error to pass on (fig. 7.1).

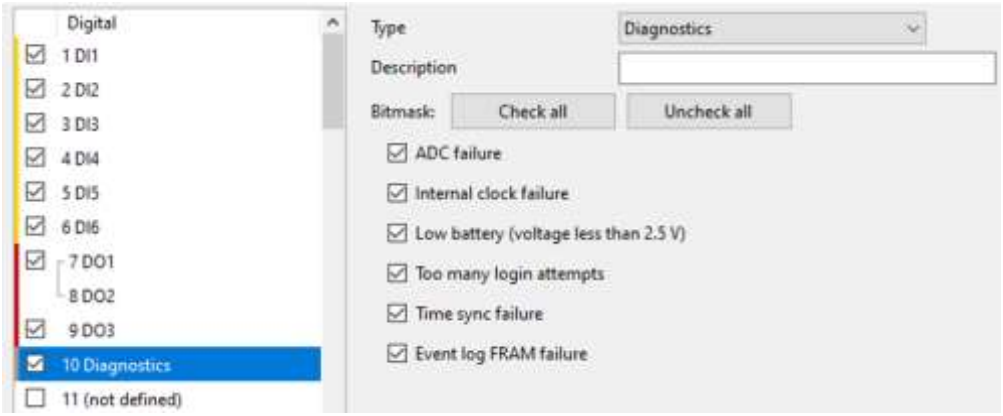


Figure 7.1. Diagnostic information in form of DI

8 Transporting, storage and packing

IO100 is transported in any covered transport (railway, car, aviation). Transports conditions temperature is –50…+70°C, relative humidity is 95% at 30°C. Save IO100 from impact during the transport.

IO100 is delivered in packaging case. Package has content according to p. 5.1.

Net weight – up to 0.6 kg.

Gross weight – up to 1.1 kg.

Store the device in dry and clean location. Essential storage conditions are listed in the following table:

Table 8.1

Condition	Device in manufacturer packing	Device without manufacturer packing
Temperature	5-40 °C	10-35 °C
Relative humidity	80% (at 25 °C)	80% (at 25 °C)

Appendix A. Connection diagrams.

IO100-24(X)/0

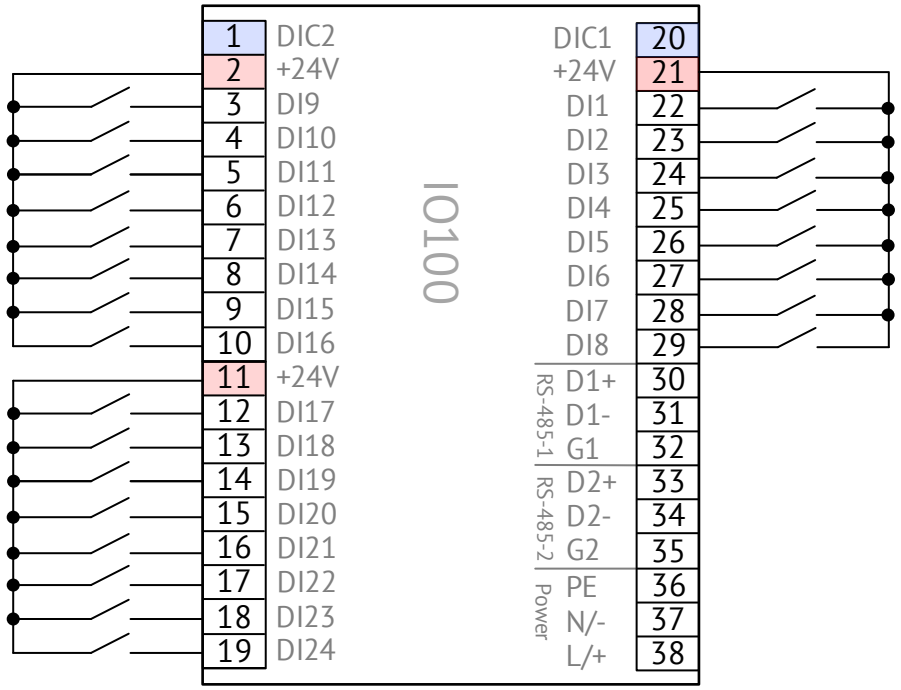


Figure A1. IO100-24(24)/0 connection diagram for «dry contact».

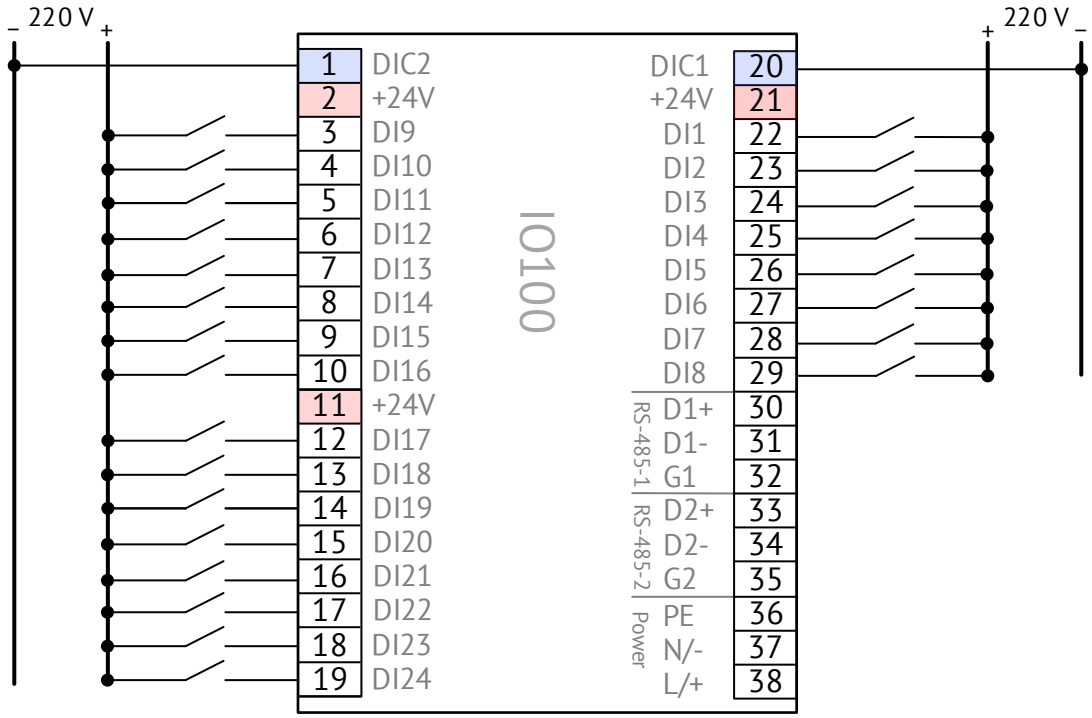


Figure A2. IO100-24(220)/0 connection diagram for «wet contact».

IO100-6/3R

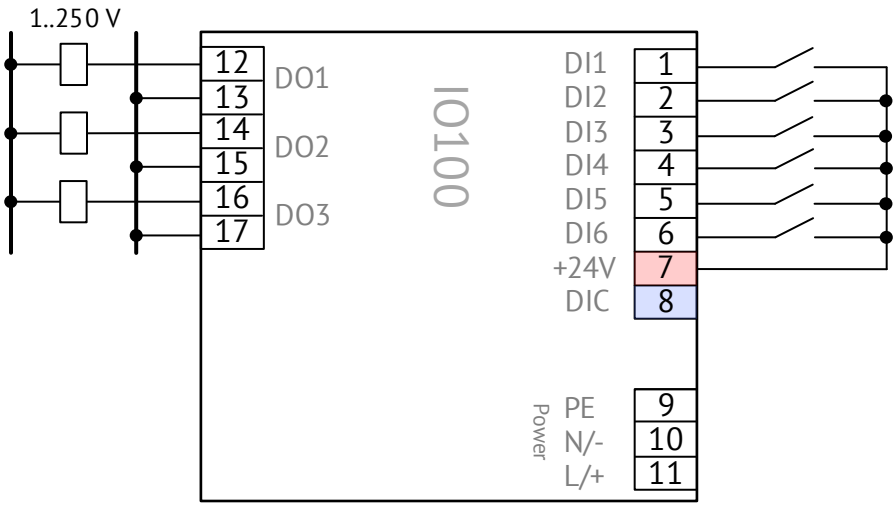


Figure A3.IO100-6(24)/3R connection diagram for «dry contact».

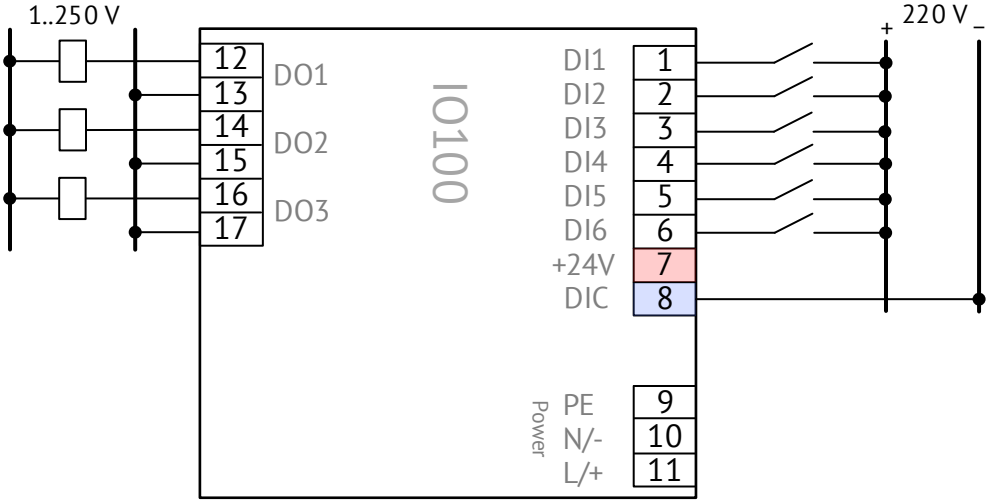


Figure A4. IO100-6(220)/3R connection diagram for «wet contact».

General

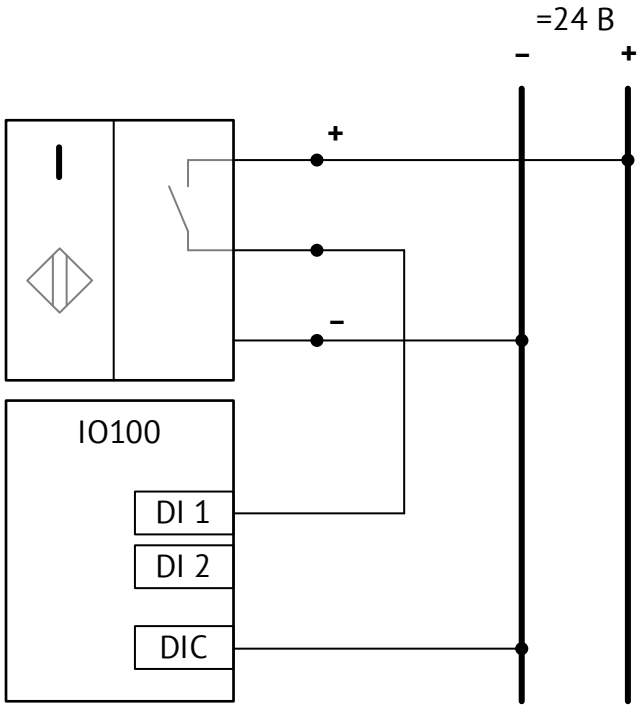


Figure A5. Inductive sensor connection diagram of IO100-X(24)/X

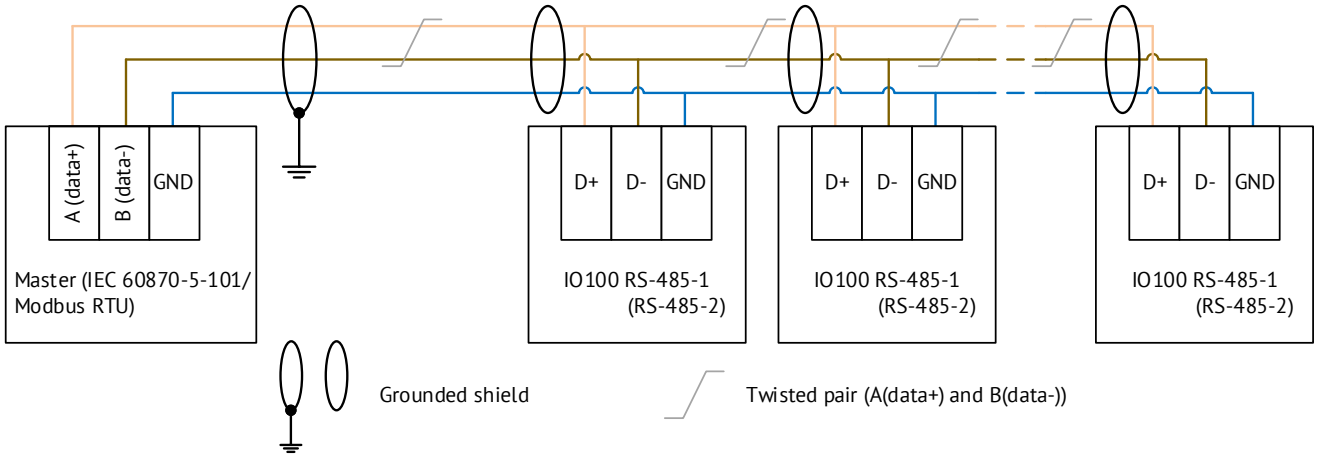


Figure A6. Connection diagram of IO100 to RS-485.

Appendix B. IO100: IEC 60870-5-101

IEC 60870-5-101 Protocol Implementation Conformance Statement

This companion standard presents sets of parameters and alternatives from which subsets have to be selected to implement particular telecontrol systems. Certain parameter values, such as the number of octets in the COMMON ADDRESS of ASDUs represent mutually exclusive alternatives. This means that only one value of the defined parameters is admitted per system. Other parameters, such as the listed set of different process information in command and in monitor direction allow the specification of the complete set or subsets, as appropriate for given applications. This Clause summarizes the parameters of the previous Clauses to facilitate a suitable selection for a specific application. If a system is composed of equipment stemming from different manufacturers, it is necessary that all partners agree on the selected parameters.

Designation:

☐ - Function or ASDU is not used;

|X| - Function or ASDU is used as standardized (default);

|R| - Function or ASDU is used in reverse mode;

|B| - Function or ASDU is used in standard and reverse mode/

The possible selection (blank, X, R, or B) is specified for each specific Clause or parameter.

1. System or device

(system-specific parameter, indicate the definition of a system or a device by marking one of the following with an «X»)

IEC 60870-5-101	
☐	System definition
☐	Controlling station definition (master)
☒	Controlled station definition (slave)

2. Network configuration

IEC 60870-5-101			
☒	Point-to-point	☐	Multipoint-partyline
☒	Multiple point-to-point	☐	Multipoint-star

3. Physical layer

(network-specific parameter, all interfaces and data rates that are used are to be marked with an «X»)

Transmission speed (control direction)

IEC 60870-5-101		
Unbalanced interchange circuit V.24/V.28 Standard	Unbalanced interchange circuit V.24/V.28 recommended if >1200 bit/s	Balanced interchange circuit X.24/X.27
☐ 100bit/s	☒ 2400bit/s	☐ 2400bit/s
☐ 200bit/s	☒ 4800bit/s	☐ 4800bit/s
☐ 300bit/s	☒ 9600bit/s	☐ 9600bit/s
☒ 600bit/s	☒ 19200bit/s	☐ 19200bit/s
☒ 1200bit/s	☒ 38400 bit/s	☐ 38400bit/s
	☒ 57600 bit/s	☐ 56000bit/s
	☒ 115200 bit/s	☐ 64000bit/s

Transmission speed (monitor direction)

IEC 60870-5-101		
Unbalanced interchange circuit V.24/V.28 Standard	Unbalanced interchange circuit V.24/V.28 recommended if >1200 bit/s	Balanced interchange circuit X.24/X.27
☐ 100bit/s	☒ 2400bit/s	☐ 2400bit/s
☐ 200bit/s	☒ 4800bit/s	☐ 4800bit/s
☐ 300bit/s	☒ 9600bit/s	☐ 9600bit/s
☒ 600bit/s	☒ 19200bit/s	☐ 19200bit/s
☒ 1200bit/s	☒ 38400 bit/s	☐ 38400bit/s
	☒ 57600 bit/s	☐ 56000bit/s
	☒ 115200 bit/s	☐ 64000bit/s

4. Link layer

Network-specific parameter, all options that are used are to be marked with an "×". Specify the maximum frame length. If a non-standard assignment of class 2 messages is implemented for unbalanced transmission, indicate the type ID and COT of all messages assigned to class 2.

IEC 60870-5-101

Frame format FT 1.2, single character 1 and the fixed time out interval are used exclusively in this companion standard.

Link transmission procedure	Address field of the link
☐ Balanced transmission ☒ Unbalanced transmission	☐ Not present (balanced transmission only) ☒ One octet ☐ Two octets ☐ Structured ☒ Unstructured
Frame length 255 Maximum length L (control direction) 255 Maximum length L (monitor direction) 5 - repetitions Time during which repetitions are permitted (Trp) or number of repetitions	

When using an unbalanced link layer, the following ASDU types are returned in class 2 messages (low priority) with the indicated causes of transmission:

☐ The standard assignment of ASDUs to class 2 messages is used as follows:

Type identification	Cause of transmission

☒ A special assignment of ASDUs to class 2 messages is used as follows:

Type identification	Cause of transmission
1, 3, 11, 13, 15, 30, 31, 35, 36,37	<3>

~~NOTE: In response to a class 2 poll, a controlled station may respond with class 1 data when there is no class 2 data available.~~

5. Application layer

Transmission mode for application data Mode 1 (least significant octet first), as defined in 4.10 of IEC 60870-5-4, is used exclusively in this companion standard.

Common address of ASDU

(system-specific parameter, all configurations that are used are to be marked with an X).

IEC 60870-5-101
☒ One octet
☒ Two octets

Information object address

(system-specific parameter, all configurations that are used are to be marked with an X).

IEC 60870-5-101			
☐	One octet	☒	Structured
☒	Two octets	☒	Unstructured
☒	Three octets		

Cause of transmission

(system-specific parameter, all configurations that are used are to be marked with an X).

IEC 60870-5-101			
☒	One octet	☒	Two octets (with originator address)

Originator address is set to zero if not used

Selection of standard ASDUs

Process information in monitor direction

Type identification and cause of transmission assignments

((station-specific parameters).

IEC 60870-5-101																
Type identification		Cause of transmission														
		1	2	3	4	5	6	7	8	9	10	11	12	13	20-36	37-41	44-47
<1>	M_SP_NA_1			X											X		
~~<2>~~	~~M_SP_TA_1~~																
<3>	M_DP_NA_1																
~~<4>~~	~~M_DP_TA_1~~																

IEC 60870-5-101																	
Type identification		Cause of transmission															
		1	2	3	4	5	6	7	8	9	10	11	12	13	20-36	37-41	44-47
<5>	M_ST_NA_1																
~~<6>~~	~~M_ST_TA_1~~																
<7>	M_BO_NA_1																
~~<8>~~	~~M_BO_TA_1~~																
<9>	M_ME_NA_1																
~~<10>~~	~~M_ME_TA_1~~																
<11>	M_ME_NB_1			X											X		
~~<12>~~	~~M_ME_TB_1~~																
<13>	M_ME_NC_1																
~~<14>~~	~~M_ME_TC_1~~																
<15>	M_IT_NA_1																
~~<16>~~	~~M_IT_TA_1~~																
~~<17>~~	~~M_EP_TA_1~~																
~~<18>~~	~~M_EP_TB_1~~																
~~<19>~~	~~M_EP_TC_1~~																
<20>	M_PS_NA_1																
<21>	M_ME_ND_1																
<30>	M_SP_TB_1			X													
<31>	M_DP_TB_1																
<32>	M_ST_TB_1																
<33>	M_BO_TB_1																
<34>	M_ME_TD_1																
<35>	M_ME_TE_1			X													
<36>	M_ME_TF_1																
<37>	M_ME_TF_1																
<38>	M_EP_TD_1																
<39>	M_IT_TB_1																
<40>	M_EP_TD_1																
<45>	C_SC_NA_1						R	R	R	R	R						R
<46>	C_DC_NA_1						R	R	R	R	R						R
<47>	C_RC_NA_1																
<48>	C_SE_NA_1																
<49>	C_SE_NB_1																
<50>	C_SE_NC_1																
<51>	C_BO_NA_1																
<70>	M_EI_NA_1																
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<101>	C_CI_NA_1						R	R			R						
<102>	C_RD_NA_1					R											R
<103>	C_CS_NA_1						R	R									R
~~<104>~~	~~C_TS_NA_1~~																
<105>	C_RP_NA_1																
~~<106>~~	~~C_CD_NA_1~~																
<110>	P_ME_NA_1																
<111>	P_ME_NB_1																
<112>	P_ME_NC_1																
<113>	P_AC_NA_1																
<120>	F_FR_NA_1													X			
<121>	F_SR_NA_1													X			
<122>	F_SC_NA_1													X			
<123>	F_LS_NA_1													X			

IEC 60870-5-101																
Type identification		Cause of transmission														
		1	2	3	4	5	6	7	8	9	10	11	12	13	20-36	37-41	44-47
<124>	F_AF_NA_1													X			
<125>	F_CG_NA_1													X			
<126>	F_DR_TA_1																

6. Basic application functions

Station initialization

☐ Remote initialization

Cyclic data transmission

|X| Cyclic data transmission

Read procedure

☐ Read procedure

Spontaneous transmission

|×| Spontaneous transmission

Double transmission of information objects with cause of transmission spontaneous

(station-specific parameter, mark each information type with an “X” where both a type ID without time and corresponding type ID with time are issued in response to a single spontaneous change of a monitored object) The following type identifications may be transmitted in succession caused by a single status change of an information object. The particular information object addresses for which double transmission is enabled are defined in a project-specific list.

☐ Single-point information M_SP_NA_1, M_SP_TA_1, M_SP_TB_1,

M_PS_NA_1

☐ Double-point information M_DP_NA_1, M_DP TA 1, M_DP_TB_1

☐ Step position information M_ST_NA_1, M_ST_TA_1, M_ST_TB_1

☐ Bitstring of 32 bit M_BO_NA_1, M_BO_TA_1, M_BO_TB_1 (if defined for a specific project, see 7.2.1.1)

☐ Measured value, normalized value M_ME_NA_1, M_ME_TA_1, M_ME_ND_1, M_ME_TD_1

☐ Measured value, scaled value M_ME_NB_1, M_ME_TB_1, M_ME_TE_1

☐ Measured value, short floating point number M_ME_NC_1, M_ME_TC_1, M_ME_TF_1

Station interrogation

|X| – Global

|X| – Group 1 ☐ – Group 7 ☐ – Group 13

☐ – Group 2 ☐ – Group 8 ☐ – Group 14

☐ – Group 3 ☐ – Group 9 ☐ – Group 15

☐ – Group 4
☐ – Group 5
☐ – Group 6
☐ – Group 10
☐ – Group 11
☐ – Group 12
☐ – Group 16
☐ – Information object addresses assigned to each group are configurable

Clock synchronization

R – Clock synchronization

Command transmission

X Direct command transmission

☐ Direct set point command transmission

X Select and execute command

☐ Select and execute set point command

☐ C_SE ACTTERM used

☐ No additional definition

X Short-pulse duration (1 sec.)
X Long-pulse duration (1 sec.)
X Persistent output (255 sec.)

Transmission of integrated totals

☐ Mode A: local freeze with spontaneous transmission

☐ Mode B: local freeze with counter interrogation

☐ Mode C: freeze and transmit by counter interrogation commands

☐ Mode D: freeze by counter-interrogation command, frozen values reported spontaneously

☐ Counter read

☐ Counter freeze without reset

☐ Counter freeze with reset

☐ Counter reset

R – Clock synchronization
R – Request counter group 1

☐ Request counter group 2

☐ Request counter group 3

☐ Request counter group 4

Parameter loading

☐ Threshold value

☐ Smoothing factor

☐ Low limit for transmission of measured value

☐ High limit for transmission of measured

Parameter activation

☐ Act/deact of persistent cyclic or periodic transmission of the addressed object

Test procedure

☐ Test procedure

File transfer

File transfer in monitor direction

|X| Transparent file

☐ Transmission of disturbance data of protection equipmen

☐ Transmission of sequences of events

☐ Transmission of sequences of recorded analogue values

File transfer in control direction

☐ Transparent file

Background scan

|X| Background scan

Appendix C. IO100: Modbus

About Modbus

Modbus (Schneider Electric trademark) is a serial communications protocol. Full description see on www.modbus.org. This protocol is used for data communication via RS-485 or Ethernet interfaces.

Address

Available addresses of IO100 from 01 to 254 (h01-hFE). h00 and hFF are multicast addresses. Any device in network responds to the request with address h00. Any device in network execute only writing command to the request with address hFF.

Available function codes

h01 read coil;

h05 write single coil;

h14 read file record

h15 force multiple coils;

Service function codes

h64 service read;

h65 service write.

Exception codes

01 – illegal function

02 – illegal data address

03 – illegal data value

04 – slave device failure

Discrete (digital)

Discrete addresses range is 0 to 59999. You can change the addressing of values using ConfigTool.

Any DIO is configured independently.

Default configuration:

Adress	**IO100-**	
	24/0	**6/3R**
Function code 01 – read coils (DI, DO); Function code 05 – write single coil (DO)		
0	DI1	DI1
1	DI2	DI2
2	DI3	DI3
3	DI4	DI4
4	DI5	DI5
5	DI6	DI6
6	DI7	DO1
7	DI8	DO2

Adress	**IO100-**	
	24/0	**6/3R**
Function code 01 – read coils (DI, DO); Function code 05 – write single coil (DO)		
8	DI9	DO3
9	DI10	
10	DI11	
11	DI12	
12	DI13	
13	DI14	
14	DI15	
15	DI16	
16	DI17	
17	DI18	
18	DI19	
19	DI20	
20	DI21	
21	DI22	
22	DI23	
23	DI24	

Function code	Command text	Description
01 hex	Read coils	Reads the status of single bit(s) in a slave
05 hex	Write single coil	Writes a single on/off bit

Request example for function code 1 if IO100 have slave address 1, DIO requested from 2 to 13

Slave address	Function code	Data address of the first coil		Number of coil		CRC	
01	01	00	01	00	0C	9D	CF

Answer example

01	01	02	00	51	78

Second and third byte describe DIO status

byte	02								00							
bit	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
DIO	9	8	7	6	5	4	3	2					13	12	11	10