Connecting devices to iCex ICX-T245/255
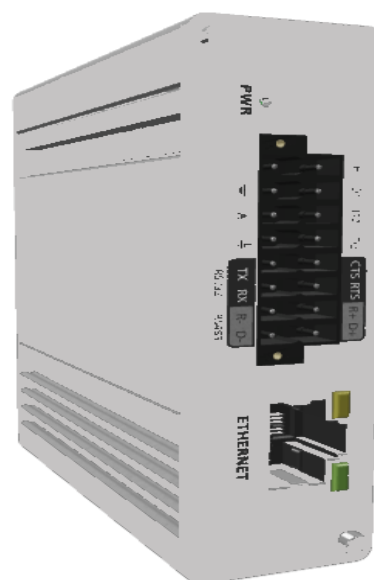
V1.0

1. Preliminary

iCex supports the following physical interface:

- Ethernet (LAN) port
- RS232 port
- RS 422/485 port
- Analog input – 0 – 30.000 V
- Digital inputs (sink/PNP; logic can be reverted via software)

Note: RS232 and RS422/485 can be used simultaneously.

Different devices can be connected to iCex via this interface, like:

- PLC
- Smart instruments
- Sensors
- Dry contacts.

Note: Before continuing with this document and starting to connect
devices to iCex, it's highly recommended to review **iCex spec** (*link*) and **Getting started** (*link*).

2. Connecting via LAN

iCex is equipped with standard LAN RJ45 10/100 Mbs/s port. Device can be connected with standard LAN cables – direct or via Switch.
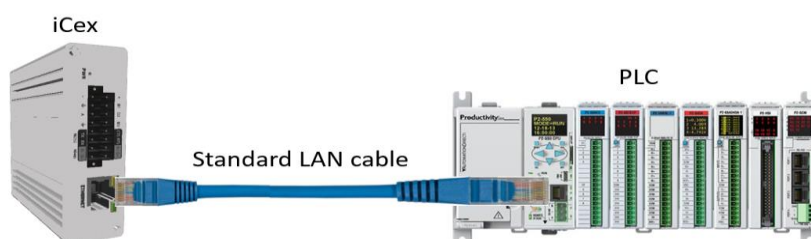

Fig. 1 Connect direct iCex to device (PLC) via Ethernet

Fig. 2 Connecting multiple devices (PLC) to iCex via Ethernet Switch

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3. Connecting via RS232

RS232 is pear to pear connection. Only one device can be connected at a time to iCex.
iCex supports the following basic RS232 signals:

- TX – Data Transmit
- RX – Data receive
- SG – Signal ground

And additional signals for hardware flow control:

- CTS – Clear to send
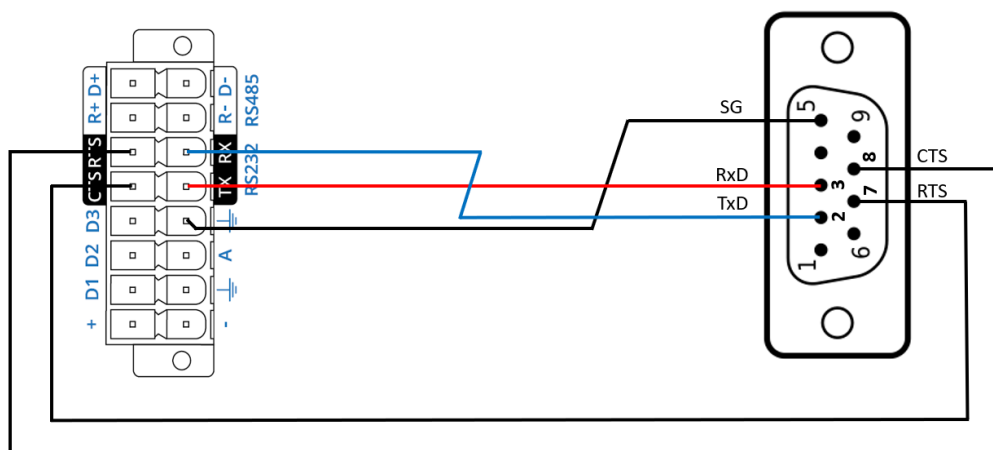- RTS – Request to send

Fig. 3 RS232 connection between iCex (left) and device (right)

> **Note**: Most of today's devices with RS232 interface support only basic signals TX (TxD), RX (RxD) and SG. In this case CTS and RTS need to remain unconnected.

4. Connecting via RS485

iCex supports full-duplex (4 wires) RS485 connection - R+ (RX+); D+ (TX+); R- (RX-) and D- (TX-). It enables also connecting to devices, supporting half-duplex and equipped with 2 wires RS485 (Tx/Rx+, stated often as A and Tx/Rx-, often stated as B).
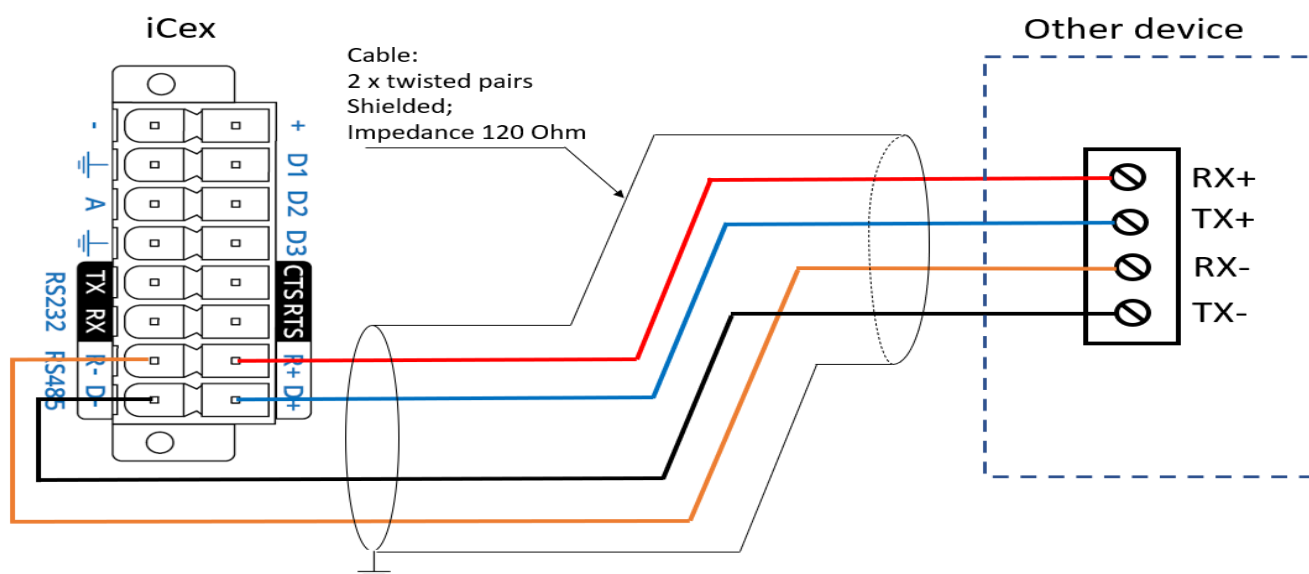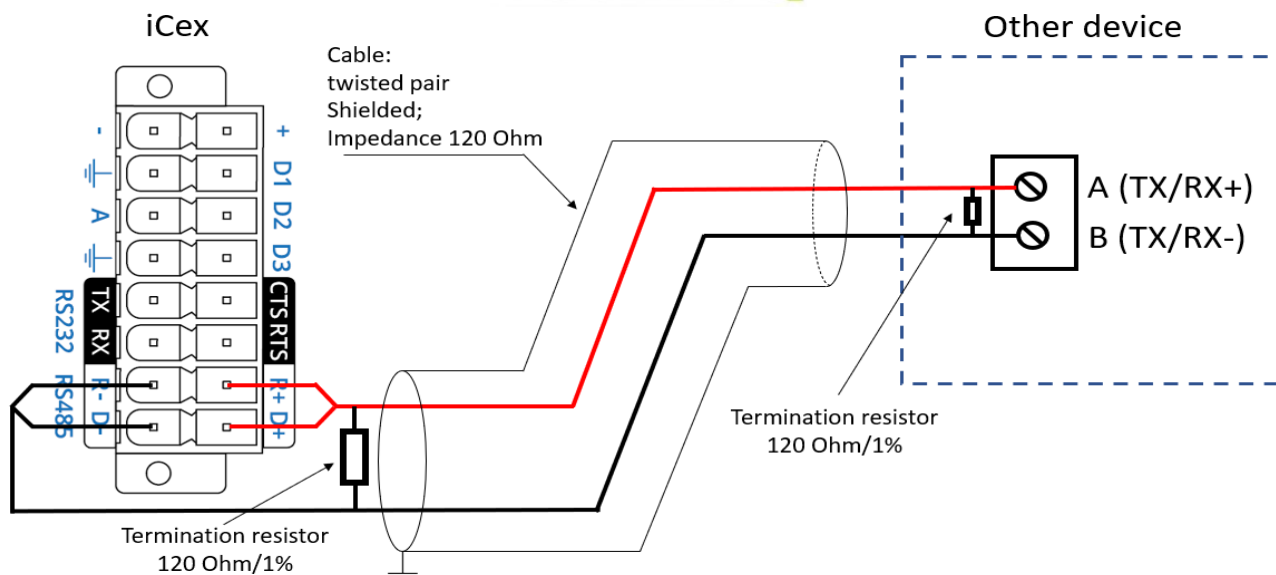

Fig. 4 RS485 4-wire connection to one device

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Fig. 5 RS485 2-wire connection to one device

> **Notes**:
> - **RS485 requires daisy chain network topology**. Cable needs to go strictly from device to device. Star topology is not allowed. Junction boxes/stubs are strongly not recommended.
> - **Termination** needs to be applied at both ends of the **cable**. In iCex side there needs to be precise resistor (1% or less) with the same value as the impedance of the cable (see Fig. 5). Usually it's 120 Ohms. For termination in other devices at the end of the cable check other devices user manuals. If nothing special is stated, use the same termination as in iCex.

5. Connecting built in digital I/O

iCex has built in 3 digital I/O and one analog input.
Digital inputs are sink (PNP) type. Signal 0 – 6 V is logic low and 8 – 30 V – logic high.
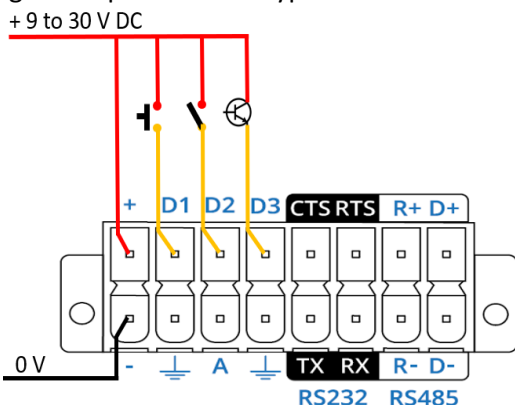Digital outputs are sink type.
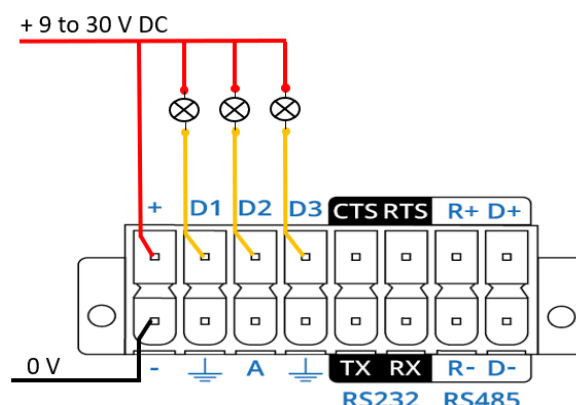

Fig. 6 Connecting D1, D2 and D3 as **inputs**

Fig. 7 Connecting D1, D2 and D3 as **outputs**

> **Note:**
> - Each one of D1, D2 and D3 can be set separately as DI or DO via iCex UI → Status tab

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6. Connecting built in analog input

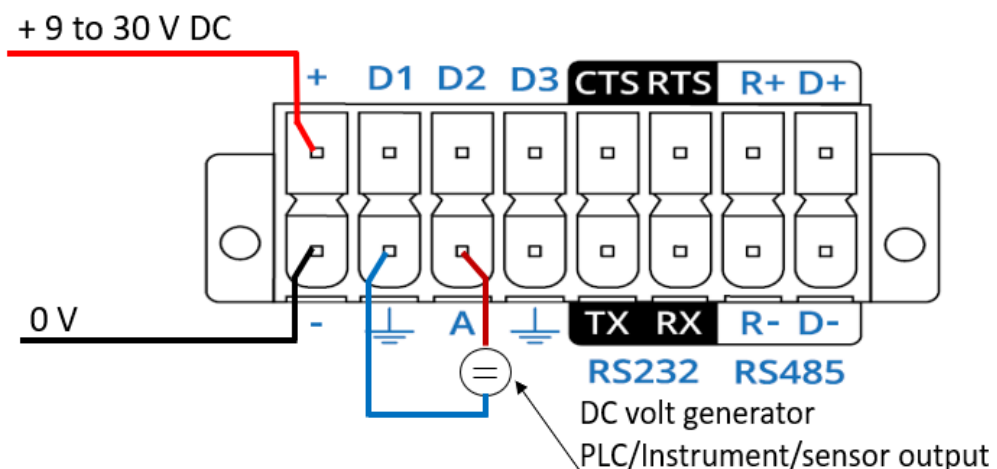Analog input measures volts DC in range 0.000V – 30.000 V

Fig. 8 Connecting analog input

7. Connecting additional I/O

If built in I/O are not enough, more digital and analog I/O can be added via third party I/O modules. Usually such modules have serial (RS485) or Ethernet interface and support Modbus RTU, respectively Modbus TCP protocol.
There are 3 most popular ways to connect third party I/O modules to iCex:
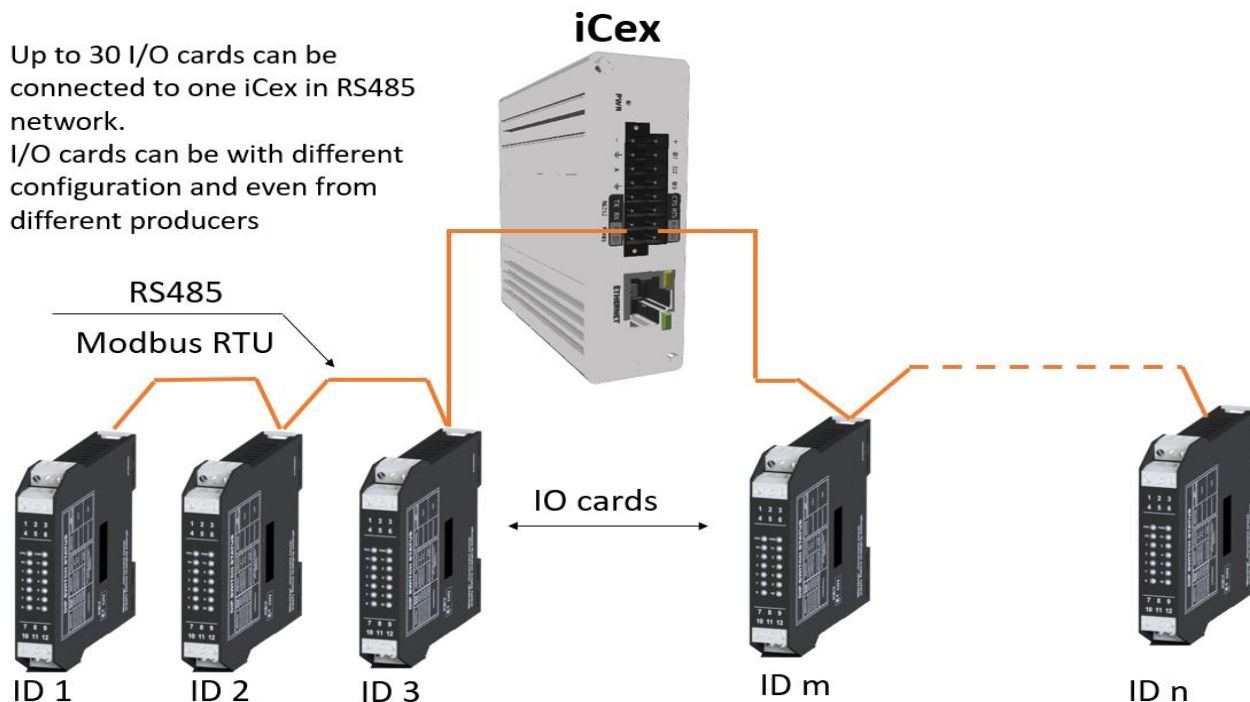
- **Via RS485/Modbus RTU**

Fig. 9 Connecting third party I/O card to iCex via RS485/Modbus RTU

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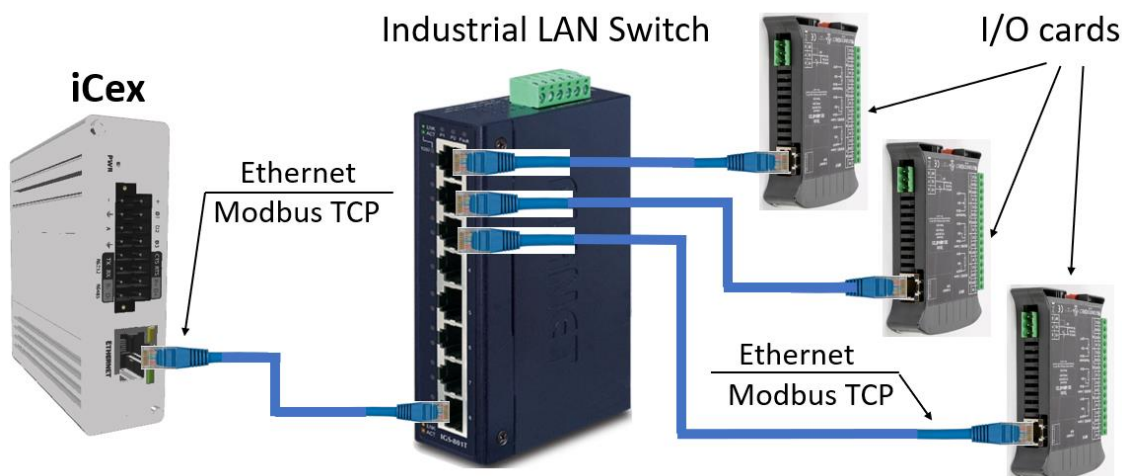
- **Via Ethernet/Modbus TCP**

Fig. 10 Connecting third party I/O card to iCex via Ethernet/Modbus TCP

Multiple I/O cards can be connected to one iCex via Ethernet/Modbus TCP. Cards can be with different I/O and even from different producers

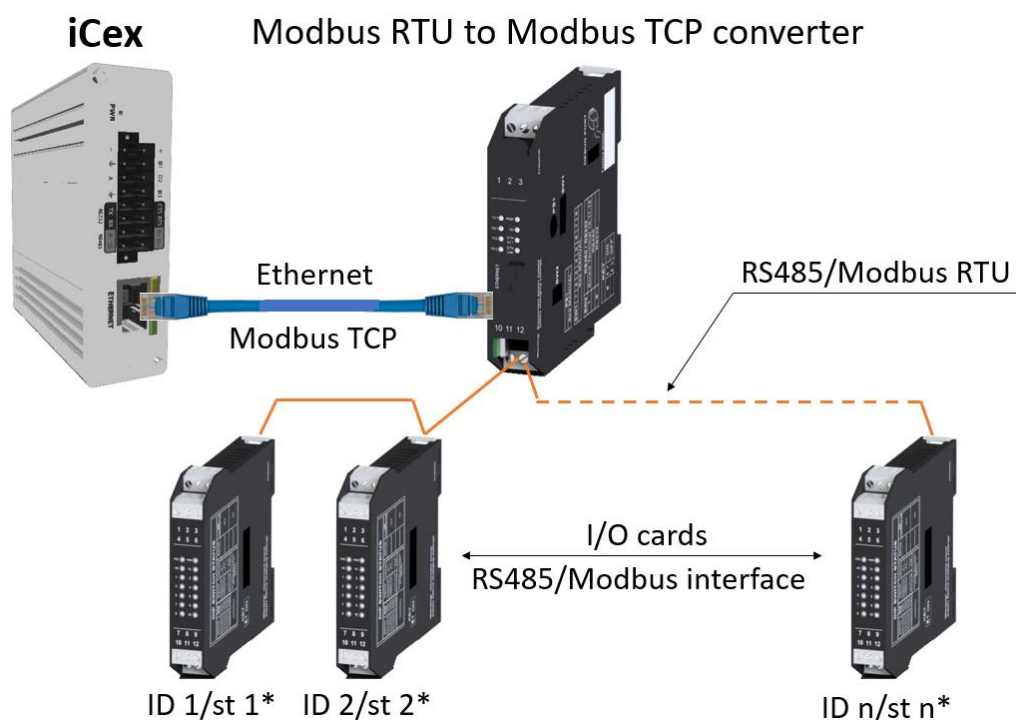- **Via Modbus RTU to Modbus TCP converter**

Fig. 11 Connecting third party I/O card to iCex via Modbus RTU/TCP converter

> * In iCex/Driver tab check **RTU to TCP** option. In Project tree define groups with name **/st n**, where **n** is ID of relevant I/O card

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