7XV5673
I/O-Unit with 6 Binary In-/Outputs

Fig. 13/52
7XV5673 I/O-Unit – binary I/O mirror, -binary I/O expansion, -contact multiplier

Description

I/O-Unit 7XV5673 is a binary input/output device and is designed for substations and increased industrial environment requirements. The I/O-Unit allows the transmission of binary inputs to binary outputs locally or via long distances. It can be used for protection applications, e.g. overcurrent protection, signal comparison, teleprotection or as I/O-expansion in substation automation systems.

Function

Via binary inputs, all kinds of binary signals of switchgear/ protection scheme (for example tripping commands, switch position signal, fault and status indications) are securely detected. This information can directly be distributed at this I/O-Unit via contacts, or be transmitted via communication links to further I/O-Units or to automation systems.

Secured telegrams are used for the communication via Ethernet or serial connections. The parameter setting of the I/O-Unit is simply carried out with a standard Web browser at the PC which is connected by the Ethernet interface.

The I/O-Unit can be set as:

- I/O mirror: Point-to-point transfer of binary signals between two I/O-Units via Ethernet or a serial connection. Signal inputs and outputs assignable by the user.
- I/O expansion: Expansion of substation controllers by binary inputs and outputs using standard protocols.
- Contact multiplier: Distribution of signals on one or several binary inputs via relay contacts of the same I/O-Unit, e.g. for isolation between different voltage levels.

Feature overview

- Binary inputs
  – 6 ruggedized EMC – hardened binary inputs
  – Pickup voltage threshold settable to 19 V DC, 88 V DC or 176 V DC for different station battery voltages
- Binary outputs
  – 6 command relay outputs
  – Safe state of contacts after loss of connection settable by the user
- Signal/Alarm outputs
  – 4 LED
- Wide-range power supply
  – 24-250 V DC +/- 20 % and 100-230 V AC 45-65 Hz
- Electrical RJ45 Ethernet interface
  – Cascading many devices without additional costs by the use of the integrated switch
- Serial fiber-optic interface (optional)
  – ST-connector, 820 nm for multi-mode fiber 62.5/ 125 μm, typical range 2000 m using fiber 62.5 μm/125 μm, baud rate 1.2 kBit/s – 187.5 kBit/s settable per software
- Serial RS485-interface (optional) Sub-D plug, 9-pole female
- Protocols, communication
  – MODBUS TCP or MODBUS RTU for connection to a substation controller
  – MODBUS UDP for point-to-point connections between two I/O-Units
  – SNTP for time synchronization
  – IEC 61850* (GOOSE and Reporting)
- Housing IP20 rail mounting
- Standards CE, UL, IEC 60255, IEEE 61000 ...
- Environmental conditions
  – EMC hardened binary I/O for substation environment
  – Extended high temperature range up to 85 °C (16 h/day).

13

SIEMENS
siemens-russia.com

Operation features

- Easy parameterization with a standard Internet browser (no special software required)
- Password protection against unauthorized access
- Monitoring of data errors, loss of connection, transfer time and the state of BI, BO.
- Time synchronization with SNTP-Protocol with 1 ms resolution from an external time server over Ethernet. Redundant time servers are supported
- Buffer battery changeable from the front
- Fast I/O mirror: Fast transmission time from BI pickup to contact closing between two I/O-Units typically 11 ms for high bandwidth connection
- Connection to a substation controller over MODBUS TCP, MODBUS RTU or IEC 61850 protocol *
- Blocking of data transmission with a binary input for testing
- Battery buffered operational event log with 1 ms resolution time stamp
- Assignment of BI / BO signals which shall be logged into the operational buffer
- Integration into network management systems with SNMP – protocol and provided MIB – files.
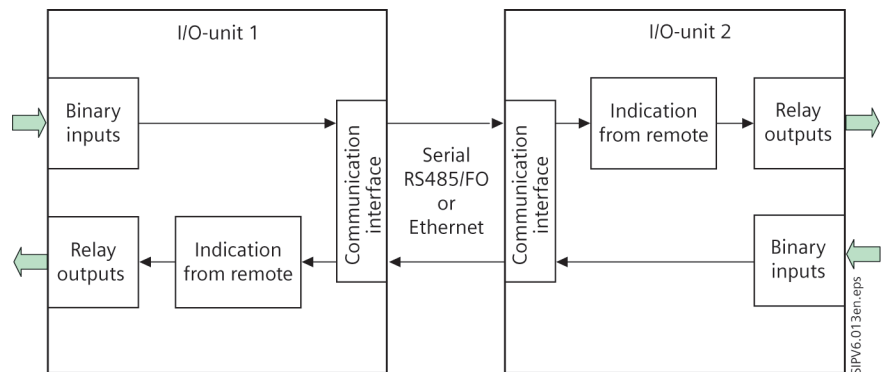

Fig. 13/53 I/O mirror, bi-directional transmission between two devices

Application

I/O mirror function

When using the I/O-Units as I/O mirror according to Fig. 13/53, the devices transmits the binary signals bi-directional. The transmission takes place between the two devices over serial links (option) or over Ethernet networks.

Via the relay output contacts voltages up to 250 V AC/DC and currents up to 5 A AC/DC can be switched. The pick threshold of the binary inputs can be set by the user on different levels.

Signal inputs and outputs can be assigned by the user.

Extension of the transmission distance

An extension of the transmission distance is possible. The following devices can be used:

- With serial optical repeater 7XV5461 scalable up to 170 km
- RS485-FO Converter 7XV5650 for cascading devices
- With different communication converters.

---

* In preparation

SIEMENS
siemens-russia.com

Application

Uni-directional binary signal transmission

When using the I/O-Units for uni-directional binary signal transmission according to Fig. 13/54, the devices transfer binary signals unidirectional from one device to several devices. In this application, the transmission only takes place in one direction. Input signals (max. 6) from the left unit are sending to output contacts of one or more units on the right side.
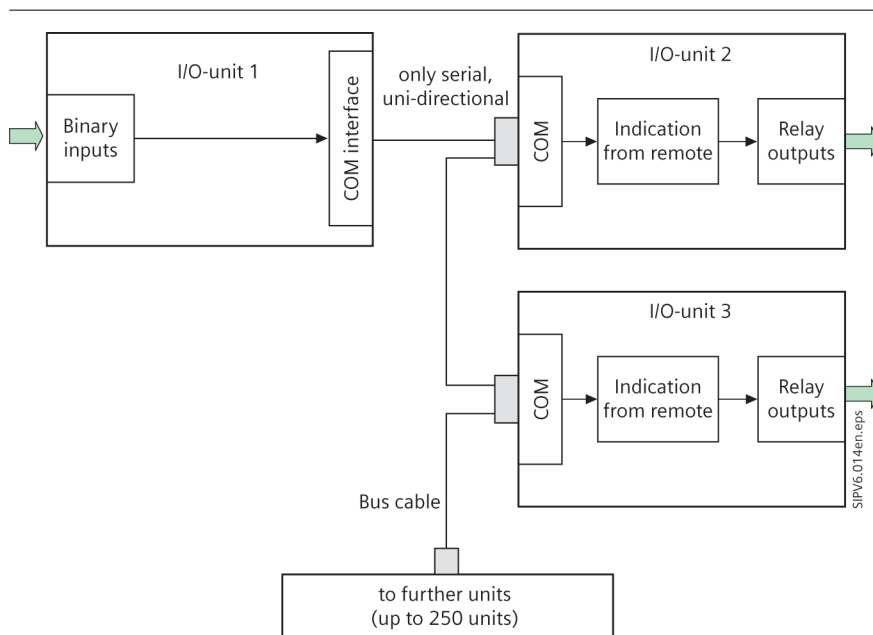

Fig. 13/54 I/O mirror, uni-directional transmission from one to multiple I/O-Units

I/O expansion of a substation controller

The I/O-Unit is used as I/O expansion, according to Fig. 13/55. Binary signals are exchanged between a substation controller (e.g. SICAM PAS) and the I/O-Units by using the MODBUS TCP protocol over an Ethernet network. If the integrated switch in the I/O-Unit is used, the units can be operated in a line without using additional external switches as shown in Fig. 13/85. Also IEC 61850 client server communication will be provided in future.
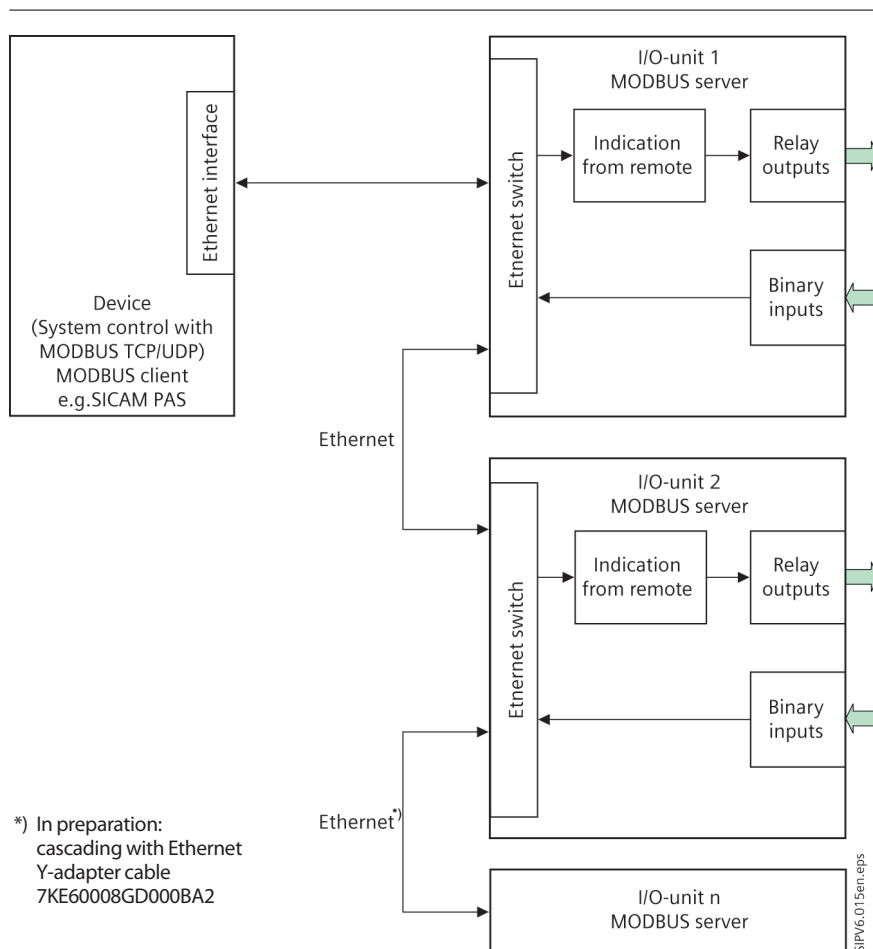
*) In preparation: cascading with Ethernet Y-adapter cable 7KE60008GD000BA2

Fig. 13/55 I/O expansion of a substation controller with binary inputs and outputs

Application

Instead of using an Ethernet network there is also the option of serial connection with MODBUS RTU protocol. The link can be done by a RS485-bus line structure or an optical star network.
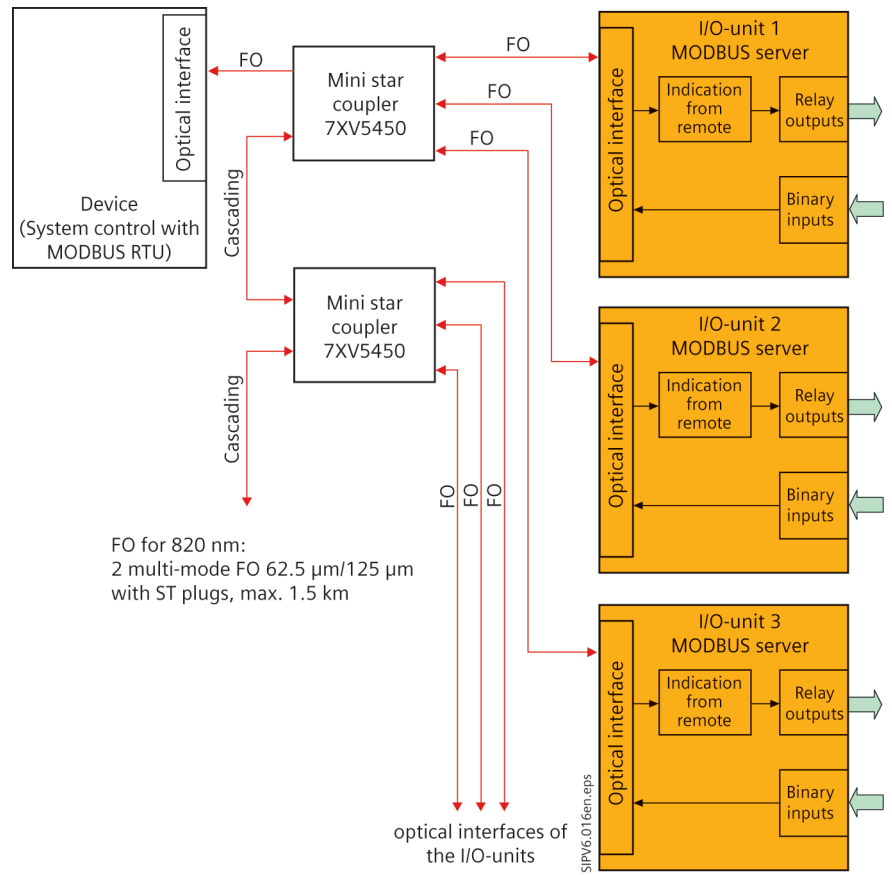

Fig. 13/56 I/O expansion for the connection to substation controller using a serial optical star topology

Application

Contact multiplier

Input signals on one or more binary inputs can be assigned to binary outputs of the local device (Fig. 13/57)

- 1 binary signal on up to 6 relay outputs
- Several binary signals to several relay outputs assignable by the user
- Different voltage levels for inputs and outputs in a wide voltage range to isolate between different voltage levels.
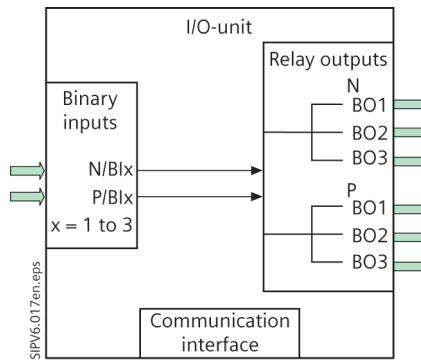

Fig. 13/57 Contact multiplier

Applications for remote transmission of binary signals

Binary signal transmission via communication networks using a G.703.1/X.21 interface

The picture shows the optical connection of an I/O-Unit to a communication converter (KU-XG) 7XV5662-0AA01, which establishes a connection to a multiplexer with G.703.1 or X.21 interface. This allows the use of this communication converter to transfer the signals via communication network. The average delay time in the network and the signal quality is monitored by the I/O-Unit. Also loss of connection is indicated. In this case, the state of the binary outputs can be set by the user to a safe condition depending on the application.

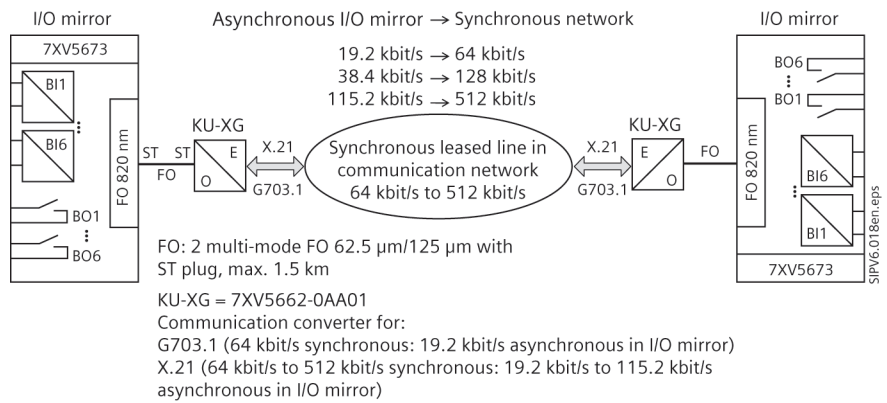A maximum of 6 binary single signals can be transmitted bi-directional via the communication network.

Fig. 13/58 Binary signal exchange over a communication converter with G.703.1/X.21 interface via a communication network

SIEMENS
siemens-russia.com

Binary signal transmission via two-wire copper cable with blocking

The picture shows the optical connection of an I/O-Unit to a communication converter 7XV5662-0AC01, which establishes a connection via pilot wire. Only one pair is necessary for bi-directional signal exchange.

An additional isolation transformer allows 20 kV isolation from the pilot wire connection.

A maximum of 6 binary single signals can be transmitted bi-directionally over the pilot wire. The additional delay caused by the transfer over the communication converter and pilot wire is less than 1 ms.

A typical application is the signal comparison of a directional overcurrent protection device via pilot wires. In this case, the definite time-overcurrent protection device is connected to the I/O-Unit via contacts and binary inputs and directional signals are transferred.
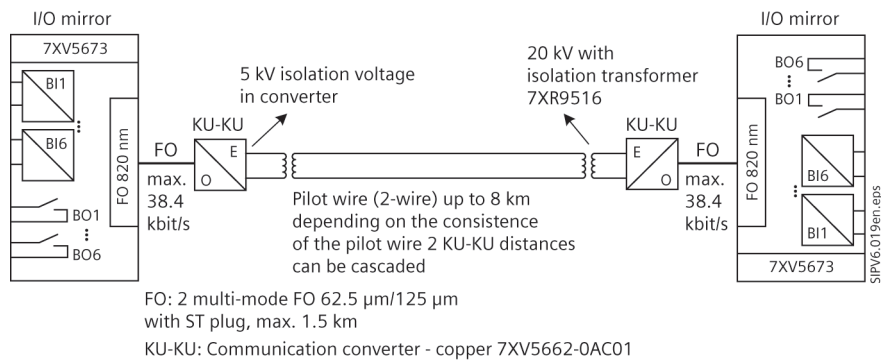

Fig. 13/59   Binary signal exchange of 6 signals via pilot wire connection

Binary signal exchange of over long fiber optic links

The figure shows the optical connection of an I/O-Unit to a serial optical repeater 7XV5461-0BX00, which establishes a connection to multi-mode or single-mode fiber cables. A max. distance of 170 km can be reached with this application without additional amplifiers.

A maximum of 12 binary signals can be exchanged via long fiber optical connections because the repeater allows connecting two I/O-Units.
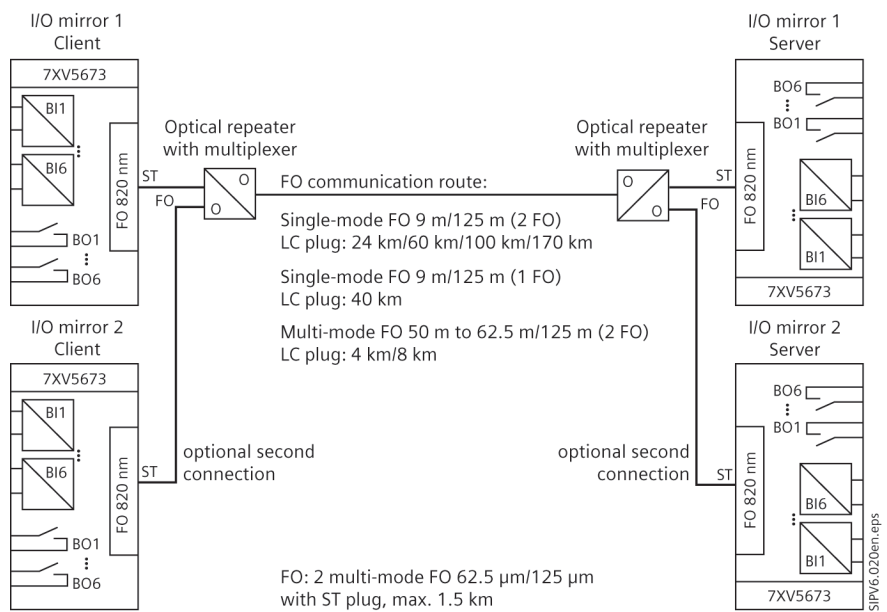

Fig. 13/60   Binary signal exchange of up to 12 signals over long fiber optic links

SIEMENS
siemens-russia.com

Application

Binary signal transmission via a communication networks using a G.703.6 interface

The figure shows the optical connection of one up to three I/O-Units to a communication converter KU-2M 7XV5662-0AD00, which establishes a connection to a multiplexer with a G.703.6 interface (1.44 kbit/s/2 Mbit/s, E1/T1).

A maximum of 18 binary single signals can be transmitted bi-directionally over the communication network. The KU-2M is provided with two optical and one electrical RS232 interface. Two I/O-Units can be directly connected by an optical cable to the KU-2M. On the RS232 interface, an additional I/O-Unit can be connected via an optoelectronic converter. Using all input interfaces (2 FO, 1 RS232) of the KU-2M, a maximum of 18 signals can be exchanged bi-directionally.

For long distance connections via Ethernet media converters or Ethernet networks can be used. The I/O-Unit supports IP – address settings and settings for a standard gateway. The electrical Ethernet interface of the I/O-Unit is connected to a media converter or switch which transfer the signals of the units over long distance Ethernet connections. The average delay time in the network is measured by the I/O-Unit.
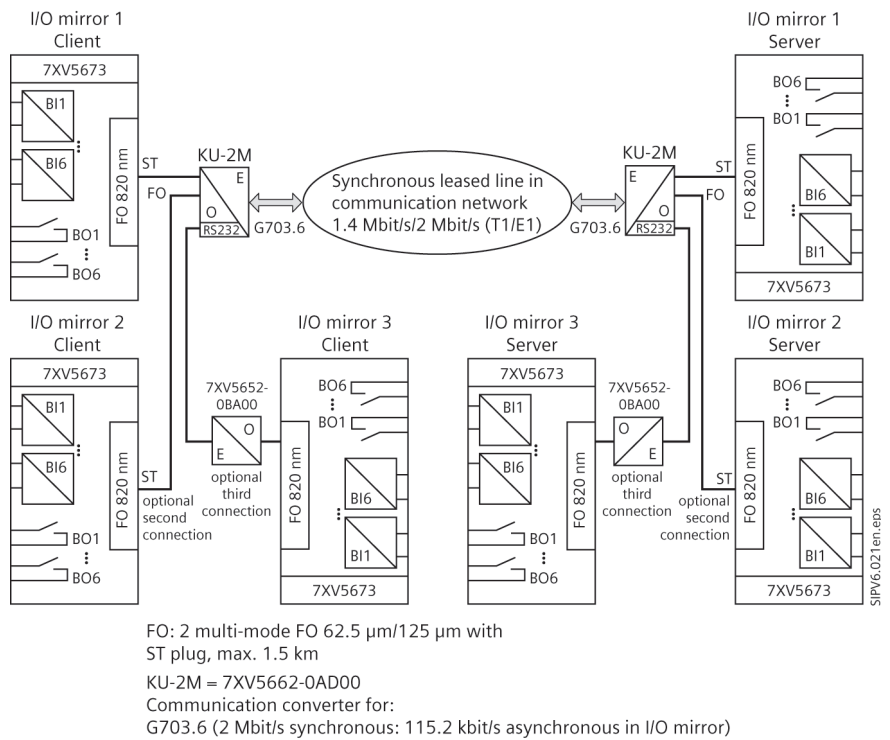

FO: 2 multi-mode FO 62.5 μm/125 μm with ST plug, max. 1.5 km

KU-2M = 7XV5662-0AD00
Communication converter for:
G703.6 (2 Mbit/s synchronous: 115.2 kbit/s asynchronous in I/O mirror)

Fig. 13/61   Binary signal exchange with G.703.6 interface via a communication network

Device configuration

The I/O-Unit is equipped with an integrated Web Server which allows easy setting using standard Internet-Browsers. Fig. 13/62 shows the User interface. All settings are done with the Browser. Also operational log and commissioning aid are supported by the Browser like the indication of the actual state of the inputs and outputs.
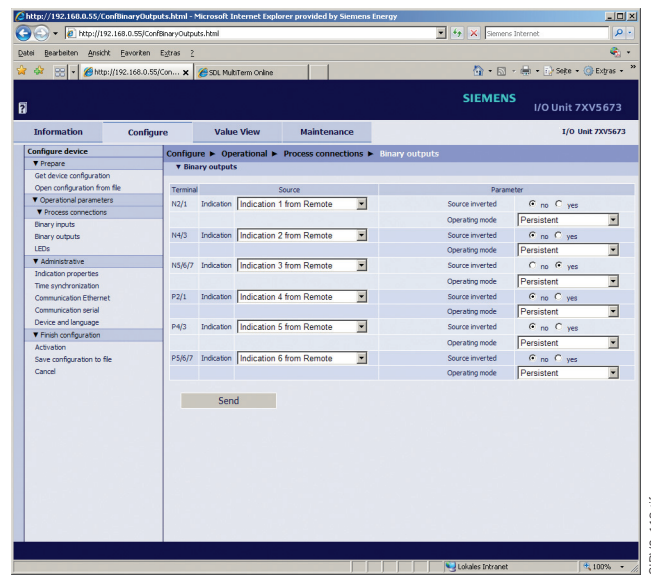

Fig. 13/62   Configuration screen of the I/O-Unit in the Browser

SIEMENS
siemens-russia.com

Description	Order No.
I/O-Unit with 6 binary in- and outputs	*7XV5673-0 J J ☐ 0 - 1 A A 1*
	↑
I/O-Unit with Ethernet interface and	
RS485-interface	*1*
optical interface	*2*

SIEMENS
siemens-russia.com