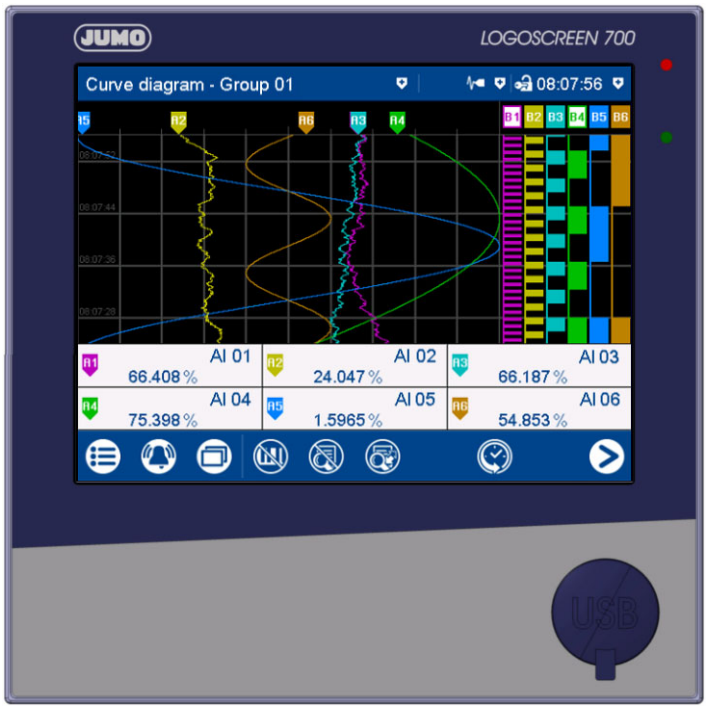
JUMO LOGOSCREEN 601/700

Paperless recorder



PROFINET interface description

70653007T92Z001K000

V2.00/EN/00710394/2021-05-06

Contents

Contents

1.1 Warning symbols

DANGER!

This symbol indicates that **personal injury from electrocution** may occur if the appropriate precautionary measures are not taken.

WARNING!

This symbol in connection with the signal word indicates that **personal injury** may occur if the respective precautionary measures are not carried out.

CAUTION!

This symbol in connection with the signal word indicates that **material damage or data loss** will occur if the respective precautionary measures are not taken.

CAUTION!

This symbol indicates that **components could be destroyed** by electrostatic discharge (ESD = Electro Static Discharge) if the respective cautionary measures are not taken.

Only use the ESD packages intended for this purpose to return device inserts, assembly groups, or assembly components.

READ THE DOCUMENTATION!

This symbol, which is attached to the device, indicates that the associated **documentation for the device** must be **observed**. This is necessary to identify the nature of the potential hazard, and to take measures to prevent it.

1.2 Note symbols

NOTE!

This symbol refers to **important information** about the product, its handling, or additional benefits.

REFERENCE!

This symbol refers to **additional information** in other sections, chapters, or other manuals.

FURTHER INFORMATION!

This symbol is used in tables and indicates that **further information** is provided after the table.

DISPOSAL!

At the end of its service life, the device and any batteries present do not belong in the trash! Please ensure that they are **disposed of** properly and in an **environmentally friendly** manner.

1 Safety information

2 Compatibility and system requirements

2.1 Certification

JUMO LOGOSCREEN 601/700

The paperless recorders JUMO LOGOSCREEN 601 and JUMO LOGOSCREEN 700 are certified to Conformance Class B (abbreviated to CC-B) and net load class "Netload Class III".

The common certificate for the JUMO LOGOSCREEN 601 and the JUMO LOGOSCREEN 700 is available for download on the Internet on the respective product page.

The following QR code or web address will take you to the product page of the JUMO LOGOSCREEN 700:

qr-706530-en.jumo.info

2.2 PROFINET IO and Ethernet standard services

The PROFINET IO communication occurs in a parameterizable time pattern (RT channel). This ensures that the IO data are transferred in real-time without being affected by Ethernet standard services. The remaining time between the RT phases (NRT channel) is used for the communication between the Ethernet standard services. Broadband bottlenecks impair the performance of the standard services. The real-time capability of the PROFINET IO communication is guaranteed by the reserved RT channel.

2.3 Requirements for hardware, software, and cabling

Network installation

Any switches used to network PROFINET IO devices must support the following standards and functions:

- 100 Mbit/s (transfer rate of the switchports)
- Auto negotiation (automatic setting of the switchport transfer rate)
- Cut through (direct relaying of the data between the switchports)

  Full duplex support for the switchports

  IEEE 802.1 Q (VLAN support for at least 4 priority classes)

The network installation must be carried out so that it is compliant with the requirements of a 100Base TX Ethernet network with cabling to CLASS D or higher. The "PROFINET Cabling and Interconnection Technology" guideline also provides information on correct cabling.

JUMO LOGOSCREEN 601/700

To use the PROFINET IO with JUMO LOGOSCREEN 601 or JUMO LOGOSCREEN 700, the device must meet the following minimum requirements:

- Device software version 323.03.03 or higher
- Hardware compatibility index 5 or higher
- Network interface card PROFINET IO device (incl. Ethernet)

The information can be displayed and reviewed with the aid of the device menu.

Open device software version:

2 Compatibility and system requirements

Main menu > Device info > Versions > Mainboard: CPU-Board > SW-Version

Open hardware compatibility index:

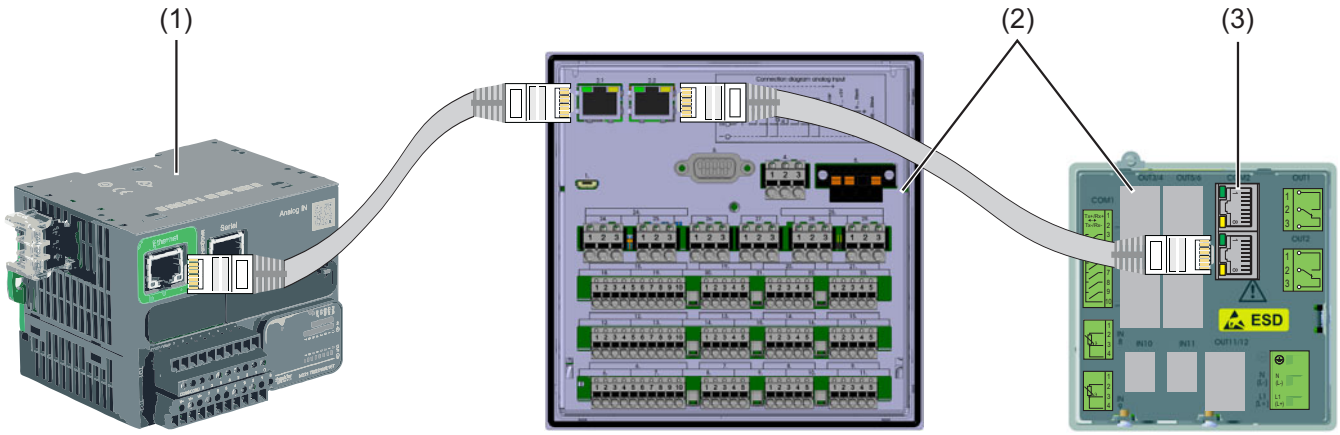
Main menu > Device info > Versions > Mainboard: CPU-Board > HW-Compatibility index

Open network interface card:

Main menu > Device info > Versions > Network interface card > Type

Cabling

JUMO field devices with PROFINET IO interface have two Ethernet switchports. Additional field devices, IO controllers, an IO supervisor (programming device and/or PC for project planning) or other Ethernet components such as switches, routers etc. can be connected to each Ethernet switchport on the device.

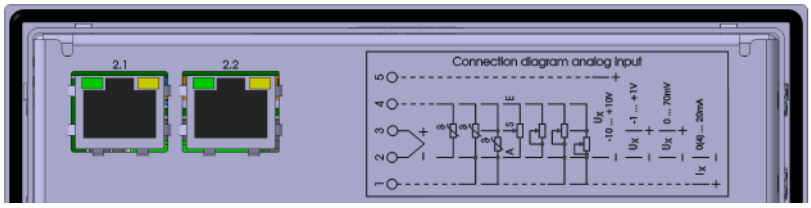


(1) PROFINET IO controller (PLC, control station PC or similar)
(2) JUMO PROFINET IO devices
(3) free Ethernet port (e.g. for additional PROFINET IO devices)

NOTE!

The cyclical data exchange with JUMO PROFINET IO devices is based on the RT protocol (Conformance Class B). PROFINET RT communication cannot be routed. It is thus necessary that the PROFINET IO controller and the IO devices be in a common broadcast domain (not connected via a router). Ethernet standard services (webserver, access via JUMO PC setup program/PCA/PCC and e-mail function) and NRT communication (e.g. project planning on the IO supervisor, system boot, noncyclical data, etc.) function via routers as before.

JUMO LOGOSCREEN 601/700



2.1, 2.2 PROFINET IO device interface (including Ethernet; extra code)
2.1 = port 2; 2.2 = port 1

3 Electrical connection

4.1 General information

The GSDML file of the JUMO field device contains all the information required to provide your PLC engineering system with the PROFINET IO functionality. The file must be imported into the engineering system so that the field device is available here for project planning. After the import, the field device and its IO functions can be integrated into the programming of your PLC projects.

4.2 Module description

4.2.1 Module concept

The configuration of the IO data of JUMO field devices to be transferred via the PROFINET IO is defined by the PROFINET modules of the device software.

The "DeviceStatusBlock" module of JUMO field devices has a defined configuration and cannot be changed. It contains a range of cyclical IO data on the device status and the PROFINET start-up parameters for the JUMO field device concerned. In the project structure of the IO controller, this module is always located in Slot 1 of JUMO IO devices. It cannot be relocated or removed.

The JUMO PC setup program can be used to create additional modules in the module configuration of the device concerned. This involves device data being selected from the selectors in the JUMO field device and assigned to the corresponding IO items in the modules. The PC setup program can be used to print the finished module configuration as a basis for the project planning of the IO controller. In the project configuration of the IO controller, the modules to be transferred via the PROFINET-IO have to be assigned to the free slots of the JUMO IO device in the project structure of the IO controller. The IO items of the inserted modules are then available for the programming of the IO controller. The assignment of the JUMO field device data to the IO items of the individual modules is provided for the programmer in the printed module configuration list.

⇨ chapter 6 "Project planning", Page 31

4.2.2 Modules

CAUTION!

All temperature values of the JUMO IO device are transferred in the unit "°C".

Misinterpretation of measured values of a JUMO IO device in the IO controller can cause errors in the system control.

▶ Note the unit for the transferred temperature values!

4 The GSDML file

"DeviceStatusBlock" module of the JUMO LOGOSCREEN 601/700

The "DeviceStatusBlock" module of JUMO IO devices has a defined configuration and cannot be changed. It contains a range of cyclical IO data on the device status and the PROFINET start-up parameters. The IO controller is only able to read the data of this module. The tables below list the data in the "DeviceStatusBlock" module of the JUMO LOGOSCREEN 601/700.

Cyclical IO data, DeviceStatusBlock

IO item	Type	Bit item	Bit address	Explanation
Sub-module 1				
Status bits 1	USINT (bit field)	Collective alarm	0	Alarms and internal signals
		Collective alarm acknowledged	1	
		Memory alarm	2	
		Logon	3	
		Malfunction	4	
		Fieldbus error	5	
		Pre-alarm battery	6	
		Battery empty	7	
Status bits 2	USINT (bit field)	External USB inserted	0	Internal signals, status signals
		Temperature in °F	1	
		Status of relay 1	2	
		Batch 1 active	3	
		Reserved	4	
		Reserved	5	
		Reserved	6	
		Reserved	7	
Analog input 1	REAL	–	–	Analog input signals
Analog input 2	REAL	–	–	
Analog input 3	REAL	–	–	
Analog output 1	REAL	–	–	Analog output signals
Analog output 2	REAL	–	–	
Analog output 3	REAL	–	–	
Digital inputs 1 to 8	USINT (bit field)	Digital input 1	0	Binary input signals
		Digital input 2	1	
		Digital input 3	2	
		Digital input 4	3	
		Digital input 5	4	
		Digital input 6	5	
		Digital input 7	6	
		Digital input 8	7	

Cyclical IO data, DeviceStatusBlock

IO item	Type	Bit item	Bit address	Explanation
Digital inputs/outputs 1 to 8	USINT (bit field)	Digital input/output 1	0	Binary input/output signals
		Digital input/output 2	1	
		Digital input/output 3	2	
		Digital input/output 4	3	
		Digital input/output 5	4	
		Digital input/output 6	5	
		Digital input/output 7	6	
		Digital input/output 8	7	
Relays 2 to 7, Limit value monitoring 1 and 2	USINT (bit field)	Status of relay 2	0	Status signals
		Status of relay 3	1	
		Status of relay 4	2	
		Status of relay 5	3	
		Status of relay 6	4	
		Status of relay 7	5	
		Status of limit value monit. 1	6	
		Status of limit value monit. 2	7	
Limit value monitoring 3 to 10	USINT (bit field)	Status of limit value monit. 3	0	Status signals
		Status of limit value monit. 4	1	
		Status of limit value monit. 5	2	
		Status of limit value monit. 6	3	
		Status of limit value monit. 7	4	
		Status of limit value monit. 8	5	
		Status of limit value monit. 9	6	
		Status of limit value monit. 10	7	
Empty byte	USINT	–	–	Not used

DeviceStatusBlock start-up parameter

Parameter	Type	Values	Explanation
Byte sequence for cyclical data	Bit	0 (Big Endian) 1 (Little Endian)	Selection of byte sequence for transferred cyclical data The byte sequence to be set is specified by the IO controller.
Byte sequence for noncyclical data	Bit	0 (Big Endian) 1 (Little Endian)	Selection of byte sequence for transferred noncyclical data The byte sequence to be set is specified by the IO controller.
IOPS handling	Bit	0 (OFF) 1 (ON)	Handling of the IOPS status via the IO device **0 (OFF):** The IOPS status of the relevant IO device slot is valid following successful system boot and no longer depends on the validity of the input data. The validity check of the input values must be implemented in the IO controller if necessary. **1 (ON):** The IOPS status of the respective IO device slot communicates to the IO controller the validity status of the input values following successful system boot. If the IOPS status is valid, all values of the slot are valid. If at least 1 invalid input value occurs in the slot concerned, the IOPS status is likewise set to invalid. In case of invalid float values (REAL type), JUMO field devices map an error code in the transferred input values. As a result, the error number rather than the input value is contained. ⇨ chapter 7.1 "Error messages for invalid values", Page 41

Configurable modules of the JUMO LOGOSCREEN 601/700

The configurable modules are intended exclusively for transferring cyclical IO data. The assignment of the modules can be compiled and printed via the PC setup program of the JUMO LOGOSCREEN 601/700. The printed list will help you maintain an overview of the configured modules of the JUMO IO device during the project planning and programming of the IO controller (PLC, host PC or similar).

⇨ chapter 4.2.2 "Modules", Page 11

The JUMO LOGOSCREEN 601/700 supports up to 10 slots in total (9 configurable slots + DeviceStatusBlock) in the device and 10 slots in the IO controller project. The possible types of configurable modules are listed in the table below.

Module types (from the point of view of the IO controller)	IO items	Data type	Data direction IO controller
Analog input values	Analog values 1 to 16	REAL	read
Analog output values	Analog values 1 to 8	REAL	write
Analog output values	Analog values 1 to 16	REAL	write
Digital input values	Digital values 1 to 32	BOOL	read
Digital output values	Digital values 1 to 8	BOOL	write
Digital output values	Digital values 1 to 32	BOOL	write
Integer values (not supported)			

4 The GSDML file

CAUTION!

All temperature values of the JUMO IO device are transferred in the unit "°C".

Misinterpretation of measured values of a JUMO IO device in the IO controller can cause errors in the system control.

▶ Note the unit for the transferred temperature values!

5.1 Programming the noncyclical data exchange in the IO controller

In addition to the cyclical data exchange between IO controller and IO device in the RT channel, PROFINET IO also offers the option of event-controlled noncyclical data exchange. The noncyclical communication is controlled by the IO controller (similar to the master-slave principle) via write/read requests and has to be implemented by the user. Noncyclical data are provisioned by PROFINET IO users as "Record Data". The transfer occurs in the NRT channel.

For the programming of write/read requests, the engineering systems of the various manufacturers contain libraries with relevant function blocks such as "RDREC" (Read Record) and "WRREC" (Write Record).

Data exchange packet

With JUMO PROFINET IO devices, the write/read requests do not access the "Record Data" directly. Instead, they transfer data exchange packets between IO controller and IO device, which are further processed in the background by the field devices. For an IO controller to be able to exchange noncyclical data with a JUMO IO device, appropriate data structures (data blocks/data type objects) have to be created in the IO controller for the data exchange packet concerned. These data structures provide the memory for the outgoing and incoming data exchange packets. Data exchange packets are identified by an index, which has to be transferred to the write/read function blocks in the form of parameters. JUMO PROFINET IO devices have up to 3 indices for 3 different types of data exchange packets, which are transferred via the write/read commands.

Indices of the JUMO LOGOSCREEN 601/700

Index	Data exchange packet	Explanation
201	Single-ID	For the write and read transfer of single noncyclical data points with a length of up to 243 bytes within a data exchange sequence Length of the data exchange packet: 255 bytes
202	Multi-ID	For the write and read transfer of multiple noncyclical data points within a data exchange sequence, the single data points are allowed to be up to 4 bytes long. Length of the data exchange packet: 640 bytes

Data exchange sequence

Within a data exchange sequence, the IO controller transfers a data exchange packet to the IO device. The IO device processes the data exchange packet and re-provisions it for pick-up by the IO controller (response with data or status messages). In order to control processing by the IO device (e.g. defining the data direction and selection of noncyclical data), the data exchange packet must be parameterized accordingly.

With JUMO IO devices, the noncyclical services are always assigned to Slot 1. In JUMO IO devices, Slot 1 is always pre-configured. Consequently, the noncyclical services are not dependent upon the module configuration or project planning in the IO controller, and are available as soon as the system has successfully booted.

The data exchange process is described in a separate chapter:
chapter 5.1.2 "Data exchange sequence", Page 22

5.1.1 Single-ID and Multi-ID

To implement the exchange of single (Single-ID) or multiple (Multi-ID) noncyclical data points, you must take the following steps:

- Declare 1 data structure each for both the outgoing and the incoming direction. Select the "Single-ID" format to transfer 1 data point within a data exchange sequence. Select the "Multi-ID" format to transfer 32 data points within a data exchange sequence.
- Program a sequence control for the data exchange sequence (see chapter 5.1.2 "Data exchange sequence", Page 22)..

CAUTION!

The data exchange packets have a predefined format.

If the data structures are not filled with fill bytes to the correct length, errors can occur during the data exchange.

▶ Be sure to respect the data structure defined above (data types, sequence of the variables and total length, including fill bytes) when declaring the data structures for data exchange packets.

Declaration of a data structure in the "Single-ID" format

In the IO controller, you need to declare 1 data structure each (user-defined "STRUCT variable") for incoming and outgoing data exchange packets as the target and source memory for data exchange packets. Data exchange packets in the "Single-ID" format have a fixed length of 255 bytes and must be created with the following structure:

Structure variable for data exchange packets in the "Single-ID" format

Data type	Name	Explanation
BYTE	ID-PLC	Sequential numbering for assigning the data exchange packets from queries and responses The "ID-PLC" value can be used by the IO controller for sequentially numbering the outgoing data exchange packets. JUMO IO devices enter the same number in the ID-PLC in the data exchange packet of the ensuing response, so that response and query can be assigned at the IO controller, or so that an error in the sequence of query and response can be intercepted by suitable control structures in the IO controller.
BYTE	**Outgoing:** DIR **Incoming:** ERROR	**Data structure for outgoing data exchange packets:** "DIR" is the data direction for transferring noncyclical data. The data direction must be specified by the PLC programmer in the data exchange packet of the query from the IO controller and controls the processing of the data in the JUMO IO device accordingly. Coding: Value = 1: Write (from IO controller to IO device) Value = 2: Read (from IO device to IO controller) **Data structure for incoming data exchange packets:** In case of an error, the JUMO IO device enters into this variable an error value, which can be evaluated by the IO controller (see chapter 7.2 "Error messages for acyclic services", Page 41).
WORD	ID1	5-element ID of the data point from the noncyclical data table (see chapter 5.2 "Data tables of noncyclical data", Page 25)
WORD	ID2	
WORD	ID3	
WORD	ID4	
WORD	ID5	
ARRAY[243 bytes] (e.g. REAL, INT, BYTE, or also an array for strings)	VALUE	Data point to be queried or overwritten of the noncyclical data with a length of 243 bytes; Value of the data point to be read/written; this variable can be declared as any data type with a length of 243 bytes (e.g. string arrays).

5 Noncyclical data exchange

Declaration of a data structure in the "Multi-ID" format

In the IO controller, you need to declare 1 data structure each (user-defined "STRUCT variable") for incoming and outgoing data exchange packets as the target and source memory for incoming/outgoing data exchange packets. Data exchange packets in the "Multi-ID" format have a fixed length of 640 bytes and must be created with the following structure:

Structure variable for data exchange packets in the "Multi-ID" format

Data type	Name	Explanation
BYTE	ID-PLC	Sequential numbering for assigning the data exchange packets from queries and responses The "ID-PLC" value must be used by the IO controller for sequentially numbering the outgoing data exchange packets. JUMO IO devices enter the same number in the ID-PLC in the data exchange packet of the ensuing response, so that response and query can be assigned at the IO controller, or so that an error in the sequence of query and response can be intercepted by suitable control structures in the IO controller.
BYTE	NUMBER	Number of data points of noncyclical data to be transferred The data structure for data exchange packets in the "Multi-ID" format is created with variables for 32 data points. The "NUMBER" parameter specifies the number of data points to be transferred between JUMO IO device and IO controller. The first of the indicated number of corresponding data points are read/written. The subsequent data points are not processed by the JUMO IO device.
WORD	DUMMY	Fill bytes (no function; used to satisfy requirements for certain data structures)

Structure variable for data exchange packets in the "Multi-ID" format

<table>
<tr><th>Data type</th><th>Name</th><th colspan="2">Explanation</th></tr>
<tr><td>BYTE</td><td>DIR_1[a]</td><td rowspan="7">Query/response data for data point 1</td><td rowspan="16">Data for transferring up to 32 data points of noncyclical data: the following variables are declared for each data point:
DIR: Data direction for transferring the respective data point;
The data direction of each data point must be specified by the PLC programmer in the data exchange packet of the query from the IO controller. The "DIR" variables control the processing of the single data points in the JUMO IO device accordingly.
Coding:
Value = 1: Write (from IO controller to IO device)
Value = 2: Read (from IO device to IO controller)

ERROR: In case of an error, the JUMO IO device enters into this variable an error value, which can be evaluated by the IO controller (see chapter 7.2 "Error messages for acyclic services", Page 41).

ID1 to ID5: 5-element ID of the data point from the noncyclical data table (see chapter 5.2 "Data tables of noncyclical data", Page 25)

VALUE: Value to be read/written of the respective data point; this variable must always be declared as a basic data type with a length of 32 bits. If the query aims at an IO device data type with 16 or 8 bits, only the corresponding lower-value bytes are relevant. The higher-value bytes are to be considered pure fill bits.</td></tr>
<tr><td>BYTE</td><td>ERROR_1[a]</td></tr>
<tr><td>WORD</td><td>ID1_1[a]</td></tr>
<tr><td>WORD</td><td>ID2_1[a]</td></tr>
<tr><td>WORD</td><td>ID3_1[a]</td></tr>
<tr><td>WORD</td><td>ID4_1[a]</td></tr>
<tr><td>WORD</td><td>ID5_1[a]</td></tr>
<tr><td>Any basic data type with a length of 32 bits</td><td>VALUE_1[a]</td></tr>
<tr><td>.
.
.</td><td>.
.
.</td><td>Query/response data, Data points 2 to 31</td></tr>
<tr><td>BYTE</td><td>DIR_32[a]</td><td rowspan="9">Query/response data, Data point 32</td></tr>
<tr><td>BYTE</td><td>ERROR_32[a]</td></tr>
<tr><td>WORD</td><td>ID1_32[a]</td></tr>
<tr><td>WORD</td><td>ID2_32[a]</td></tr>
<tr><td>WORD</td><td>ID3_32[a]</td></tr>
<tr><td>WORD</td><td>ID4_32[a]</td></tr>
<tr><td>WORD</td><td>ID5_32[a]</td></tr>
<tr><td>Any basic data type with a length of 32 bits</td><td>VALUE_32[a]</td></tr>
<tr><td>BYTE[24]</td><td>DUMMY</td><td colspan="2">Fill byte array for filling the data exchange packet to the fixed size of 640 bytes</td></tr>
</table>

[a] In the "Multi-ID" format, all variables for 32 data points are declared and also transferred. Only the first "DIR", "ERROR", "ID" and "VALUE" variables that correspond to the "NUMBER" value are relevant to processing on the JUMO IO device.

5.1.2 Data exchange sequence

With JUMO IO devices, the noncyclical data are not directly accessed via the "WRREC" and "RDREC" PROFINET IO function blocks. Instead, data exchange packets that are processed by the IO device are transferred. The IO controller has to write a data exchange packet with query data to the JUMO IO device (WRREC). JUMO IO devices accept the data from the data exchange packet and then prepare this packet with response data for the IO controller. The IO controller must pick up this data exchange packet with response data again (RDREC). The data exchange packet in the "Single-ID" format can be used to transfer single data points within a data exchange sequence. The "Multi-ID" format can be used to transfer up to 32 data points within a data exchange sequence. This requires a suitable sequence control to be implemented in the IO controller. The sequence control of a data exchange sequence in the "Single-ID", and "Multi-ID" formats can be designed as follows:

Sequence control of a data exchange sequence

1. **Parameterize data structure for outgoing data exchange packets with query data:** To be able to correctly control the processing of the query in the JUMO IO device, the "ID-PLC" count variable is incremented. It can be used to check the affiliation of query and response data. In the "DIR" variable, the transfer direction (write/read) for the single data points must be defined (see description of the data structures for various formats). The 5-element IDs of the respective data points to be written to/read in the JUMO IO device are entered into fields ID1 to ID5 (see chapter 5.2 "Data tables of noncyclical data", Page 25). For write data exchange sequences (IO controller sends data points to IO device), the values to be transferred must be entered into the "VALUE" variables. For queries in "Multi-ID" format, the number of data points to be transferred must be entered into the "NUMBER" variable. The first of the indicated number of corresponding data points are read/written. The subsequent data points are not processed by the JUMO IO device.
2. **Transfer the data exchange packet to the IO device:** The data exchange packet must now be transferred to the IO device. This is done by calling up the write function (WRREC) in the IO controller. The parameters that have to be transferred at call-up appear in the table at the end of this section.
3. **Wait for the successfully completed transfer of the outgoing data exchange packet:** The JUMO IO device acknowledges the "Write Request" of the IO controller following successful transfer (Write Response). "WRREC.DONE", "WRREC.BUSY", "WRREC.ERROR" and "WRREC.STATUS" can be evaluated to be able to query the status of the transfer. The JUMO IO device reports back WRREC.DONE = TRUE to the IO controller to signal successful receipt of the data exchange packet. The JUMO IO device starts to process the transferred query data. At this point, the IO controller should respect a waiting period of 0.5 to 2 seconds before continuing with the next steps in the data exchange sequence.
4. **Pick-up of the data exchange packet with response data from the IO device:** The IO controller must pick-up data exchange packets from the device in cycles and check their validity as response data by means of "ID-PLC" (polling). If the values of outgoing and incoming "ID-PLC" match, valid response data have been read from the JUMO IO device. The IO controller can then end the polling process and accept the response data from the data structure of the incoming data exchange packets.
   a) **Polling:** The IO controller has to pick-up, via cyclical read accesses (RDREC), data exchange packets from the JUMO IO device, place them in the data structure for incoming data exchange packets and compare the "ID-PLC" variables in the data structures for outgoing and incoming data exchange packets with one another (polling). Unless the outgoing and incoming values of "ID-PLC" are identical, processing in the JUMO IO device is still ongoing and the IO controller must continue with the polling process. If the values of outgoing and incoming "ID-PLC" match, the IO controller has received valid response data from the JUMO IO device and polling can be ended.

      In order to query the status of the individual RDREC transfers within the poll cycles, "RDREC.VALID", "RDREC.BUSY", "RDREC.ERROR" and "RDREC.STATUS" can be evaluated. When RDREC.VALID = TRUE, the data exchange packet has been successfully received and transferred to the data structure for incoming data exchange packets. Following the successful transfer of a data exchange packet, outgoing and incoming "ID-PLC" must be compared and

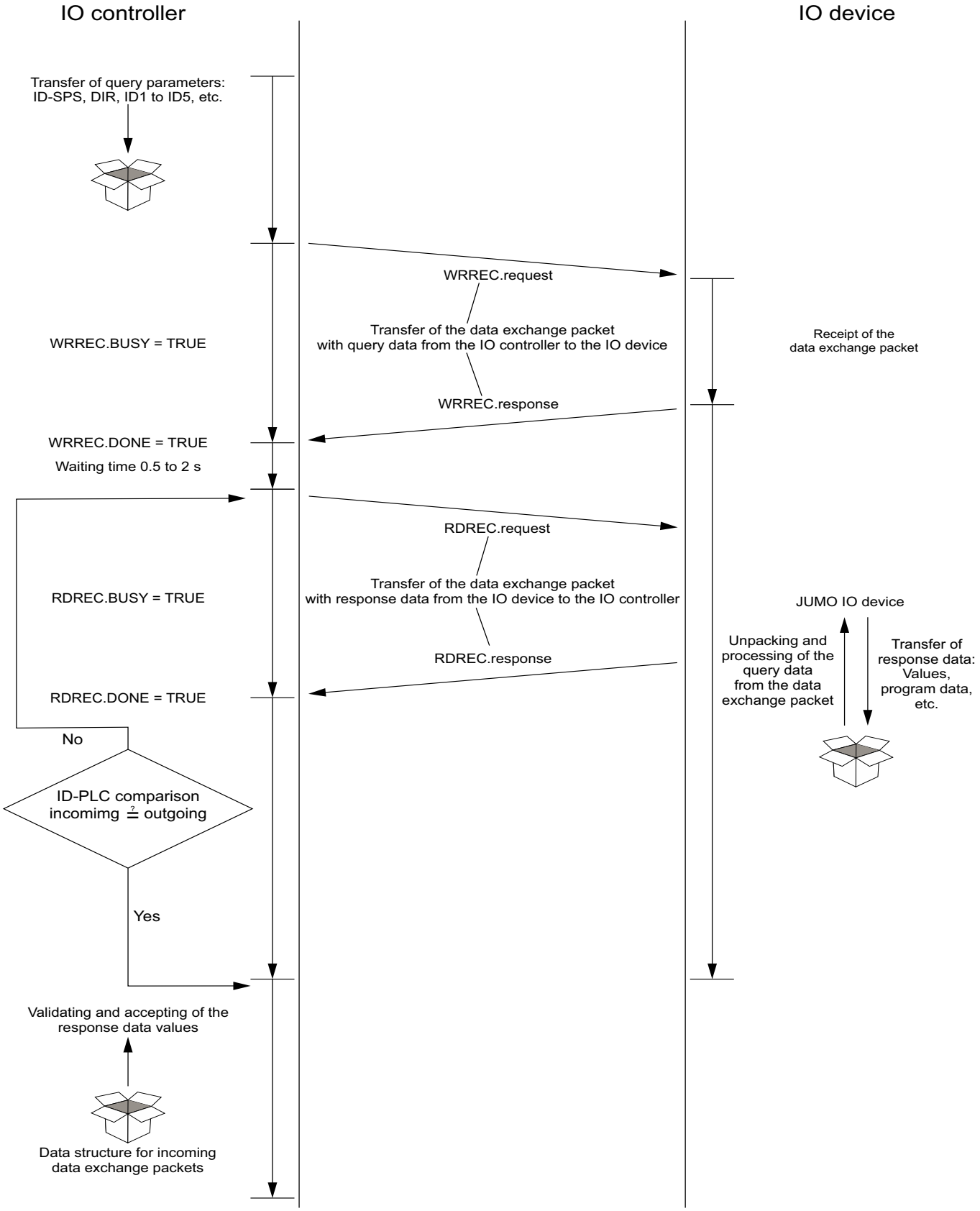
a decision made as to whether a further poll cycle is required ("ID-PLC" different) or valid response data were received ("ID-PLC" identical). The parameters that need to be transferred at cyclical call-ups of RDREC appear in the table at the end of this section.

b) **Acceptance of response data:** As soon as a data exchange packet is received from the JUMO IO device and the values for "ID-PLC" in the data structures for outgoing and incoming data exchange packets are identical, the data structure for incoming data exchange packets contains the valid response data from the JUMO IO device. The data have to be copied from here to the target before they are overwritten by another read request.

Parameterizing function blocks WRREC/RDREC

Input parameters for WRREC/RDREC	**Transfer values**		
	Single-ID	**Multi-ID**	
LEN (Length of the data to be written for WRREC in bytes)	255	640	
MLEN (Maximum length of the data to be read for RDREC in bytes)			
ID (Hardware detection of slots/subslots to be addressed on the IO device)	Hardware detection of Slot 1 on JUMO IO devices (DeviceStatusBlock)		
INDEX (Index of the target range for data exchange packets of JUMO IO devices)	201	202	
RECORD (Pointer on data points to be read/written; with JUMO IO devices, data structures for incoming and outgoing data exchange packets are transferred.)	for WRREC: Pointer on the data structure for **outgoing** data exchange packets for RDREC: Pointer on the data structure for **incoming** data exchange packets		

Sequence of a WRREC-RDREC cycle for transferring data exchange packets



5.2 Data tables of noncyclical data

CAUTION!

All temperature values of the JUMO IO device are transferred in the unit "°C".

Misinterpretation of measured values of a JUMO IO device in the IO controller can cause errors in the system control.

▶ Note the unit for the transferred temperature values!

5.2.1 Configuration data

CAUTION!

Write operations on read/write configuration parameters cause a storage in the flash memory. This has only a limited number of write cycles.

Writing too often to a variable with constantly changing values can lead to a memory error in the event of a power failure.

▶ Avoid fast cyclic write operation with constantly changing values.

Limit value monitoring 1 to 120 – limit value

Index					Signal designation	Data type	Access
2	59	0	2	0	Limit value monitoring 1 – limit value	REAL (4 byte)	Read/Write
2	59	1	2	0	Limit value monitoring 2 – limit value	REAL (4 byte)	Read/Write
					...		
2	59	23	2	0	Limit value monitoring 24 – limit value	REAL (4 byte)	Read/Write
					For type 706530 only:		
2	59	24	2	0	Limit value monitoring 25 – limit value	REAL (4 byte)	Read/Write
2	59	25	2	0	Limit value monitoring 26 – limit value	REAL (4 byte)	Read/Write
					...		
2	59	119	2	0	Limit value monitoring 120 – limit value	REAL (4 byte)	Read/Write

Limit value monitoring 1 to 120 – switching differential

Index					Signal designation	Data type	Access
2	59	0	3	0	Limit value monit. 1 – switching differential	REAL (4 byte)	Read/Write
2	59	1	3	0	Limit value monit. 2 – switching differential	REAL (4 byte)	Read/Write
					...		
2	59	23	3	0	Limit value monit. 24 – switching differential	REAL (4 byte)	Read/Write
					For type 706530 only:		
2	59	24	3	0	Limit value monit. 25 – switching differential	REAL (4 byte)	Read/Write
2	59	25	3	0	Limit value monit. 26 – switching differential	REAL (4 byte)	Read/Write
					...		
2	59	119	3	0	Limit value monit. 120 – switching different.	REAL (4 byte)	Read/Write

5.2.2 Process values

NOTE!

For the transmission of a text, a data exchange packet in the "Single-ID" format is to be used. The maximum text length of 243 bytes must be observed..

External analog inputs 1 to 120 – write only

Index					Signal designation	Data type	Access
2	158	0	0	0	External analog input 1	REAL (4 byte)	Write
2	158	1	0	0	External analog input 2	REAL (4 byte)	Write
					...		
2	158	23	0	0	External analog input 24	REAL (4 byte)	Write
					For type 706530 only:		
2	158	24	0	0	External analog input 25	REAL (4 byte)	Write
2	158	25	0	0	External analog input 26	REAL (4 byte)	Write
2					...		
2	158	119	0	0	External analog input 120	REAL (4 byte)	Write

External digital inputs 1 to 120 – write only

Index					Signal designation	Data type	Access
2	159	0	2	0	External digital input 1	INT/BOOL (4 byte)	Write
2	159	1	2	0	External digital input 2	INT/BOOL (4 byte)	Write
					...		
2	159	23	2	0	External digital input 24	INT/BOOL (4 byte)	Write
					For type 706530 only:		
2	159	24	2	0	External digital input 25	INT/BOOL (4 byte)	Write
2	159	25	2	0	External digital input 26	INT/BOOL (4 byte)	Write
					...		
2	159	119	2	0	External digital input 120	INT/BOOL (4 byte)	Write

External analog inputs 1 to 120 – read only

Index					Signal designation	Data type	Access
2	158	0	1	0	External analog input 1	REAL (4 byte)	Read
2	158	1	1	0	External analog input 2	REAL (4 byte)	Read
					...		
2	158	23	1	0	External analog input 24	REAL (4 byte)	Read
					For type 706530 only:		
2	158	24	1	0	External analog input 25	REAL (4 byte)	Read
2	158	25	1	0	External analog input 26	REAL (4 byte)	Read
2					...		
2	158	119	1	0	External analog input 120	REAL (4 byte)	Read

External digital inputs 1 to 120 – read only

Index					Signal designation	Data type	Access
2	159	0	0	0	External digital input 1	INT/BOOL (4 byte)	Read
2	159	1	0	0	External digital input 2	INT/BOOL (4 byte)	Read
					...		
2	159	23	0	0	External digital input 24	INT/BOOL (4 byte)	Read
					For type 706530 only:		
2	159	24	0	0	External digital input 25	INT/BOOL (4 byte)	Read
2	159	25	0	0	External digital input 26	INT/BOOL (4 byte)	Read
					...		
2	159	119	0	0	External digital input 120	INT/BOOL (4 byte)	Read

External text variables 1 to 64 (long)

Index					Signal designation	Data type	Access
2	160	0	4	0	External text variable 1	CHAR (480 byte)	Read/Write
2	160	1	4	0	External text variable 2	CHAR (480 byte)	Read/Write
					...		
2	160	9	4	0	External text variable 10	CHAR (480 byte)	Read/Write
					For type 706530 only:		
2	160	10	4	0	External text variable 11	CHAR (480 byte)	Read/Write
2	160	11	4	0	External text variable 12	CHAR (480 byte)	Read/Write
					...		
2	160	63	4	0	External text variable 64	CHAR (480 byte)	Read/Write

External event texts 1 to 10 (long)

Index					Signal designation	Data type	Access
2	161	0	1	0	External event text – group 1	CHAR (480 byte)	Write
2	161	1	1	0	External event text – group 2	CHAR (480 byte)	Write
2	161	2	1	0	External event text – group 3	CHAR (480 byte)	Write
2	161	3	1	0	External event text – group 4	CHAR (480 byte)	Write
					For type 706530 only:		
2	161	4	1	0	External event text – group 5	CHAR (480 byte)	Write
2	161	5	1	0	External event text – group 6	CHAR (480 byte)	Write
2	161	6	1	0	External event text – group 7	CHAR (480 byte)	Write
2	161	7	1	0	External event text – group 8	CHAR (480 byte)	Write
2	161	8	1	0	External event text – group 9	CHAR (480 byte)	Write
2	161	9	1	0	External event text – group 10	CHAR (480 byte)	Write

NOTE!

If a GPS receiver is operated at the serial interface (NMEA 0183), the GPS data are entered as event text in the event list of the assigned group. In this case, the external event text of the relevant group must not be used (GPS data will be overwritten).

Batch texts – batch 1 (long)

Index					Signal designation	Data type	Access
2	174	0	6	0	Batch recipe	CHAR (1204 byte)	Read/Write
2	175	0	1	0	Batch text line 1	CHAR (480 byte)	Read
2	175	1	1	0	Batch text line 2	CHAR (480 byte)	Read
2	175	2	1	0	Batch text line 3	CHAR (480 byte)	Read
2	175	3	1	0	Batch text line 4	CHAR (480 byte)	Read
2	175	4	1	0	Batch text line 5	CHAR (480 byte)	Read
2	175	5	1	0	Batch text line 6	CHAR (480 byte)	Read
2	175	6	1	0	Batch text line 7	CHAR (480 byte)	Read
2	175	7	1	0	Batch text line 8	CHAR (480 byte)	Read
2	175	8	1	0	Batch text line 9	CHAR (480 byte)	Read
2	175	9	1	0	Batch text line 10	CHAR (480 byte)	Read

For type 706530 only: Batch texts – batch 2 (long)

Index					Signal designation	Data type	Access
2	174	1	6	0	Batch recipe	CHAR (1204 byte)	Read/Write
2	175	10	1	0	Batch text line 1	CHAR (480 byte)	Read
2	175	11	1	0	Batch text line 2	CHAR (480 byte)	Read
2	175	12	1	0	Batch text line 3	CHAR (480 byte)	Read
2	175	13	1	0	Batch text line 4	CHAR (480 byte)	Read
2	175	14	1	0	Batch text line 5	CHAR (480 byte)	Read
2	175	15	1	0	Batch text line 6	CHAR (480 byte)	Read
2	175	16	1	0	Batch text line 7	CHAR (480 byte)	Read
2	175	17	1	0	Batch text line 8	CHAR (480 byte)	Read
2	175	18	1	0	Batch text line 9	CHAR (480 byte)	Read
2	175	19	1	0	Batch text line 10	CHAR (480 byte)	Read

For type 706530 only: Batch texts – batch 3 (long)

Index					Signal designation	Data type	Access
2	174	2	6	0	Batch recipe	CHAR (1204 byte)	Read/Write
2	175	20	1	0	Batch text line 1	CHAR (480 byte)	Read
2	175	21	1	0	Batch text line 2	CHAR (480 byte)	Read
2	175	22	1	0	Batch text line 3	CHAR (480 byte)	Read
2	175	23	1	0	Batch text line 4	CHAR (480 byte)	Read
2	175	24	1	0	Batch text line 5	CHAR (480 byte)	Read
2	175	25	1	0	Batch text line 6	CHAR (480 byte)	Read
2	175	26	1	0	Batch text line 7	CHAR (480 byte)	Read
2	175	27	1	0	Batch text line 8	CHAR (480 byte)	Read
2	175	28	1	0	Batch text line 9	CHAR (480 byte)	Read
2	175	29	1	0	Batch text line 10	CHAR (480 byte)	Read

For type 706530 only: Batch texts – batch 4 (long)

Index					Signal designation	Data type	Access
2	174	3	6	0	Batch recipe	CHAR (1204 byte)	Read/Write
2	175	30	1	0	Batch text line 1	CHAR (480 byte)	Read
2	175	31	1	0	Batch text line 2	CHAR (480 byte)	Read
2	175	32	1	0	Batch text line 3	CHAR (480 byte)	Read
2	175	33	1	0	Batch text line 4	CHAR (480 byte)	Read
2	175	34	1	0	Batch text line 5	CHAR (480 byte)	Read
2	175	35	1	0	Batch text line 6	CHAR (480 byte)	Read
2	175	36	1	0	Batch text line 7	CHAR (480 byte)	Read
2	175	37	1	0	Batch text line 8	CHAR (480 byte)	Read
2	175	38	1	0	Batch text line 9	CHAR (480 byte)	Read
2	175	39	1	0	Batch text line 10	CHAR (480 byte)	Read

For type 706530 only: Batch texts – batch 5 (long)

Index					Signal designation	Data type	Access
2	174	4	6	0	Batch recipe	CHAR (1204 byte)	Read/Write
2	175	40	1	0	Batch text line 1	CHAR (480 byte)	Read
2	175	41	1	0	Batch text line 2	CHAR (480 byte)	Read
2	175	42	1	0	Batch text line 3	CHAR (480 byte)	Read
2	175	43	1	0	Batch text line 4	CHAR (480 byte)	Read
2	175	44	1	0	Batch text line 5	CHAR (480 byte)	Read
2	175	45	1	0	Batch text line 6	CHAR (480 byte)	Read
2	175	46	1	0	Batch text line 7	CHAR (480 byte)	Read
2	175	47	1	0	Batch text line 8	CHAR (480 byte)	Read
2	175	48	1	0	Batch text line 9	CHAR (480 byte)	Read
2	175	49	1	0	Batch text line 10	CHAR (480 byte)	Read

Digital outputs 1 to 24

Index					Signal designation	Data type	Access
2	156	0	0	0	Digital output 1	INT/BOOL (4 byte)	Read
2	156	1	0	0	Digital output 2	INT/BOOL (4 byte)	Read
					...		
2	156	11	0	0	Digital output 12	INT/BOOL (4 byte)	Read
					For type 706530 only:		
2	156	12	0	0	Digital output 13	INT/BOOL (4 byte)	Read
2	156	13	0	0	Digital output 14	INT/BOOL (4 byte)	Read
					...		
2	156	23	0	0	Digital output 24	INT/BOOL (4 byte)	Read

Relays 1 to 7

Index					Signal designation	Data type	Access
2	157	0	0	0	Relay 1	INT/BOOL (4 byte)	Read
					For type 706530 only:		
2	157	1	0	0	Relay 2	INT/BOOL (4 byte)	Read
2	157	2	0	0	Relay 3	INT/BOOL (4 byte)	Read
					...		
2	157	6	0	0	Relay 7	INT/BOOL (4 byte)	Read

6.1 Project integration of JUMO IO devices

For JUMO field devices to be integrated into the project structure of the IO controller as IO device, the GSDML file of the respective device must be imported into the engineering system of your IO controller. The GSDML file describes all PROFINET-IO features of IO devices and delivers to the engineering system all the information required for the project planning phase. This file is located on the DVD from the supply scope of your JUMO field device, or can alternatively be downloaded from the JUMO website. Once the GSDML file has been imported into the engineering system, the corresponding field device is available as an IO device in the engineering system (e.g. "Hardware catalog" for SIMATIC®[1] or "Device repository" for CODESYS®[2]) and can be integrated into the hardware structure of your projects. With JUMO IO devices, modules can then be added as slots. In the engineering system, modules are treated as modular devices for expanding IO devices. They are selected from the engineering system catalog and assigned to the slots in the JUMO IO device. The procedure for integrating devices into project structures is described in the documentation for the engineering system of your IO controller.

Procedure

1. Import the GSDML file for your JUMO IO device into the engineering system of your IO controller. Make sure the device software version matches the version data in the GSDML file.

NOTE!

The GSDML file for the current device version is located on the DVD from the supply scope of your JUMO field device. Alternatively, you can download the GSDML file from the JUMO website.

2. Configure the PROFINET modules for your JUMO field device using the JUMO PC setup program and print out the finished module configuration.

   ⇨ chapter 6.2 "Configuring PROFINET modules", Page 33

3. Integrate the desired JUMO field device into the project structure of your IO controller. Make sure the device software version matches the version data of the JUMO field device integrated into the project structure.

NOTE!

The JUMO IO device appears in the project structure with the "DeviceStatusBlock" module in Slot 1. The "DeviceStatusBlock" module is immovably placed in Slot 1.

NOTE!

The exact procedure for integrating PROFINET IO devices can be found in the description of your engineering system.

4. Assign a device name.

NOTE!

Engineering systems offer a function for **identifying** field devices. If JUMO field devices are addressed via the **"Identification function"** of the engineering system, this is signaled by the flashing of the front display.

5. Insert the configured modules into the project structure of the IO controller in the desired slot position below the 1st slot on the JUMO IO device.
6. Set the communication parameters of the JUMO field device in the project structure of the IO controller.

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[1] SIMATIC is a registered trademark of Siemens AG in 80333 Munich, Germany.
[2] CODESYS is a registered trademark of 3S-Smart Software Solutions GmbH in 87439 Kempten, Germany.

⇨ chapter 6.3 "Configuring the JUMO IO device", Page 35

7. Set the startup parameters in the project structure of the IO controllers correctly. Pay attention in particular to the settings for the byte sequence for cyclical and noncyclical data. The byte sequence to be set is specified by the IO controller. Please refer to the documentation for your IO controller.
8. The IO data of the JUMO IO device are now available for the programming of the IO controller. To localize the IO data configured in the JUMO field device, refer to the printed module configuration list. During program, the assignment of the device data to the IO items of the modules can be taken from this list.

6.2 Configuring PROFINET modules

For project configuration in the engineering system of your PROFINET IO controller, you can populate all slots with modules apart from Slot 1 on your JUMO IO device. Slot 1 is permanently assigned with the immovable "DeviceStatusBlock" module. You can create additional modules for various data types via the JUMO PC setup program for the field device concerned and configure their contents to suit your needs. During this process, the selectable IO data in a module are filtered by data type suitable for the module type. An overview of the module types can be found in the "Module description" chapter.
⇨ chapter 4.2 "Module description", Page 11

The placeholders in the respective module can be assigned data from the selectors of the JUMO field device and be provided with a comment. In other words, the content of the configurable modules can be determined by the user. In the project configuration of the IO controller, the modules have to be assigned to the free slots in the JUMO IO device.

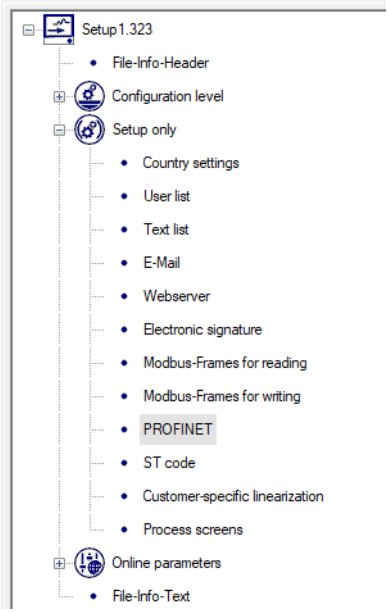
Once the configuration has been created by means of the JUMO PC setup program and loaded into the field device, the PROFINET configuration can be printed. The printout contains an overview of the complete module configuration of the JUMO field device with all IO data, which the field devices provisions for the PROFINET IO communication. In the engineering system, the modules must then be assigned to the slots in the JUMO IO device, so that they can be queried by the IO controller during the cyclical communication.

NOTE!

Make sure that your JUMO IO device has the software version required to use PROFINET IO (see chapter 2.3 "Requirements for hardware, software, and cabling", Page 7). The PROFINET configuration in the JUMO setup program of your device is available only for device software versions that are compatible with PROFINET IO.

Procedure for module configuration

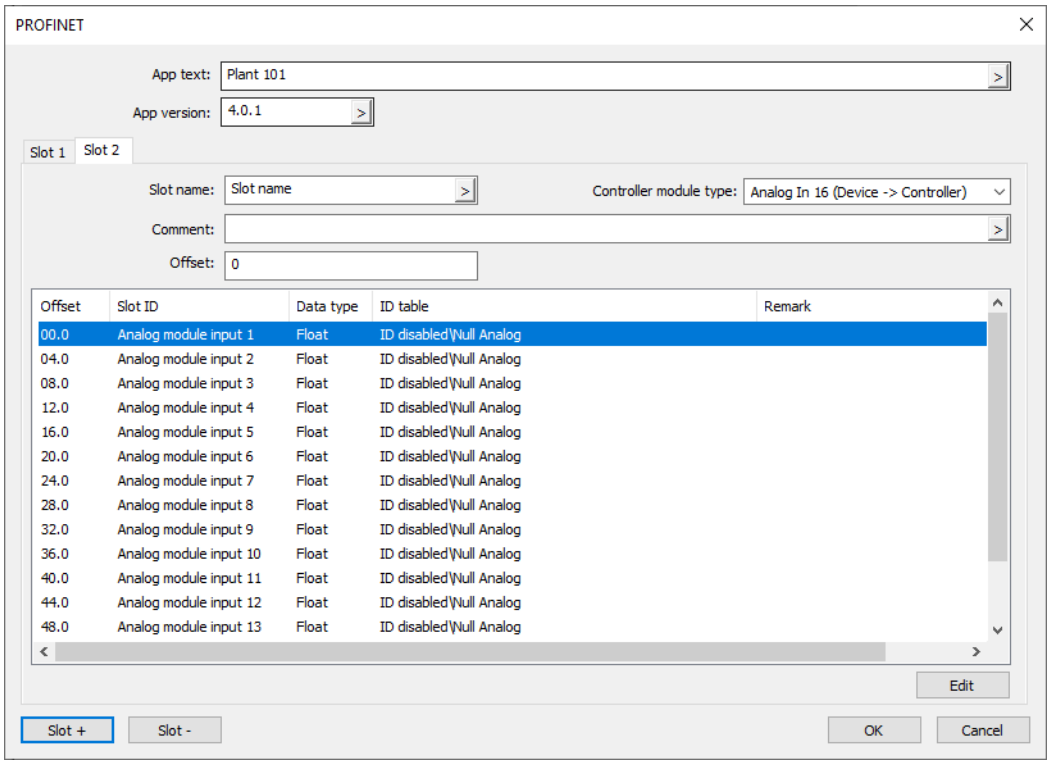
1. Call up the module configuration dialog in the JUMO PC setup program:
   Double-click: Setup only > PROFINET



2. In the "App text" and "App Version" fields of the module configuration dialog, assign information about the application (e.g. system or system part), for which the configuration is intended. This information will appear later on the printout of the module configuration. In addition, the "App-Version" is displayed in the "Device info" of the JUMO field device.

NOTE!

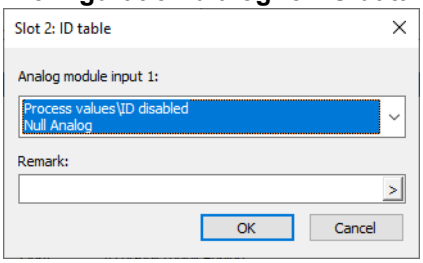
Entry fields with an arrow button are multilingual. By pressing the arrow button, you can open a dialog for entry and maintenance of the field contents for all languages installed on the device.



3. The module configuration contains 1 tab for each activated module. Define the number of modules you want to configure. To add modules, press the "Slot +" button. To reduce the number of modules, click the next module tab to activate it and press the "Slot -" button.
4. Now determine the type you require for each module in the "Controller module type" field (see chapter 4.2.2 "Modules", Page 11).
5. The value in the field "Offset" (default setting = 0) represents the address shift in the IO image of a Siemens PLC. If necessary, enter the corresponding value (not required for CODESYS PLC).

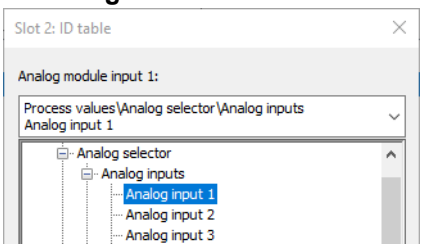
   This value is added to the respective value in the "Offset" column.
6. In each module, select the IO data required for the cyclical communication.
   a) Open the configuration dialog for each item in the module list by double-clicking the required item or by selecting it and pressing the "Edit" button.

Configuration dialog for IO data

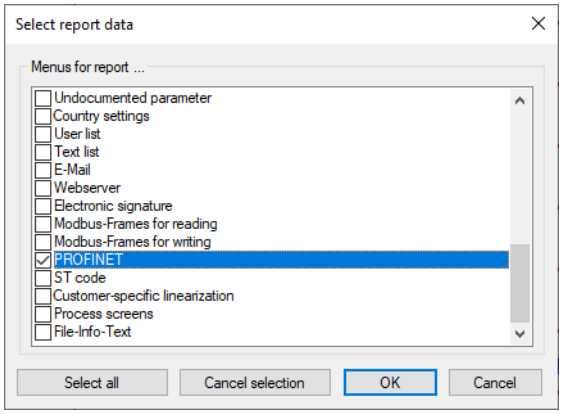


   b) Double-clicking the selection field at the top opens the selector with selectable device data, which you can assign to the module list item. In the "Comment" field, you can enter a name for the data point (e.g. equipment designation). The content of the comment field also appears in the module configuration printout to make it easier to identify the IO data.

Configuration dialog for IO data with selector expanded



7. Once you have completed the configuration for all the required modules, click the "OK" button in the module configuration window to confirm the configuration.
8. Transfer the configuration to the JUMO field device and save the configuration file on the PC if required.
9. Print out the module configuration.
   a) Do this by calling up the print command from the menu bar of the PC setup program. This opens "Select protocol data".
      File> Print
   b) In this selection field, activate the "PROFINET" item and click "OK".



The module list will be printed on your default printer. This is helpful for the configuration and programming of your IO controller.

6.3 Configuring the JUMO IO device

6.3.1 Start-up parameters

When the system boots, the start-up parameters are transferred from the IO controller to the JUMO field device during the course of the IO device parameterization procedure. Prior to start-up, you must configure the settings for the start-up parameters with the engineering system in the project planning of your IO controller. The start-up parameters for each JUMO field device are located in the "DeviceStatusBlock" module (Slot 1.)

The list of start-up parameters to be configured can be found in the module description.

⇨ chapter 4.2.2 "Modules", Page 11

6.3.2 Communication parameters

Station name

To improve the overview in the IO controller project structure, each device should be assigned a self-explanatory and preferably unique station name. This permits a better overview for programming and project planning. The station name is entered in the engineering system of your IO controller at the PNIO identification data of the JUMO IO device.

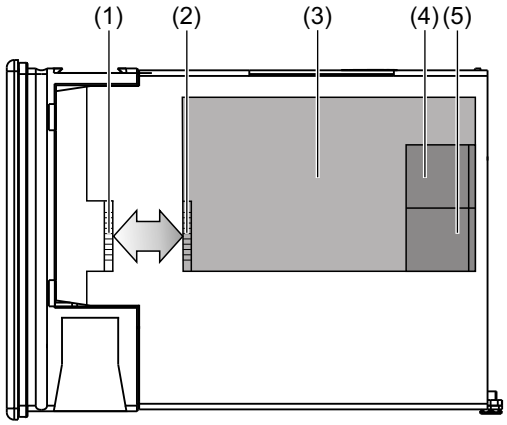
IP configuration

JUMO IO devices communicate with your PROFINET optional board via the internal Ethernet interface of the device. In order for the PROFINET optional board in a JUMO IO device to become operational, internal communication must be established between the optional board and the device. This requires valid IP configuration of the Ethernet interface of the JUMO IO device. Without valid IP configuration of the Ethernet interface, the device does not connect to the PROFINET IO interface and the PROFINET optional board is not initialized.

NOTE!

The JUMO IO device is still accessible via the JUMO PC programs (e.g. setup program and PCC) or via web browser via Ethernet. The IP address of the internal Ethernet interface must be used for communication.

Block diagram of a PROFINET optional board with its interfaces (example)

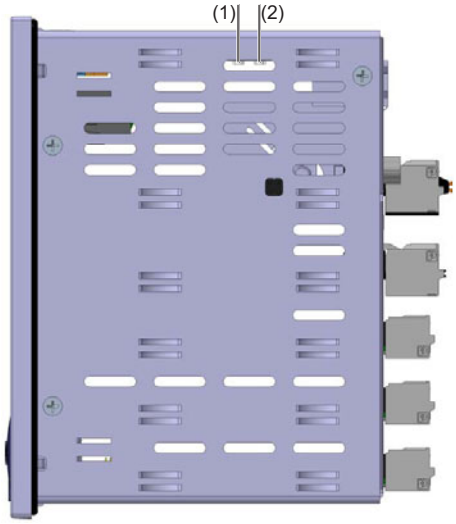


(1) Ethernet slot in a JUMO IO device (COM2) with its own MAC address (cf. chapter 6.3.3 "Device information", Page 39)
(2) Internal interface (SMK socket) of the PROFINET optional board for the slot in the JUMO IO device with its own MAC address (PROFINET MAC address of the JUMO IO device, cf. chapter 6.3.3 "Device information", Page 39)
(3) PROFINET optional board
(4) Switchport RJ-45 with its own MAC address (cf. chapter 6.3.3 "Device information", Page 39)
(5) Switchport RJ-45 with its own MAC address (cf. chapter 6.3.3 "Device information", Page 39)

The operating status and the IP configuration data of the PROFINET interface can be viewed on the device's display with the information in***Main menu > Device info > PROFINET*** and ***Main menu > Device info > Ethernet***as well as with the aid of 2 status LEDs located on the PROFINET optional board.

On the JUMO LOGOSCREEN 601/700, the status LEDs can be viewed through a ventilation slot on the right-hand side of the device housing (see figure below).

Status LEDs of the PROFINET optional board on the JUMO LOGOSCREEN 601/700



(1) Front status LED on PROFINET optional board
(2) Rear status LED on PROFINET optional board

A **non-initialized** PROFINET optional board can be recognized from the following indicators:

- the MAC addresses of the interfaces on the PROFINET optional board ***Main menu > Device info > PROFINET > Info*** are not initialized (display: 00-00-00-00-00-00)
- the connection status of the PROFINET interface in ***Main menu > Device info > PROFINET > Status > Status*** shows "unknown"
- the front status LED on the PROFINET optional board is off
- the rear status LED on the PROFINET optional board flashes red

Cyclical transfer timing

Send clock and reduction ratio determine the frequency at which an IO device transfers cyclical data in a PROFINET IO network. The transfer cycle time of the JUMO IO device is calculated by dividing the send clock by the reduction ratio. On JUMO field devices, these parameters apply globally for all slots. The setting is configured in the engineering system of your IO controller at the PNIO parameters of the JUMO IO device.

NOTE!

In order to set meaningful transfer cycles, it is advisable to observe the processing cycle time of the respective JUMO field device.

For the **JUMO LOGOSCREEN 601/700**, the processing cycle time is 125 ms.

A value **> 64 ms** should be selected as the **transfer cycle time** so that there is still sufficient transmission capacity available for Ethernet communication.

Watchdog

If the watchdog function is activated, the cyclical communication is monitored in cycles. The watchdog cycle time can be set as a multiple of the transfer cycle time (maximum 1.92 s). If a "consumer" detects a communication failure, it dismantles the "Application Relation" and hence also the "Communication Relation" to the provider.

NOTE!

The watchdog cycle time can be set up to a maximum of 1.92 s. This is defined by the PROFINET IO standard for RT communication.

6 Project planning

Starting up the PROFINET interface of a JUMO IO device

Proceed as follows to start up the PROFINET interface of a JUMO IO device:

1. Log on to the JUMO IO device as "Master" (see JUMO IO device operating manual).

   Open user log-on:*Main menu > Logon*

2. The Ethernet interface of the JUMO IO device must be configured for the PROFINET optional board to connect internally to the JUMO IO device and be initialized. Either manually assign an IP configuration that is valid in your network or set the Ethernet interface to automatic configuration. If automatic IP configuration is set, the device must be physically connected to a network with a DHCP server. The DHCP server assigns a valid IP configuration to the Ethernet interface. If manual IP configuration is set, a physical connection is not yet absolutely essential at this point.

   Open the Ethernet configuration:*Main menu > Configuration > Ethernet*

3. After a valid IP configuration has been saved in the JUMO IO device, the PROFINET IO interface connects to the JUMO IO device and is initialized. To test, check the following indicators: The **front status LED on the PROFINET optional board must glow green** and the **MAC addresses of the PROFINET optional board** must now have valid content (not 00-00-00-00-00-00).

   Check the MAC addresses:*Main menu > Device info > PROFINET > Info*

   ⇨ chapter 6.3.3 "Device information", Page 39

4. If you have not yet inserted a network connector into the switchports of the PROFINET interface, establish the connections to your network now. As soon as the physical connection to the network has been established, the PROFINET status changes to "Link Up".

   Check the PROFINET status:*Main menu > Device info > PROFINET > Status*

   ⇨ chapter 6.3.3 "Device information", Page 39

5. Make sure that the correct communication settings have been defined in the project planning for your IO controller. Check for correct assignment of the IP configuration and unique station name for the JUMO IO device.

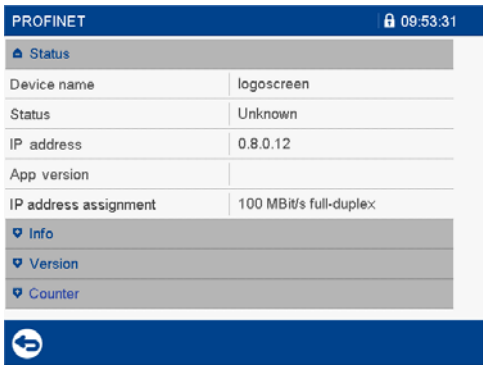
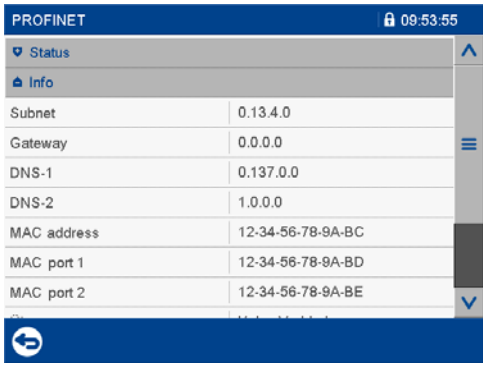
   The subnet configuration for PROFINET communication must be saved in the IO controller. Then, as the system is booted, the IP configuration (IP address, subnet mask and default gateway) is transferred from the PROFINET IO controller to the IO device according to the IO controller configuration. The procedure for project planning can be found in the documentation of the engineering system you are using for the project planning of your system.

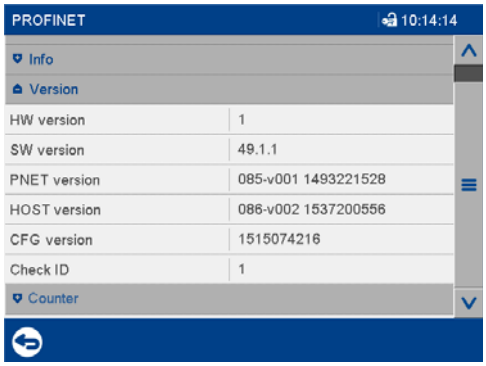
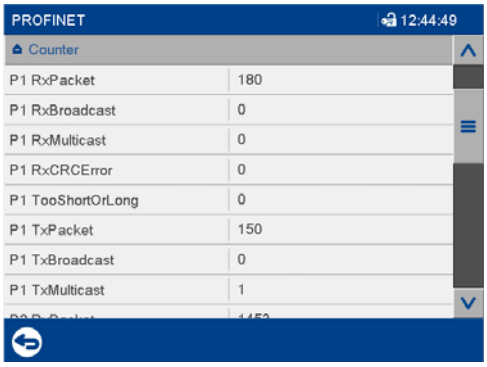
6. After the system has booted successfully with DCP assignment of the IP configuration to the JUMO IO device by the IO controller, the device is ready to communicate with the IO controller. The PROFINET status changes to "Network Up". Immediately thereafter, communication with the IO controller starts and the PROFINET status changes to "PLC Connection Up".

6.3.3 Device information

The device info for the JUMO IO device displays, for control and error diagnostics, information about network configuration, hardware and software component versions, as well as counters for evaluating data traffic. For more details about the displayed data, see the operating manual for your JUMO IO device.

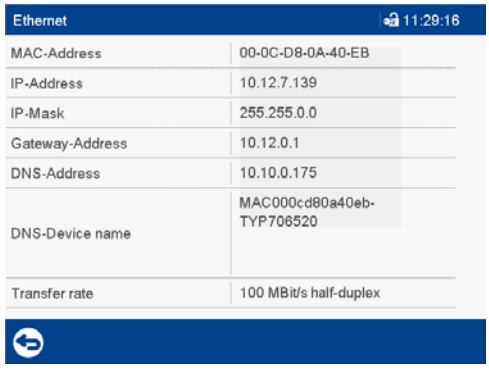
Open: Main menu > Device info > PROFINET > ...

Status: Data for connecting the JUMO IO device to the IO controller In addition to the essential IP configuration data for the JUMO IO device, additional important information is displayed. For example: The "App version" from the module configuration of the device (see chapter 6.2 "Configuring PROFINET modules", Page 33) and in the "Status" field the connection status of the JUMO IO device. The last PROFINET diagnosis event is displayed as the current connection status: • **Unknown** Connection status unknown (no previous diagnosis event) • **Link Up/Down** At least 1 RJ45 switchport of the PROFINET optional board has established or lost a physical connection. • **Network Up/Down** IP configuration status of the IO devices valid or invalid (e. g. address conflict). • **PLC Connection Up/Down** The IO device has established or lost a communication connection to the IO controller.	
Info: Network data of the IO device The network configuration data of the PROFINET interface such as the MAC addresses of the 3 interfaces of the PROFINET optional board are displayed here (cf. chapter 6.3.2 "Communication parameters", Page 36). The individual MAC addresses: • **MAC address** MAC address of the internal interface (SMK socket) of the PROFINET optional board for connection to the internal Ethernet interface of the JUMO IO device (COM2 slot); this MAC address represents the JUMO IO device in your project planning for device detection and topology recognition • **MAC port 1/2** MAC addresses of the 2 switchports (RJ 45) of the PROFINET optional board	

Version: Version numbers of hardware and software components	
Counter: Packet statistics of the JUMO IO device for control and error diagnostics for evaluating data traffic	

The status of the Ethernet interface is relevant for the PROFINET interface because the PROFINET optional board communicates internally with the JUMO IO device via the Ethernet interface (COM2 slot). It is essential for communication that the Ethernet interface of the JUMO IO device be configured with a valid IP address (cf. chapter 6.3.2 "Communication parameters", Page 36). For checking and for diagnostic purposes, the IP configuration of the Ethernet interface can be viewed in Device info.

Open: Main menu > Device info > Ethernet

IP configuration data of the internal Ethernet interface of the JUMO IO device	

7.1 Error messages for invalid values

For measured values in float format, the error number itself is displayed as a value, i.e. instead of the measured value, the error number is returned.

Error code for float values	Error
$1{,}0 \times 10^{37}$	First error value
$1{,}0 \times 10^{37}$	Underrange
$2{,}0 \times 10^{37}$	Overrange
$3{,}0 \times 10^{37}$	Not a valid input value
$4{,}0 \times 10^{37}$	Division by zero
$5{,}0 \times 10^{37}$	Mathematical error
$6{,}0 \times 10^{37}$	Invalid compensation temperature (thermocouple)
$9{,}0 \times 10^{37}$	Timeout during value determination

7.2 Error messages for acyclic services

The variable ERROR contains error messages from the IO device, which can be evaluated by the IO controller. The following error IDs are used:

Error ID	Description
0	No error
3	Wrong ID
FF	Wrong length

7 Error messages

JUMO GmbH & Co. KG
Street address:
Moritz-Juchheim-Straße 1
36039 Fulda, Germany
Delivery address:
Mackenrodtstraße 14
36039 Fulda, Germany
Postal address:
36035 Fulda, Germany
Phone: +49 661 6003-0
Fax: +49 661 6003-607
Email: mail@jumo.net
Internet: www.jumo.net

JUMO Instrument Co. Ltd.
JUMO House
Temple Bank, Riverway
Harlow, Essex, CM20 2DY, UK
Phone: +44 1279 63 55 33
Fax: +44 1279 62 50 29
Email: sales@jumo.co.uk
Internet: www.jumo.co.uk

JUMO Process Control, Inc.
6733 Myers Road
East Syracuse, NY 13057, USA
Phone: +1 315 437 5866
Fax: +1 315 437 5860
Email: info.us@jumo.net
Internet: www.jumousa.com