OPERATION MANUAL

2511
PROFINET Manual

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For your safety

The following symbols on the 2511 and in this operation manual warn of hazards.

1.1 Symbols used in the instruction manual

1.1.1 Signal words

The following signal words are used in the operation manual according to the specified hazard classification.

DANGER
High degree of risk: indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING
Moderate degree of risk: indicates a hazardous situation which, if not avoided, may result in death or serious injury.
CAUTION
Low degree of risk: indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE
Property damage to the equipment or the surroundings will result if the hazard is not avoided.

Note: It is important to heed these safety notices in order to ensure you handle the RESISTOMAT® 2x11 correctly.

IMPORTANT: Follow the information given in the operation manual.

1.1.2 Pictograms

Symbol	Description
	Warning concerning the use and installation of the device and software.
	Observe the advice for protecting the instrument.

1.2 Symbols and precautionary statements on the instrument

Symbol	Description
	Hazard warning Disconnect the power plug before opening – Follow safety instructions – Professional servicing only
Warning ! To prevent electrical shock do not open device.	**Warning of electrical shock hazard** Do not open the unit.
To prevent fire replace only with same type and rating of fuse !	**Warning of fire hazard** Always replace the fuse with a fuse of the same type and rating.

1.3 Abbreviations

Abbreviation	Description
BF	Bus error
GSD	Device description data
GSDML	The GSDML file describes the physical properties of the device.
PI	PROFIBUS and PROFINET International (user organization)

2 Introduction

2.1 General safety instructions

DANGER

Warning concerning installation of the device and software

Installation of the device and the interface must be carried out by qualified personnel only. Qualified personnel meets the following requirements:

- You are familiar with the safety designs used in automation engineering, and understand how to deal with them in your capacity as configuration engineer.
- You are an operator of automation systems and have been instructed in how to handle the system. You are familiar with the operation of the equipment described in this documentation.
- You are a commissioning or service engineer and have successfully completed a training course qualifying you to repair automation systems. In addition, you are authorized to commission, ground and label circuits and equipment in accordance with safety engineering standards.

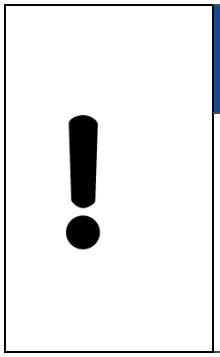
Always observe the current safety and accident prevention regulations when commissioning the equipment.
Install automation engineering equipment and installations with sufficient protection against accidental actuation.

DANGER

Warning concerning use of the device

- Take suitable precautions in both the hardware and software to prevent any undefined states of the automation installation in the event of an open circuit.
- In installations where major damage to property or even personal injury may be caused by a malfunction, take suitable precautions to establish a safe operating state in the event of a fault. This may be achieved using limit switches, mechanical interlocks etc. for example.
- Do not make unauthorized modifications to the device or to the PROFINET interface.
- Always observe the current safety and accident prevention regulations when commissioning the equipment.

Install automation engineering equipment and installations with sufficient protection against accidental actuation.



NOTICE

- Install the power, signal and sensor cables so as to prevent electromagnetic interference from impairing operation of the equipment.
- Proper transportation, storage, installation and assembly plus careful operation and maintenance are essential for trouble-free and safe operation of the equipment.
- Have non-functional instruments inspected by the manufacturer.

3 Technical data

3.1 Supported PROFINET-functions

- Conformance Classes: A, B, C
- Shared Device
- Media Redundancy Protocol (MRP)
- Link Layer Discovery Protocol (LLDP)
- I&M Services (I&M0-I&M4)

*Specified according to PROFINET version 2.43

I&M0 identification:

Parameter	Value
Vendor-ID	0x01CE
Order-ID	2511-Vxxx
Serial	767676
HW-Version	3
SW-Version	V20.22.0
Rev.-Counter	0
Profile-ID	0x0000
Profile type	0x0004
I&M-Version	0x0101
I&M-Support	0x002E

Profil-ID: 0xF600 (Generic Device)

You will find further information about PROFINET at: www.profibus.com.

3.2 Model 2511 device data

Bus connector	RJ45
GSD file	GSDML-V2.43-burster-2511-20220922.xml

3.3 Electrical safety

Reverse voltage protection	Yes
Air clearance/leakage paths	To DIN EN 61010-1:2011
Electrical isolation	Between fieldbus and internal electronics
Withstand voltage	DC 500 V

3.4 Electromagnetic compatibility

3.4.1 Interference immunity

Interference immunity to EN 61326-1:2013

Industrial locations

3.4.2 Emitted interference

Emitted interference to EN 61326-1:2013

Class A

EN 61000-3-2:2014

EN 61000-3-3:2013

3.5 Notes on CE labeling

burster equipment carrying the CE mark meets the requirements of the EU directives and the harmonized European standards (EN) cited therein.

The EU declarations of conformity are available to the relevant authorities as specified in the directives. A copy of the declaration of conformity is included in the relevant equipment documentation.

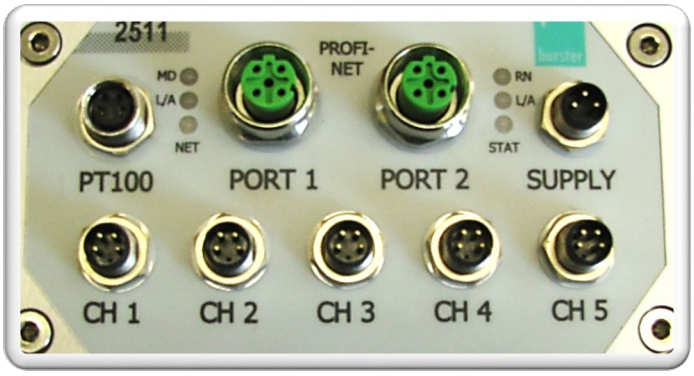
4 Installation

Please note that you can download various documents such as installation guidelines and specifications about PROFINET at PI: www.profibus.com.

4.1 Connection of fieldbus lines

burster devices with a PROFINET option have two **RJ 45** connectors for the fieldbus connection.

4.2 Meaning of LED states



4.2.1 Status LED (STAT)

The Status LED is a bi-coloured LED that indicates the module's basic status.

Flashing pattern	colour	Meaning
Fast	green	Boot-up
Slow (~2Hz)	green	Normal operation
Repeating x times **3** **4** **5** **6** **7**	red	 Fieldbus module error: Module not detected Module not supported Module not responding Module shutdown Unexpected error
Slow (~2Hz) & **Permanent**	green red	Analogue Input overflow

Table 1: Status LED (STAT)

4.2.2 Network Status LED (NET)

The Network Status LED is a bi-coloured LED that indicates the module's network status.

LED State	Description	Comments
Off	Offline	• No power • No connection with IO Controller
Green	Online (RUN)	• Connection with IO Controller established • IO Controller in RUN state
Green, 1 flash	Online (STOP)	• Connection with IO Controller established • IO Controller in STOP state or IO data bad • IRT synchronization not finished
Green, blinking	Blink	Used by engineering tools to identify the node on the network
Red	Fatal event	Major internal error (this indication is combined with a red module status LED)
Red, 1 flash	Station Name error	Station Name not set
Red, 2 flashes	IP address error	IP address not set
Red, 3 flashes	Configuration error	Expected Identification differs from Real Identification

Table 2: Network Status LED (NET)

4.2.3 Run LED (RN)

The Run LED is a green LED that turns on when the internal setup is completed and the module is running.

4.2.4 Module Status LED (MD)

The Module Status LED is a bi-coloured LED that indicates the module's general status.

LED State	Description	Comments
Off	Not initialized	No power OR Module in SETUP or NW_INIT state
Green	Normal Operation	Module has shifted from the NW_INIT state
Green, 1 flash	Diagnostic Event(s)	Diagnostic Event(s) present
Red	Exception Error	Device in state EXCEPTION
	Fatal event	Major internal error (this indication is combined with a red module status
Alternating Red / Green	Firmware update	Do NOT power off the module. Turning the module off during this phase could cause permanent damage

Table 3: Module Status LED (MD)

4.2.5 LINK/Activity LED (L/A)

The two LINK/Activity LEDs are green LEDs that indicate the Ethernet status of the respective port.

LED State	Description	Comments
Off	No Link	No link, no communication present
Green	Link	Ethernet link established, no communication present
Green, flickering	Activity	Ethernet link established, communication present

Table 4: LINK/Activity LED (L/A)

4.3 Configuration of a PROFINET network

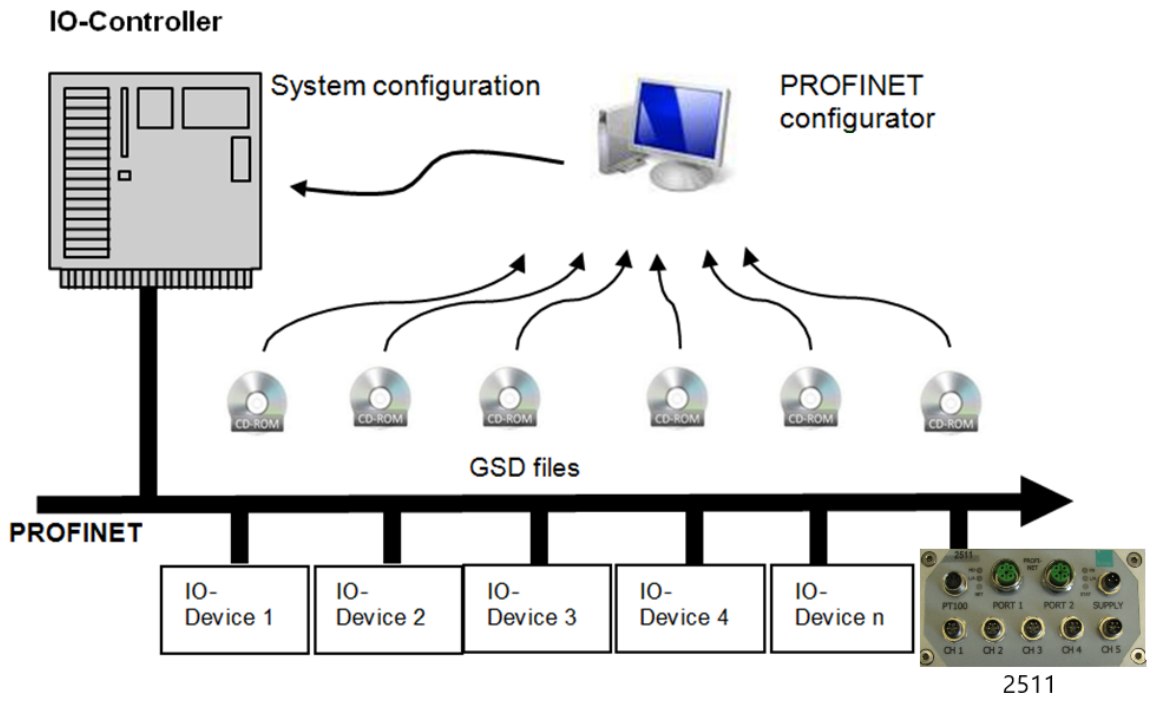


Diagram 1: Configuration of a PROFINET network

5 PROFINET

5.1 General information on PROFINET data transfer

For PROFINET (cyclic data traffic), the amount of bytes transferred between Controller and Device during each cyclic access must be defined in the configuration stage (GSDML file).

The device is controlled using the data transferred from Controller to Device. This data always consists of 8 bytes for the 2511 unit. See section 6.1 for an explanation of the function of these bytes.

The 2511 cyclically sends 88 bytes to the controller. See section 6.2 for an explanation of the meaning of these bytes**Fehler! Verweisquelle konnte nicht gefunden werden.**.

5.2 GSDML file

Fieldbus related files of the 2511 with the PROFINET option are found under the ‘Fieldbus’ tab on the download area of the burster website:
https://www.burster.de/en/download-area

This includes the device description file GSDML-V2.43-burster-2511-20220922.xml (GSDML file). This GSDML file describes the physical properties of the device.

The structure, contents and encoding of this device description data is standardized so that any Profinet devices can be configured using configuration tools from various manufacturers.

The GSDML file does not specify which data is transferred or how this data should be interpreted. The user must glean this information from the operating manual and program their Controller accordingly.

5.3 Data conversion

5.3.1 Description of the data formats in this manual

The terms PLC inputs and PLC outputs refer to the 2511 unit. These terms are reversed when referring to the Controller.

The floating-point numbers ("float" / “real”) mentioned are four bytes long (32 bits) and are based on the IEEE-754 standard.

Numbers that are not specifically labeled or are labeled with "d" or "dec" are decimal numbers, i.e. 1234, 1234dec, dec1234, 1234d.

Numbers labeled "0x" or "hex" are hexadecimal numbers, i.e. 0x1234, hex1234, 1234hex, 1234h.

Numbers labeled "b" or "bin" are binary numbers, i.e. b1100, bin1100, 1100b, 1100bin.

5.3.2 Handling problems that arise when reading floating-point numbers

This only concerns cases in which floating-point numbers need to be read from the 2511 unit.

Floating-point numbers (data type REAL), according to IEEE 754, are encoded as four bytes for transfer. This may create problems depending on the type of PLC used.

Cause

In the 2511-PROFINET, the sign byte is transferred first if using acyclic data transfer and last during cyclic data transmission. Some PLCs expect this byte in the highest of the four addresses not in the lowest address. This inevitably leads to misinterpretation of the numeric value. In this case, the order of the four bytes has to be changed by the PLC as shown in the figure.

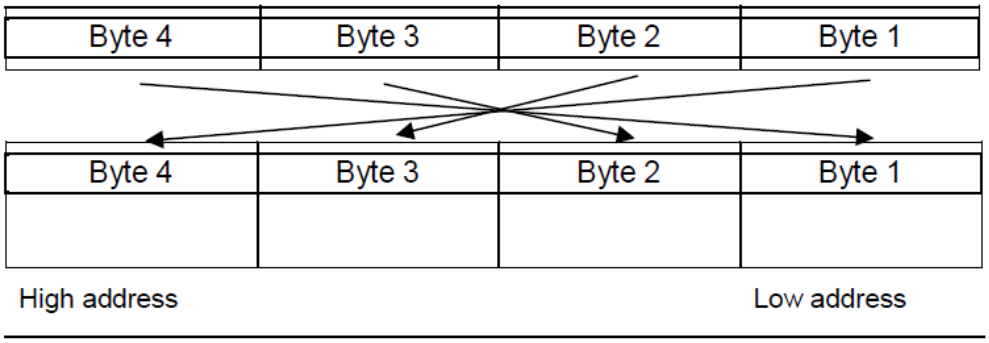


Diagram 2: Exchange of the order of bytes caused by misinterpretation of the numeric value

5.4 Illegal / not valid data

If the device has no valid measurement data to send, it will send the number “909090.0” instead as a default.
If no data was transmitted from the measurement unit to the control board after start-up yet, the measurement results will be initialized with “909089.0”
This value will be replaced with the real measurement value (or 909090.0 if not successful) after the first measurement.

6 PROFINET data protocol

6.1 PLC outputs – Transfer from controller to device

Eight bytes of PLC-Out data for the 2511 are always transferred from the PROFINET Controller to the 2511.

Please Note: Bits marked as 'reserved' should remain at 0.

6.1.1 PLC output bytes overview

Address-offset	Length (Bytes)	Description	
0	1	**CONTROL Byte A**	
		xxxx xxx1	Bit 0: Start measurement on configured channel (0->1 Edge triggered)
		xxxx xx1x	Bit 1: Reserved
		xxxx x1xx	Bit 2: Reserved
		xxxx 1xxx	Bit 3: Reserved
		xxx1 xxxx	Bit 4: Reserved
		xx1x xxxx	Bit 5: Reserved
		x1xx xxxx	Bit 6: Reserved
		1xxx xxxx	Bit 7: Reserved
1	1	**CONTROL Byte B**	
		xxxx xxx1	Bit 0: Reserved
		xxxx xx1x	Bit 1: Reserved
		xxxx x1xx	Bit 2: Reserved
		xxxx 1xxx	Bit 3: Reserved
		xxx1 xxxx	Bit 4: Reserved
		xx1x xxxx	Bit 5: Reserved
		x1xx xxxx	Bit 6: 0: "Set Operating Mode NumParam/Speed/Freq in cyclic communication" disabled 1: "Set Operating Mode NumParam/Speed/Freq in cyclic communication" enabled
		1xxx xxxx	Bit 7: 0: "Set Operating Mode InpRange in cyclic communication" disabled 1: "Set Operating Mode InpRange in cyclic communication" enabled
2	1	Operating Mode: Number of Parameters/Speed/Frequency (see Index 24) **Only valid, if enabled with CONTROLBYTE B bit 6 (above AdrOffset 1 bit 6)** "0": 3-parameter-measurement, standard speed (f1 = 1 kHz, f2 = 1 Hz) "1": 3-parameter-measurement, standard speed (f1 = 1 kHz, f2 = 10 Hz) "2": 3-parameter-measurement, standard speed (f1 = 1 kHz, f2 = 100 Hz) "3": 2-parameter-measurement, standard speed (f1 = 1 kHz) "4": 3-parameter-measurement, fast speed (f1 = 1 kHz, f2 = 100 Hz) "5": 2-parameter-measurement, fast speed (f1 = 1 kHz) "6": 3-parameter-measurement, slow speed (f1 = 1 kHz, f2 = 1 Hz) "7": 3-parameter-measurement, slow speed (f1 = 1 kHz, f2 = 10 Hz)	
3	1	Operating Mode: Input Range (see Index 25) **Only valid, if enabled with CONTROLBYTE B bit 7 (above AdrOffset 1 bit 7)** "0": 10 mΩ "1": 30 mΩ "2": 100 mΩ "3": 300 mΩ	
4	2	Reserved	
6	2	Reserved	

Table 5: PLC output bytes overview

6.2 PLC inputs – Transfer from device to controller

The following data refers to the PLC input from the 2511, transferred from the 2511 to the PROFINET controller.

6.2.1 PLC input bytes overview

Address-offset	Length (Bytes)	Description		
0	1	**READY Status**		
		xxxx xxx1	Bit 0: Ready-bit	
		xxxx xx1x	Bit 1: Reserved	
		xxxx x1xx	Bit 2: Reserved	
		xxxx 1xxx	Bit 3: Reserved	
		xxx1 xxxx	Bit 4: Reserved	
		xx1x xxxx	Bit 5: Reserved	
		x1xx xxxx	Bit 6: Reserved	
		1xxx xxxx	Bit 7: Ready-Mode activated	
1	**1**	**Device Status**		
		xxxx xxx1	Bit 0:Illegal Attempt “Measurement Start without Ready” detected Flag is reset with next valid measurement start	
		xxxx xx1x	Bit 1: Reserved	
		xxxx x1xx	Bit 2: Reserved	
		xxxx 1xxx	Bit 3: Reserved	
		xxx1 xxxx	Bit 4: Reserved	
		xx1x xxxx	Bit 5: Reserved	
		x1xx xxxx	Bit 6: Reserved	
		1xxx xxxx	Bit 7: Reserved	
Measurement Channel 1				
2	1	Live Counter		See 6.2.2 Device Measurement Channel explanation
3	1	Error Code		
4	1	Limit Check Result		
5	1	Reserved		
6	4	R_{AC}		
10	4	R_{DC}		
14	4	U_{CELL}		
Measurement Channel 2				
18	1	Live Counter		See 6.2.2 Device Measurement Channel explanation
19	1	Error Code		
20	1	Limit Check Result		
21	1	Reserved		
22	4	R_{AC}		
26	4	R_{DC}		
30	4	U_{CELL}		
Measurement Channel 3				
34	1	Live Counter		See 6.2.2 Device Measurement Channel explanation
35	1	Error Code		
36	1	Limit Check Result		
37	1	Reserved		
38	4	R_{AC}		
42	4	R_{DC}		
46	4	U_{CELL}		
Measurement Channel 4				
50	1	Live Counter		See 6.2.2 Device Measurement Channel explanation
51	1	Error Code		
52	1	Limit Check Result		
53	1	Reserved		

54	4	R_{AC}			
58	4	R_{DC}			
62	4	U_{CELL}			
Measurement Channel 5					
66	1	Live Counter			See 6.2.2 Device Measurement Channel explanation
67	1	Error Code			
68	1	Limit Check Result			
69	1	Reserved			
70	4	R_{AC}			
74	4	R_{DC}			
78	4	U_{CELL}			
82	4	Measured Temperature (real)			
86	1	Temperature Live Counter, incremented with each temperature measurement			
87	1	Operating Mode Mirror			
		xxxx xxxR	Range	0000: 10 mΩ	
		xxxx xxRx		0001: 30 mΩ	
		xxxx xRxx		0010: 100 mΩ	
		xxxx Rxxx		0011: 300 mΩ	
		xxxM xxxx	Mode	0000: Mode 0	See 6.1.1 offset 2
		xxMx xxxx		0001: Mode 1	
		xMxx xxxx		0010: Mode 2	
		Mxxx xxxx		0011: Mode 3	
				0100: Mode 4	
				0101: Mode 5	
				0110: Mode 6	
				0111: Mode 7	

Table 6: PLC input bytes overview

6.2.2 Device Measurement Channel explanation

The 2511 has five measurement channels, each containing 16 bytes of data with following structure:

Address-offset	Length (Bytes)	Description	
0	1	**Live Counter** Incremented with each new measurement (RAC, RDC, U). This counter is used to check if a new measurement has been made and can further reveal if one or multiple measurement values have been missed. The counter overflows from 255 to 0, before counting up again.	
1	1	**Error Code (bit coded)**	
		xxxx xxx1	Bit 0: U Range exceeded
		xxxx xx1x	Bit 1: Impedance Range exceeded
		xxxx x1xx	Bit 2: Contact Error SENSE
		xxxx 1xxx	Bit 3: Contact Error FORCE
		xxx1 xxxx	Bit 4: Internal Checksum Error
		xx1x xxxx	Bit 5: Cross Switch Contact Error: Force
		x1xx xxxx	Bit 6: Cross Switch Contact Error: Sense
		1xxx xxxx	Bit 7: Cross Switch Error: Polarity
2	1	**Limit Check Result (bit coded)**	
		xxxx xxx1	Bit 0: Measurement Value of RAC under lower limit
		xxxx xx1x	Bit 1: Measurement Value of RAC over upper limit
		xxxx x1xx	Bit 2: Measurement Value of RDC under lower limit
		xxxx 1xxx	Bit 3: Measurement Value of RDC over upper limit
		xxx1 xxxx	Bit 4: Measurement Value of UCELL under lower limit
		xx1x xxxx	Bit 5: Measurement Value of UCELL over upper limit
		x1xx xxxx	Bit 6: Reserved
		1xxx xxxx	Bit 7: Reserved
3	1	Reserved	
4	4	Newest measurement value: Resistance AC, RAC (real)	
8	4	Newest measurement value: Resistance DC, RDC (real)	
12	4	Newest measurement value: Cell Voltage, UCELL (real)	

Table 7: Device measurement channel explanation

7 Acyclic PROFINET services

The services are described from the point of view of the controller.

Note: Both the slot and subslot numbers always have to be set to 1.

The acyclic PROFINET services allow access to the following 2511 functions:

- Complete device configuration
- Transfer of component/worker/job data for logging
- Retrieval of measurement values and related analytical data

For further information and support for Siemens PLC integration, please contact our service department at service@burster.com.

7.1 Device Info (Index 10-19)

Index (Decimal)	Type	Size (Bytes)	Access	Description
10	STR20	20	RO	Device Type
11	STR20	20	RO	Serial Number digital board
12	STR20	20	RO	Calibration Date digital board
13	UINT16	2	RO	Calibration counter digital board
14	STR20	20	RO	Software Version Digital Board
15	STR20	20	RO	Serial Number Analog Board
16	STR20	20	RO	Board Type Analog Board
17	STR20	20	RO	Software Version Analog Board
18	STR20	20	RO	Flasher Version Analog Board
19	STR20	20	RO	DIGI Hardware information string. Like DIGI?-command, parameters are separated with "_"

Table 6: Device Info (Index 10-19)

7.2 Measurement Setup (Index 20-29, 400, 500, 502, 503)

Index (Decimal)	Type	Size (Bytes)	Access	Description
20	STR15	1	RW	RTC Setup: Timestamp Format: "YYYYMMDD_HHMMSS"
21	UINT8	1	RO	Available Channels for Measurement (bit coded)
22	UINT8	1	RW	Selected Channels for Measurement (bit coded)
23	UINT8	1	RW	Reserved
24	UINT8	1	RW	Operating Mode: Number of Parameters / Speed / Frequency "0": 3-parameter-measurement, standard speed (f1 = 1 kHz, f2 = 1 Hz) "1": 3-parameter-measurement, standard speed (f1 = 1 kHz, f2 = 10 Hz) "2": 3-parameter-measurement, standard speed (f1 = 1 kHz, f2 = 100 Hz) "3": 2-parameter-measurement, standard speed (f1 = 1 kHz) "4": 3-parameter-measurement, fast speed (f1 = 1 kHz, f2 = 100 Hz) "5": 2-parameter-measurement, fast speed (f1 = 1 kHz) "6": 3-parameter-measurement, slow speed (f1 = 1 kHz, f2 = 1 Hz) "7": 3-parameter-measurement, slow speed (f1 = 1 kHz, f2 = 10 Hz)
25	UINT8	1	RW	Operating Mode: Measurement Input Range "0": 10mΩ "1": 30mΩ "2": 100mΩ "3": 300mΩ
26	UINT8	1	RO	Setup change counter increments with every setup change, 0 … 255
27	UINT16	2	WO	Reset all User Settings to default values! write password 62830 (2xPi)

28	UINT8	1	RW	Readymode 0x0: inactive // 0x01: active See RDYM command in interface manual
29	UINT8	1	RW	Ready-State Only relevant with activated Readymode See REDY command in interface manual
500	UINT8	1	RW	Password Protection for Display Menu Enable “0”: Disabled “1”: Enabled
400	UINT16	2	RW	Current Password “0000” … “9999”
502	UINT8	1	RW	Display Brightness “0”… “5”
503	UINT8	1	RW	User Language “0”: Deutsch “1”: English “2”: Francais “3”: Espanol “4”: Italiano

Table 7: Measurement Setup (Index 20-29, 400, 500, 502, 503)

7.3 Limits (Index 30-78)

Index (Decimal)	Type	Size (Bytes)	Access	Description
Measurement Channel 1				
30	UINT8	1	RW	Enable Limit R_{DC} 0x00: Disabled, 0x01: Enabled
31	UINT8	1	RW	Enable Limit R_{AC} 0x00: Disabled, 0x01: Enabled
32	UINT8	1	RW	Enable Limit U_{CELL} 0x00: Disabled, 0x01: Enabled
33	REAL	4	RW	Lower Limit R_{DC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
34	REAL	4	RW	Upper Limit R_{DC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
35	REAL	4	RW	Lower Limit R_{AC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
36	REAL	4	RW	Upper Limit R_{AC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
37	REAL	4	RW	Lower Limit U_{CELL} in [V] Please make sure: Upper>Lower, Upper ≠ Lower
38	REAL	4	RW	Upper Limit U_{CELL} in [V] Please make sure: Upper>Lower, Upper ≠ Lower
Measurement Channel 2				
40	UINT8	1	RW	Enable Limit R_{DC} 0x00: Disabled, 0x01: Enabled
41	UINT8	1	RW	Enable Limit R_{AC} 0x00: Disabled, 0x01: Enabled
42	UINT8	1	RW	Enable Limit U_{CELL} 0x00: Disabled, 0x01: Enabled
43	REAL	4	RW	Lower Limit R_{DC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
44	REAL	4	RW	Upper Limit R_{DC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
45	REAL	4	RW	Lower Limit R_{AC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
46	REAL	4	RW	Upper Limit R_{AC} in [mΩ]

				Please make sure: Upper>Lower, Upper ≠ Lower
47	REAL	4	RW	Lower Limit U_{CELL} in [V] Please make sure: Upper>Lower, Upper ≠ Lower
48	REAL	4	RW	Upper Limit U_{CELL} in [V] Please make sure: Upper>Lower, Upper ≠ Lower
Measurement Channel 3				
50	UINT8	1	RW	Enable Limit R_{DC} 0x00: Disabled, 0x01: Enabled
51	UINT8	1	RW	Enable Limit R_{AC} 0x00: Disabled, 0x01: Enabled
52	UINT8	1	RW	Enable Limit U_{CELL} 0x00: Disabled, 0x01: Enabled
53	REAL	4	RW	Lower Limit R_{DC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
54	REAL	4	RW	Upper Limit R_{DC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
55	REAL	4	RW	Lower Limit R_{AC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
56	REAL	4	RW	Upper Limit R_{AC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
57	REAL	4	RW	Lower Limit U_{CELL} in [V] Please make sure: Upper>Lower, Upper ≠ Lower
58	REAL	4	RW	Upper Limit U_{CELL} in [V] Please make sure: Upper>Lower, Upper ≠ Lower
Measurement Channel 4				
60	UINT8	1	RW	Enable Limit R_{DC} 0x00: Disabled, 0x01: Enabled
61	UINT8	1	RW	Enable Limit R_{AC} 0x00: Disabled, 0x01: Enabled
62	UINT8	1	RW	Enable Limit U_{CELL} 0x00: Disabled, 0x01: Enabled
63	REAL	4	RW	Lower Limit R_{DC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
64	REAL	4	RW	Upper Limit R_{DC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
65	REAL	4	RW	Lower Limit R_{AC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
66	REAL	4	RW	Upper Limit R_{AC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
67	REAL	4	RW	Lower Limit U_{CELL} in [V] Please make sure: Upper>Lower, Upper ≠ Lower
68	REAL	4	RW	Upper Limit U_{CELL} in [V] Please make sure: Upper>Lower, Upper ≠ Lower
Measurement Channel 5				
70	UINT8	1	RW	Enable Limit R_{DC} 0x00: Disabled, 0x01: Enabled
71	UINT8	1	RW	Enable Limit R_{AC} 0x00: Disabled, 0x01: Enabled
72	UINT8	1	RW	Enable Limit U_{CELL} 0x00: Disabled, 0x01: Enabled
73	REAL	4	RW	Lower Limit R_{DC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
74	REAL	4	RW	Upper Limit R_{DC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
75	REAL	4	RW	Lower Limit R_{AC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
76	REAL	4	RW	Upper Limit R_{AC} in [mΩ] Please make sure: Upper>Lower, Upper ≠ Lower
77	REAL	4	RW	Lower Limit U_{CELL} in [V]

				Please make sure: Upper>Lower, Upper ≠ Lower
78	REAL	4	RW	Upper Limit U_{CELL} in [V] Please make sure: Upper>Lower, Upper ≠ Lower

Table 8: Limits (Index 30-78)

7.4 Temperature Measurement Setup (Index 501, 80-85)

Note: Only available with Pyrometer option.

Index (Decimal)	Type	Size (Bytes)	Access	Description
501	UINT8	1	RW	Temperature Measurement Enable “0”: Disabled “1”: Enabled
80	U8	1	RO	Pyrometer function available 0x00: no // 0x01: yes
81	REAL	4	RW	Pyrometer calibration value low in [V]
82	REAL	4	RW	Pyrometer calibration value high in [V]
83	REAL	4	RW	Pyrometer scale value low in [°C]
84	REAL	4	RW	Pyrometer scale value high in [°C]
85	U8	1	WO	Calculate pyrometer calibration Requires prior valid entries written to Indices 81-84

Table 9: Temperature Measurement Setup (Index 501, 80-85)

7.5 Temperature Measurement Values (Index 90-91)

Index (Decimal)	Type	Size (Bytes)	Access	Description
90	REAL	4	RO	Current temperature measurement value
91	U8	1	RO	Temperature measurement Toggle Counter

Table 10: Measurement Values (Index 90-91)

7.6 Data Container (Index 100-126)

Index (Decimal)	Type	Size (Bytes)	Access	Description
100	STR50	50	RW	Device Name Zero terminated String, String length has to be 50 Bytes exactly
101	STR50	50	RW	Device Comment Zero terminated String, String length has to be 50 Bytes exactly

Table 11: Data Container (Index 100-101)

IMPORTANT: The index range 102-126 is occupied. Further information is only relevant for internal use.

7.7 Order Sheet (Index 130-164)

Index (Decimal)	Type	Size (Bytes)	Access	Description
130	STR20	20	RW	Station name
131	STR64	64	RW	Worker name
132	STR64	64	RW	Order number
133	STR64	64	RW	Batch number
134	STR64	64	RW	Part Name
135	STR64	64	RW	Part Serial Number 1 Channel 1
136	STR64	64	RW	Part Serial Number 2 Channel 1
137	STR64	64	RW	Part Serial Number 1 Channel 2
138	STR64	64	RW	Part Serial Number 2 Channel 2
139	STR64	64	RW	Part Serial Number 1 Channel 3
140	STR64	64	RW	Part Serial Number 2 Channel 3
141	STR64	64	RW	Part Serial Number 1 Channel 4

142	STR64	64	RW	Part Serial Number 2 Channel 4
143	STR64	64	RW	Part Serial Number 1 Channel 5
144	STR64	64	RW	Part Serial Number 2 Channel 5
145	U8	1	RW	Reserved – Do not use
146	STR64	64	RW	Reserved – Do not use
147	STR64	64	RW	Reserved – Do not use
148	STR64	64	RW	Reserved – Do not use
149	STR64	64	RW	Reserved – Do not use
150	STR64	64	RW	Reserved – Do not use
151	STR64	64	RW	Reserved – Do not use
152	U8	1	WO	Reset Shift Counter write any byte to reset all counters
153	U32	4	RO	Read combined Measurement Counter of all Channels
154	U32	4	RO	Read Measurement Counter of Channel 1 (counts measurements only of channel 1)
155	U32	4	RO	Read Measurement Counter of Channel 2 (counts measurements only of channel 2)
156	U32	4	RO	Read Measurement Counter of Channel 3 (counts measurements only of channel 3)
157	U32	4	RO	Read Measurement Counter of Channel 4 (counts measurements only of channel 4)
158	U32	4	RO	Read Measurement Counter of Channel 5 (counts measurements only of channel 5)
159	U32	4	RO	Read combined NOK Counter of all Channels
160	U32	4	RO	Read NOK Counter of Channel 1 (counts only NOKs of channel 1)
161	U32	4	RO	Read NOK Counter of Channel 2 (counts only NOKs of channel 2)
162	U32	4	RO	Read NOK Counter of Channel 3 (counts only NOKs of channel 3)
163	U32	4	RO	Read NOK Counter of Channel 4 (counts only NOKs of channel 4)
164	U32	4	RO	Read NOK Counter of Channel 5 (counts only NOKs of channel 5)

Table 12: Order Sheet (Index 130-164)

7.8 Reserved for future use (Index 200-599)

Index (Decimal)	Type	Size (Bytes)	Access	Description
200	REAL	4	RW	Reserved float number 1
…	….	….	….	….
299	REAL	4	RW	Reserved float number 100
300	U32	4	RW	Reserved integer number 1
…	….	….	….	….
399	U32	4	RW	Reserved integer number 100
401	U16	2	RW	Reserved short number 2 (1 element is already used)
…	….	….	….	….
499	U16	2	RW	Reserved short number 100
504	U8	1	RW	Reserved byte number 5 (4 bytes are already used)
…	….	….	….	….
599	U8	1	RW	Reserved byte number 100

Table 13: Reserved for future use (Index 200 – 599

7.9 Error Codes

The following error codes are of a Hilscher Master in response to Profinet communication with the 2511.

Error number	Description
0x00000000	PNIO_S_OK No error, write/read successful
0xDE80A000	READ_APPL_ERROR Data could not be read from the device.
0xDE80B000	READ_ACCESS_INVALIDINDEX This index is not specified
0xDE80B200	READ_ACCESS_INVALIDSLOT_SUBSLOT Reading from this slot is not supported **Note**: Only slot and subslot 1 is supported
0xDE80B600	PNIO_E_IOD_READ_ACCESS_DENIED Read from this Slot/Subslot/Index is not allowed
0xDE80C000	READ_RESOURCE_CONSTRAINCONFLICT The requested length is too small (< 2 Bytes)
0xDF80A100	WRITE_APPL_ERROR Data could not be written to the device. Please check your data and data length here.
0xDF80B000	WRITE_ACCESS_INVALIDINDEX This index is not specified
0xDF80B100	WRITE_ACCESS_INVALIDLENGTH Please check the length of the data which can be accepted by the 2511
0xDF80B200	WRITE_ACCESS_INVALIDSLOT_SUBSLOT Reading from this slot/subslot is not supported **Note**: Only slot and subslot 1 are supported
0xDF80B600	WRITE_ACCESS_DENIED Write to this Slot/Subslot/Index not allowed
0xDF80B800	WRITE_ACCESS_INVALIDPARAM Invalid parameter
0xDF80C100	WRITE_RESOURCE_CONSTRAINCONFLICT The length of the data to write is too small (< 2 Bytes)

Table 14: Error Codes