

string.bloxx 116 E 1500V

Manual



Vers. No. 1.0



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Table of Contents

1	Safety Instructions	5
1.1	Intended use	5
1.2	Check for transport damage	5
1.3	Personnel	5
1.4	Special risks	6
1.5	Installation sites	6
1.6	Alterations	6
1.7	Maintenance and cleaning	6
1.8	Disposal	7
1.9	General hazards in the event of failure to comply with safety regulations	7
1.10	Markings on the string.bloxx module	7
1.11	Markings and warnings in this manual	8
1.12	Conventions in this manual	8
2	Introduction	9
2.1	The documentation for string.bloxx	10
2.2	About this manual	10
2.3	System description	11
3	Installation and Removal	13
3.1	Integration of the module into a solar power system	13
3.2	Terminal assignment	14
3.3	Installation	15
3.4	Withdrawal from operation, removal	17
4	Modbus Communication	19
4.1	Interface parameters	19
4.2	Connecting interfaces	20
4.2.1	Cables	
4.2.2	Tx and Rx LED indicators	
4.2.3	Bus termination	
4.2.4	Setting the interface bus address	
4.3	List of registers and functions	22



4.4	Extended configuration options	25
4.4.1	Synchronization of modules (data acquisition modes)	26
4.4.2	Use response delay (Delay)	28
5	Technical Data	29
5.1	Block diagram string.bloxx 116 E 1500V	29
5.2	Technical Data string.bloxx 116 E 1500V	30
6	Declaration of Conformity	33

1

Safety Instructions

Please read and follow all warnings and safety instructions in this manual before beginning the installation, commissioning and maintenance.

Installation, commissioning, operation and maintenance of the modules must be carried out in accordance with specifications, i.e. within the operating conditions outlined in this manual and the technical data of the relevant module.

1.1 Intended use

The modules of the string.bloxx series are designed for monitoring and testing of solar modules. Solar module strings (interconnection of multiple solar modules), hereafter referred to as strings, can be connected to the modules. The modules may be used only for these measurement and control tasks. Any other use above and beyond this is considered as improper use.

To ensure safe operation, the modules may be operated only in accordance with the information in the manuals and technical data sheets. In addition, the legal and safety regulations required for the individual application have to be observed.

1.2 Check for transport damage

Directly on receipt of the goods, inspect both the packaging and the module itself for any signs of damage. Also check that the delivery is complete (accessories, documentation, auxiliary devices, etc.). If the packaging has been damaged in transport or should you suspect that the product has been damaged or that it may have a fault, the product must not be put into service. In this case, contact your customer advisor or Gantner Instruments Environment Solutions GmbH.

1.3 Personnel

Installation, commissioning and maintenance of the modules must only be carried out by suitably trained personnel. Persons are suitably trained when they have acquired sufficient knowledge in the field of electrical installation through their training as specialists in the electrical trade or similar training, and when they are familiar with the relevant national occupational health and safety regulations, accident prevention regulations, standards and approved rules of technique. They must be able to assess the results of their work safely, and they must be familiar with the contents of this manual.



Please observe in particular:

- the national installation and mounting regulations (e.g. VDE in Germany)
- · the generally recognized rules of technology
- details on transportation, installation, operation, maintenance and disposal in this manual
- the parameters, limit values and specifications for the operating and environmental conditions on the type plates and in the data sheets.

1.4 Special risks

The modules are used as a component in installations of solar systems and must therefore be integrated into the safety concept of the system. The modules are not safety components and cannot perform any safety-related shutdowns. This requires additional components that must be provided by the company setting up and/or operating the system.

A very high voltage is permanently present at the modules after connection of solar modules, which upon contact can result in death or serious bodily harm. Therefore, please make sure that only qualified personnel have access to the modules and the modules can be switched off for servicing by means of a load break switch.

1.5 Installation sites

The modules have to be mounted in an enclosed housing so that they are accessible only to authorized personnel. If required by the environmental conditions, the modules can be installed in water-protected or water-proof enclosures.

Please note the permissible ambient temperatures specified in the technical data.

1.6 Alterations

It is prohibited to make alterations to the modules.

1.7 Maintenance and cleaning

Installation and maintenance work on the modules is exclusively to be carried out when the modules are disconnected from the power supply. Check before carrying out any work on the module that the voltage has been disconnected.

Do not attempt yourself to repair devices after a defect, failure or damage, or to put the devices back into operation again. In such cases, please contact your customer adviser or Gantner Instruments Environment Solutions GmbH.

1.8

Disposal

Equipment that is no longer suitable for use must be disposed of in accordance with national and local regulations for environmental protection and resource recycling. Electronic components must not be disposed of together with household garbage.

1.9

General hazards in the event of failure to comply with safety regulations

The modules employ state-of-the-art technology and are safe to operate. However, an element of risk remains if the modules are used or operated by untrained personnel.

Any person commissioned with the installation, start-up, maintenance or repair of a module of the string.bloxx series must have read and understood the manual, especially the safety-related function recommendations.

1.10

Markings on the string.bloxx module

 ϵ

This symbol is the CE marking. It guarantees that our product complies with the requirements of relevant EU directives.

For the declaration of conformity please refer to Chapter 6 on page 33.



This symbol is the marking for disposal required by law. Equipment that is no longer suitable for use must be disposed of in accordance with national and local regulations for environmental protection and resource recycling, separate from regular household waste.



1.11

Markings and warnings in this manual

To avoid personal injury and damage to property, please follow the warnings and safety instructions in this operating manual.



Indicates an immediate danger which will result in death or serious bodily harm if not avoided.

Symbol:



Meaning: High voltage may be present on the module connections. Connections may only be made by particularly educated persons.

Symbol:



Meaning: Before connecting or disconnecting cables make sure that all sources of power are Locked Out.

1.12 Conventions in this manual

To make it easier for you to read this manual, we will use the following conventions:



IMPORTANT

Paragraphs with this symbol give important information about the product or about using the product.



Tip

Contains application hints and other particularly useful information.

italic font

indicates emphasis

 \Rightarrow

refers to special features or restrictions

Introduction

Dear customer!

Thank you for purchasing a module of the string.bloxx series by Gantner Instruments Environment Solutions GmbH. We are sure that with this module you have acquired an excellent product that enables you to perform reliable measurements.

The scope of supply also includes this manual. Always keep this manual within easy reach. To avoid personal injury and property damage, please follow the warnings and safety instructions in this manual (Chapter 1, page 5). If you still can't resolve an issue, despite studying this manual, please do not hesitate to contact us.

Should you discover any fault with the product or in its accompanying documentation, or have any suggestions for improvement, you may confidently approach either your customer adviser or Gantner Instruments Environment Solutions GmbH directly. We are looking forward to your suggestions.

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2.1 The documentation for string.bloxx

The documentation for the string.bloxx module 116 E 1500V consists of this manual. You can also download this manual as a PDF file from our home page www.gantner-environment.com.

2.2 About this manual

The manual is divided into several chapters:

- Safety information in Chapter 1, page 5ff.
- You will find a description of the system and the main combination and expansion options in the next section.
- The description of the installation and the terminal assignments can be found in Chapter 3, *Installation and Removal*, page 13ff.
- The description of the configuration of the interface and the Modbus RTU commands and functions applicable to the module can be found in Chapter 4, Modbus Communication, page 19ff.
- A block diagram of the string.bloxx module and all technical data can be found in Chapter 5, *Technical Data*, page 29ff.
- The declaration of conformity can be found in Chapter 6 on page 33.

2.3 System description

The string.bloxx series has been developed for measurement and test engineering on solar power systems, in particular for multichannel measurements of electrical and thermal quantities. The modules enable the direct voltage side of photovoltaic systems (PV systems) to be monitored independently of the inverter and you can also detect errors promptly and rectify them:

- · soiling due to pollen, dust and soot
- · influence of the weather, e.g. hail, snow loads
- installation errors
- production errors
- · theft and vandalism

You can combine individual modules as desired in one system, when more than 16 solar module strings (interconnection of multiple solar modules), hereafter referred to as PV strings, are to be connected.

The modules can be directly plugged onto mounting rails (35 mm DIN rails according to DIN EN 60715).

The modules have a Modbus interface for control and for reading out data.

3

Installation and Removal







The cables to be connected may be carrying voltages of up to 1500 volts!

Before connecting cables make sure that all sources of power are Locked Out.

Follow the safety information in Chapter 1, page 5.

3.1

Integration of the module into a solar power system

A typical example for the wiring of the string.bloxx module $116\ E$ 1500V within a solar power system is shown in Fig. 3-1.

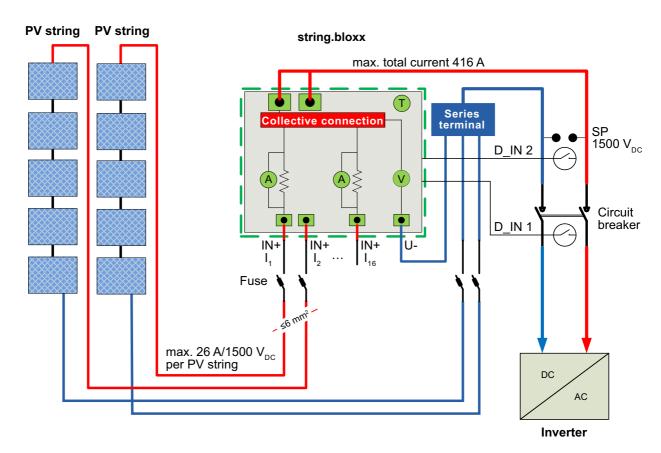


Fig. 3-1 Typical wiring; OVP = overvoltage protection.

The combinations of the individual photovoltaic modules (PV strings) are connected to the IN+ inputs (positive voltage). In this way the currents of the individual strings can be measured. Up to



16 strings can be connected to a string.bloxx module. The total current is led out through two terminals, the bus connection.

NOTICE

For a proper connection further components are required which are not included with the string.bloxx module, e.g. fuses, overvoltage protection (SPD, Surge Protection Devices) or DC disconnectors.

Install these types of elements depending on the system (size, spatial distribution, etc.), because otherwise the module can be damaged.

3.2 Terminal assignment

Fig. 3-2 illustrates the terminal assignment of the string.bloxx module.

Reserved names for the digital input functions

D_IN 1: Main Switch

D_IN 2: Surge Protection

The inputs are connected to the internal module operating voltage of +5V through a resistor. Therefore, wire the inputs, for example, to ground through a relay contact or an optocoupler.

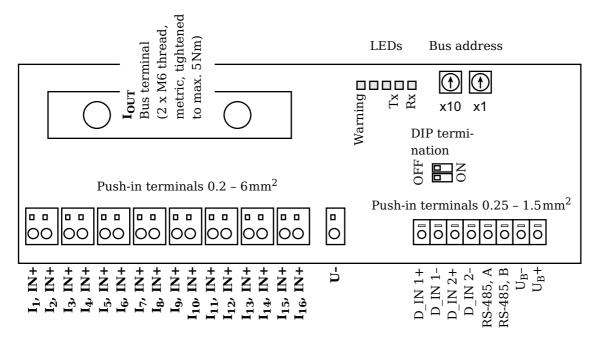


Fig. 3-2 Terminal assignment of the string.bloxx module 116 E 1500V (the drawing is not drawn to scale).

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Installation

To install the module on a mounting rail first hook the module onto the mounting rail at the bottom and then at the top press it onto the mounting rail until it latches (refer also to the illustration in Section 3.4, *Withdrawal from operation, removal*, page 17).

Fitting the cables into the push-in terminals

To connect cables to the push-in terminals insert a narrow screwdriver into the slot in the terminal next to the cable entry (conductor shaft). This opens the clamping fastener and the wire can be pushed into the spring cage. Once the screwdriver is removed, the spring pulls the conductor against the bus bar.

Fitting the cable to the bus terminal

Use both bolts (metric M6 thread) for the connection or use a copper bar which you connect with both bolts and which can be used for further connections. Tighten the fastening nuts with a maximum of $5\,\mathrm{Nm}$. The maximum screw-in depth (length of the mounting screws) is $15\,\mathrm{mm}$.

Procedure for connection

- 1. Make sure that the mounting rail is earthed. If not, connect the mounting rail to ground potential.
- 2. Connect the supply voltage.
- 3. If required, connect the interface links (RS-485 / Modbus) and set the bus termination.
 - Refer to Section 4.2, *Connecting interfaces* on page 20 with regard to wiring the bus cables and the bus termination.
- 4. Connect your signals, as required, to the D_IN digital inputs. We recommend the following type of connection: D_IN 1 on appropriate auxiliary contacts of the main switch and D_IN 2 on remote alarm contacts of the overvoltage protection. Note that the status 1 with open input and the status 0 with short-circuited input are displayed. The terminals identified with "–" are at GND potential (U_b –).
- 5. Connect the cables for the positive output voltage to both connections of the bus terminal. Alternatively, you can also use a copper bar which joins the two connections and then connect only one cable to the copper bar.
- 6. Connect the cable for the measurement of the total voltage to U- ("terminal block" in Fig. 3-1).
- 7. Connect the individual strings (I_1 to I_{16}).



With that the string.bloxx module is fully connected and can be put into operation. $\,$

3.4

Withdrawal from operation, removal







The connected cables may be carrying voltages of up to 1500 volts!

Before removal check that all sources of power are Locked Out.

Follow the safety information in Chapter 1, page 5.



IMPORTANT

The "Warning" LED on the circuit board (Fig. 3-2, page 14) lights when a voltage exceeding 40V is present on one of the terminals for the PV strings.

Removal of the cables

To remove cables from the push-in terminals insert a narrow screwdriver into the slot in the terminal next to the cable entry. This opens the clamping fastener and the conductor can be easily pulled out.

Removal from the mounting rail

Insert a narrow screwdriver through one of the lugs at the top on the module (1 in Fig. 3-3). Then press the screwdriver in the direction of the module (2). The retaining mechanism then unlatches and you can slightly pull off the module from the mounting rail on this side (3). Hold the module with one hand so that it dos not fall down and proceed similarly with the lug on the other side to completely remove the module from the mounting rail.



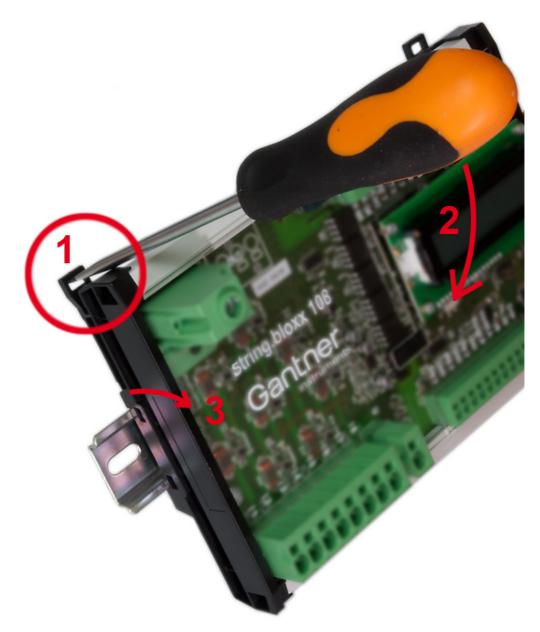


Fig. 3-3 Removing a module (example).

4.1

Modbus Communication

This chapter contains the list of interface parameters (Section 4.1), the list of available registers with the relevant functions (Section 4.3) and the explanation of the advantages and disadvantages of particular functions (sections 4.4.1 to 4.4.2).

Interface parameters

The string.bloxxmodule supports the Modbus RTU protocol with the following interface parameters:

Baud rate	1200 115200 bit/s
Format	8n1, 8e1 or 8o1
Max. cable length	1.2km
Unit load	1/8
Byte order	MSBit-LSBit
Word order	LSByte-MSByte
Address range	1 - 99
Max. frame length	256 bytes

The following are supported as function codes:

03	Read content of a holding register
04	Read content of an input register
06	Write content of a R/W register (preset single register)

For reading the registers the following therefore arises:

	Address basis	Function code for reading	Function code for writing
Input register	30001	0x04	-
Holding register	40001	0x03	0x06

The table in Section 4.3 contains a list of the functions, the associated registers and data types and the admissible or possible values.



4.2 Connecting interfaces

4.2.1 Cables

Use twisted-wire cables, with a screen if possible. Connect all bus devices as a chain (one behind the other; refer to Fig. 4-1).

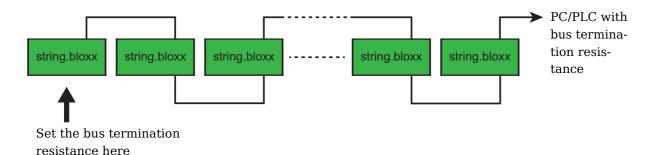


Fig. 4-1 Bus wiring for RS-485 or Modbus.



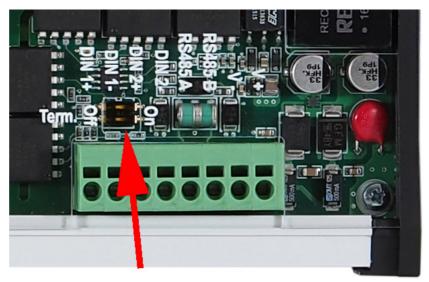
Connect the screen of the bus cable flat on the screen terminals (no point contact), e.g. with the type SKS 8-SNS35 – 3062786 from Phoenix Contact (refer to the adjacent illustration). We recommend that the screens are only earthed at one point and between the modules are only connected one to the other.

4.2.2 Tx and Rx LED indicators

The Rx LED lights when communication is taking place on the bus. Tx lights when the module itself is transmitting. Refer to Fig. 3-2, page 14 for the location of the LEDs.

4.2.3 Bus termination

To prevent signal reflections on the interface lines each section (bus segment) must be terminated at its physical start and end with a certain resistance. To do this, a terminating resistance is connected between the bus lines A and B. The line A is then connected via a pull-up resistor to +5V and line B is connected via a pull-down resistor to 0V. This cascade of three resistors ensures interference-free data transmission and defined potentials (voltage levels) when no data are being transmitted over the bus (the interface). The string.bloxx modules 116 E 1500V already have these resistors built in. You activate the resistors via *both* DIP switches; in this way both bus lines are connected to the resistance circuit: Push the switch Fig. 4-2 to the right (refer also to Fig. 3-2 on page 14). The DIP switches must always be both actuated, i.e. both set to On or both set to Off.



DIP switches for activating the bus termination resis-Fig. 4-2 tances; current setting: OFF (left, default setting).

IMPORTANT

The terminating resistances may only be activated at the end points of the interface line (of the bus segment). If resistances are also activated in between, the signal is weakened and interference or even interruption of the data transmission occurs for the modules located after the additional resistances.

4.2.4

Setting the interface bus address

The RS-485 interface is an interface capable of bus operation, i.e. basically up to 32 devices can be connected to one interface. In order to be able to establish a connection to a device, each device must therefore have a unique address.

On the string.bloxx module you can enter addresses 1 to 99; the address 0 is reserved.

Procedure

- 1. Set the decade place of the address with the switch x10 (to the left in Fig. 4-3).
- 2. Set the unit address with the switch x1.







Fig. 4-3 Switches for setting the bus address.

Example

To set the address 45 set the switch x10 to 4 and the switch x1 to 5.

4.3

List of registers and functions

Abbreviations used	Explanation
UINT16	Data type unsigned integer, 16 bit
UINT32	Data type unsigned integer, 32 bit
Float32	Data type floating, 32 bit
R	Only read access possible (Read only)
R/W	Read and write access possible (Read/Write)

Register (integer)	Data type	Channel (description)	Possible values	Unit	R/W
0000	UINT16	Digital input 01 (Main switch)	0: OFF 1: ON		R
0001	UINT16	$\begin{array}{c} \mbox{Digital input 02} \\ \mbox{(1500V}_{DC} \mbox{ overvoltage protection)} \end{array}$	0: NOK 1: OK		R
0004, 0005	Float32	Current I ₁	0 +30.00	A	R
0006, 0007	Float32	Current I ₂	0 +30.00	A	R
0008, 0009	Float32	Current I ₃	0 +30.00	A	R
0010, 0011	Float32	Current I ₄	0 +30.00	A	R
0012, 0013	Float32	Current I ₅	0 +30.00	A	R

Register (integer)	Data type	Channel (description)	Possible values	Unit	R/W
0014, 0015	Float32	Current I ₆	0 +30.00	A	R
0016, 0017	Float32	Current I ₇	0 +30.00	A	R
0018, 0019	Float32	Current I ₈	0 +30.00	A	R
0020, 0021	Float32	Current I ₉	0 +30.00	A	R
0022, 0023	Float32	Current I ₁₀	0 +30.00	A	R
0024, 0025	Float32	Current I ₁₁	0 +30.00	A	R
0026, 0027	Float32	Current I ₁₂	0 +30.00	A	R
0028, 0029	Float32	Current I ₁₃	0 +30.00	A	R
0030, 0031	Float32	Current I ₁₄	0 +30.00	A	R
0032, 0033	Float32	Current I ₁₅	0 +30.00	A	R
0034, 0035	Float32	Current I ₁₆	0 +30.00	A	R
0036, 0037	Float32	Summed current	0 +480.00	A	R
0038, 0039	Float32	Voltage	0 1500.0	V	R
0040, 0041	Float32	Power	0 480,000	W	R
0042, 0043	Float32	Temperature	-40,0 +125.0	°C	R
0050, 0051	UINT32	Firmware date	0xDDMMYYYY Example: 0x040507DB 04.05.2011		R
0052, 0053	UINT32	Software version	0xBBBBMMNN Example: 0x12510102 V1.02.1251		R
0059	UINT16	Sync ID ¹⁾	User code of Reg.		R
0060, 0061	Float32	Sync_current I ₁ ¹⁾	0302	A	R
0062, 0063	Float32	Sync_current I ₂	0 +30.00	A	R
0064, 0065	Float32	Sync_current I ₂	0 +30.00	A	R
555 F, 5555	1100002	5,110_0u11011t 13	· 1 50.00	11	11



Register (integer)	Data type	Channel (description)	Possible values	Unit	R/W
0066, 0067	Float32	Sync_current I ₄	0 +30.00	A	R
0068, 0069	Float32	Sync_current I ₅	0 +30.00	A	R
0070, 0071	Float32	Sync_current I ₆	0 +30.00	A	R
0072, 0073	Float32	Sync_current I ₇	0 +30.00	A	R
0074, 0075	Float32	Sync_current I ₈	0 +30.00	A	R
0076, 0077	Float32	Sync_current I ₉	0 +30.00	A	R
0078, 0079	Float32	Sync_current I ₁₀	0 +30.00	A	R
0080, 0081	Float32	Sync_current I ₁₁	0 +30.00	A	R
0082, 0083	Float32	Sync_current I ₁₂	0 +30.00	A	R
0084, 0085	Float32	Sync_current I ₁₃	0 +30.00	A	R
0086, 0087	Float32	Sync_current I ₁₄	0 +30.00	A	R
0088, 0089	Float32	Sync_current I ₁₅	0 +30.00	A	R
0090, 0091	Float32	Sync_current I ₁₆	0 +30.00	A	R
0092, 0093	Float32	Sync_summed_current	0 +480.00	A	R
0094, 0095	Float32	Sync_voltage	0 1500.0	V	R
0096, 0097	Float32	Sync_power	0 480.000	W	R
0098, 0099	Float32	Sync_temperature	-40,0 +125.0	°C	R
0200	UINT16	Device identification, string.bloxx type, see right	2005: 108 2006: 116 2007: 208 2008: 124 2009: AIO 2010: 116 E 2011: 116 E 1500V 2012: 124 E 2013: 124 E 1500V		R
0202	UINT16	Serial number low	e.g. 14148		R
0203	UINT16	Serial number high	e.g. 4		R
0205	UINT16	Modbus address	1 99		R/W

Register (integer)	Data type	Channel (description)	Possible values	Unit	R/W
0208	UINT16	Response delay in ms ²⁾	0 250		R/W
0209	UINT16	Baud rate and parity	For values refer to table on below		R/W
0302	UINT16	Sync register ¹⁾	User code Write: Trigger sync		R/W

For the explanation of the sync register and the advantages of synchronization refer to Section 4.4.1, page 26.

Table of values for setting the baud rate and parity

Setting	Specified value (decimal)
No parity (8n1)	0 7
Even parity (8e1)	100 107
Odd parity (8o1)	200 207
1200 bit/s	0 100 200
2400 bit/s	1 101 201
4800 bit/s	2 102 202
9600 bit/s	3 103 203
19.2kbit/s	4 104 204
38.4kbit/s	5 105 205
57.6kbit/s	6 106 206
115.2 kbit/s	7 107 207

For even parity and a baud rate of 38.4kbit/s enter 105 as the value. The number of stop bits cannot be changed (always 1). The factory setting is: no parity (8n1) and 19.2kbit/s (4).

4.4 Extended configuration options

In order to adapt the string.bloxxmodule optimally to your requirements, you can control the behavior using several parameters. The following table gives you an overview of the available options; a comprehensive explanation can be found in the sections stated in the table ("Refer to" column).

²⁾ For the explanation of the response delay refer to Section 4.4.2, page 28.

	Modus	Properties	Explanation	Regis- ters	Refer to
Data acquisition modes	Default	Simple communication	With several string.bloxx modules on a bus the data are acquired sequentially, i.e. with a time offset.	-	
	Sync	Synchronous measurements of all modules in a system	In the synchronized mode the controller sends a broadcast value to all modules (register 302). The modules save the current measurements simultaneously in special registers. Then the measurements are transmitted sequentially. Consequently, all values are acquired simultaneously even in large systems.	302	4.4.1
Delay	Default	Short response times	Bus master requests are answered as quickly as possible.	-	4.4.2
	Delayed	Adaptation to PLC reaction time	Bus master requests are only answered after the specified time.	208	7.7.2

4.4.1 Synchronization of modules (data acquisition modes)

A problem with larger solar power systems arises due to the serial transmission of data and the limited transmission speed of the Modbus link: The values of each PV string (or each module with string.bloxx) are normally interrogated individually and sequentially. Consequently a time offset arises between the data of the first (t_1) and the last PV string (t_n) , which can be in the range of several seconds (Fig. 4-4). The measurements are therefore not acquired synchronously and cannot be directly compared. (With the string.bloxx modules all PV strings are acquired simultaneously within a module.)

Time for the serial interrogation of all string measure-

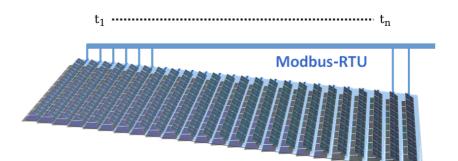


Fig. 4-4 Time offset due to serial communication in standard PV systems.

The string.bloxx modules offer you the possibility of preventing this time delay in that you send a special command simultaneously to all modules (broadcast) to "freeze" the current measurements of all PV strings of all modules simultaneously. Then you can interrogate and transmit these values consecutively from all string.bloxx modules. Although the data here arrive at the controller with a time offset, the values themselves have been acquired simultaneously and simultaneously.

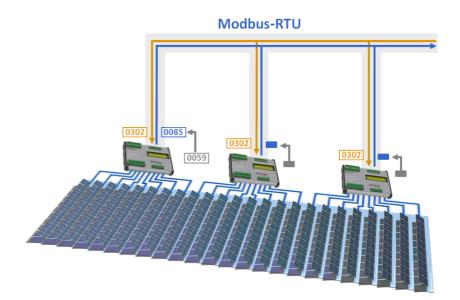


Fig. 4-5 Synchronous acquisition of all measurements of all PV strings with string.bloxx



Procedure

- 1. Send a broadcast message by writing a value in register 302 (sync register) via the Modbus address 0 (broadcast address). With that the current measurements in each module are written to the (internal) registers 60 to 101 and the broadcast value is transferred into register 59.
- 2. Now read out the measurements of all strings from the registers 60 to 101 and the value of register 302 from register 59 from all modules consecutively.

Since the modules transfer the measurements of the individual strings simultaneously into the sync registers 60 to 101, with this method you obtain synchronously acquired measurements of all PV strings.



If you write a different value into register 302 for each broadcast, you can check with the value from register 59 whether the broadcast has been received and that the current measurement (same value) is involved.

4.4.2

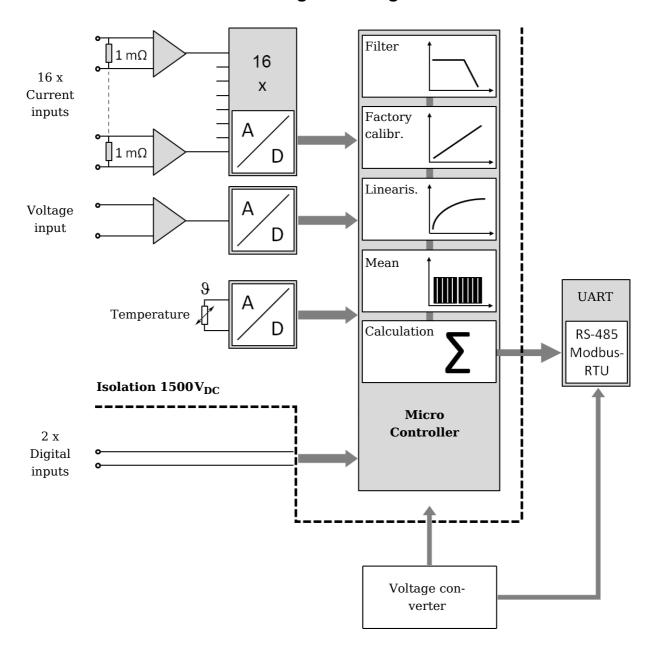
Use response delay (Delay)

Depending on the measurement mode for the current and voltage measurements the response time for a request (Request) through the Modbus interface is between 5 and 20 milliseconds. With register 208 you can extend the time up to the response if this is too fast for the Modbus master used and there is therefore the risk that responses are not detected, because they were already available on the bus shortly after the request. Specify the additionally desired delay in milliseconds in register 208 as a numerical value.

Technical Data

5.1

Block diagram string.bloxx 116 E 1500V





5.2 Technical Data string.bloxx 116 E 1500V

Current input			
Number	16		
Measuring range	0 +26A		
Accuracy	1% of full scale reading		
Connection (push-in spring connector)	$0.2\mathrm{mm^2}$ to $10\mathrm{mm^2}$ for rigid conductor $0.2\mathrm{mm^2}$ to $6\mathrm{mm^2}$ for flexible conductor $0.25\mathrm{mm^2}$ to $6\mathrm{mm^2}$ for flexible conductor with wire-end sleeve without plastic sleeve $0.2\mathrm{mm^2}$ to $4\mathrm{mm^2}$ for flexible conductor with wire-end sleeve with plastic sleeve, bared length 15 mm		
Current output			
Number	2		
Maximum summed current	416A		
Connection	2 x metric M6 thread, max. tightening torque 5Nm, max. screw-in depth 15mm; both connections must be connected; alternatively, a copper bar can be screwed on.		
Voltage input			
Voltage input Number	1		
	1 0V to 1500V _{DC}		
Number			
Number Measuring range	0V to 1500V _{DC}		
Number Measuring range Accuracy	$0 V$ to $1500 V_{DC}$ 1% of full scale reading		
Number Measuring range Accuracy Connection	$0V \ to \ 1500 V_{DC}$ $1\% \ of \ full \ scale \ reading$ $0.2 \ mm^2 \ to \ 4 \ mm^2 \ for \ rigid \ conductor$		
Number Measuring range Accuracy Connection	$0V to \ 1500 V_{DC}$ $1\% of full scale reading$ $0.2 mm^2 to \ 4 mm^2 for rigid conductor$ $0.2 mm^2 to \ 2.5 mm^2 for flexible conductor$ $0.25 mm^2 to \ 2.5 mm^2 for flexible conductor with wire-end sleeve$		
Number Measuring range Accuracy Connection	$0V to 1500 V_{DC} \\ 1\% of full scale reading \\ 0.2 mm^2 to 4 mm^2 for rigid conductor \\ 0.2 mm^2 to 2.5 mm^2 for flexible conductor \\ 0.25 mm^2 to 2.5 mm^2 for flexible conductor with wire-end sleeve without plastic sleeve, bared length 8 mm \\ 0.2 mm^2 to 1.5 mm^2 for flexible conductor with wire-end sleeve with plastic sleeve, bared length 8 mm$		
Number Measuring range Accuracy Connection (push-in spring connector)	$0V to 1500 V_{DC} \\ 1\% of full scale reading \\ 0.2 mm^2 to 4 mm^2 for rigid conductor \\ 0.2 mm^2 to 2.5 mm^2 for flexible conductor \\ 0.25 mm^2 to 2.5 mm^2 for flexible conductor with wire-end sleeve without plastic sleeve, bared length 8 mm \\ 0.2 mm^2 to 1.5 mm^2 for flexible conductor with wire-end sleeve with plastic sleeve, bared length 8 mm$		
Number Measuring range Accuracy Connection (push-in spring connector) Temperature measuremen	$0V to 1500 V_{DC}$ $1\% of full scale reading$ $0.2 mm^2 to 4 mm^2 for rigid conductor$ $0.2 mm^2 to 2.5 mm^2 for flexible conductor$ $0.25 mm^2 to 2.5 mm^2 for flexible conductor with wire-end sleeve without plastic sleeve, bared length 8 mm 0.2 mm^2 to 1.5 mm^2 for flexible conductor with wire-end sleeve with plastic sleeve, bared length 8 mm t$		

Digital input		
Number	2	
Type Upper switching threshold Lower switching threshold	Status >3.5V (logical 0, the input is internally pulled up to +5V) <1.0V (logical 1)	
Maximum input voltage	$30V_{DC}$	
Pre-assigned	D_IN 1: Main Switch D_IN 2: Surge Protection	
Connection (push-in spring connector)	$0.2\mathrm{mm^2}$ to $4\mathrm{mm^2}$ for rigid conductor $0.2\mathrm{mm^2}$ to $2.5\mathrm{mm^2}$ for flexible conductor $0.25\mathrm{mm^2}$ to $2.5\mathrm{mm^2}$ for flexible conductor with wire-end sleeve without plastic sleeve, bared length $8\mathrm{mm}$ $0.2\mathrm{mm^2}$ to $1.5\mathrm{mm^2}$ for flexible conductor with wire-end sleeve with plastic sleeve, bared length $8\mathrm{mm}$	
Supply		
Supply voltage	$18V_{DC}$ to $36V_{DC}$, overvoltage and reverse polarity protection	
Power consumption	approx. 0.7W	
Connection (push-in spring connector)	0.2mm ² to 4mm ² for rigid conductor 0.2mm ² to 2.5mm ² for flexible conductor 0.25mm ² to 2.5mm ² for flexible conductor with wire-end sleeve without plastic sleeve, bared length 8mm 0.2mm ² to 1.5mm ² for flexible conductor with wire-end sleeve with plastic sleeve, bared length 8mm	

5



Communication interface	
Standard	RS-485 (TIA/EIA-485), 2-wire
Data format	8n1, 8e1 or 8o1, default setting: 8n1
Protocols	Modbus-RTU
Bit rate	1200 to 115200bit/s, default setting: 19200bit/s
Number of devices on the bus	max. 32
Unit load on the bus	1/8
Connection	0.2 mm ² to 4 mm ² for rigid conductor
(push-in spring connector)	0.2 mm ² to 2.5 mm ² for flexible conductor
	$0.25\mathrm{mm}^2$ to $2.5\mathrm{mm}^2$ for flexible conductor with wire-end sleeve without plastic sleeve, bared length 8mm
	0.2 mm ² to 1.5 mm ² for flexible conductor with wire-end sleeve with plastic sleeve, bared length 8 mm

Ambient conditions		
Operating temperature	-20°C to +60°C: max. 416A	
Storage temperature	-40°C to +85°C	
Relative humidity	5% to 95% at 50°C, non-condensing	
Electromagnetic compatibility (EMC)	Conforms to EN 61000-4 and EN 55011	
Housing		
Material	Polycarbonate	
Dimensions (W x H x D)	305 x 95 x 55 (figures in mm)	
Weight	approx. 600g	
Type of installation	Mounting rail to DIN EN 60715 or wall installation	

Declaration of Conformity



Konformitätserklärung - Declaration of Conformity - Déclaration de Conformité

The undersigned, representing:

Gantner Instruments Environment Solutions GmbH Am Mühlgraben 8 – 08297 Zwönitz /Germany tel: +49 /37754-3351-0 – www.gantner-environment.com herewith declares, that the product:

String.bloxx-116-E-1500V

Certificate Ref No: 160701JS-10

is in conformity with the following EC directive(s), including all applicable amendments:

Dire	ectives	Short Title
X	2004 / 108 / EC	EMC Directive
	99 / 5 / EEC	R&TTE Directive
Χ	2006 / 95 / EC	Low Voltage Directive
	2006 / 42 / EC	Machinery Directive
	99 / 519 / EEC	Limitation of human exposure to electromagnetic Fields

Only "x"-marked directives are relevant for the product and for this declaration of conformity!

and that the standards and/or technical specifications referenced below have been applied:

Stand	ards		Short Title
		EN 61000-6-1 : 2007	Generic immunity standard for residential, commercial and light-industrial environments
	Х	EN 61000-6-2 : 2005	Generic immunity standard for industrial environments
EMC		EN 61000-6-3 : 2007	Generic emission standard for residential, commercial and light-industrial environments
	X	EN 61000-6-4 : 2007	Generic emission standard for industrial environments
	X	EN 61326: 1997+A1+A2	Electrical equipment for measurement, control and laboratory use – EMC requirements
ш		EN 300220-1/3 : 2010	Electromagnetic compatibility for Short Range Devices (SRDs) from 25 to 1000 MHz
R&TTE		EN 300330-1/2 : 2010	Electromagnetic compatibility for Short Range Devices (SRDs) from 9 kHz to 25 MHz
2		EN 301489-1/3 : 2008	Electromagnetic compatibility for Short Range Devices (SRDs) from 9 kHz to 40 GHz
	Х	EN 61010 : 2001	Safety requirements for electrical equipment for measurement, control and laboratory use
ety		EN 60950 : 2000	Safety requirements for information technology equipment
Safety		EN 60335 : 2002	Safety of household and similar electrical appliances
		IEC 62109 - 1	Safety of power converters for use in photovoltaic power systems
ery		EN 12100-1: 2003+A1:09	Safety of machinery – Basic concepts, general principles for design
Ë		EN 954-1: 1996	Safety of machinery – Safety-related parts of control system
Machinery		EN 60204-1: 2006/A1:09	Safety of machinery – Electrical equipment
an os.		EN 50364 : 2001	Limitation of human exposure to electromagnetic fields
Human Expos.		EN 50371 : 2002	Limitation of human exposure to electromagnetic fields (10MHz-300GHz) – Generic Standar

Remarks: Only "x"-marked standards are relevant for the product and for this declaration of conformity! Concerning safety aspects, the general and the product specific warning and safety instruction in the product accompanying documents must also be regarded!

This declaration is based upon the respective technical documentation held by the manufacturer.



Zwönitz, 01th July 2016

Jörg Scholz, General Manager

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Subject to change in the course of further technical development

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