

OPERATION MANUAL

Resistomat 2311 PROFINET Integration into TIA Portal

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Valid from: 01.02.2023 Applies to: Resistomat 2311-VXX03 Manufacturer:
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1 Introduction

This quick start guide describes an approach how you can configure the RESISTOMAT[®] 2311 via TIA Portal using the example of S7-1511 CPU. Please note that the samples here cannot be directly used in your production line because they have beed extremely simplified to reach a better understanding. Therefore, you may have to complete them by checking of status, error, length values etc.

Note: Please also note that you will have to use the RESISTOMAT[®] 2311 PROFINET manual to get futher information about input and output parameters (cyclic as well acyclic data transfer).



2 Creating new project

1. Start the **Totally Integrated Automation Protal**, select *Create New Project* (a), assign the project a name (b) and click *Create* (c):

UA Siemens		_ ¤ ×
		Totally Integrated Automation PORTAL
Start		Create new project
Devices & for the second secon	 Open existing project Create new project Migrate project 	Project name: 2311_TIA_Integration Path: E:lSiemens Version: V17 Author: om Comment:
Motion & technology	Close project	✓
Drive parameterization	 Welcome Tour First steps 	Create
Visualization	Installed software	
Online & Diagnostics	Help	
	🚱 User interface language	
Project view		

2. Go to *Devices & networks* (a) on the left side select *Add new device (b)* and look for yor CPU (c). Afterwards click the **Add** button (d).

VA Siemens - E:\Siemens\2311_TIA_Inte	egration\2311_TIA_Integration				_ _ ×
	_			т	Fotally Integrated Automation PORTAL
Start	a	Add new device			
Devices &	Show all devices Add new device	Device name:			
PLC programming	b			c ^{re:}	-
Motion & technology		Controllers	6657 511-14K00-048		8
Drive parameterization			CPU 1511C-1 PN CPU 1512C-1 PN CPU 1512C-1 PN CPU 1513-1 PN CPU 1513-1 PN CPU 1515-2 PN	Article no.:	CPU 1511-1 PN 6E57 511-1AK01-0AB0
Visualization 🚺	Configure networks	HMI	CPU 1516-3 PN/DP Im CPU 1517-3 PN/DP	Version:	V2.6
Online & Diagnostics			(1) (1) (1) (2) (1 MB data; 60 protection co	play; work memory 150 KB code and 0 ns bit operation time; 4-stage sncept, technology functions :
		PC systems	CPU 1511F-1 PN CPU 1513F-1 PN CPU 1513F-1 PN CPU 1515F-2 PN CPU 1515F-2 PN	measuring; t supports RT/II V2.3, 2 ports,	rol, closed-loop control, counting & racing; PROFINET IO controller, RT, performance upgrade PROFINET , I-device, MRP, MRPD, transport
			CPU 1516F-3 PN/DP CPU 1517F-3 PN/DP CPU 1517F-3 PN/DP CPU 1518F-4 PN/DP CPU 1518F-4 PN/DP ODK	Communicat DNS client, O methods, co	IP, secure Open User tion, 57 communication, Web server, JPC UA: server DA, client DA, mpanion specifications; mode, routing; Runtime options,
	🔵 Help	Drives	CU 1518F-4 PN/DP MFP CPU 1511T-1 PN CPU 1511T-1 PN CPU 1511T-2 PN	firmware V2.	
					d
		Open device view			Add
Project view	Opened project: E:\Siemens\2311_		[IA_Integration		

4 of 17

3 Installation of GSDML files

- **Note:** Please make sure that your GSDML file is compatible to the field bus firmware in the Resistomat 2311. Also for compatibility reasons, uninstall all previous GSDML files of particular device if you have any!
- 1. Go to Options→Manage general station description files (GSD) (a)

Project Edit View Insert Online Options						ols Window 🕨		Totally Integrated Automation			
2	j 🎦 🔚 Save project ا 🐰 🗐 🗓	Ť	Set	ting	s			e	, <u>.</u>	PORTAL	
	Project tree		Sup	por	t pa	ckages		am blocks →	Main [OB1]	_ 🖬 🖬 🗙	
	Devices				- ×	eneral station description files (GSD)				
						nation License Manager		a d	e° 🐅 🖑 🖷		
		<u>*</u>				ence text				• • • •	True l
	🔻 🔂 Program blocks		Glo	ball	ibra	aries	•		Default value	Comment	Instructions
art	Add new block	=	1	-00	•	Input					5
S	📲 Main [OB1]	_	2	-		Initial_Call	Bool			Initial call of t	
	Technology objects	¥	З	-00	•	Remanence	Bool			=True, if rem	8
	✓ Details view		4	-00	•	Temp					Tes
		-	5		•	<add new=""></add>					esting
			6	-00	٠	Constant					9
	Name Addres	s	7		•	<add new=""></add>					

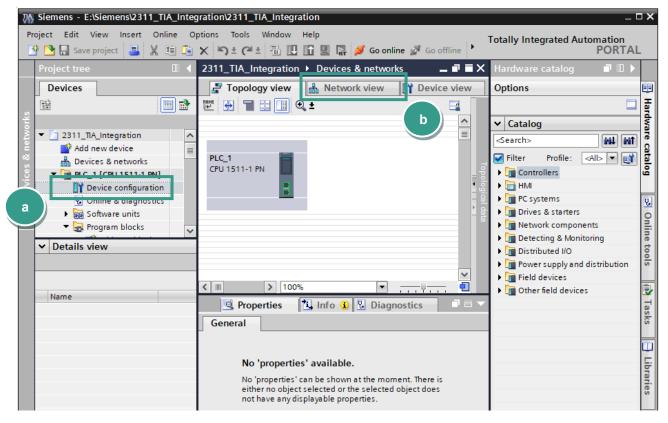
2. Navigate to your Resistomat 2311 GSDML directory (a) (you will find the GSD on <u>www.burster.com/en/download-area</u>), select the GSDML file (b) and click *Install* (c)

Manage general station description files			×
Installe a GSDs in the project			
Source path: E:\2311\GSDML			
Content of imported path			
File	Version	Language	Status
GSE ML-V2.35-BURSTER-RESISTOMAT-2311-2021101	9.x V2.35	English	Not yet installed
b			
			c) >
		elete l	nstall Cancel



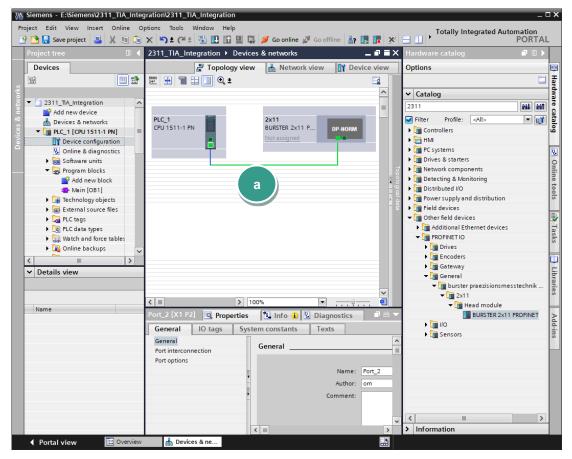
4 Creation of network connections

1. Double click *Device Configuration* (a) in the project tree und switch to Network view (b) :



2. Now select the Resistomat 2311 device in the catalog and drag & drop it into the working area (a):

₩ Siemens - E:\Siemens\2311_TIA_Integration\2311_TIA_Integration _ □ X									
Project Edit View Insert Online Op	tions Tools Window Help 🗙 🏷 ± (주 ± 🗟 🗓 🏠 🖳 🙀 🥥 Go online 🖉 Go offline 🎎 🕕 🛽	Totally Integrated Automation							
Project tree 🔲 🖣		Hardware catalog 🔊 🗊 🗈							
Devices	Topology view 🚠 Network view 📑 Device view	Options 💷							
orks		Catalog 2311 Filter Profile: <all> Filtor Profile: <all> Catalog</all></all>							
Z 2311_TIA_Integration ▲ Add new device		2311 MH MT G							
[∞]	PLC_1 CPU 1511-1 PN								
Details view		Power supply and distribution							
	< IIII > 100% <	Field devices One field devices							
Name	🖸 Properties 🚺 Info 🔋 🗓 Diagnostics 🗖 🗖 🤝	✓ ✓ PROFINETIO O Trives							
	General	Gateway							
	No 'properties' available.								
	No 'properties' available. No 'properties' can be shown at the moment. There is either no object selected or the selected object does not	✓							
	have any displayable properties.	BURSTER 2x11 PROFINET							
		> 🚰 Sensors							
		Information							
Portal view Overview	📩 Devices & ne								



4. Change now to **Network view** (a) to assign a controller to the Resistomat 2311. Click on the link "Not assigned" (b) of Resistomat 2311 and select your controller (c):

Project Edit View Insert Online Options Tools Window Help Totally Integrated Automation PORTAL Project tree 2311_TIA_Integration Image: Connections Im	Siemens - E:\Siemens\2311_TIA_Integration\2311_TIA_Integration				_ 🗆 ×
Project tree 2311_TIA_Integration > a etworks Particle view Devices Projocy V Network view Device view Options Projocy V Network view Device view Projocy V Projocy V Network view Device view Options Projocy V Network view Device view Projocy V Projocy V Network view Device view Projocy V Projocy V Projocy V Projocy V Projocy V Projocy V Projocy V<	Project Edit View Insert Online Options Tools Window Help			Totally Integrated Automa	ition
Uppology Image: Connections Image: Connections<	📑 📴 🔒 Save project 📕 🐰 🗐 📬 🗙 🏷 🛨 (주 ± 🐻 🖳 🏠 🎽	Go online 🚀 Go offline 🛛 🏭 🛽		E D PC	ORTAL
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Mane More assigned Processing Processing Processing	Devices & networks	IRSTER 2x11 P			🗖 📑 📑
Sect 10 controller PLC_1ROFINETinterface_1 PRC_1ROFINETinterface_1	j ▼ J PLC_1 [CPU 1511-1 PN]	DF-IIOKan			9
Control and a rest of the second				_	5
Image: Source files Image: Source fil					8
Image: Source files Image: Source fil		PN/IE_1			E S
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Image: Source files Image: Source fil	- Main [OB1]		- 2	Distributed I/O	too
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General	General				Add-in:

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IMPORTANT: Check if devices are also connected physically to the right ports. You find the port number assignment in the section *Port-Identification of* **Resistomat 2311 PROFINET** manual

5. Change the device name in Device view \rightarrow Properties \rightarrow General \rightarrow Ethernet addresses:

2x11 [BURSTEI	R 2x11 PROF	FINET]		Properties	🚺 Info 🚺 🗓 Diagnostics				
General	IO tags	System consta	ants	Texts					
General					💿 Set IP addr	ess in the project	^		
PROFINET interf	face [X1]				IP a c	ddress: 192.168.110.34			
Identification 8					Subnet	mask: 255 . 255 . 255 . 0	_		
Shared Device					_	e router settings with IO controller	≡		
					Use router				
					Routerad	ddress: 0 . 0 . 0 . 0			
					O IP address	is set directly at the device			
		PROFI	NET						
		-			📃 Generate P	ROFINET device name automatically			
		-	PROFIN	ET device na	name: resistomat2x11				
			c	onverted na	me: resistomat2x1	11			
				Device num	ber: 1		-		
		Advance	d option	s					

5 Perform a measurement and read the measurement result

In this section, you will learn how to create a simple program to start and stop a measurement periodically and display the measured resistance value with corresponding unit in a watch table. You will need to refer to sections *PLC inputs* and *PLC outputs* of the **RESISTOMAT**[®] **2311**.

PROFINET manual to understand the meaning of inputs and outputs bytes.

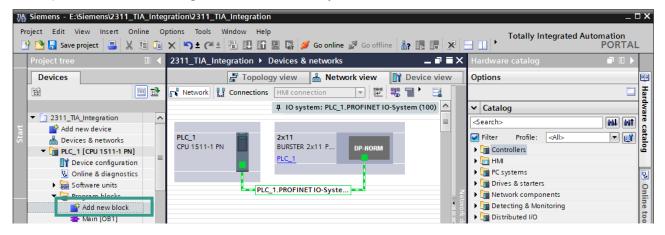
1. Add the variables out_start, in_ready and in_error as shown below

VA∕	Siemens - E:\Siemens\2311_TIA_Integration\2311_TIA_Integration									
	Project Edit View Insert Online Options Tools Window Help									
	Project tree III IA_Integration > PLC_1 [CPU 1511-1 PN] > PLC tags > Default tag table [88] _ II = II = X									
	Devices		•	Tags 🗉 Us	ser constants	🗶 Syste	m const	ants		
	ŭ 🗉 🗉	•	🗳 🔮 🖿 🛃 📽 🛍							
60			Default tag table							
Ξ.	📥 Devices & networks	^	Name	Data type	Address	Retain A	cces W	rita		
am	PLC_1 [CPU 1511-1 PN]		1 📲 out_start	Bool	%Q0.0					
- 16o	Device configuration		2 📶 in_ready	Bool	%I0.0					
E.	🛂 Online & diagnostics		3 📶 in_error	Bool 🔳	%I0.1					
PLC	Software units		4 <add new=""></add>				V	 Image: A start of the start of		

Note: Please note: the addresses may be different. You have to check them in the Device view → Device overview of the Resistomat[®] 2311:

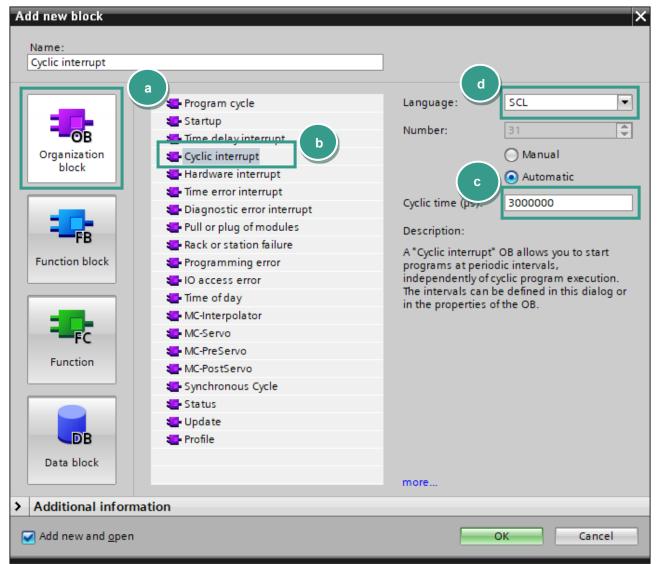
WA Siemens - E:\Siemens\2311_TIA_Integ	ration\2311_TIA_Integration	n							
Project Edit View Insert Online Options Tools Window Help Totally Save project 📑 🐰 🗉 🖆 🗶 🏷 🛨 🍊 🖞 🕼 😰 🎧 💋 Go online 🖉 Go offline 🎎 🕼 👫 🧏 🗖 🛄 🔸									
Project tree 🛛 🔳 📢	311_TIA_Integration >	Ungrouped devices 🔸 2x11 [BUR	STER 2x1	1 PROFINE	T] 🗕 🖬 🖬 🗙				
Devices		📱 Topology view 🛔	Network	view 🚺	Device view				
	dd 🖌 🔰 🗖	Device overview			-				
ork		Wodule .	. Rack	Slot 1 a	address Q ad				
2311_TIA_Integration		▼ 2x11	0	0	~				
Add new device		▶ PN-IO	0	0 X1					
📸 📩 Devices & networks		4 Bytes Input_1	0	1 0	3				
🖞 🔻 📊 PLC_1 [CPU 1511-1 PN]	1	4 Bytes Output_1	0	2	03				
Device configuration			0	3	5.115				
Online & diagnostics			0	4					

2. Expand the tree node Program blocks in the Project tree and double click Add new block:





Select in the new window Organization block (a) → Cyclic interrupt (b). Set the cyclic time to 3.000.000 µs (c). As language set SCL (d) and click OK:



4. Type in the following source code in the code field of the new block:

IF "out_start" = TRUE THEN	// Is measurement start set?
"out_start" := FALSE;	// Then reset it
IF "in_error" = FALSE THEN	// No error?
"read_meas_value"();	// Read the measurement value
END_IF;	
ELSE	
IF "in_ready" = TRUE THEN	// Is 2311 ready for a new measurement?
"out_start" := TRUE;	// Start a new measurement
END_IF;	
END_IF;	



5. Add a new function block and name it **read_meas_value**:

Add new block					×
Name: read_meas_value					
Organization block	Language: Number:	SCL 1 Manual Automatic	▼		
FB Function block	Description: Functions are co	ode blocks or subrout	ines without deo	dicated memory.	
Data block	more				
> Additional inform	nation				
Add new and open				ОК	Cancel

You will use this block to read the measurement value string, containing the measurement resistance value and the corresponding unit. For this acyclic operation, you will also need an instance of **RDREC** block.

Variables:

	read_meas_value										
		Na	me	Data type	Default value	Comment					
12	-	•	Done	Bool							
13	-	•	BytesWritten	UInt							
14	-	•	LenRead	UInt							
15		•	Data	Bool							
16	-	•	MeasStatus	UInt							
17		•	MeasValueAsByteArray	Array[063] of Byte							
18	-	•	Constant								
19		•	<add new=""></add>								
20	-	•	Return								
21		•	read_meas_value	Void 🔳							



6. Type in the following source code in the new function block:

Sourcecode:

"Data_block_1".MeasValueAsString := '---';

REPEAT

```
"RDREC_DB"(REQ := TRUE,
ID := 296,
INDEX := 12,
MLEN := 2,
VALID => #Valid,
BUSY => #Busy,
ERROR => #Error,
STATUS => #Status,
LEN => #LenRead,
RECORD := #MeasStatus);
```

```
IF #Error = TRUE OR #Status > 0 OR #MeasStatus > 0 THEN
RETURN;
END_IF;
IF #Error = TRUE OR #Status > 0 OR #MeasStatus > 0 THEN
RETURN;
END_IF;
```

REPEAT

```
"RDREC_DB"(REQ := TRUE,
ID := 296,
INDEX := 15,
MLEN := 64,
VALID => #Valid,
BUSY => #Busy,
ERROR => #Error,
STATUS => #Status,
LEN => #LenRead,
RECORD := #MeasValueAsByteArray);
UNTIL NOT #Busy
END_REPEAT;
```

Chars_TO_Strg(Chars := #MeasValueAsByteArray, pChars := 0, Cnt := #BytesWritten, Strg => "Data_block_1".MeasValueAsString); // Init Measurement value string

- // 296: HW-ID for slot 48
 // Index 12: Measurement Status
 // Max. lenth of data to read
 // New data received and valid
 // Read not completed yet
 // Read error
 // Read status
 // Number of bytes was read from device
- // Measurement status

- // 296: HW-ID for slot 48
 // Index 15: measured resistance value
 // Max. lenth of data to read
 // New data received and valid
 // Read not completed yet
 // Error
 // State
 // Number of bytes were read
 // Array[0..63] of Byte
- // Byte array// Start position// Number of bytes copied// Destination string

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 Note:
 Your Hardware identifier for the slot 48 (Current measurement values) may be different. You can check it in the Device view → Device Overview → System constants:

 Why Siemens - E:\Siemens\2311_TIA_Integration\2311_TIA_Integration

Project Edit View Insert Online Options Tools Window Help												
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Project tree		11_TIA_Integration	Ungrouped devices > 2	x11 [BURSTE	R 2x11	PROFIN	ET] 🗕 🕯	7 8				
Devices		🚰 Topology view 🛛 🛗 Network view 🛛 🏦 Device view										
 ř		🔐 M 🖂										
rks		^	Module		Deals	Slot	l address	0				
2 V 2311_TIA_Integration	^	=			Rack O	41	Taddress	Q				
Add new device			Data Logging_1		0	41						
🖉 🚠 Devices & networks			Comparator_1 Max Min Values 1		0	42						
🕴 👻 🛅 PLC_1 [CPU 1511-1 PN]	27			0	45						
Device configuration	on 😑		PT100_1 Temperature compe		-	44						
Online & diagnosti				-	0	45						
Software units			Scaling of voltage in Cooling curve 1	iput_1	0	40						
👻 🚘 Program blocks			Current measureme	ntunluos 1	0	47	1					
Add new block			Record errors events		0	40						
Cyclic interrupt	[Record errors events	s in the login	0	50						
💶 Main [OB1]					0	50						
📲 read_meas_val	ue.				0	52						
System blocks					0	53						
Technology objects	;	~			0	54						
External source file	s	<> • •	<			54						
🕨 🚂 PLC tags				••••								
PLC data types		Current measuremer	it values_1 💽 Properties	🗓 Info	🤨 🖸 L	Diagnos	tics					
Watch and force ta	bles	General IO tag	s System constants	Texts								
Online backups		Show hardware system	constant 🔻									
🕨 🔀 Traces		Name		Туре		н	ardware iden	tifier				
DPC UA communic	a		asurement values 1	Hw SubMo	dule		96					
Device proxy data	>				- and	-						

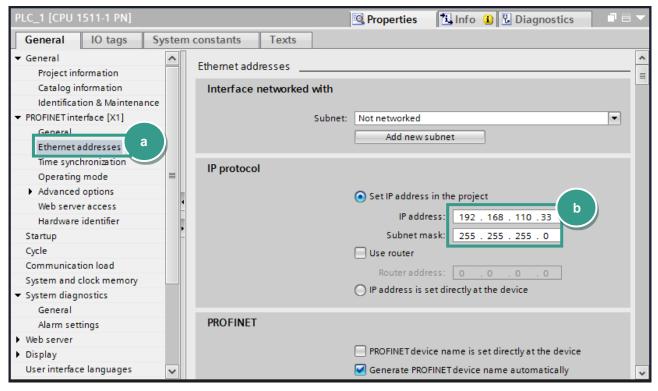
7. Add a new data block via *Add new block* (a) → *Data block* and insert the string variable '*MeasValueAsString*' into it (b):

₽	/ 3								
	roject Edit View Insert Online Options								
	🏄 🔁 🔒 Save project ا 📕 🔏 🗐 🏦 🗙 💆	ອ ະ ເຟ	±	1 I	🗓 🚹 🖳 🗛 💋 Goonlin	ne 🖉 Go offline	Å? II II → E	- 💷 < e	arch in project>
	Project tree		23	11_1	TIA_Integration → PLC_	1 [CPU 1511-1	PN] 🕨 Program bloc	:ks 🕨 Data	a_block_1 [DB2
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	2	🔲 🖬	- Milli	; ;	🔍 🛃 🔛 🖏 Keepa	actual values 🛛 🔒	Snapshot 🦄 🖏	Copysnap	shots to start valu
P				Dat	ta_block_1				
Ē	Software units		•		Name	Data type	b J _{le}	Retain	Accessible f
all	🔻 🛃 Program blocks		1		▼ Static				
5	Add new block		2	-00	MeasValueAsSting	String	E 1		
L.	 Cyclic interrupt [OB30] 								
Ĕ	read_meas_value [FC1]								
	Data_block_1 [DB2]								
	System blocks								
	Technology objects								
	External source files								
	PLC tags								
	PLC data types								
	 Watch and force tables 								
	📑 Add new watch table								
	E Force table	~	·						
	✓ Details view								
	Module								

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 Before you load the project into the CPU you have to set the IP addresse of your CPU. To do this please go to **Device view** and select *Ethernet addresses* (a) in *General* tab. Set now the IP-Address and a subnet mask(b) assigned to your in section *IP-Protocol*:

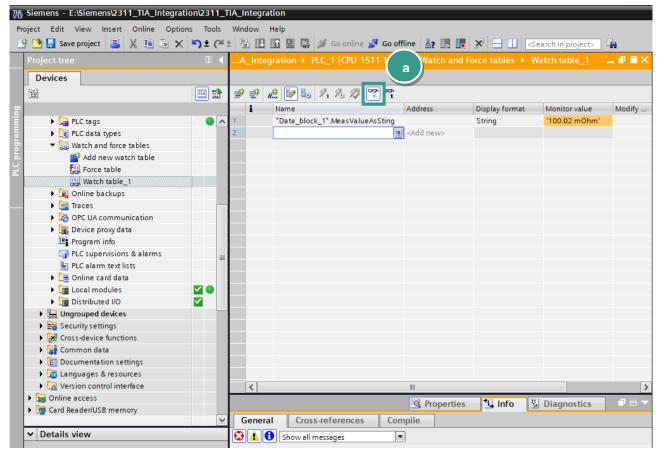


To load the configuration into the CPU select it first go to Online → Download to device and click on Start search (a) to look for your controller. Then select the controller and click on Load (b):

	Configured access	nodes of "PLC_1"						
	Device	Device type	Slot	Туре	Address	Sub	net	
	PLC_1	CPU 1511-1 PN	1 X1	PN/IE	192.168.110.33			
-	CM 1542-5_1	CM 1542-5	3 X1	PROFIBUS	5	PRO	PROFIBUS_1	
		Type of the PG/PC inte	erface:	PN/IE			•	
		PG/PC inte			79V Gigabit Network C	onnection	•	
		Connection to interface/s	ubnet:	Direct at slot '1	X1'		- 🖲	
		1st ga	iteway:				- 💎	
						-		
	Device	Device type	Type	A	ddress	Target d	evice	
-	Device PLC_1	Device type CPU 1511-1 PN	Type PN/IE	19	92.168.110.33	Target d PLC_1	evice	
				19			evice	
1			PN/IE	19	92.168.110.33		evice	
			PN/IE	19	92.168.110.33		evice	
			PN/IE	19	92.168.110.33 cccess address		evice	
			PN/IE	19	92.168.110.33 cccess address	PLC_1 -	evice	
			PN/IE	19	92.168.110.33 cccess address	PLC_1 -		
Flash LED	PLC_1 -		PN/IE	19	92.168.110.33 cccess address	PLC_1 -	levice tart searc	
	PLC_1		PN/IE	19	92.168.110.33 cccess address	PLC_1 -		
Flash LED line status informa Retrieving device	PLC_1	CPU 1511-1 PN 	PN/IE	19	92.168.110.33 cccess address	PLC_1 -		
Flash LED line status informa Retrieving device Scan and inform	PLC_1	CPU 1511-1 PN 	PN/IE	19	92.168.110.33 cccess address	PLC_1 -		
Flash LED line status informa Retrieving device	PLC_1	CPU 1511-1 PN 	PN/IE	19	92.168.110.33 cccess address	PLC_1 -		

The PLC checks the 2311 device ready status and starts a new measurement. Then it stops the measurement after 3 seconds, read the measurement results, starts a new measurement again and so on.

- **Note:** Make sure that PROFINET Control is enabled in RESISTOMAT[®] 2311. For details, see chapter *Configuration menu in Resistomat 2311* of *the* **RESISTOMAT[®] 2311 PROFINET** manual.
- 1. To control the measurement value just add the variable "Data_block_1".MeasValueAsString to the watch table and click on the button Monitor all (a)







6 Further Examples

6.1 Writing of string data types

Note: Datatype **String** in TIA Portal contains two additional bytes, which represent the length of the string. To avoid these two bytes being sent use the function 'Strg_TO_Chars' to convert the String to a byte array as shown below:

Example 1: Reading Device ID and write it as station name to device

In this example, we perform a write access on slot 30/Subslot 1/index 16 to set the station name of Resistomat 2311. For this acyclic operation, you will need an instance of a WRREC block. You can see the new station name in the **info menu** of Resistomat 2311.

PLC parameters table:

		Name		Data type	Default value	Comment
4	-00	•	Temp			
5	-00	•	Num Bytes Written	UInt		
6		•	abStationName	Array[064] of Byte		
7	-00	•	Busy	Bool		
8	-00	•	Error	Bool		
9		•	Status	DWord		
10		•	Done	Bool		
11	-00	•	Constant			

Sourcecode:

<pre>Strg_TO_Chars(Strg := 'Station 3',</pre>	// Station name as a string
pChars := 0,	// Position in byte array
Cnt => #NumBytesWritten,	// Number of bytes written
Chars := #abStationName);	// Station name as byte array
REPEAT	
"WRREC_DB"(REQ := TRUE,	
ID := 268,	// 268: HW-ID for General Settings
INDEX := 16,	// Index 16: Station Name
LEN := #NumBytesWritten,	// Length of data to write
DONE => #Done,	// Write done
BUSY => #Busy,	// Write not completed yet
ERROR => #Error,	// Error
STATUS => #Status,	// Status
RECORD := #abStationName);	// Bytes to write
UNTIL NOT #Busy AND #Done	
END_REPEAT;	

Example 2: Writing of serial number 1 into device order sheet

PLC parameters table:

	_	Na	me	Data type	Default value	Comment
4		•	Temp			
5	-	•	NumBytesWritten	UInt		
6	-	•	abSerial	Array[064] of Byte		
7	-	•	Busy	Bool		
8	-	•	Error	Bool		
9	-	•	Status	DWord		
10	-	•	Done	Bool		
11	-	•	Constant			

Sourcecode:

Strg_TO_Chars(Strg := 'SN123456789', pChars := 0, Cnt => #NumBytesWritten, Chars := #abSerial);

REPEAT

"WRREC_DB"(REQ := TRUE, ID := 268, INDEX := 76, LEN := #NumBytesWritten, DONE => #Done, BUSY => #Busy, ERROR => #Error, STATUS => #Status, RECORD := #abSerial); UNTIL NOT #Busy AND #Done END_REPEAT; // Serial as a string

// Position in byte array

// Number of bytes written

- // Station name as byte array
- // 268: HW-ID for General Settings
 // Index 76: Serial number 1
 // Length of data to write
 // Write done
 // Write not completed yet
 // Error
- // Status
- // Bytes to write

You can see the written serial in the **Order sheet** menu of Resistomat 2311.