How do you connect and display nonelectrical measuring points with SIMATIC powerrate?

SIMATIC powerrate

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Caution

The functions and solutions described in this article confine themselves predominantly to the realization of the automation task. Furthermore, please take into account that corresponding protective measures have to be taken in the context of Industrial Security when connecting your equipment to other parts of the plant, the enterprise network or the internet. Further information can be found in Entry ID: !50203404!.

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Question

How do you connect and display non-electrical measuring points with SIMATIC powerrate?

Answer

Follow the instructions and notes listed in this document for a detailed answer to the above question.

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1 Introduction

The SIMATIC powerrate power data management software captures, visualizes and archives power consumption values of all the connected measuring points (measuring devices). Furthermore, these archived measured values can be output in Excel reports using the "Powerrate Reports" reporting tool supplied with SIMATIC powerrate.

The default configuration of the S7 library and the S7 sample project of SIMATIC powerrate permits electrical power values to be captured and processed (unit: 'kW') and likewise the energy values (unit: 'kWh').

The connection and processing of the energy value is done device-independent and unit-independent in SIMATIC powerrate. The link with the physical unit is done on the powerrate capture block in the S7-CPU and is then transferred to the WinCC faceplate and the Excel Report.

This gives the user the possibility of changing the physical unit to suit requirements.

Examples

Table 1-1

	Physical unit for		
	Energy, Volume, Quantity etc.	Power, Flow rate, Throughput etc.	Notes, examples
Electrical energy	kW	kWh	Electric motor
	m³	m³/h	Water, compressed air
	m³ i.N.	m³ i.N./h	Standard cubic meter,
Non-electrical			heating gas
measured variables	Piece	Pieces/h	Piece goods, production data
	kg	kg/min	Mass

2 Advantages and Benefits

The uniform and universal capturing of electrical and non-electrical consumer and production data makes it possible to synchronize the plant data relevant for energy data management and display and archive it in a standardized form.

Thanks to the same time reference of the captured values you can set the consumer data in direct relation to the production data (to calculate key ratios, for example).

3 Configuration

There are two possible ways of configuring depending on the configuration environment used.

- Default: LAD/FBD/STL editor of STEP 7
- Optional: CFC (Continuous Function Chart, not included in the standard delivery package of STEP 7)

Both methods are described in this document.

Note Furthermore, S7 blocks and faceplates are designated with the prefix 'PRx_...'. The 'x' designates a wildcard and describes blocks for both S7-400 with the prefix 'PRE_...' and S7-300 with the prefix 'PR3_...'.

3.1 Using the LAD/FBD/STL Editor

Table 3-1

Step		Description	
1.	Duplicate the functio	n block 'PRx_SUM' (S7-300: FB161; S7-400: FB1061).	
	When requested, assign a block number (FB 191, for example).		
	Insert Function Block		
	The shires I	D101 des de stête De sus sette server	
	it?	B 161 aiready exists. Do you want to rename	
	Rename	Adjust Attributes	
	Yes	No Help	
2.	Assign a new symbol	lic name for the new FB.	
	 The name of the FB must begin with the character string 'PRx_SUM' ('PR3_SUM_Volume' for example) so that the powerrate wizard can identify the block as 		
	a powerrate capture block.		
	Note		
	Do not use the character string 'PRx_SUMC', because this is reserved for the special capture block for batch-oriented energy data capture		
	suprare block for batch onenced energy data capture.		
	Properties - Function Block		
	General - Part 1 General - Part 2 Calls Attributes From source		
	Name:	FB191 Multiple Instance Capability	
	Symbolic Name:	PR3_SUM_Volume	
	Symbol Comment:		
	Created in Language:	STL	
	Project Path: WsDCc0-5\PLC_Energy\CPU315_FW3.2\S7-Prg_Energy\Blocks\F B191		
	Storage location of project:	G:\030 KHI-EM Workshop\03 TEMP-Projects (only used by Trainer	
		Code Interface	
	Date created:	04/18/2012 12:43:13 PM	
	Last modified:	06/14/2010 06:00:00 PM 01/15/2009 12:02:49 PM	
	Comment:	PR3_SUM Energy acquisition	
	OK	Cancel Help	

Step	Description
3.	 Open the new FB in the LAD/STL/FBD editor. A message appears indicating that the FB is write-protected. Confirm this with the "OK" button.
	Note You can make the necessary changes despite the write protection.
	 In the FB interface you must change the unit attribute according to the relevant input and output parameters.
	 You can change the attributes via the object properties of the parameter. The corresponding attribute is 'S7_unit' and has the default value 'kWh' or 'kW'. Change the value to the desired unit (m³ for example)
	● File Edt Inset PLC Debug View Options Window Help ● File Edt Inset PLC Debug View Options Window Help ● ひつじか 「「「」」 「」」 「」」 「」」 「」」 「」」 「」」 「」」 「」」
	Interface Name Data Type Address Image: Strain Stra
	B Converter Display Columns F11 148.0 B Converter Object Properties Alt+Return 150.0
	B: at Floating-point Fct. Dial of the second s
	B. Of Timers Data URSU_SAR Bool 167.0 B. Of Timers Data URSU_SAR Bool 167.0 B. Of Timers Data URSU_SAR Bool 167.0
	Variable Properties X General Information Attributes General
	Attribute Value 1 S7_dynamic true 2 S7_m_c true 3 S7_qc true 4 S7_shortcut Instant. 5 S7_unit m³ 6 7 7 8 7 7
	Note: Note: Insert Row Delete Row
	Cancel Help OK Cancel Help

Step			Description		
4.	The list below sho "m ³ /h" units.	ows all the paramete	rs to be modified ta	king the example o	f the "m³" and
		Parameter type	Parameter	Example]
		Out	CUR VAL	m ³	
		out	LAST VAL	m ³	
			EST VAL	m ³	
			CUR PWR	m³/h	
			AVG PWR	m³/h	
			EST PWR	m³/h	
		In/Out	V MAN	m ³	
		in out	V MAN L1	m ³	
			V MAN L2	m ³	
			V MAN L3	m ³	-
				1	1
	After changing all	the attributes you sa	ave and close the F	B.	
5.	The FB is now rea	adv and can be inter	connected with the	relevant measured	value (water
	meter, for example).				
	• For this you call the new FB together with an instance data block (the call is similar to the				
	default PRx-S	SUM blocks, in the F	C103 "Energy" ove	r OB34 every 100m	ns, for example).
	Call the block	according to the nu	mber of measuring	points/measuring of	devices to be
	captured.	-	-		
	Create a new	instance data block	for each call.		
	Note				
	When assigning the	he symbolic name of	f the instance DB, c	hoose a meaningfu	Il designation,
	because it will be	used later for identil	ication in the visual		apons.
	CALL UDDO CU	W Relame" "DC	Notor" FD19		
	RINO	M_VOIUME", "DC -="DB WIWO" WI	_water FBIS	52 DBM0	
	SAMPLE T	:= DD_PIFC .FI :=#SAMPLE T	fo DDIC #SAF	IPLE T	
	RUNUPCYC	:=10	<i>"</i>		
	INP SEL	:=0			
	CSF	:=			
	VALUE_P	:="PAC_Digital	Input" I379	9.0	
	QC_P	:=			
	VALUE_D	:=			
	QC_D	:=			
	ATOR K	:=			
				~~~ I	
	1				

Step	Description		
6.	<ul> <li>Create all the necessary instance DBs.</li> <li>Enable the "Operator Control and Monitoring" property in all instance DBs of the FB.</li> <li>Then you compile the WinCC OS.</li> </ul>		
	Note Enabling this property creates a corresponding tag structure in the WinCC data management when the WinCC project is compiled.		
	Disciplination         Discipl		
7.	Now start the powerrate wizard and update the process value archive.		
8.	In the WINCC Explorer you open the "@ I emplate_pre.pdl" powerrate picture library using the Graphics Designer. This picture was copied into the WinCC project directory beforehand when the OS project editor was run.		
9.	<ul> <li>In the Graphics Designer you duplicate the faceplate for the PRx_SUM and open the Properties dialog.</li> <li>In the Object Properties of the faceplate you change the "type" and "Servername" attributes accordingly.</li> <li>In the example you must append the suffix "Volume" to the character string "PR3_SUM" – corresponding to the symbolic name of the new FB (in the example:</li> </ul>		
	<ul> <li>"PR3_SUM_Volume", see Step 1).</li> <li>Save the changes.</li> </ul>		
	Object Properties       Properties         Properties       Events         Properties       Events         Openeties       Static       Openetics         Properties       Events       Openetics         Openetics       Static       Openetics         Properties       Events       Openetics       Static       Openetics         Openetics       Events       Static       Openetics		

Step	Description				
10.	In the file explorer (Windows Explorer, for example) you open the "GraCS" folder in the WinCC project directory. Here you find the following PRx_SUM faceplate pictures:				
	<ul> <li>@PG_PRx_SUM.pdl</li> <li>@PG_PRx_SUM_EDIT.pdl</li> <li>@PG_PRx_SUM_MAINTENANCE.pdl</li> <li>@PG_PRx_SUM_OVERVIEW.pdl</li> <li>@PG_PRx_SUM_STANDARD.pdl</li> <li>@PG_PRx_SUM_TABLE.pdl</li> <li>@PG_PRx_SUM_VIEWLIST.pdl</li> <li>@PL_PRx_SUM.pdl</li> </ul>				
11.	Duplicate these PDL files in the same directory and change the new name accordingly; for example, "@PG_PRx_SUM.pdl" to "@PG_PRx_SUM_Volume.pdl".				
	Folders X Name Size Type A Date Modified				
	S7Netze S7Netze S7NFREMX S7NFREMX S7PPLOMX CommonArchiving CommonArchiving Config Config Config CROSSREF CaraCS PRE_SUM Volume GraMT Durary Mapper MELD	È @TopAlarmNew.pdl     OTRG_Default.Pdl     @TRG_Standard.Pdl     @WarningLevel.PDL     @WarningTopfield.PDL     @Wecome.PDL     @Wecome.PDL     OT_Energy.Pdl     OT_Energy.Pdl     OPG_PR3_SUM_Volume_Pdl     @PFG_PR3_SUM_Volume_OVERVIEW.pdl     @PFG_PR3_SUM_Volume_OTANDARD.pdl     @PFG_PR3_SUM_Volume_TABLE.pdl     @PFG_PR3_SUM_Volume_TABLE.pdl     @PFG_PR3_SUM_Volume_INTERVIEW.IST.pdl     @PFG_PR3_SUM_Volume_Pdl     @PFD_PR3_SUM_Volume_Pdl     @PFD_PR3_SUM_VOLUME_PDI     @PFD_PR3_SUM_VOLUME_VOLUME_PDI     @PFD_PR3_SUM_VOLUME_VOLUME_VOLUME_VOLUME_VOLUME_VOLUME_PDI     @PFD_PR3_SUM_VOLUME_VOLUME_PDI     @PFD_PR3_SUM_VOLUME_VOLUME_VDI     @PFD_PR3_SUM_VOLUME_PR3_VOLUME_PDI     @PFD_PR3_SUM_VOLUME_PR3_VOLUME_PDI     @PFD_PR3_SUM_VOLUME_PR3_VOLUME_PDI     @PFD_PR3_SUM_VOLUME_PR3_VOLUME_PDI     @PFD_PR3_SUM_VOLUME_PR3_VOLUME_PR3_VOLUME_PR3_VOLUME_PR3_VOLUME_PR3_VOLUME_PR3_VOLUME_PR3_VOLUME_PR3_VOLUME_PR3_VOLUME_PR3_VOLUME_PR3_VOLUME_PR3_VOLUME_PR3_VOLUME_PR3_VOLUME_PR	235 KB 27 KB 126 KB 28 KB 32 KB 32 KB 32 KB 1,656 KB 14 KB 93 KB 192 KB 103 KB 138 KB 138 KB 38 KB 38 KB 52 KB	WinCC.Graphics.Do WinCC.Graphics.Do WinCC.Graphics.Do WinCC.Graphics.Do WinCC.Graphics.Do WinCC.Graphics.Do WinCC.Graphics.Do WinCC.Graphics.Do WinCC.Graphics.Do WinCC.Graphics.Do WinCC.Graphics.Do WinCC.Graphics.Do WinCC.Graphics.Do WinCC.Graphics.Do WinCC.Graphics.Do WinCC.Graphics.Do WinCC.Graphics.Do WinCC.Graphics.Do WinCC.Graphics.Do	10/19/2011 8:- 11/28/2008 5:5 10/21/2009 6:- 11/28/2008 5:5 11/28/2008 5:5 11/28/2008 5:5 6/15/2010 1:32 4/18/2012 8:56 10/19/2011 2:0 4/18/2012 4:11 9/2/2010 3:45 9/3/2010 4:07 9/3/2010 4:
	8 objects selected 759 KB V Computer			mputer	

Step	Description
12.	<ul> <li>Open both new pictures "@PG_<block name="">.pdl" and "@PL_<block name="">.pdl".</block></block></li> <li>In both pictures you use the "Linking" function in the Graphics Designer to change all the references and interconnections to the S7 block.</li> <li>For this you use the key combination <ctrl> + <a> to mark all the picture elements.</a></ctrl></li> <li>Open the editor through the menu "Edit &gt; Re-wire &gt; Texts".</li> </ul>
	-h-File Edit View Arrange Tools Window Help DataConnector
	Undo Ctrl+Z I I I I I I
	The Aria     Cut     Ctrl+X       Copy     Ctrl+C
	Paste Ctrl+V Delete Del DOW
	Select All Ctrl+A Customized object • Group object •
	TAB Sequence
	Linking     Tag Connections
	Properties
	Edit Faceplate Tags Configure Faceplate Type

Step	Description
13. Use the "Find and Replace" function to find the "PR3_SUM" character string and with "PR3_SUM_Volume".	
	Find and Replace Texts
	Texts used in the object properties:
	Text     Property     Ubject       @PG_PR3_SUM_STANDARD     FirstView     @Faceplate       @PG_PR3_SUM_VIEWLIST.pdl     Picture Name     Viewlist       PR3_SUM     Input Value     BlockType       PR3_SUM     Output Value     BlockType
	Find and Replace
	Search for:     PR3_SUM     Select all       Replace by:     PR3_SUM_Volume     Replace
	Find whole texts only Match Case
	OK Cancel
14.	<ul> <li>Incorporate the new faceplate into your process pictures.</li> <li>Then connect this to the new S7 capture blocks (like the standard "PRx_SUM" via the "Connect faceplate to measuring point" wizard in the Graphics Designer).</li> </ul>
15.	Then transfer the changes to the CPU and start the WinCC Runtime.

### 3.2 Using the CFC Editor

|--|

Step		Description
1.	<ul> <li>Insert a new "PRx_SUM" into y</li> <li>CFC creates a new DB automa</li> <li>Assign a new name for the mean</li> </ul>	our CFC plan. htically in the background. asuring point ('Water Pump', for example).
	SYSTEM(A,1)\FIF0 FIF0 Number of FIF0-DB	WaterPump           PR3_SUM         0834           enrgy co         1/1           FIFO         QPARAMF           1         INP_SEL         QPF_FIFO
	water counter	0 CSF QBAD 0 VALUE_P QSIM 16#80 QC_P QOVL VALUE_D QCALCERR 16#80 QC_D QMAN_AUT 0.0 VALUE R LAST VAL
		16#80         QC_R         QC_LAST_           0.0         WEIGHT_P         CUR_VAL           1.0         WEIGHT_A         QC_CUR_V           1000000.0         MAX_CNT         EST_VAL           0         CALC_FN         QC_EST_V           0         CALC_FN         QC_EST_V
		16#80         0C ACT1         0C CUR P           0.0         ACTUAL2         AV0_PUR           16#80         0C_ACT2         QC_AVG_P           0.0         ACTUAL3         EST_PUR           16#80         QC_ACT3         QC_EST_P
		0.0 CALC_P0 UASE_S0P 0.0 CALC_P1 0.0 CALC_P2 0.0 CALC_P3 0.0 ZER0_CUT 16#4 ARSNO_S
	SYSTEM(A,1)\SYNC_15MIN SYNC_PER Synchronisation period [s] SYSTEM(A,1)\SYNC 15MIN	16#104
	SYNC_OUT Synchronisation pulse SYSTEM(A,1)\SYNC_15MIN SYNC_TS Synchronisation time stamp	Image: Manual AUT_ON_0
2.	Interconnect as usual the CFC bloc	k of the "PRx_SUM" to your measuring point.

Step	Description							
3.	Change the unit attribute at the following interface parameters of the CFC block.							
						1	_	
		Parameter type		Paramet	er	Example		
		Out		CUR_V	AL	m³		
				LAST_V	/AL	m ³		
				EST_VA		m ³	_	
				CUR_P	WR	m³/h	_	
				AVG_P		m³/h	_	
				ESI_PV	VR	m³/n	4	
		In/Out	V_MA		11	m ³	_	
					_L1 12	m ³	_	
				V MAN	13	m ³	-	
4	For this you open	the "Object Proj	nerti	es" of each	 narame	ter		
			porti	00 01 0401	rparamo			
		WaterPump						
		eprov co		0B34				
		FIFO		ODADAME				
	1-	TMP SFL		OPE ETEO				
	- 0-	CSF	<u> </u>	OBAD				
	0-	VALUE P		OSIM				
	16#80-	QC P		QOVL				
		VALUE D		QCALCERR	_			
	16#80—	QC_D	1	QMAN_AUT	_			
	0.0-	VALUE_R		LAST_VAL				
	16#80-	QC_R		QC_LAST	Intercon	nection to Address	F3	
	0.0-	WEIGHT_P		CUR_VA:	Object Pi	roperties	Alt+Return	
	1.0-	WEIGHT_A		QC_CUR_V	-			í
	100000.0-	MAX_CNT		EST_VAL	_			
	0	CALC_FN		QC_EST_V				
	0.0-	ACTUAL1		CUR_PWR				
	16#80-	QC_ACT1		QC_CUR_P				
	0.0-	ACTUAL2		AVG_PWR				
	16#80-	QC_ACT2		QC_AVG_P				
	0.0-	ACTUAL3		EST_PWR				
	16#80-	QC_ACT3		QC_EST_P				
	0.0-	CALC_PO		OMSG_SUP				
	0.0-	CALC_P1						

Step	Description					
5.	<ul> <li>In the Object Properties you now select the unit you want by one of these two methods:</li> <li>Select from the drop-down list box</li> <li>Enter text.</li> </ul>					
	Properties - Input/Output					
	Block:: PR3_SUM.WaterPump					
	I/O: LAST_VAL - OUT(REAL)					
	Value: 0.0					
	☐ Invisible ▼ Watched					
	Comment: Last archived accumulated value					
	Identifier: Previous Unit:					
	Archive: m/s m/h					
	Operator authorization level: 0 OS additional text: m²/s m²/min m²/h m²/d ppm					
	Force     Image: Add forcing       Forcing active     Signal					
	Force value:					
	OK Cancel Help					
6.	Now compile the CFC chart and then the WinCC OS.					
7.	If you have created new measuring points (PRx_SUM) and have not run the powerrate wizard since then, start the wizard no to update the process value archive.					
8.	Then transfer the changes to the CPU and start the WinCC Runtime.					

## 4 Result

The desired units are displayed in the "PRx_SUM" faceplates regardless of the configuration method.

Figure 4-1



þ.		×					
*	S7-Prg_Energy/DC_Water						
	🦋 👗	standard 💌 🛐					
Mode	Γ	Auto •					
Periode	Γ	900 s					
Energy	Previous	0.00 m³					
	Instant.	3.00 m³					
	Forecast	77.01 m³					
Power	Prev. Avg	0.00 m³/h					
	Instant.	360.00 m³/h					
	Forecast	308.04 m³/h					

f.	×						
ž		Sī	7-Prg_Energy/DC_Water				
	🔺 🔌	table	▼ 🔊				
M (11 🔁 🛄 🕐 10 <00 PP PI							
	Date/Time	Energy (m ³ )	Power [m³/h]				
1	4/18/2012 4:30:00 PM	0.00	0.00				
2	4/18/2012 4:45:00 PM	6.30	25.20				
3	4/18/2012 5:00:00 PM	3.10	12.40				
4							
5							
6							
7							
8							
9							
Re	Ready Row 3 5:03:45 PM						