



SIPROTEC 5 Application Note

Display of the power factor $\cos \phi$

SIP5-APN-035, Edition 1

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1 Display of the power factor $\cos \varphi$

1.1 Introduction

In SIPROTEC 5 the power factor λ is calculated acc. $\frac{|P|}{s}$, factor therefore between 0 and 1. In SIPROTEC 4 refer to $\cos \varphi = \frac{P}{s}$, factor is between -1 and 1.

The application describes how the power factor $\cos \phi$ can be calculated and visualized on the display with the help of CFC chart.

1.2 Implementation

1.2.1 New user defined measured value

Create a new user defined measured value "cos (phi)" in the information matrix:

Information	Destination					
			+ L	EDs		Recorder
				Expansion moi		
Signals	Number	Туре	14	3.15	3.16	Signal
(All)	(All)	💌	-	💌		(All)
🕨 🦆 Mes.v.fail.det	21.2671		1			
👻 🤪 User-def. MV	21.0					
Mode (controllable)	21.0.51	ENC				
🕨 🔶 Behavior	21.0.52	ENS				
🕨 🔶 Health	21.0.53	ENS				
🛂 🙀 cos(phi)		MV				
Process monitor	21.1131					*
👻 😺 Operational values	21.761					
🕨 🔶 Behavior	21.761.114	ENS	1			1
Health	21.761.114	ENS				

Set the number of decimal places in the properties of the Measured Value "cos(phi)" to 1:

os(phi) [SignalData.Use	Properties		
General			
Details	Details		
User information	Details		
	Name:	cos(phi)	
	Original name:	MV	
	IEC 61850 name:	MV	
	IEC 61850 path:	SIP1/Ln1/USER1/MV	
	General Deadband for magnitude:	10 🔷 %	
	Unit		
	Unit:		•
	Multiplier:	1E0	
	Number of decimal places:	1	

Display of the power factor $\cos \varphi$

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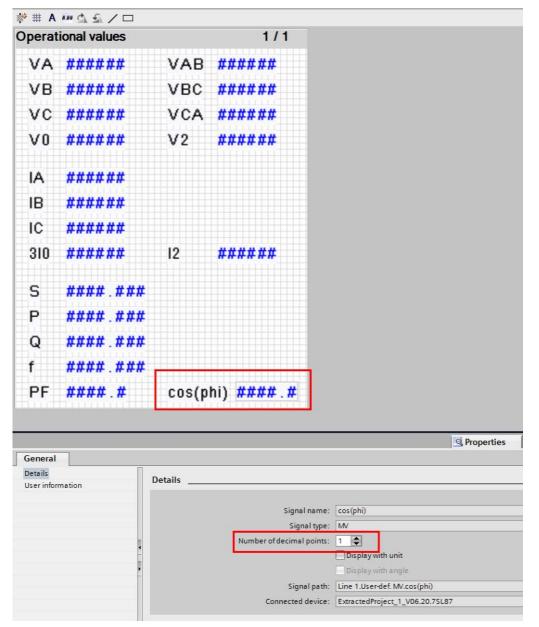
1.2.2 CFC Plan

Select function chart (CFC) task: Measurement and insert the chart DIV_R. The DIV_R block divides a floating-point number (numerator) = Input IN by a 2nd floating-point number (denominator) = Input INDIV.



1.2.3 Display

Assign the measured value to the desired display; e.g. to the measured values as follows:



Set the number of decimal places in the properties of the Measured Value "cos (phi)" to 1.

1.2.4 Test

Load configuration to device and inject current and voltage.

Signals		All Internal				
DL . IN	03:02:23,461					
Physical Meaning	Amplitude	Phase	Frequency			
Analog Profile:	<user defined<="" td=""><td>></td><td></td></user>	>				
PhysU1	57,735 V	0,00 °	50,000 Hz			
PhysU2	57,735 V	-120,00 °	50,000 Hz			
PhysU3	57,735 V	120,00 °	50,000 Hz			
PhysU4	100,000 V	30,00 °	50,000 Hz			
PhysU5	0,000 V	0,00 °	50,000 Hz			
PhysU6	0,000 V	0,00 °	50,000 Hz			
PhysU7	0,000 V	0,00 °	50,000 Hz			
PhysU8	0,000 V	0,00 °	50,000 Hz			
PhysI1	10,000 mA	120,00 °	50,000 Hz			
Physl2	10,000 mA	0,00 °	50,000 Hz			
Physl3	10,000 mA	-120,00 °	50,000 Hz			

The above injected current and voltage will have a negative $\cos \varphi$. If desired the pre-configured power factor "PF" can be deleted from the display.

Oper	ational valu	es		1/1
VA	231kV	VAB	400kV	
VВ	231kV	VBC	400kV	
VC	231kV	VCA	400kV	
VO	0kV	∨2	0kV	
IA	10A			
IB	10A			
IC	10A			
310	0A	12	0A	
s	6.9MVA			
Р	-3.5MW			
Q	-6.0M∨ar			
f	50.0Hz			
PF	0.5	cos(p	hi) -0.5	
Logon				Menu

1.3 Summary

The calculation and display of the power factor differs between SIPROTEC 4 and SIPROTEC 5. Through the use of CFC charts the display of the power factor as $\cos\varphi$ value can be adjusted.

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