

SIEMENS



SIPROTEC 5 Application Note

Display of the power factor $\cos \varphi$

SIP5-APN-035, Edition 1

SIPROTEC 5 – Application Note

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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 $\cos \varphi$ 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			
			LEDs Recorder			
			Expansion moi			
Signals	Number	Type	14	3.15	3.16	Signal
(All)	(All)	(All)
▶ Mes.v.fail.det	21.2671					
▼ 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				
▶ Health	21.761.114...	ENS				

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

cos(phi) [SignalData.UserDefined]

Properties

General

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

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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:

The screenshot shows the SIPROTEC 5 display interface. The top part is a grid of operational values. The bottom part is a 'Properties' window for the 'cos(phi)' signal.

Operational values

1 / 1	
VA #####	VAB #####
VB #####	VBC #####
VC #####	VCA #####
V0 #####	V2 #####
IA #####	
IB #####	
IC #####	
3I0 #####	I2 #####
S #####.###	
P #####.###	
Q #####.###	
f #####.###	
PF #####.#	cos(phi) #####.#

Properties

General

Details

User information

Details

Signal name: cos(phi)

Signal type: MV

Number of decimal points: 1

☐ Display with unit

☐ Display with angle

Signal path: Line 1.User-def. MV.cos(phi)

Connected device: ExtractedProject_1_V06.20.75L87

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

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1.2.4 Test

Load configuration to device and inject current and voltage.

Signals	All Internal		
Physical Meaning	03:02:23,461		
	Amplitude	Phase	Frequency
Analog Profile:	<User Defined>		
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
PhysI2	10,000 mA	0,00 °	50,000 Hz
PhysI3	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.

Operational values		1/1
VA 231kV	VAB 400kV	
VB 231kV	VBC 400kV	
VC 231kV	VCA 400kV	
V0 0kV	V2 0kV	
IA 10A		
IB 10A		
IC 10A		
3I0 0A	I2 0A	
S 6.9MVA		
P -3.5MW		
Q -6.0Mvar		
f 50.0Hz		
PF 0.5	cos(phi) -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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