Current and Energy Measurement Technology – Efficiency Is That Easy!

Product Overview

Content

WAGO ENERGY MANAGEMENT – THE RIGHT SOLUTION FOR EVERY STEP

With Our Modern Energy Data Collection

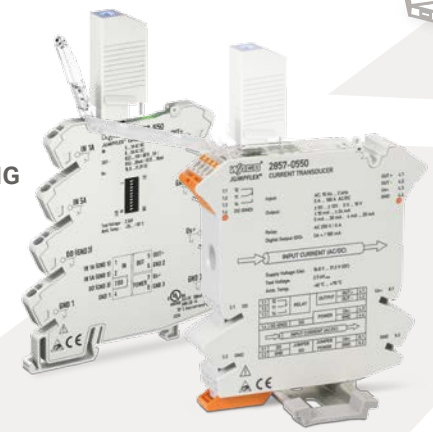
Transparency Pays Back

Complementary electricity and energy measurement solutions enable comprehensive consumption recording to create a base for determining relevant efficiency ratios. It is only through this transparency that potential savings can be discovered and, through appropriate measures, considerable cost savings can be realized. This is also particularly important for large-scale consumers, such as the press or body shop in an auto plant.

Measuring – Systematically Record Energy Consumption

Anywhere high currents must be measured and processed, plug-in current transformers are always the first choice. If existing systems will be retrofitted, save time by using Rogowski coils to avoid disassembling cables or interrupting processes.

CONVERTING



Cloud Connectivity
(via MQTT)

PARAMETER SETTING
VISUALIZING

EVALUATING

MEASURING

Evaluating –
Identifying and Planning Energy Use

Three standard operation 3-phase power measurement modules within the WAGO-I/O-SYSTEM 750 are available for recording and evaluating all relevant metrics from a three-phase supply network. An extreme operation (XTR) variant is also available for harsh applications. This allows comprehensive network analysis to be performed and the power supply for machine drives to be optimally controlled, helping prevent damage, machine failures and downtime.

Parameterization and Visualization

Software solutions for the WAGO-I/O-SYSTEM and WAGO's signal conditioners make parameterization and visualization as simple as child's play via the new WAGO Energy Data Management Application.

Cloud Connectivity

The MQTT software extension for the PFC100 and PFC200 Controllers allows data to be easily transmitted from the field level to the cloud. You can decide whether the controller sends the data to Microsoft Azure, Amazon Web Services, or IBM Bluemix.

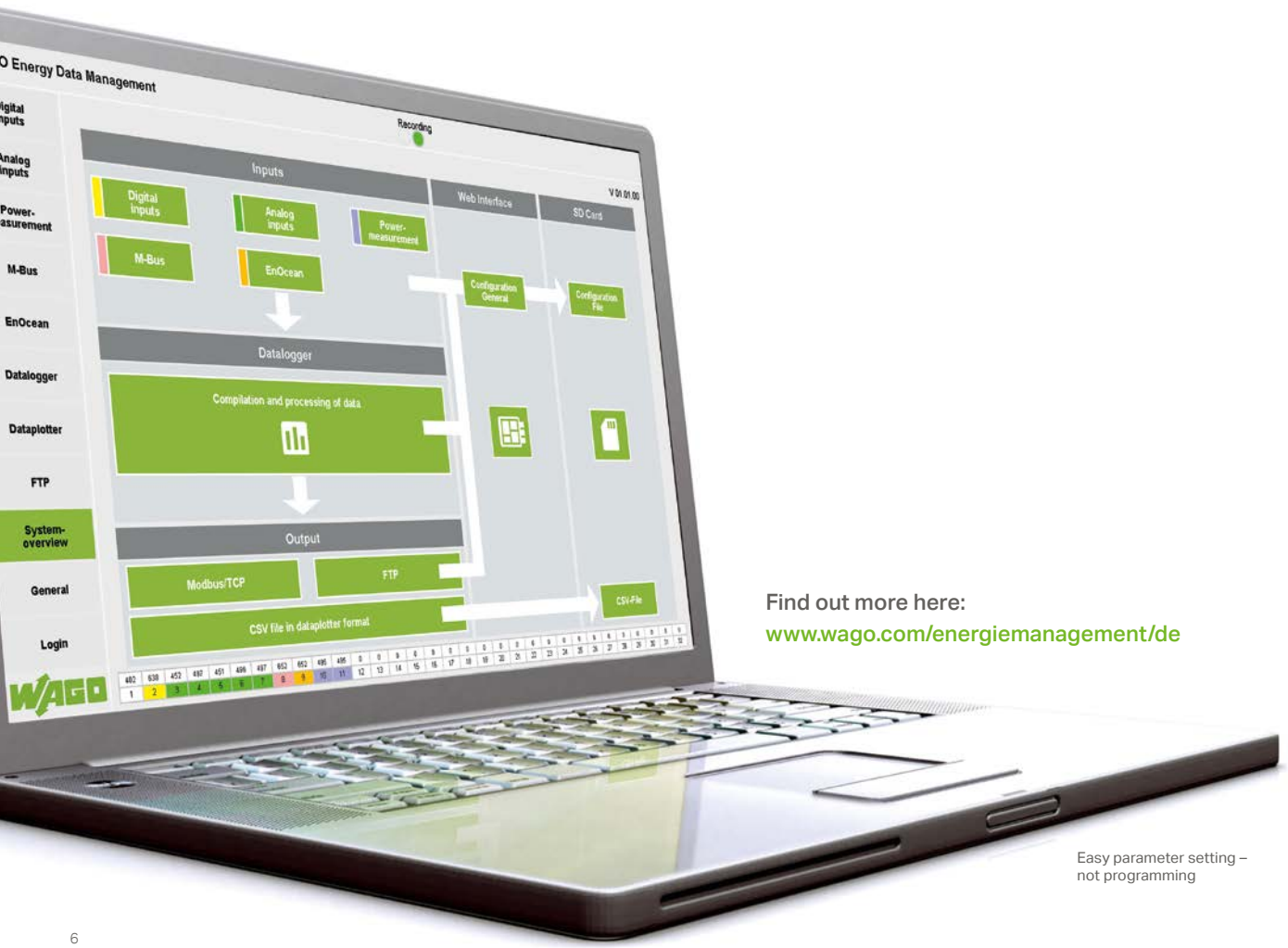
WAGO ENERGY MANAGEMENT: ONE SOLUTION – MANY APPLICATIONS

This user-friendly solution, consisting of software combined with a modular control system, records measurement data from different media and influencing factors for energy monitoring and processes them for further analyses, archiving and reporting.

With the PFC200 Application Controller (750-8202/000-022), data from meters and sensors can be easily collected by one convenient input module and parameterized through the available software application – no cumbersome and complicated programming.

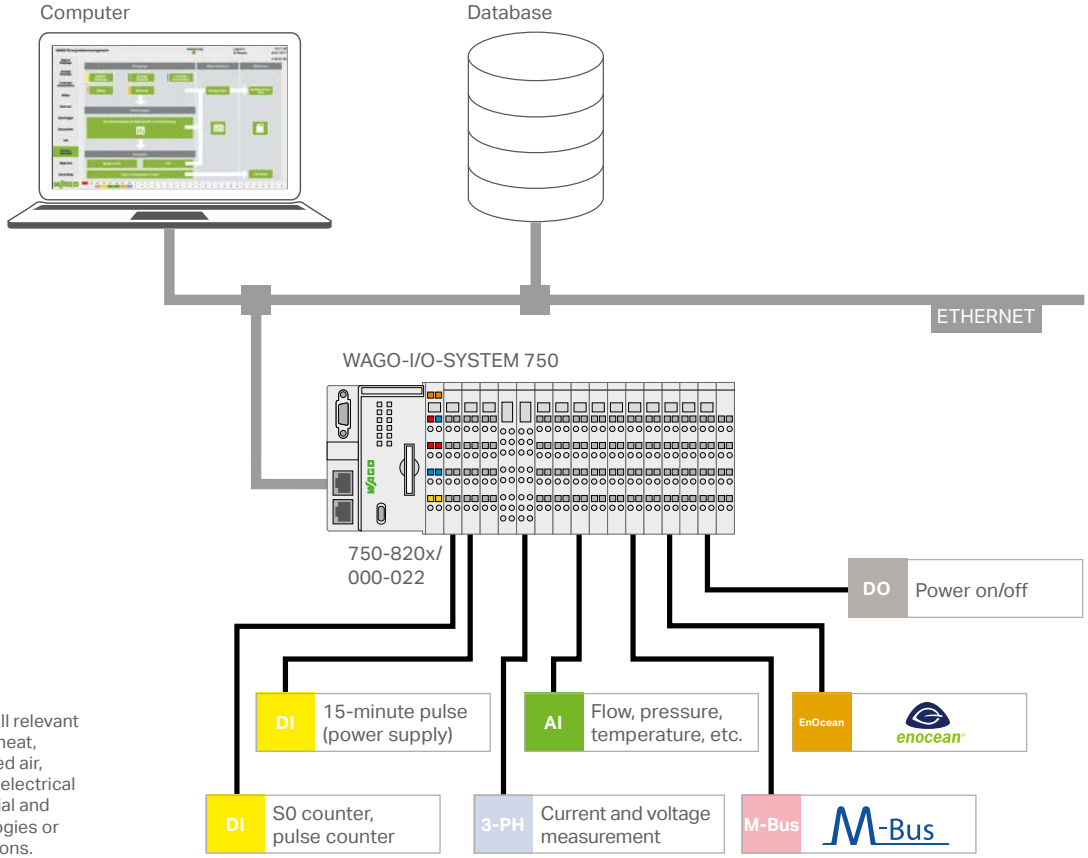
ADVANTAGES:

- Modular energy and process data collection, management and visualization
  → User-friendly energy data evaluation and derivation of efficiency plans
- Easy input parameterization via Web visualization
  → No programming experience required
- Establish indicators to achieve DIN EN ISO 50001
  → Economical alternative to energy management software
- Connect existing sensors to the WAGO-I/O-SYSTEM
  → Integrates into existing systems for flexibility and maximum return on investment



Easy parameter setting – not programming

Find out more here:
www.wago.com/energiemanagement/de



Record virtually all relevant metrics like gas, heat, water, compressed air, temperature and electrical energy in industrial and process technologies or building applications.

The data can be transferred to higher level energy management software via MODBUS TCP/IP or as a CSV file via FTP/FTPS. In addition, it is possible to save history on an SD card. Because it is so easy to integrate the versatile new WAGO solution into existing systems, adapting to individual requirements is also quite simple. With the integrated visualization tool, collected data are readily displayed and evaluated in various forms such as bar or line graphs.

PFC200 Application Controller
(750-8202/000-022)

CURRENT TRANSFORMERS SELECTION GUIDE

The Right Solution for Every Application

855 Series Current Transformers	Split-Core Current Transformers	Plug-In Current Transformers with CAGE CLAMP® Connection Technology
		
Application	Retrofits	New systems
Coil bobbin	Separable	Closed
Connection technology	Connection cable (color coded)	CAGE CLAMP®
Mounting	Round cable (insulated), copper current bar (insulated)	Round cable, copper current bar, DIN-rail, mounting plate
Compatibility with other WAGO components	750-493, (750-493/000-001) 750-494, (750-494/000-001) 750-495, (750-495/000-001) 857-550	
Primary rated current	60 … 1000 A	50 … 2500 A
Secondary rated current	1 A / 5 A	1 A / 5 A
Accuracy class	0.5; 1 or 3	1 or 3
Ambient operating temperature	–10 … +55 °C	–5 … +50 °C
Standards	EN 61869-2	EN 61869-2
Approvals	–	c UL us
Connection examples		

*In the measurement range 0.8 to 32 A and in combination with WAGO's 3-phase power measurement modules, the accuracy class 0.5 is met per EN 61869-2.

Plug-In Current Transformers with a *picoMAX*® Pluggable Connector		Rogowski Coils RT500/RT2000	Rogowski Coils RC 70 / RC 125 / RC 175
			
New systems		Retrofits	Retrofits
Closed		Separable	Bayonet connector, separable
picoMAX®		Connection cable	Connection cable
Round cable, DIN-rail, mounting plate		Round cable (insulated), copper current bar (insulated)	Round cable, copper current bar
750-493 750-494 750-495 857-550		750-495/000-002 857-552 789-652 / 789-654	750-495/000-002 857-552
32 A	35 / 64 A	Up to 2000 A	Up to 4000 A
320 mA	1 A	(up to 40.02 mV)	22.5 mV / kA
0.5*	1	–	1
−10 … +55 °C		−40 … +80 °C	−40 … +80 °C
EN 61869-2		IEC 61010-1	IEC 61010-1 / EN 61869-2
–	cULus	cULus	UL pending
			

POWER AND ENERGY MEASUREMENT

With the WAGO-I/O-SYSTEM 750 and 750 XTR

The I/O modules for three-phase power measurement record and process all relevant metrics from a three-phase supply network. They provide system operators with increased insight into energy consumption by specific machines and systems, as well as the ability to perform comprehensive network analysis.

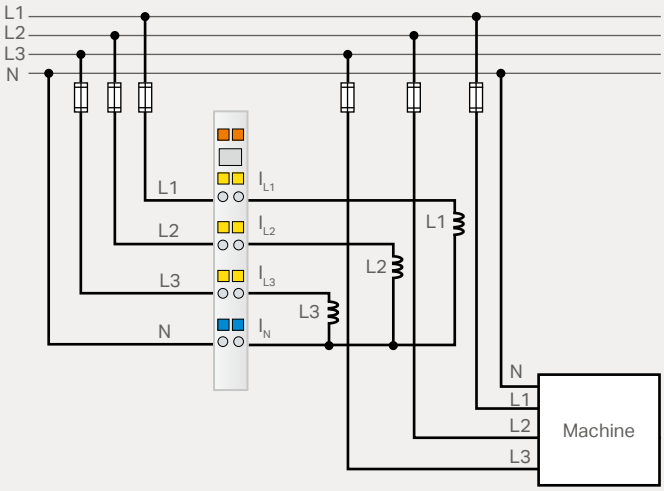
ADVANTAGES:

- Measure machine and system energy consumption values
- Measures and processes all relevant measured variables
- Comprehensive network analysis
- Connection to the WAGO-I/O-SYSTEM: fieldbus-independent, compact and flexible
- The dark gray modules from the 750 XTR Series can also be used in eXTReme environments and offer these advantages:
  – eXTReme temperatures from −40 to +70 °C (−40 … +158 °F)
  – eXTReme isolation up to 5 kV of impulse voltage
  - eXTReme vibration resistance up to 5g of acceleration

Image			
Energy consumption	✓	✓	✓
Voltage	3~ 480 V	3~ 480 V	3~ 480 V/690 V
Current	1 A (750-493) 5 A (750-493/000-001)	1 A (750-494) 5 A (750-494/000-001) External shunts (750-494/000-005)	1 A (750-495) 5 A (750-495/000-001) Rogowski coil (750-495/000-002)
Active power/energy	✓	✓	✓
Phase position	✓	✓	✓
Reactive power/energy	via function block	✓	✓
Apparent power/energy	via function block	✓	✓
Rotary field detection		✓	✓
Power factor	(✓)	✓	✓
Frequency measurement	✓	✓	✓
Four-quadrant operation (inductive, capacitive, consumer, generator)		✓	✓
Harmonic analysis (up to the 41st harmonic)		✓	✓
Neutral conductor measurement			✓
Other product variants		Extended temperature range: −20 … +60 °C (−4 … +140 °F) 750-494/025-000 (1 A), 750-494/025-001 (5 A)	750 XTR: 750-495/040-000 (1 A), 750-495/040-001 (5 A), 750-495/040-002 (Rogowski coil)
Housing width	12 mm (0.472 in.)	12 mm (0.472 in.)	24 mm (0.945 in.)
Item number	**750-493**	**750-494**	**750-495**

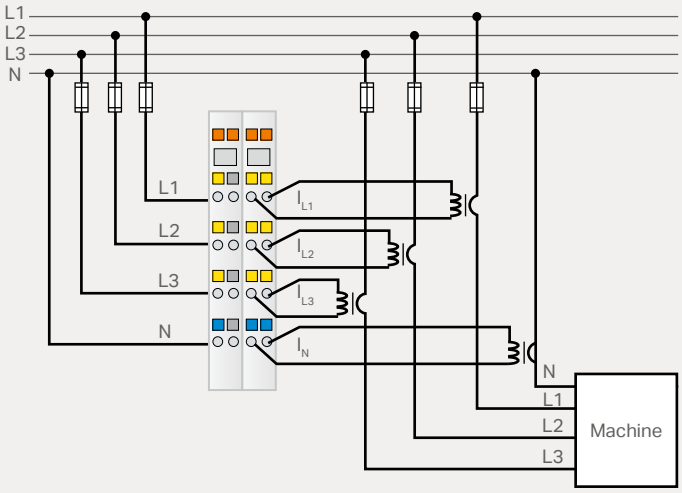
General Configurations

Power and energy measurement of a machine in a 480 VAC mains network via three-phase power measurement module (750-493, 750-494)



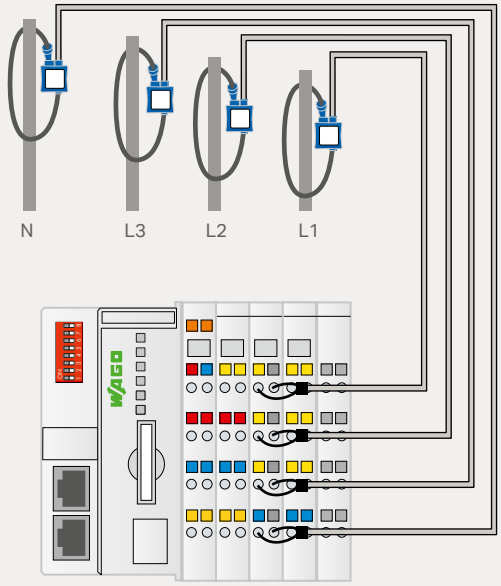
General Configurations

Power, energy and N-conductor measurement of a machine in a 480/690 VAC mains network via three-phase power measurement module (750-495)



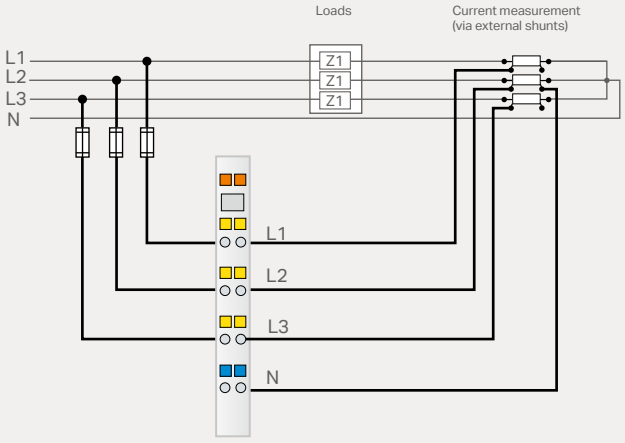
Application

Direct connection of Rogowski coils to the three-phase power measurement module (750-495/000-002)

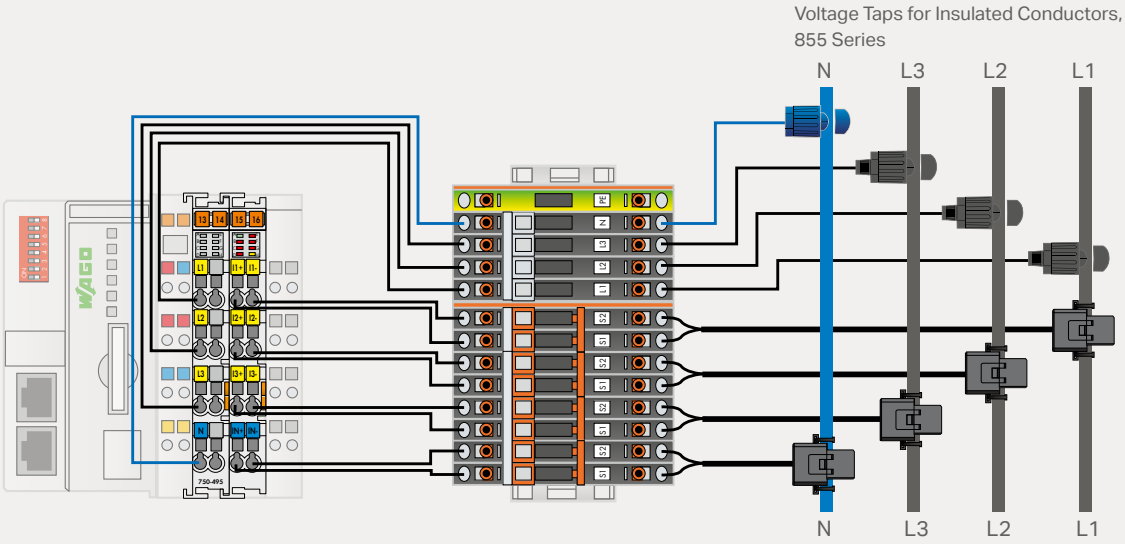


Application

Direct connection of external shunts to the three-phase power measurement module (750-494/000-005)



Application Example: The Complete Retrofit Solution



3-Phase Power Measurement Module, 750-495

Terminal Block Assembly, 2007-8874

Split-Core Current Transformers, 855 Series

VOLTAGE TAPS

For Insulated Conductors

Installation on insulated conductor with IDC connection

Integrated SIBA fuse to protect equipment and conductor

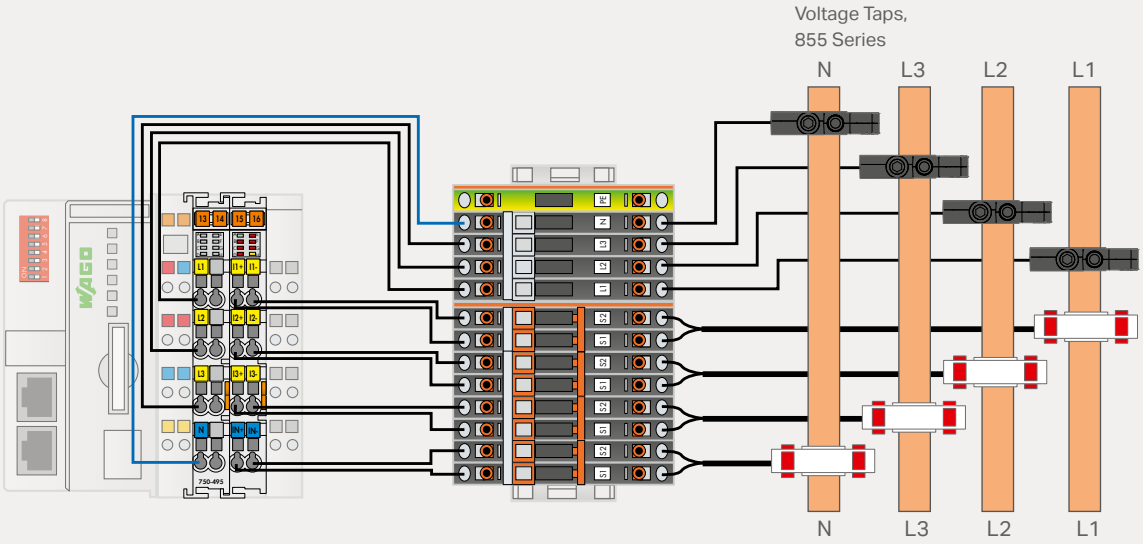
ADVANTAGES:

- Faster measurement voltage tapping with just one turn
- Tool-free assembly
- Conductor contact via IDC connection
- Reliable measurement device and conductor protection via integrated SIBA fuse

Watch the video to learn more.

Image	Conductor Range	Fuse	Cable Length	Mounting	Item Number
	2.5 … 6 mm² (14 … 10 AWG) 3 … 5 mm Ø Feedthrough for Measurement Conductor	2 A, 450 V, F, 70 kA (5 x 25 mm)	3 m (pre-assembled)	Conductor contact via IDC connection	**855-8001**
		–			**855-8002**
	10 … 16 mm² (8 … 6 AWG) Ø 5 … 7 mm (feedthrough for measurement conductor)	2 A, 450 V, F, 70 kA (5 x 25 mm)			**855-8003**
		–			**855-8004**

Application Example: The Complete Retrofit Solution



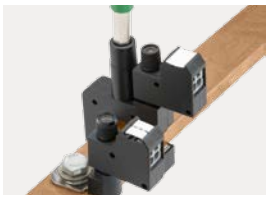
3-Phase Power Measurement Module, 750-495

Terminal Block Assembly, 2007-8874

Plug-In Current Transformers with CAGE CLAMP®, 855 Series

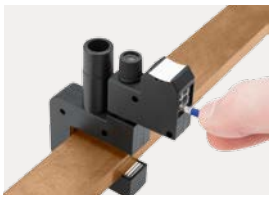
VOLTAGE TAPS

For Busbars



Installation on busbar; fastening with Allen wrench

Integrated SIBA fuse (overload and short circuit protection)



Conductor termination via Push-in CAGE CLAMP® connection technology

Various marking options for clear identification

ADVANTAGES:

- Fast, easy installation to live busbar with clamp mount or M6/M8 mount
- Various marking options for clear identification
- Universal conductor termination via Push-in CAGE CLAMP® connection technology
- Fused voltage path protects downstream measurement devices

Image	Fuse	Connection Technology Solid-/Fine-Stranded	Mounting	Item Number
	2 A, 450 V, F, 70 kA (5 x 25 mm)	Push-in CAGE CLAMP® (WAGO 2624 Series)	M6 mount	**855-8006**
			M8 mount	**855-8008**
			Clamp mount (4 … 15 mm/ 0.157 … 0.591 in. bar thickness)	**855-8015**

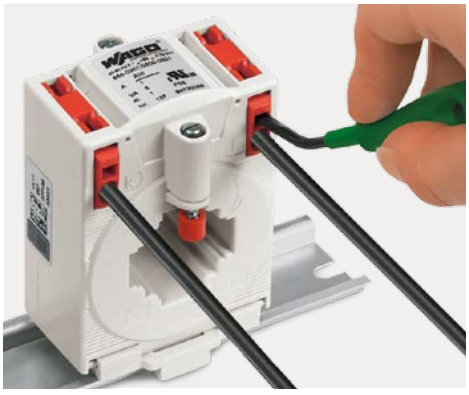
PLUG-IN CURRENT TRANSFORMERS

With CAGE CLAMP® Connection Technology

ADVANTAGES:

- Screwless CAGE CLAMP® connection technology
- Primary currents 50 to 2500 A / secondary currents 1 A or 5 A
- Continuous overload of 120% the nominal primary current
- Tool-free installation via quick-mount kit
- Low-voltage current transformer for max. operating voltages up to 1.2 kV
- UL certified (Certificate No. E356480)
- EN 61869-1/EN 61869-2

Watch the video to learn more.



Conductor termination

CAGE CLAMP® connection

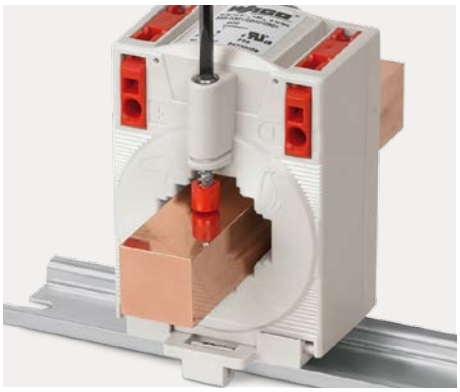
Time-Saving Installation with Plug-in Current Transformers from WAGO

Quick-Mount Kit, 855-9910

Mounting on round cable

Mounting on DIN-rail via carrier rail adapter

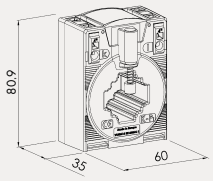
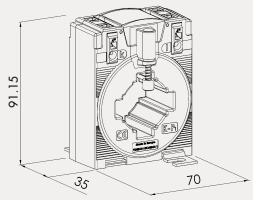
Secured to mounting plate



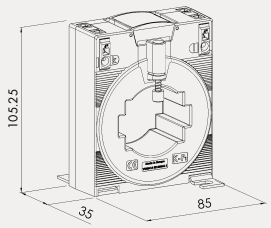
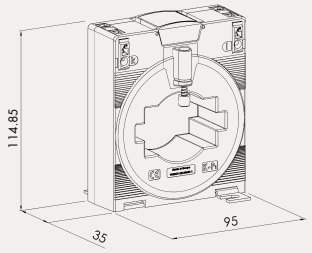
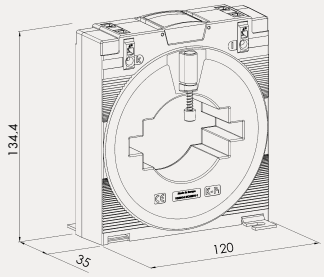
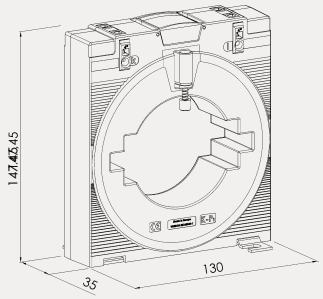
Mounting on copper DIN-rail

PLUG-IN CURRENT TRANSFORMERS

With CAGE CLAMP® Connection Technology

Image	Primary Rated Current	Secondary Rated Current	Rated Power	Accuracy Class	Item Number
	50 A	1 A	1.25 VA	3	**855-301/050-103**
	50 A	5 A	1.25 VA	3	**855-305/050-103**
	60 A	1 A	1.25 VA	1	**855-301/060-101**
	60 A	5 A	1.25 VA	1	**855-305/060-101**
	75 A	1 A	2.5 VA	1	**855-301/075-201**
	75 A	5 A	2.5 VA	1	**855-305/075-201**
	100 A	1 A	2.5 VA	1	**855-301/100-201**
Current bar 1: 30 x 10 mm Current bar 2: 25 x 12 mm Current bar 3: 20 x 20 mm **Round cable: 26 mm**	100 A	5 A	2.5 VA	1	**855-305/100-201**
	150 A	1 A	5 VA	1	**855-301/150-501**
	150 A	5 A	5 VA	1	**855-305/150-501**
	200 A	1 A	5 VA	1	**855-301/200-501**
	200 A	5 A	5 VA	1	**855-305/200-501**
	250 A	1 A	5 VA	1	**855-301/250-501**
	250 A	5 A	5 VA	1	**855-305/250-501**
	300 A	5 A	5 VA	1	**855-305/300-501**
	400 A	1 A	10 VA	1	**855-301/400-1001**
	400 A	5 A	10 VA	1	**855-305/400-1001**
	600 A	1 A	10 VA	1	**855-301/600-1001**
	600 A	5 A	10 VA	1	**855-305/600-1001**
	250 A	1 A	5 VA	1	**855-401/250-501**
	250 A	5 A	5 VA	1	**855-405/250-501**
	400 A	1 A	5 VA	1	**855-401/400-501**
	400 A	5 A	5 VA	1	**855-405/400-501**
	600 A	1 A	5 VA	1	**855-401/600-501**
	750 A	5 A	5 VA	1	**855-405/750-501**
Busbar 1: 40 x 10 mm Busbar 2: 30 x 15 mm **Round cable: 32 mm**					

Accessories		Item Number
	Carrier Rail Adapter for Plug-In Current Transformers (for 855-3xx/xxxx-xxxx and 855-4xx/xxxx-xxxx)	**855-9900**
	Quick-Mount Kit (2 pieces including cable tie)	**855-9910**

Image	Primary Rated Current	Secondary Rated Current	Rated Power	Accuracy Class	Item Number
 Busbar 1: 50 x 12 mm Busbar 2: 40 x 30 mm **Round cable: 44 mm**	400 A	1 A	10 VA	1	**855-501/400-1001**
	400 A	5 A	10 VA	1	**855-505/400-1001**
	600 A	1 A	10 VA	1	**855-501/600-1001**
	600 A	5 A	10 VA	1	**855-505/600-1001**
	800 A	1 A	10 VA	1	**855-501/800-1001**
	800 A	5 A	10 VA	1	**855-505/800-1001**
	1000 A	1 A	10 VA	1	**855-501/1000-1001**
	1000 A	5 A	10 VA	1	**855-505/1000-1001**
 Busbar 1: 63 x 10 mm Busbar 2: 50 x 30 mm **Round cable: 44 mm**	1500 A	1 A	5 VA	1	**855-601/1500-501**
	1500 A	5 A	5 VA	1	**855-605/1500-501**
 Busbar 1: 80 x 10 mm Busbar 2: 60 x 30 mm **Round cable: 55 mm**	1000 A	1 A	10 VA	1	**855-801/1000-1001**
	2000 A	1 A	10 VA	1	**855-801/2000-1001**
	2000 A	5 A	10 VA	1	**855-805/2000-1001**
 Busbar 1: 100 x 10 mm Busbar 2: 80 x 30 mm **Round cable: 70 mm**	2500 A	1 A	10 VA	1	**855-1001/2500-1001**
	2500 A	5 A	10 VA	1	**855-1005/2500-1001**

SPLIT-CORE CURRENT TRANSFORMERS

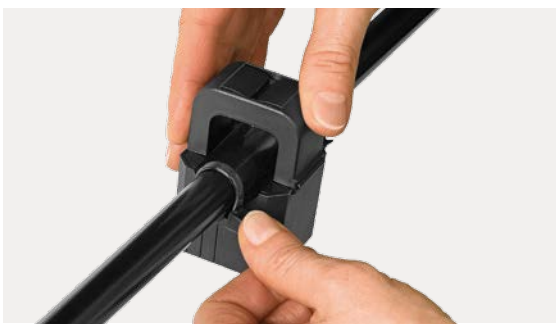
Retrofit Existing Systems

ADVANTAGES:

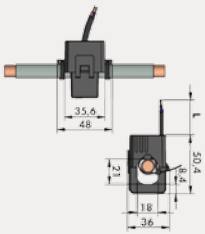
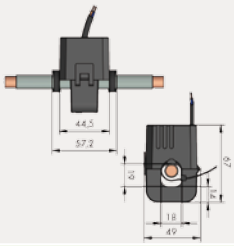
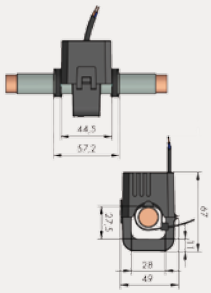
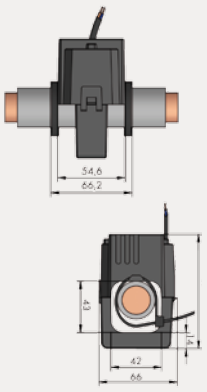
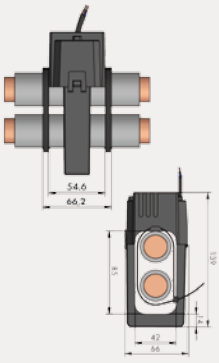
- No measuring cable interruption
- Primary currents 60 to 1000 A / secondary currents 1 or 5 A
- Compact, dividable housing means fast and easy mounting for retrofits
- Transformer leg (855-5xxx) can be completely removed if space is tight
- Easy, cost-effective installation via cable ties (included)
- Color-coded connection cables
- EN 61869-1/EN 61869-2

Watch the video to learn more.

Simple termination!



Quick and easy mounting!

Image	Primary Rated Current	Secondary Rated Current	Rated Power	Accuracy Class	Cable Length	Item Number
Ø 18 mm						
	60 A	1 A	0.2 VA	3	3 m	**855-3001/060-003**
	100 A	1 A	0.2 VA	3	3 m	**855-3001/100-003**
	200 A	1 A	0.2 VA	1	3 m	**855-3001/200-001**
	250 A	1 A	0.2 VA	1	3 m	**855-3001/250-001**
Ø 18 mm						
	100 A	1 A	0.2 VA	1	3 m	**855-4001/100-001**
	150 A	1 A	0.2 VA	1	3 m	**855-4001/150-001**
	150 A	5 A	1 VA	1	0.5 m	**855-4005/150-101**
	200 A	1 A	0.2 VA	0.5	3 m	**855-4001/200-001**
Ø 28 mm						
	200 A	1 A	0.2 VA	1	3 m	**855-4101/200-001**
	250 A	1 A	0.2 VA	1	3 m	**855-4101/250-001**
	250 A	5 A	1 VA	1	0.5 m	**855-4105/250-101**
	400 A	1 A	0.2 VA	1	3 m	**855-4101/400-001**
	400 A	5 A	1 VA	1	0.5 m	**855-4105/400-101**
Ø 42 mm						
	250 A	1 A	0.5 VA	1	5 m	**855-5001/250-001**
	400 A	1 A	0.5 VA	0.5	5 m	**855-5001/400-000**
	400 A	5 A	0.5 VA	1	3 m	**855-5005/400-001**
	600 A	1 A	0.5 VA	0.5	5 m	**855-5001/600-000**
	600 A	5 A	0.5 VA	0.5	3 m	**855-5005/600-000**
	1000 A	1 A	0.5 VA	0.5	5 m	**855-5001/1000-000**
	1000 A	5 A	0.5 VA	0.5	3 m	**855-5005/1000-000**
Ø 2 x 42 mm						
	1000 A	1 A	0.5 VA	0.5	5 m	**855-5101/1000-000**
	1000 A	5 A	0.5 VA	0.5	3 m	**855-5105/1000-000**

PLUG-IN CURRENT TRANSFORMERS

With *picoMAX*® Pluggable Connector

With 1 A Output

ADVANTAGES:
- Converts 64 A or 35 A to 1 A
- Accuracy class 1 per EN 61869-2
- Mount on DIN-rail or panels via carrier rail adapter
- UL certified (Certificate No. E356480)

Watch the video to learn more.

Mounting

Just snap together.

Use carrier rail adapter to snap to DIN-rail.

As a space-saving option, mount directly above circuit breaker.

Conductor Termination

Push-in termination of solid and ferruled conductors

Universal connection for fine-stranded conductors

Image	Primary Rated Current	Secondary Rated Current	Rated Power	Accuracy Class	Conductor Hole	Item Number
	35 A	1 A	0.2 VA	1	Ø 7.5 mm	**855-2701/035-001**
	64 A	1 A	0.2 VA	1	Ø 7.5 mm	**855-2701/064-001**
	Carrier Rail Adapter					**855-9927**

With Low Power Output

ADVANTAGES:

- First transformer with lower power output
- Specifically designed for converting low currents from 32 A to 320 mA
- Complies with accuracy class 0.5 per EN 61869-2 in the measurement range of 0.8 to 32 A and in combination with WAGO's 3-Phase Power Measurement Module

Watch the video to learn more.

Mounting

Just slide together.

Side-by-side assembly

To save space, mount directly above circuit breaker.

Conductor Termination

Push-in termination of solid and ferruled conductors

Universal connection for fine-stranded conductors

Image	Primary Rated Current	Secondary Rated Current	Rated Power	Accuracy Class	Conductor Hole	Item Number
	32 A*	320 mA	0.1 Ω	0.5**	Ø 5.0 mm (0.197 in.)	**855-1700/032-000**

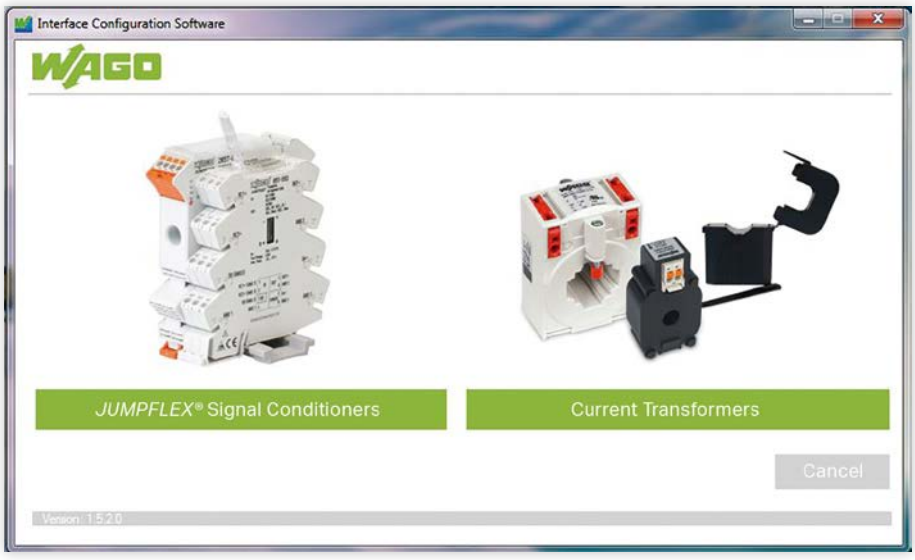
*Measurement range: 0.8 to 32 A in combination with the three-phase power measurement modules (750-493/494/495)
**Testing adheres to EN 61869-2 with a conversion ratio of 16 A/0.16 A (accuracy class: 0.5) and an extended primary current of 200%

iStock.com/AvatarKnowmad

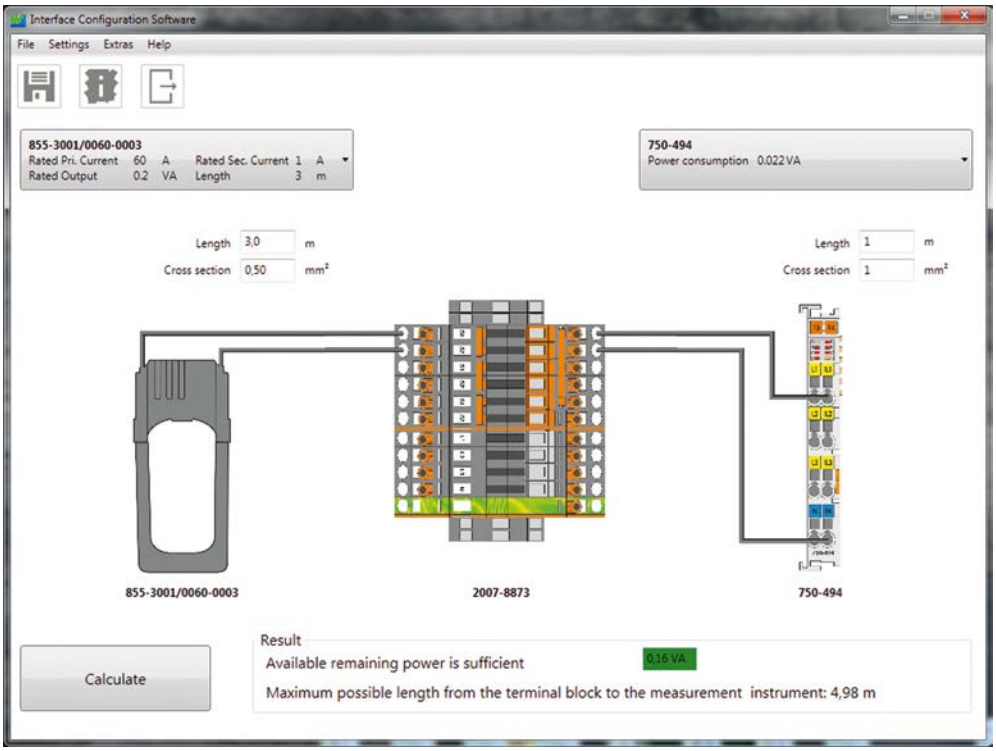
LINE LENGTH CALCULATION FOR CURRENT TRANSFORMERS

Refined Solution for Your System Planning

To determine actual power requirements, both the power requirements of the connected measurement devices and the power losses from the measurement lines connected to a transformer's secondary circuit must be taken into account.
The interface configuration software's new feature quickly and easily calculates cable length and provides the results for your system documentation.



WAGO Interface Configuration Software Start Screen



Cable length calculation using WAGO Interface Configuration Software

Cable length calculator

Configuration report

Project	WAGO
Project number	1582.23.58877
Company	Wago Kontakttechnik GmbH & Co. KG
Author	Michael Meyer
Date	21.08.2015
Stamp	

Transducer	
Item number	855-3001/0060-0003
Rated Pri. Current	60A
Rated Sec. Current	1A
Rated Output	0,221VA
Measurement instrument	
Item number	750-494
Power consumption	0,022VA
Cabel from transducer to terminal block	
Length	3m
Cross section	0.5mm²
Power loss	0,021VA
Cabel from terminal block to measurment instrument	
Length	1m
Cross section	1mm²
Power loss	0,036VA
Result	
Available power	0,221VA
Total power loss	0,057VA
Remaining power	0,164VA
Required power	0,022VA
Result	Available remaining power is sufficient

Simply documented!

Power calculation of copper cables between measurement device and current transformer:

$$P_V = \frac{I_S^2 \times 2 \times l}{A_{CU} \times 56} \text{ VA}$$

I_S = Secondary rated measuring current strength [A]
l = Simple cable length in m
A_{CU} = Cable cross-section in mm²
P_V = Power loss of connection cables

Note: When using a common three-phase return line, the values for P_V are halved.

Example:
A 1 amp or 5 amp current transformer is used, with an ammeter on the secondary circuit, at a distance of 10 m between the transformer and the measurement device.

Current transformer 5 A

$$P_V = \frac{5^2 \times 2 \times 10}{1.5 \times 56} = 5.96 \text{ VA}$$

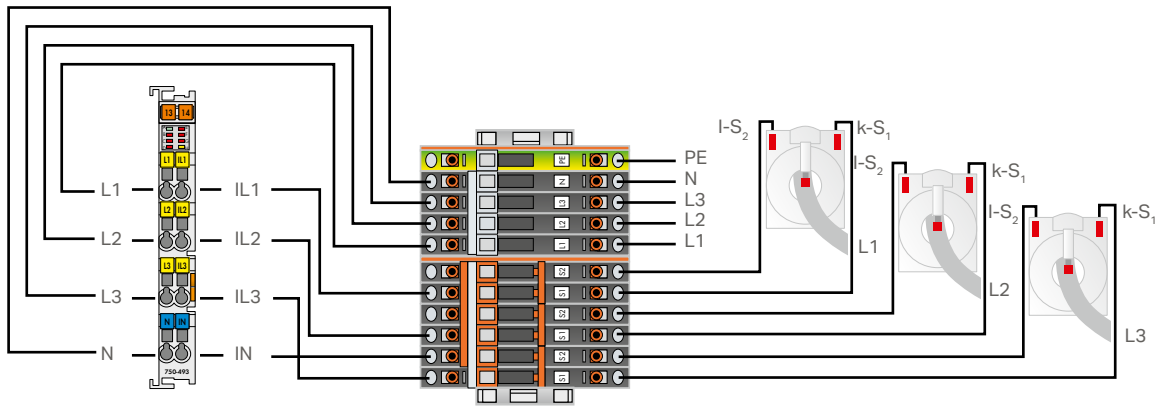
Current transformer 1 A

$$P_V = \frac{1^2 \times 2 \times 10}{1.5 \times 56} \text{ VA} = 0.24 \text{ VA}$$

Free software download at:
www.wago.com/configuration-software

TERMINAL BLOCK ASSEMBLIES FOR CURRENT TRANSFORMERS AND VOLTAGE TAPS

For Fast and Easy Connections

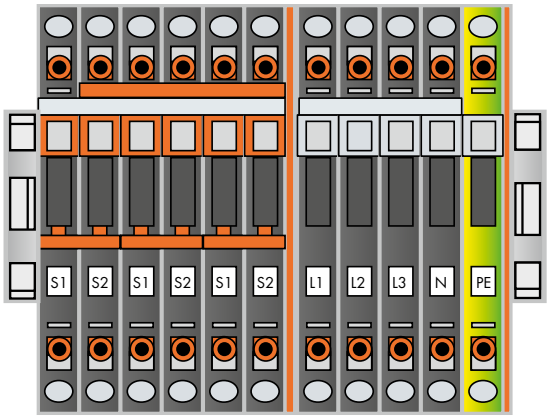


3-Phase Power Measurement Module, 750 Series

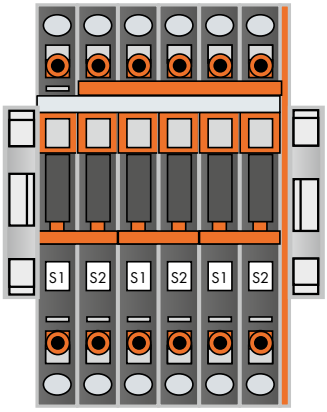
Terminal Block Assemblies for Current Transformers and Voltage Taps

Current Transformers, 855 Series

Pre-assembled terminal block assembly for easily connecting and short circuiting current transformers, suitable for three-phase power measurement modules (750-495 and 750-494)



Compact terminal block for current transformer circuit, 2007-8873
Connection option for current and voltage, including 'Y' point jumper

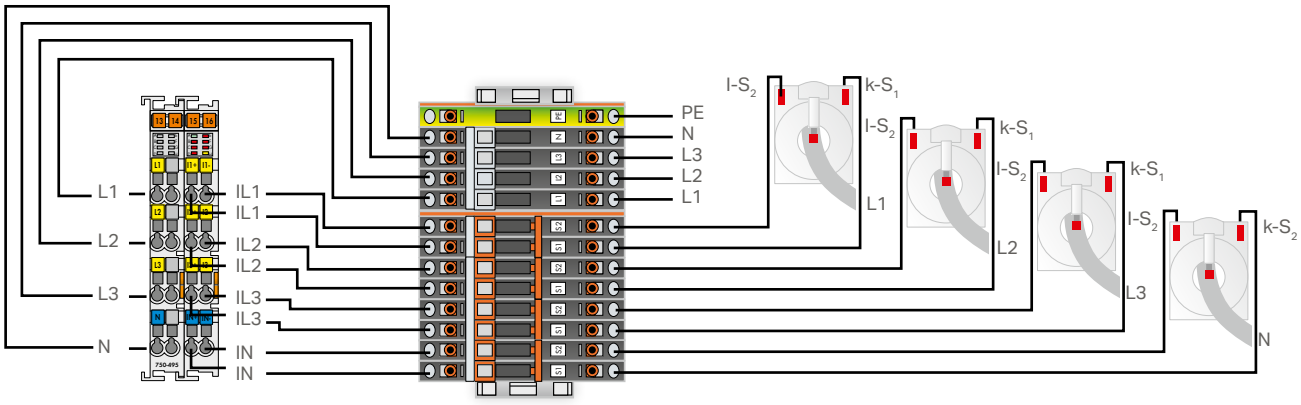


2007-8875
Connection option for current and voltage, including 'Y' point jumper

Watch the video to learn more.

ADVANTAGES:

- Neutral bridging
- Easy and clear wiring
- Short-circuiting of current transformers
- Test sockets for control measurements
- Visible current and voltage path separation

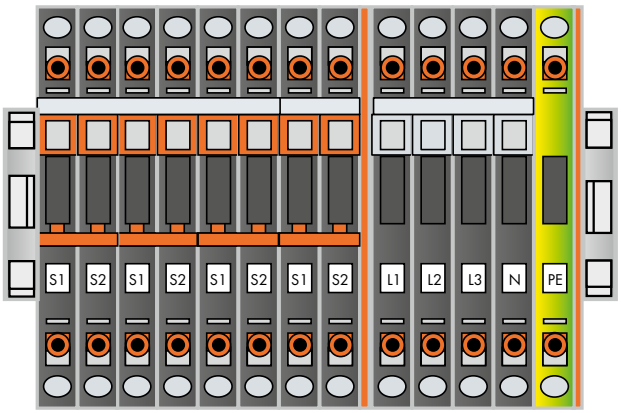


3-Phase Power Measurement Module, 750 Series

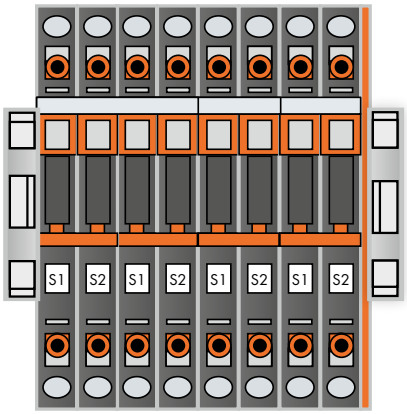
Terminal Block Assemblies for Current Transformers and Voltage Taps

Current Transformers, 855 Series

Pre-assembled terminal block assembly for easily connecting and short circuiting current transformers, suitable for three-phase power measurement modules (750-495)



Compact terminal block for current transformer circuit, 2007-8874; connection option for current and voltage



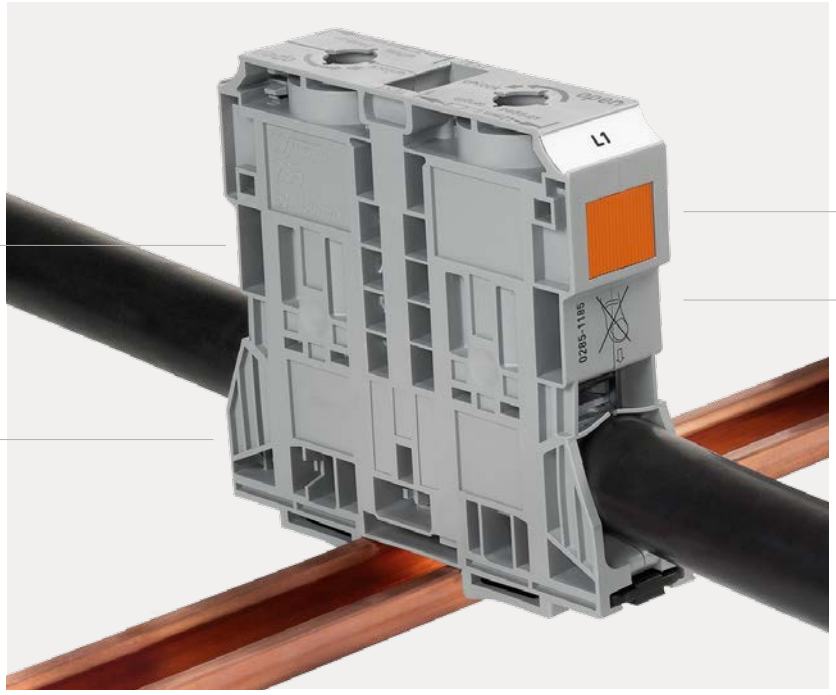
Compact terminal block for current transformer circuit, 2007-8877; connection option for current

HIGH-CURRENT, RAIL-MOUNT TERMINAL BLOCKS UP TO 185 mm² (350 KCMIL)

The Ideal Addition to Current Measurement with Plug-In Transformers

Fast Termination
- Eliminate time-consuming preparation – no ring terminals or ferrules required

Easy Termination
- Side-entry conductor termination
- Orange locking tab keeps the clamp open for hands-free wiring

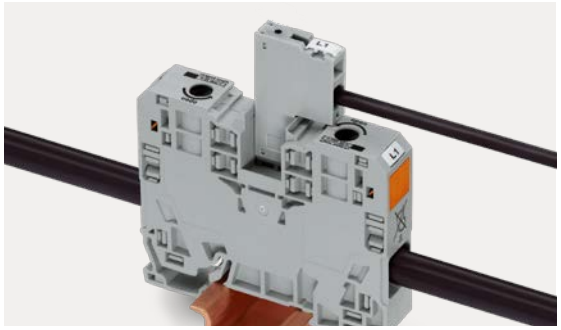


Always Reliable
- Perfect clamping force – independent of operator skill

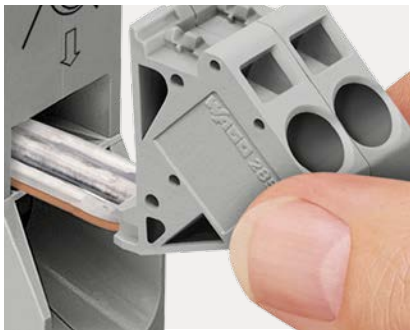
Suitable for All Applications
- Meet the most stringent requirements, including those specified for railway and marine applications
- Material durability at high and low external temperatures

285 Series Item Number				
Designation	**35 mm² (2 AWG)**	**50 mm² (1/0 AWG)**	**95 mm² (4/0 AWG)**	**185 mm² (350 kcmil)**
Conductor range	6 … 35 mm² 10 … 2 AWG	10 … 50 (70 "f-st") mm² 8 … 1/0 AWG	25 … 95 mm² 4 … 4/0 AWG	50 … 185 mm² 1/0 AWG … 350 kcmil (ground per standard max. 120 mm² / 250 kcmil)
Nominal current I_N	125 A	150 A	232 A	353 A
Rated voltage	1000 V	1000 V	1000 V	1000 VAC/DC, 1500 VDC
Through terminal block ●	285-135	285-150	285-195	285-1185
Through terminal block ●	285-134	285-154	285-194	285-1184
Ground conductor terminal block ◑	285-137	285-157	285-197	285-1187
Adjacent jumper*	285-435	285-450	285-495	285-1171
Step-down jumper (for TOBJOB® S, 10/16 mm²)	285-430	-	-	-
Power tap*	285-427	285-447	285-407	285-1175
Three phase set (without DIN-rail and marking accessories)	285-139	285-159	285-199	285-1169
Warning cover	285-420	285-440	285-170	285-1177
Shock protector	285-421	285-441	285-169	285-1178
Marking strip (reel)	2009-110	2009-110	2009-110	2009-110
Marker carrier	285-442	285-442	285-442	-
WMB Inline markers (reel)	2009-115	2009-115	2009-115	2009-115
WMB Multi marking system (for 5 … 5.2 mm)	793-5501	793-5501	793-5501	793-5501

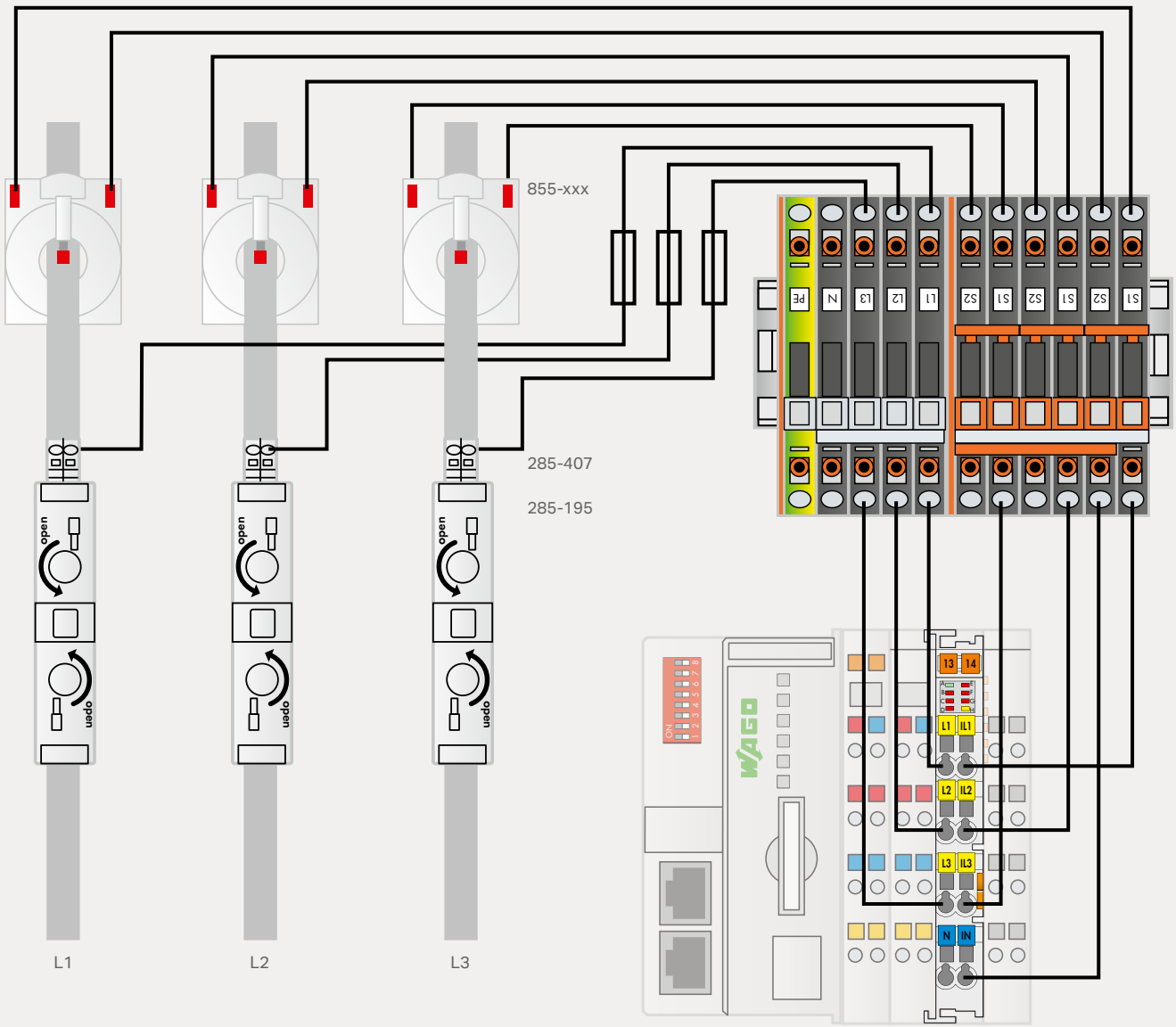
*For more technical data, see our Full Line Catalog, Volume 1, or visit http://eshop.wago.com.



The power tap is inserted into the jumper contact slot. It can be fitted with a strain relief plate (for 35 mm²) high-current, rail-mount terminal blocks).



Power tap provides safe and easy power distribution to additional loads. The tap is inserted when the spring is retracted – without connected conductor (for 50mm²/1/0 AWG to 185 mm² /350 kcmil) high-current, rail-mount terminal blocks).



CURRENT AND VOLTAGE TAP

The 2-in-1 Solution

A combination of current transformer and voltage tap, the current and voltage tap (can be quickly and easily mounted into the jumper slot of a two-conductor through terminal block (95 mm²/4/0 AWG, 285-195). This combination fits perfectly into a successful energy management plan.

Output – Voltage
- Redundant design

Output – Current
- Energy measurement device connection (1A)
- Short-circuiting the current transformer
- Neutral bridging

Marking Possibility
- TOPJOB® S Marking Strips
- WMB Multi Marking System

Feedthrough for Primary Conductors up to 95 mm²/4/0 AWG

Fuse Protection

855-951/250-000

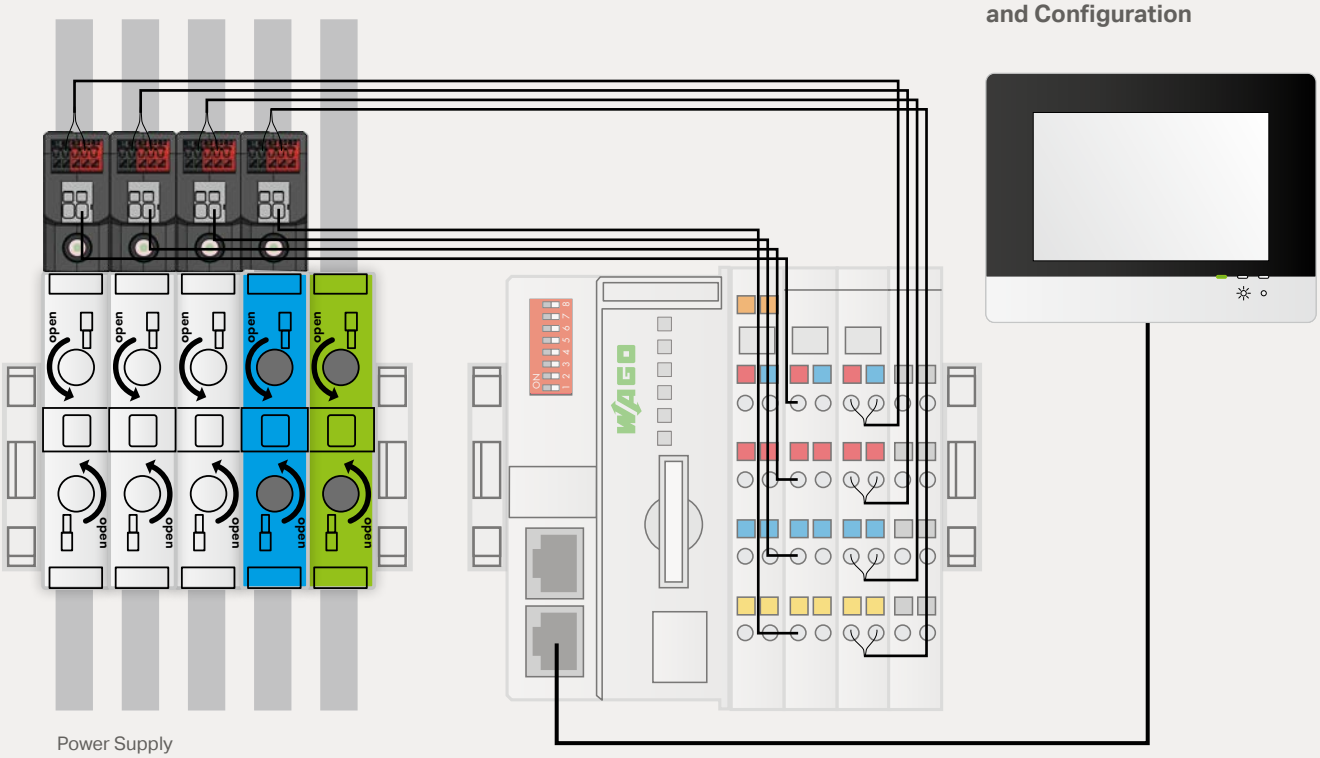
Technical Data for Current and Voltage Taps (855-951/250-000)	
Primary rated current I_{pri}	250 A
Secondary rated current I_{sec}	1 A
Accuracy class	0.5
Rated power S_r	0.2 VA
Rated voltage	690 VAC
Fuse	2 A, 450 V, F, 70 kA (5 x 25 mm)
Feedthrough for measurement conductor	Ø 16.0 mm (0.630 in.)

Current and voltage can be measured directly at the supply with the current and voltage tap (855-951/250-000) and the two-conductor through terminal block (95 mm²/4/0 AWG, 285-195)

ADVANTAGES:

- Power data can be directly tapped into the power supply
- Easy installation – simply insert the tap into the jumper slot of the two-conductor through terminal block (95 mm²/4/0 AWG) with POWER CAGE CLAMP
- Integrated 250 A/1 A current transformer
- Complies with accuracy class 0.5 per EN 61869-2 for exact measurement results
- Fused voltage path protects downstream measurement devices

Watch the video to learn more.



ROGOWSKI COILS

For Quick, Easy Retrofit of Existing Systems

ADVANTAGES:

- Rated insulation voltage:
  1000 V Cat. III / 600 V Cat. IV
- Accuracy class 1 per EN 61869-2
- IP67 protection class
- Ambient temperature: −40 … +80 °C
- UL certified

Watch the video to learn more.

Image	Description	Cable Length	Feedthrough for Measurement Conductor
	Rogowski coils RC-070	1.5 m (59.06 in.) 4.5 m (0.177 in.)	Ø 70 mm (2.756 in.)
	Rogowski coil RC-125	1.5 m (59.06 in.) 4.5 m (0.177 in.)	Ø 125 mm (4.921 in.)
	Rogowski coil RC-175	1.5 m (59.06 in.) 4.5 m (0.177 in.)	Ø 175 mm (6.890 in)
	Rogowski coil RT-500	1.5 m (59.06 in.) 3.0 m (118.11 in.)	Ø 55 mm (2.165 in.)
	Rogowski coil RT-2000	1.5 m (59.06 in.) 3.0 m (118.11 in.)	Ø 125 mm (4.921 in.)

*The specifications for the primary rated current refer to a combination with the WAGO Modules (857-552 and 750-495/000-002). Rogowski technology allows the coils to measure a wide primary current range of up to 10,000 A without loss of accuracy, because there are no saturation effects with this technology.

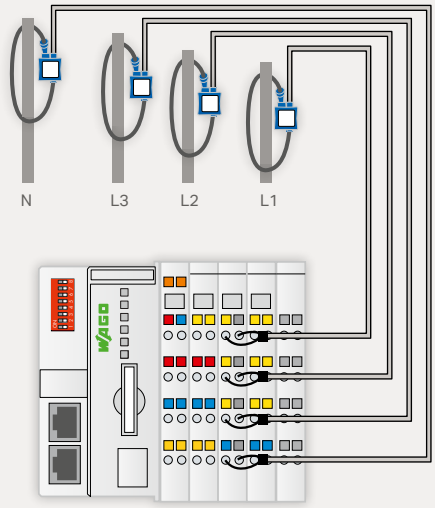
Bayonet connector:
Robust and durable

Anchor points:
Quick and easy mounting with cable ties

Lock-out seal option:
Higher security via sealable bayonet lock

Easy to Use:

- Rogowski coil diameter: 70, 125 or 175 mm
- Length of signal line: 1.5 m or 4.5 m
- Sealable bayonet connector
- Anchor points for cable ties



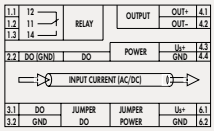
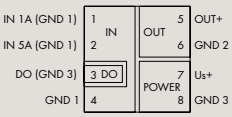
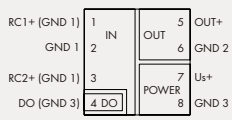
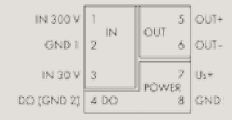
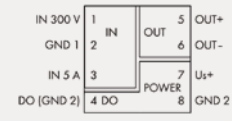
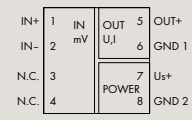
Direct connection of Rogowski coils to the three-phase power measurement module (750-495/000-002)

Primary Rated Current*	Output Signal	Accuracy Class**	Item Number
4000 AAC	22.5 mV / kA at 50 Hz	1	855-9150/2000-0701
			855-9450/2000-0701
4000 AAC	22.5 mV / kA at 50 Hz	1	855-9150/2000-1251
			855-9450/2000-1251
4000 AAC	22.5 mV / kA at 50 Hz	1	855-9150/2000-1751
			855-9450/2000-1751
500 AAC	10.5 mV / 500 A at 50 Hz	-	855-9100/500-000
			855-9300/500-000
2000 AAC	40.2 mV /2000 A at 50 Hz	-	855-9100/2000-000
			855-9300/2000-000

**per EN 61869-2

SIGNAL CONDITIONERS AND ISOLATION AMPLIFIERS

Current and Voltage Signal Conditioners

	Description	Image	Circuit Diagram	Input			Output	
Current and Voltage Signal Conditioners	Current and Voltage Signal Conditioners							
	Through-Hole Current Signal Conditioner			AC/DC 100 A			0 ... 10 mA 2 ... 10 mA 0 ... 20 mA 4 ... 20 mA	
	Current Signal Conditioner			1 A AC/DC 5 A AC/DC			0 ... 10 mA 2 ... 10 mA 0 ... 20 mA 4 ... 20 mA	
	Rogowski Coil Current Signal Conditioner			Rogowski coils 500 AAC 2000 AAC 4000 AAC			0 ... 10 mA 2 ... 10 mA 0 ... 20 mA 4 ... 20 mA	
	Voltage Signal Conditioner			300 VAC/DC			0 ... 10 mA 2 ... 10 mA 0 ... 20 mA 4 ... 20 mA	
	Power Signal Conditioner			300 VAC/DC (5 A)			0 ... 10 mA 2 ... 10 mA 0 ... 20 mA 4 ... 20 mA	
	Millivolt Signal Conditioner				0 ... 200 mV 0 ... 1000 mV	±100 mV	0 ... 10 mA 2 ... 10 mA 0 ... 20 mA 4 ... 20 mA	

Current

Voltage

Bipolar signals
Current and voltage

Digital output (DO)

Clipping capability

Zero/span adjustment

Output		Special Functions				Configuration				Power Supply	Item Number
											
0 ... 5 V 1 ... 5 V 0 ... 10 V 2 ... 10 V	±10 mA ±20 mA ±5 V ±10 V	x	x	x	x	x	x	x	x	24 VDC	**2857-550**
0 ... 5 V 1 ... 5 V 0 ... 10 V 2 ... 10 V		x	x			x	x	x		24 VDC	**857-550**
0 ... 5 V 1 ... 5 V 0 ... 10 V 2 ... 10 V		x	x			x	x	x		24 VDC	**857-552**
0 ... 5 V 1 ... 5 V 0 ... 10 V 2 ... 10 V		x	x			x	x	x		24 VDC	**857-560**
0 ... 5 V 1 ... 5 V 0 ... 10 V 2 ... 10 V		x	x			x	x	x		24 VDC	**857-569**
0 ... 5 V 1 ... 5 V 0 ... 10 V 2 ... 10 V			x			x	x	x		24 VDC	**857-819**

Simulation

DIP switch

Supply voltage

Interface configuration software

Interface configuration app

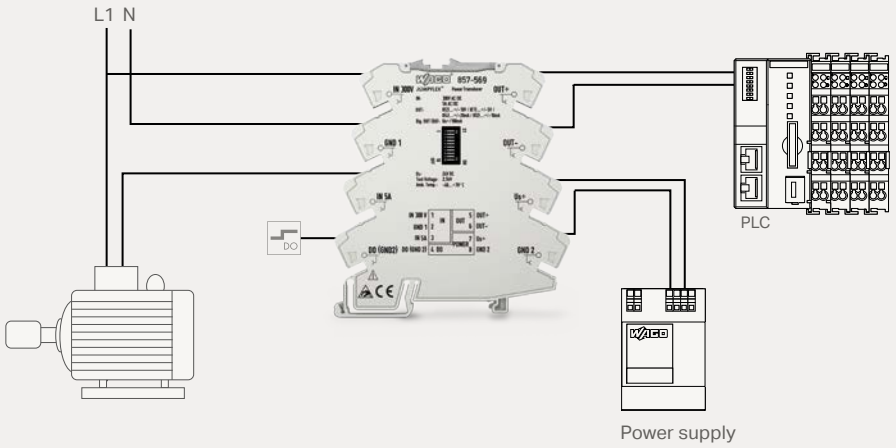
Interface configuration display, 2857-900

Free down-load

Free download from Google Play Store

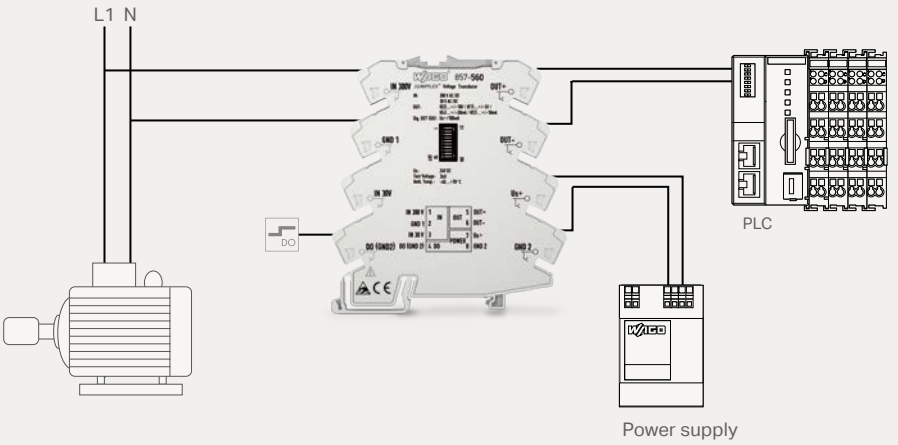
Signal Conditioners and Isolation Amplifiers

Current and Voltage Signal Conditioners



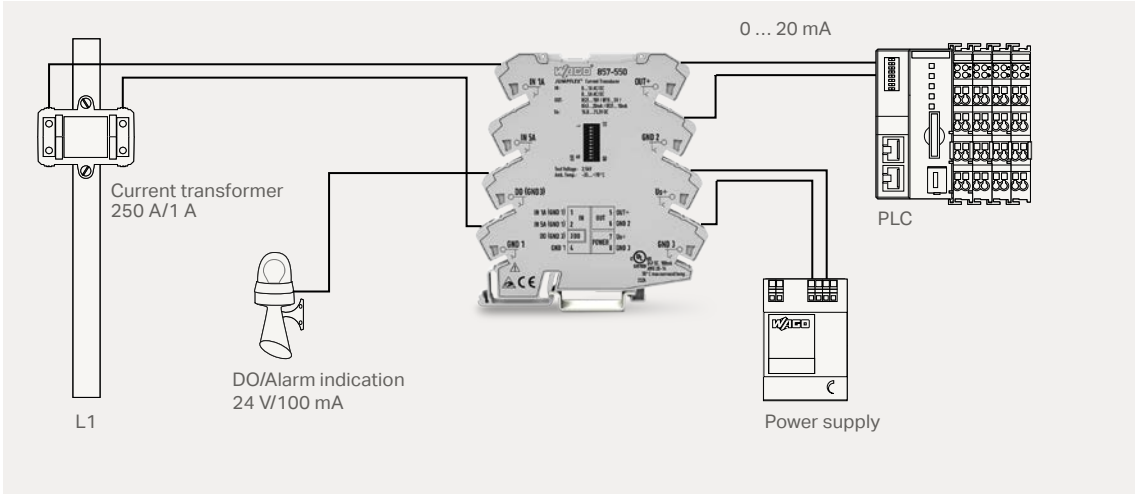
Power Signal Conditioner, 857-569

1-phase power measurement



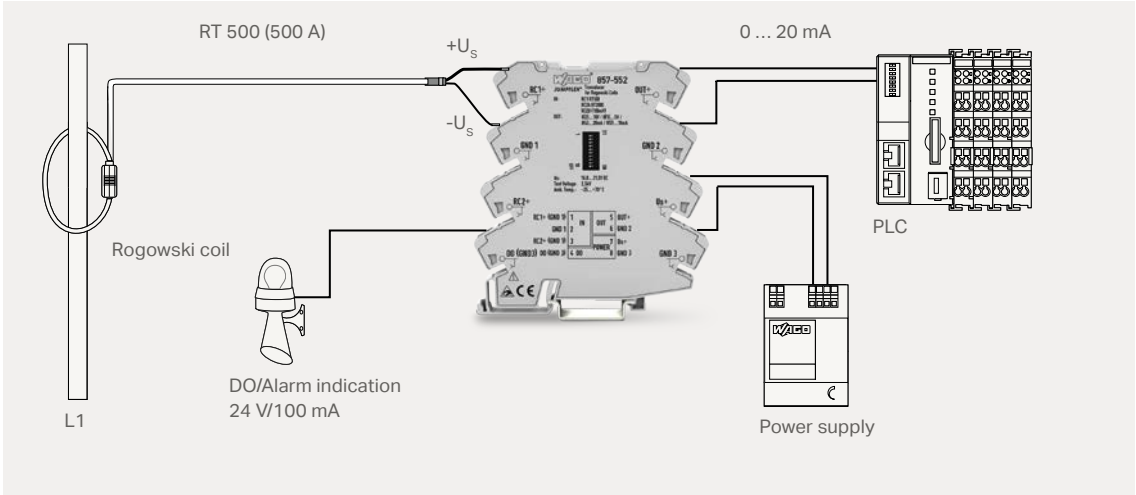
Voltage Signal Conditioner, 857-560

Voltage measurement



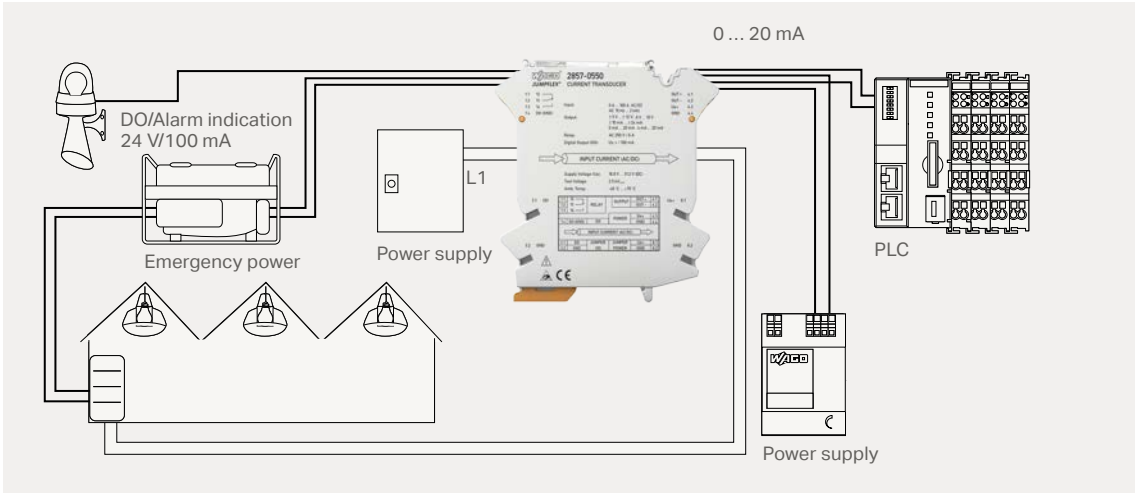
Current Signal Conditioner, 857-550

Current measurement via plug-in current transformer



Rogowski Signal Conditioner, 857-552

Current measurement via Rogowski coil



Current Signal Conditioner, 2857-550

Light monitoring

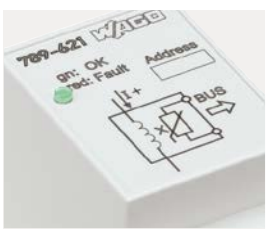
INTELLIGENT CURRENT SENSORS

Monitor Solar Plants via MODBUS Communication

ADVANTAGES:

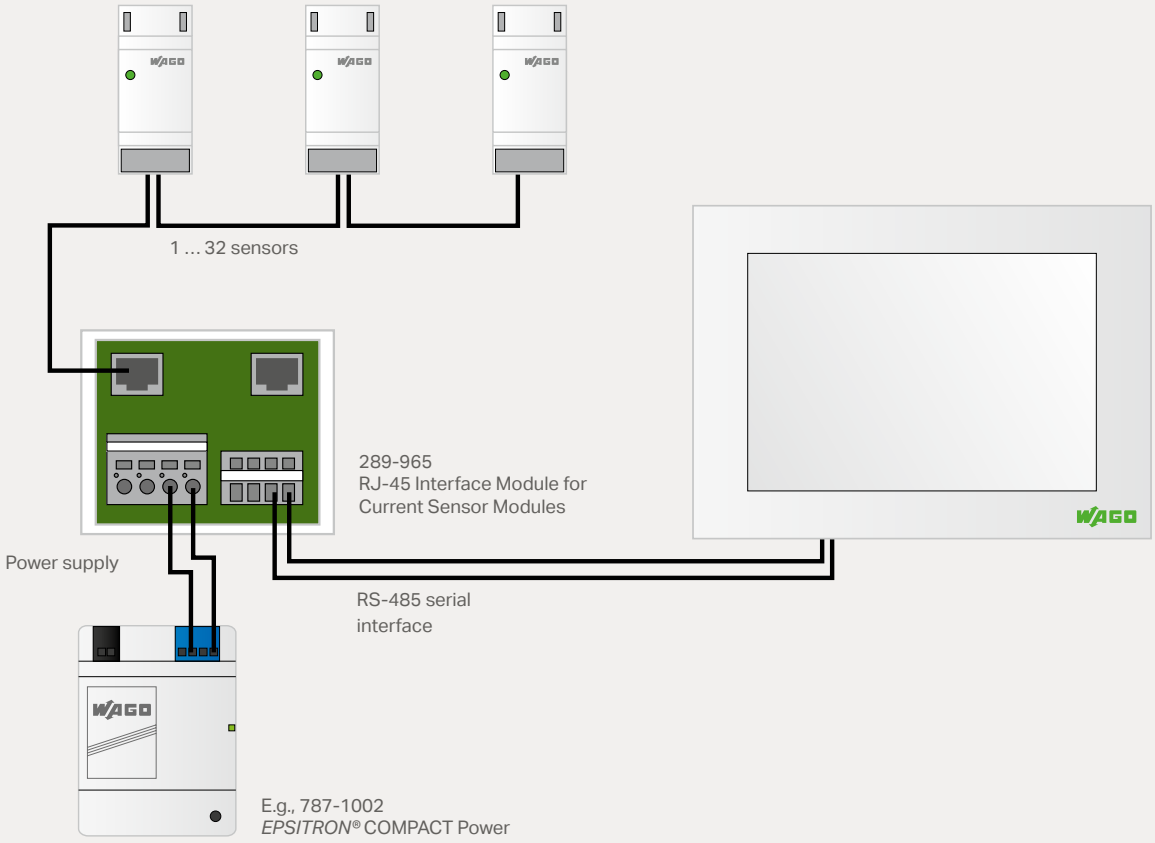
- Wide measurement range for measuring AC and DC current
- Measure line and sum currents for perfect system monitoring
- Easily guide live conductor through current sensor
- Quickly mount to DIN-rail

Addressing



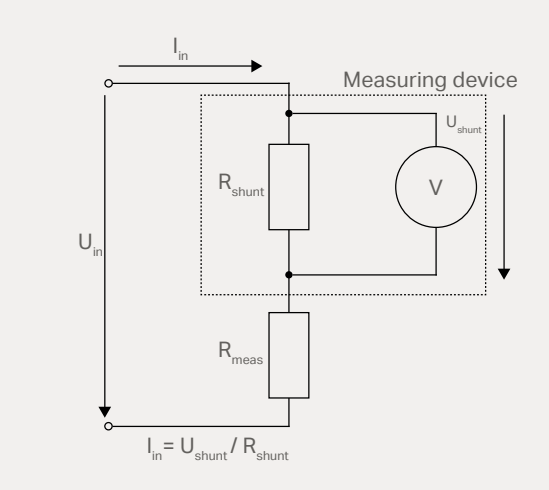
Status indicator

Connection to a *PERSPECTO*® Control Panel

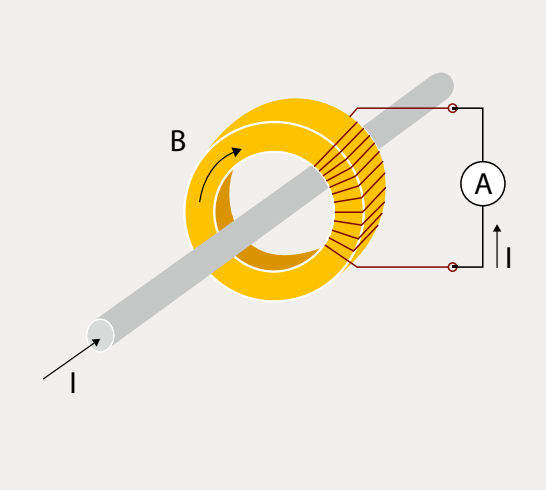


			
Measurement range	0 … 80 ADC	0 … 140 ADC	AC 0 … 50 A_{rms}
Transmission error	≤ 0.5% of upper-range value	≤ 0.5% of upper-range value	≤ 0.5% of upper-range value
Power supply	12 … 34 V (via RJ-45)	12 … 34 V (via RJ-45)	12 … 34 V (via RJ-45)
Feedthrough	15 mm (for electrical lines)	15 mm (for electrical lines)	15 mm (for electrical lines)
Interface	RS-485	RS-485	RS-485
Protocol	MODBUS over serial line	MODBUS over serial line	MODBUS over serial line
Addressing	1 … 32	1 … 32	1 … 32
Max. bus length	≤ 1200 m	≤ 1200 m	≤ 1200 m
Item number	**789-620**	**789-621**	**789-622**

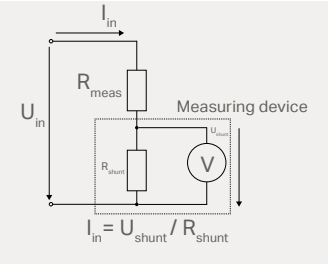
MEASUREMENT METHODS



High-Side Method



Transformer Principle

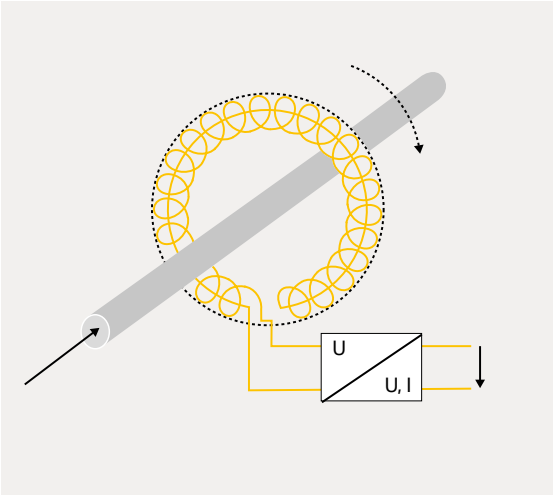


Low-Side Method

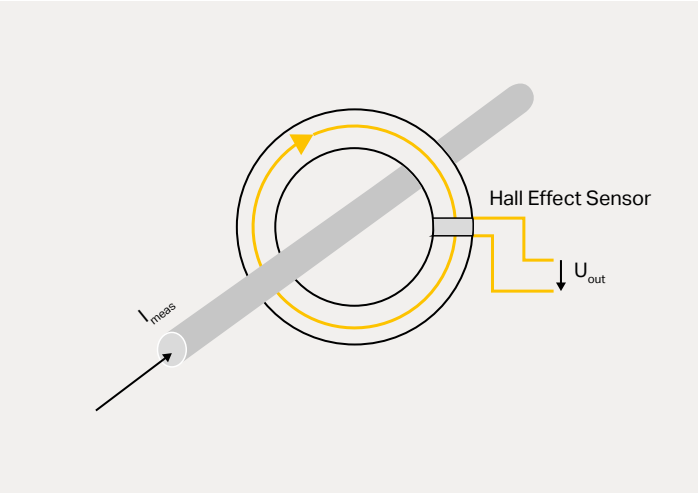
Shunt Measurement (AC/DC)
Current measurement is performed using a low-ohm resistor (shunt), which is connected in parallel to a voltmeter. The current is proportional to the current measured at the shunt resistor, I = U/R.

The shunt can be located upstream or downstream of the load (high-side/low-side method). WAGO products are equipped for both methods, giving users the freedom to decide where the conductor section should be disconnected. In addition to DC and AC currents, shunt measurements are also suitable for measuring superimposed signals (DC + AC). Accuracies of 0.1% and greater can be achieved. WAGO's 855 Series Plug-In Current Transformers with a predefined division ratio can be used to expand the measurement range for pure AC measurements.

Shunt Measurement in Combination with Plug-In Current Transformer (AC)
Plug-In Current Transformers are used at higher measurement currents. They function based on the transformer principle and expand the range of an existing measurement system (usually a shunt transformer). The number of secondary windings mirrors the fixed setting of the division ratio. The electrically isolated output AC is proportional and in phase with the input AC. The measuring error typically lies below 1%.



Rogowski Coil



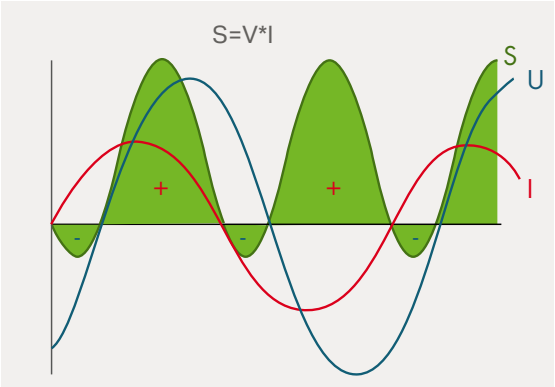
Hall Effect Sensor

Rogowski Coil (AC)
A closed-air coil, i.e., coil without iron core, is applied around the conductor that will be measured. The AC current flowing through the conductor induces a proportional voltage in the Rogowski coil. The output voltage is amplified and conditioned. A measurement error of less than 2% and a response threshold of only a few amps guarantee straightforward measurement of high to very high AC currents.

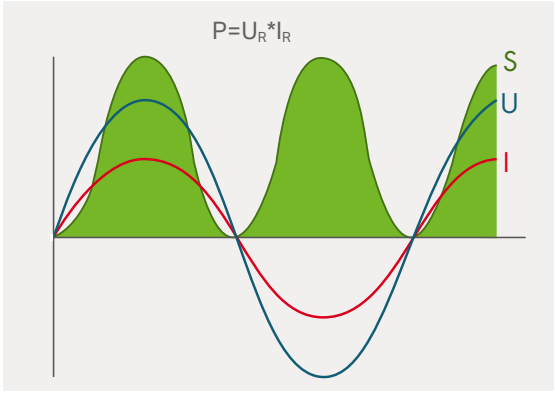
Hall Effect Sensors (AC/DC)
A soft, magnetic core is wrapped around the conductor. The core has a small air gap in which the Hall effect sensor is located. A magnetic flux is generated in the ring-shaped core by the current flowing through the conductor. The magnetic flux also flows through the Hall effect sensor, which outputs a voltage signal proportional to the current measured. This signal is prepared and forwarded for processing. Using the Hall method, different signals (AC/DC) and measurement ranges can be mapped, depending on the design. Measurement accuracy lies between 0.5% and 1%.

Measurement Method	Advantages	Application Areas
Shunt	• Very high accuracy • Suitable for DC and AC currents	• Integration into control and regulation systems • Process and energy technology
Shunt + Current transformer	• Suitable for higher AC currents • Potential-free measurement	• Installations and systems technology • Network monitoring and analysis
Hall effect	• Potential-free measurement • For higher currents • DC and AC versions	• PV systems and general energy technology • Control processing of several individual systems

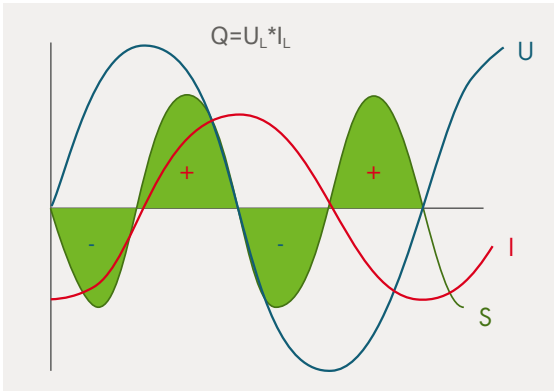
GLOSSARY



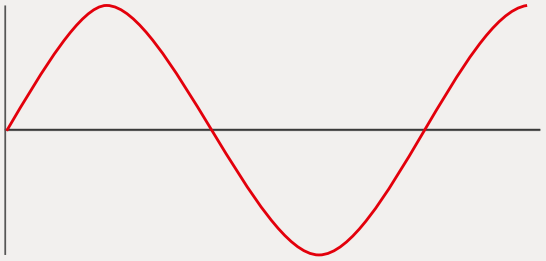
Apparent Power S
Apparent power (S) is the total power of a transmission network. It is composed of active power (P) and reactive power (Q). Positive apparent power, which is in the interest of the consumer, means that the power is drawn from the grid. Negative apparent power, however, means that power is fed back into the grid.



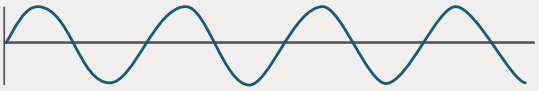
Active Power P
The active power (P) is the power actually consumed. It has no phase shift between current and voltage and relates to a resistive load. For an alternating voltage, the active power results from the multiplication of the RMS values for current and voltage.



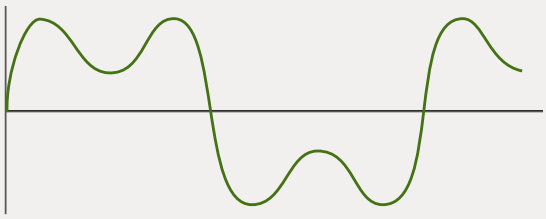
Reactive Power Q
Reactive power (Q) refers to a load on the power grid, which acts against the power flowing from the producer to the consumer. Reactive power is the product of voltage and current flowing through a reactance. Reactive power is generated by any device that is connected to an AC grid. All electrical equipment generates an electromagnetic field when voltage is applied. The magnetic field is constantly being built up and then dismantled by the alternating voltage. The energy created when the field is being dismantled is fed back into the power grid, increasing the resistance to the current flow.



Fundamental frequency (50 Hz)



Third harmonic (150 Hz)



Addition creates a non-sinusoidal wave form.

Harmonics

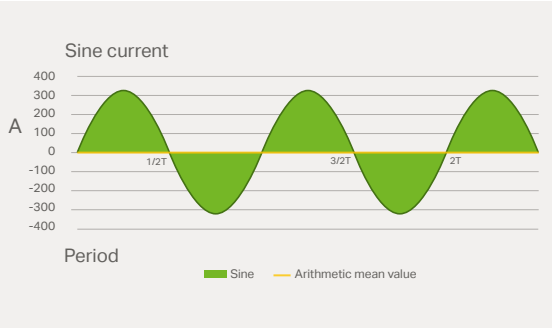
Harmonics are currents having frequencies that are multiples of the 50 Hz fundamental frequency. The harmonic degree is defined as the relationship between harmonic and fundamental frequency. Harmonics are created by devices with non-linear characteristic curves (e.g., transformers, rectifiers, televisions, computers, halogen lighting). The non-sinusoidal currents of these devices result in a voltage drop in the network impedance, which distorts the network nominal voltage and affects operation.

The impacts of harmonics contamination include: failure of protective devices, thermal overload and premature aging of electrical equipment, loss of mechanical stability, performance loss, measurement errors, higher noise level, hard drive failures, system crashes, operational breakdowns and more.

If many devices are operated within a network that generates the third harmonic, it may result in a very high current load of the neutral conductor. Neutral conductor currents caused by harmonics in TN-C power networks travel within the entire equipotential bonding system via water/heating pipes, grounding systems, shields of data lines, video lines and communication systems. This can lead to increased corrosion or pitting on piping systems.

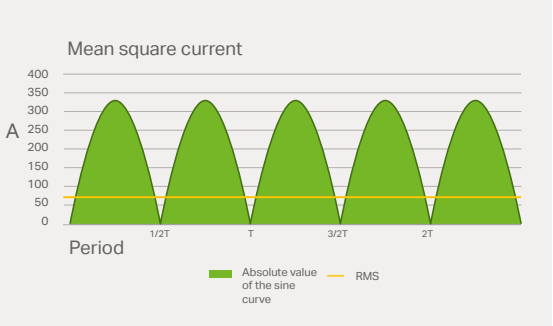
Therefore, continuous harmonics and neutral conductor analysis are required for guaranteeing both power supply and overvoltage protection, as well as fire safety.

GLOSSARY



Arithmetic Mean Value
The arithmetic mean value (also average) is the sum of all measured values detected and divided by the number of measured values.

For periodic variables (e.g., sine waves), the arithmetic mean is zero. For this reason, it is not meaningful for use with periodic variables, or it only provides information about a possibly present constant. For DC variables, the arithmetic mean value corresponds to the average measured value viewed over time.

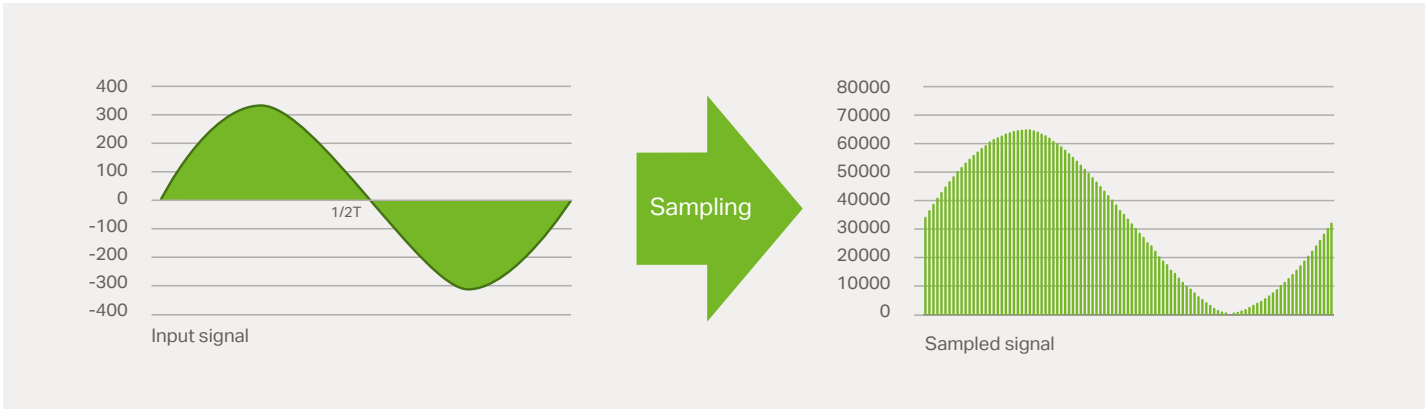


$$I_{rms} \approx \sqrt{\frac{1}{n}\sum_{i=1}^{n} x_i^2}$$

Mean Square Value
The mean square value – RMS (root-mean-square), also the TRMS (true root-mean-square) – is the square root of the quotient of the sum of squares for the measured values and number of measured values (square root of the average of the measured value).

In electrical engineering, the effective value of a periodic quantity corresponds to the effective value of the DC variable. It is characteristic of the power transformed in the consumer.

The RMS and TRMS terms are frequently differentiated. This is based on historical context, so that newer measuring procedures are preferred over form factor based methods. In principle, WAGO measures according to the TRMS method. However, no special differentiation is made, as both terms describe the same mathematical equation, and one merely indicates the specific accuracy of the measurement.



Digital Processing
During digital processing, the signal is sampled in defined, very short time intervals (digitized). The sampled values are processed and, e.g., converted into an analog standard signal.

Digital processes are becoming increasingly common, since high reproducibility and signal-authentic mapping can be guaranteed due to high sampling rates. In addition, further processing or transmission of the digitized information is easier, less susceptible to interference and more flexible, due to the software.

Analog Processing
During analog processing, the input signal is fed directly to a processing unit and prepared according to a fixed transfer function. The processing occurs using an operational amplifier (OpAmp) and a few passive components.

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