

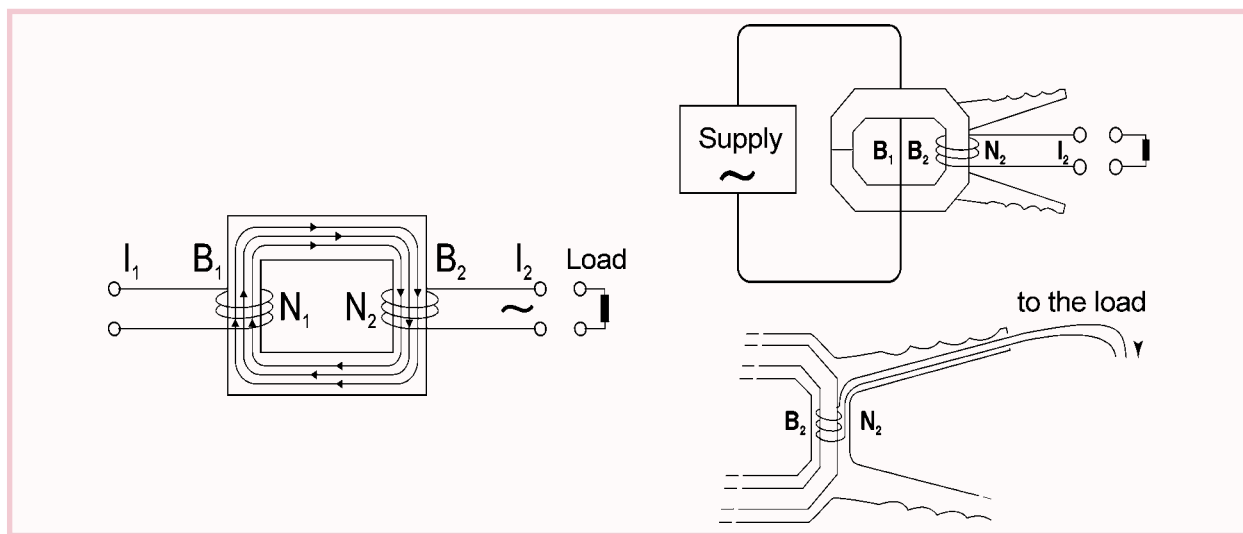
ELECTRICAL VARIABLES

How Split-Core Type Transformers Work

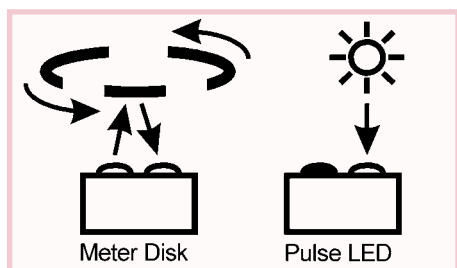
Current transformers are used to acquire high alternating currents without contact and without interrupting the circuit. In principle, they consist of 2 separate transformer windings (B_1 = primary winding with N_1 windings, B_2 = secondary winding with N_2 windings) on one common iron core (closed magnetic circuit).

If an alternating current I_1 flows through the winding B_1 , a current I_2 is induced in the winding B_2 , which depends on the winding ratio N_1/N_2 . In comparison with stationary-installed panel transformers, split-core type transformers must be able to embrace a conductor within a magnetic circuit that is split open.

In practice, the primary winding B_1 consists of only one winding that carries the current to be measured. The transformation ratio of a current transformer is: $I_1 \times N_1 = I_2 \times N_2$



How Optical Probes for Current Meters Work



When scanning passive optical indicators (meter disks) the revolutions of the stroboscopic disk are converted into electrical pulses. When scanning active optical indicators (pulse LED) the energy-proportional pulses of electronic counters are registered. The coverage ranges from green, yellow and red LEDs up to IR emitting LEDs.

Current Meter Scanning à la ALMEMO®

Our self-calibrating optical probes allow to include existing energy meters, which do not have a pulse output, at low cost in the energy management. No conversion is required for this and, furthermore, the energy-proportional pulses of electronic meters can be detected. Therefore, ALMEMO® probe heads can be used in many different fields of application, e.g. industrial systems, large houses with several flats, shopping centres, trade fairs and exhibitions, holiday and camping resorts, hotel and apartment installations, municipalities and authorities.

Each probe head is equipped with a frequency meter module and is programmed for pulse measurement, i.e. the ALMEMO® device counts the amount of revolutions or pulses for each measuring cycle. A suitable choice of the time base or a scaling of the measured value allows for a correct scaled display of consumption values. Through the formation of sums over a specific period or over the entire measuring period, it is also possible to determine the total consumption over longer periods.

Split-Core Type Transformer for AC Currents Type FEA6049



- ▶ Perfectly suitable for use in maintenance and monitoring of electrical systems without interrupting their current supply.
- ▶ Application oriented design, particularly suitable for measurement in dense wiring.
- ▶ Ideal for non-contact control measurements with ALMEMO® hand-held devices, e.g. for fault currents or at devices with low current consumption.

Types (including manufacturer's test certificate)

Single-range split-core type transformer with integrated rectifying for small AC currents incl. ALMEMO® connecting cable ($\pm 26\text{VDC}$)

Order no. FEA6049

Technical Data:

Measuring range:	1A to 150A AC
Accuracy of meas. at 50/60Hz:	40 to 150A: $\pm 4\%$ 15 to 40A: $\pm 3\% \pm 0.2\text{A}$ 5 to 15A: $\pm 6\% \pm 0.2\text{A}$ 1 to 5A: $\pm 10\% \pm 0.2\text{A}$
Encompassing capacity:	cable \varnothing 10mm
Transformation ratio:	100mVDC/1A AC
Output signal:	15VDC
Nominal conditions	23°C $\pm 3\text{K}$, 1013 mbar, 20 to 75% RH
Electrical safety	EN 61010-2-032 (issue 2/2003)
Admissible voltage	300 V category IV or 600 V category III
Operating frequency	48 to 500 Hz
Operating conditions	-10 to +50°C, 10 to 85% RH
Dimensions	130 x 37 x 25 mm
Weight	approx. 180 grams
Storage temperature	-40 to +80°C
Connecting cable	Cable, 1.5 meters, with safety laboratory connectors, including safety coupling and 1.5-meter ALMEMO connecting cable with banana plugs

01/2011 We reserve the right to make technical changes.

Split-Core Type Transformer for AC Currents Type FEA604MN



- ▶ Perfectly suitable for use in maintenance and monitoring of electrical systems without interrupting their current supply.
- ▶ Asymmetric shape of the jaw of tongs, particularly suitable for encompassing cables and rails.
- ▶ With polarity indicator for power measurements.
- ▶ Ideal for non-contact control measurements with ALMEMO® handheld devices, e.g. at low power systems.

Types (including manufacturer's test certificate)

Single-range split-core type transformer with integrated rectifying for small AC currents incl. ALMEMO® connecting cable ($\pm 26\text{VDC}$)

Order no. FEA604MN

Technical Data:

Measuring range:	0.5A to 200A AC (the higher value corresponds to 120% of the max. nominal value)
Accuracy of meas. at 50Hz:	$\pm 3\%$ of meas. val. $\pm 0.5\text{A}$
Encompassing capacity:	cable \varnothing 20mm rail 20 x 5mm
Transformation ratio:	100mVDC/1A AC
Output signal:	20VDC
Operating frequency:	40Hz to 10kHz
Safety standards:	IEC 1010-1
Overvoltage protection:	category III
Dimensions:	135 x 50 x 30mm
Weight:	approx. 180g
Nominal conditions:	25°C $\pm 3\text{C}/1013\text{mbar}$
Operating temperature:	-10 to +55°C
Relative humidity:	0% to 90% at 40°C max.
Storage temperature:	-40 to +70°C
Connecting cable:	Connecting cable Integrated banana sockets, including 1.5-meter ALMEMO connecting cable with banana plugs

ELECTRICAL VARIABLES

Split-Core Type Transformer for AC Currents FEA 6044 N



- ▶ Perfectly suitable for use in maintenance and monitoring of electrical systems without interrupting their current supply.
- ▶ Asymmetric shape of the jaw of tongs, particularly suitable for encompassing cables and rails.
- ▶ With polarity indicator for power measurements.
- ▶ Ideal for non-contact control measurements with ALMEMO® handheld devices, e.g. at low power systems.

Types (including manufacturer's test certificate)

Single-range split-core type transformer with integrated rectifying for small and medium AC currents incl. ALMEMO® connecting cable (± 2.6 VDC) **Order no. FEA6044N**

Technical Data:

Measuring range:	2A to 500A AC (the higher value corresponds to 120% of the max. nominal value)
Accuracy of meas. at 50Hz:	$\pm 3\%$ of meas. val. ± 0.5 A
Encompassing capacity:	cable \varnothing 30mm rail 30 x 63mm
Transformation ratio:	1mVDC/1A AC
Output signal:	0.5VDC
Operating frequency:	40Hz to 1kHz
Safety standards:	IEC 348, IEC 1010-2-032
Overvoltage protection:	no
Dimensions:	215 x 66 x 34mm
Weight:	approx. 420g
Nominal conditions:	25°C ± 3 °C/1013mbar
Operating temperature:	-10 to +55°C
Relative humidity:	0% to 90% at 40°C max.
Storage temperature:	-40 to +70°C
Connecting cable:	Cable, 1.5 meters, with safety laboratory connectors, including safety coupling and 1.5-meter ALMEMO connecting cable with banana plugs

ALMEMO® Measuring Modules for DC Voltage and DC Current ZA 9900 AB / ZA 9901 AB



Technical Data:

Accuracy:	0.1% of fin. val. ± 2 digits
Sampling rate:	1 kHz
Resolution:	12bit, ± 2048 digits
Meas. period/transient time:	0.1s
Measuring cycle, maximum:	14h
Electrical isolation:	1kV permanent, 4kV for 1s
Housing:	polystyrene, dimensions L100 x W54 x H31mm
Sockets:	touchproof, \varnothing 4mm
Operating voltage:	6 ... 14V through ALMEMO® device
Current consumption:	< 40mA (connector and module)

- Acquisition of the momentary, maximum, minimum and average value, plus transferring data of each measuring point scan to the ALMEMO® device.
- DC voltage or DC current signal are scanned with 1kHz.
- Pure digital data transmission to the measuring instrument.
- Connector sockets electrically isolated and overvoltage-protected.



Types (incl. touchproof connecting cable):

DC Voltage:

Measuring range	Resolution	Overload	Internal resistance
± 2.000 V	0.001V	± 400 V	800 k Ω
± 20.00 V	0.01V	± 500 V	1 M Ω
± 200.0 V	0.1V	± 500 V	1 M Ω
± 400 V	1V	± 1000 V	4 M Ω

Order no. ZA9900AB2

Order no. ZA9900AB3

Order no. ZA9900AB4

Order no. ZA9900AB5

DC Current:

Measuring range	Resolution	Overload	Internal resistance
± 20.00 mA	0.01mA	± 0.1 A*	10 Ω
± 200.0 mA	0.1mA	± 1 A*	1 Ω
± 2.000 A	0.001A	± 10 A*	0.1 Ω
± 10.00 A	0.01A	± 20 A*	0.01 Ω

Order no. ZA9901AB1

Order no. ZA9901AB2

Order no. ZA9901AB3

Order no. ZA9901AB4

*Without fuse, overload condition only up to 1 minute maximum

DC via external shunt:

± 200.0 mV	0.1mV	± 40 V	50 k Ω
----------------	-------	------------	---------------

Order no. ZA9900AB1

01/2011 We reserve the right to make technical changes.

ELECTRICAL VARIABLES

True/Effective Measuring Modules for AC Voltages and AC Current ZA 9903 AB / ZA 9904 AB



- Independent, full digital acquisition of the true/effective values of an AC variable.
- Measuring signals with any course of a curve are digitised with 1kHz.
- Pure digital data transmission to the measuring instrument.
- Acquisition of the frequency through a second measuring channel.
- Connector sockets electrically isolated and overvoltage-protected.

Technical Data:

TRMS

Accuracy:	0.1% of fin. val. ± 2 digits
Sampling rate:	1 kHz
Resolution:	12 bit, ± 2048 digits for Uss
Frequency range:	20.0 ... 250Hz
Meas. period/transient time:	0.5s

Frequency

Accuracy:	± 0.1 Hz
Sampling rate:	1 kHz
Resolution:	0.1Hz
Sensitivity:	10% of final value
Frequency range:	20.0 ... 250Hz
Meas. period/transient time:	0.5s

Electrical isolation:	1kV permanent, 5kV for 1s
Housing:	polystyrene, dim. L 100 x W 54 x H 31mm
Sockets:	touchproof, \varnothing 4mm
Operating voltage:	6 ... 14V through ALMEMO® device
Current consumption:	< 40mA (connector and module)

Types (incl. touchproof connecting cable):

AC Voltage

Meas. range	Resolution	Peak	Overload	Internal resistance	
130.0mV _{rms} ¹⁾	0.1mV	± 0.2 V	± 400 V	0.5M Ω	Order no. ZA9903AB1
1.300V _{rms}	1mV	± 2 V	± 400 V	0.8M Ω	Order no. ZA9903AB2
13.00V _{rms}	10mV	± 20 V	± 500 V	1M Ω	Order no. ZA9903AB3
130.0V _{rms}	0.1V	± 200 V	± 500 V	1M Ω	Order no. ZA9903AB4
400V _{rms}	1V	± 1000 V	± 1000 V	4M Ω	Order no. ZA9903AB5

¹⁾ When using the measuring module for the purposes of current measurement with an external shunt, the shunt must be looped into the neutral conductor (not into the phase).

AC Current

Meas. range	Resolution	Peak	Overload	Internal resistance	
1.000A _{rms}	1mA	± 2 A	± 10 A ²⁾	0.10 Ω	Order no. ZA9904AB1
10.00A _{rms}	10mA	± 20 A	± 20 A ²⁾	0.01 Ω	Order no. ZA9904AB2

²⁾ Without fuse, overload condition only up to 1 minute maximum

Optical Probes for Current Meters FUA 919 SZ



Technical Data:

Sensor housing:	40 x 20 x 20 (W x H x D)
Protection system:	IP 50
Material:	plastic, black
Operating voltage:	5.5 ... 30VDC
Max. current consumption:	5mA
Function control:	through LED
Signal output:	transistor open collector PNP (1k protective resistor)
Max. sampling rate:	3 pulses/s, FUA919SZ4B: 30 Hz
Temperature range:	-20 ... 60°C
Connecting cable:	3m long with ALMEMO® connector
Max. distance from meas. instrument:	15m

- Self-calibrating optical probe heads for the scanning of supply meters.
- Existing energy meters that do not have a pulse output can be included in the energy management at low cost and with no conversion required. Furthermore, the energy-proportional pulses of electronic meters can be registered.
- Suitable for various fields of application, e.g. industrial systems, large houses with several flats, shopping centres, trade fairs and exhibitions, holiday and camping resorts, hotel and apartment installations, municipalities and authorities.

Variants (including connecting cable and ALMEMO® connector)

Optical probe for visual scanning of rotor disk

No fastening (adhesive tape recommended, "Tesa Power-Strip")

Optical probe with adjustable stand (maximum span 400 mm) and suction cup fixture for mobile operation, reading power supply meters

Optical probe for visual scanning of LEDs on power supply meters

No fastening (adhesive tape recommended, "Tesa Power-Strip")

Order no. FUA919SZB

Order no. FUA919SZD

Order no. FUA919SZ4B

01/2011 We reserve the right to make technical changes.