

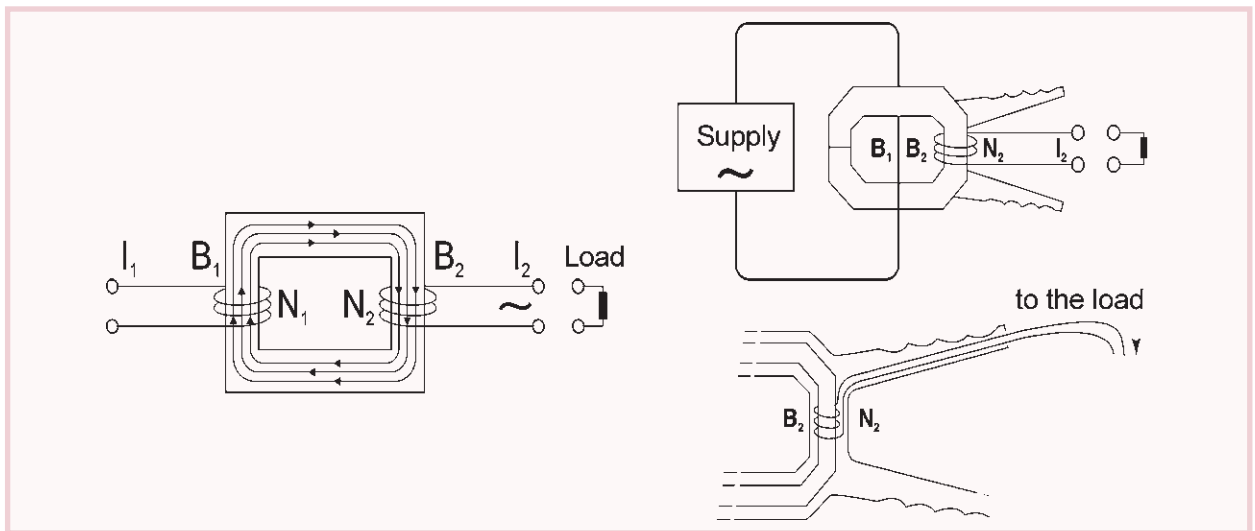
# ELECTRICAL VARIABLES

## How Split-Core Type Transformers Work

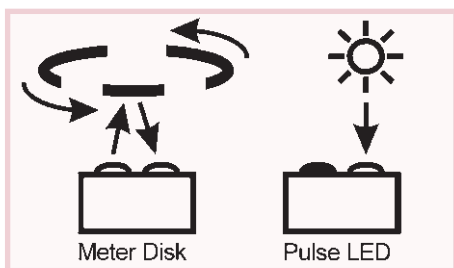
Current transformers are used to acquire high alternating currents without contact and without interrupting the circuit. In principle, they consist of 2 separate transformer windings ( $B_1$  = primary winding with  $N_1$  windings,  $B_2$  = secondary winding with  $N_2$  windings) on one common iron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

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# ELECTRICAL VARIABLES

## Split-Core Type Transformer for AC Currents Type FEA6042



- ▶ 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. FEA6042**

### Technical Data:

Measuring range:	1A to 150A AC (the higher value corresponds to 120% of the max. nominal value)
Accuracy of meas. at 50Hz:	15 to 150A: $\pm 3\%$ 5 to 15A: 0 to $-6\%$ 1 to 5A: 0 to $-(10\% + 200\text{mA})$
Encompassing capacity:	cable $\varnothing$ 12mm
Transformation ratio:	100mVDC/1A AC
Output signal:	15VDC
Operating frequency:	50 to 400Hz
Safety standards:	IEC 414
Overvoltage protection:	yes
Dimensions:	115 x 35 x 22mm
Weight:	approx. 100g
Nominal conditions:	25°C $\pm 3^\circ\text{C}/1013\text{mbar}$
Operating temperature:	-10 to +55°C
Relative humidity:	0% to 90% at 40°C max.
Storage temperature:	-40 to +70°C
Connecting cable:	1.5m long with banana plugs and ALMEMO® connector

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## 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 $\pm 3^\circ\text{C}/1013\text{mbar}$
Operating temperature:	-10 to +55°C
Relative humidity:	0% to 90% at 40°C max.
Storage temperature:	-40 to +70°C
Connecting cable:	1.5 m long with banana plugs and ALMEMO® connector

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# ELECTRICAL VARIABLES

## Split-Core Type Transformer for AC Currents Type FEA6044N



- ▶ 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 (±2.6VDC) **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:	± 3% of meas. val. ±0.5A
Encompassing capacity:	cable Ø 30mm rail 30 x 63mm
Transformation ratio:	1 mVDC/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:	1.5m long with banana plugs and ALMEMO® connector

# ELECTRICAL VARIABLES

## ALMEMO® Measuring Modules for DC Voltage and DC Current Type ZA9900AB/ZA9901AB




### Technical Data:

Accuracy:	0.1% of fin. val. ±2 digits
Sampling rate:	1kHz
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, Ø 4mm
Operating voltage:	6 ... 14V through ALMEMO® device
Current consumption:	< 40mA (connector and module)

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- ▶ 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.



 The measuring module is not designed for operation with selector switch board ES5590MF.

### Types (incl. touchproof connecting cable):

#### DC Voltage:

Measuring range	Resolution	Overload	Internal resistance	Order No.
±2.000 V	0.001V	400 V	800 kΩ	<b>ZA9900AB2</b>
±20.00 V	0.01V	500 V	1 MΩ	<b>ZA9900AB3</b>
±200.0 V	0.1V	500 V	1 MΩ	<b>ZA9900AB4</b>
±400 V	1V	1000 V	4 MΩ	<b>ZA9900AB5</b>

#### DC Current:

Measuring range	Resolution	Overload	Internal resistance	Order No.
±20.00 mA	0.01mA	0.1 A*	10 Ω	<b>ZA9901AB1</b>
±200.0 mA	0.1mA	1 A*	1 Ω	<b>ZA9901AB2</b>
±2.000 A	0.001A	10 A*	0.1 Ω	<b>ZA9901AB3</b>
±10.00 A	0.01A	20 A*	0.01 Ω	<b>ZA9901AB4</b>

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

#### DC via external shunt:

Measuring range	Resolution	Overload	Internal resistance	Order No.
±200.0 mV	0.1mV	40 V	50 kΩ	<b>ZA9900AB1</b>

# ELECTRICAL VARIABLES

## True/Effective Measuring Modules for AC Voltages and AC Current Type ZA9903AB/ZA9904AB



- ▶ 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.

The measuring module is not designed for operation with selector switch board ES5590MF.

### Technical Data:

#### TRMS

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

#### Frequency

Accuracy:	± 0.1Hz
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, Ø 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	Order No.
130.0mV <sub>rms</sub> <sup>1)</sup>	0.1mV	0.2V	400V	0.5MΩ	<b>ZA9903AB1</b>
1.300V <sub>rms</sub>	1mV	2V	400V	0.8MΩ	<b>ZA9903AB2</b>
13.00V <sub>rms</sub>	10mV	20V	500V	1MΩ	<b>ZA9903AB3</b>
130.0V <sub>rms</sub>	0.1V	200V	500V	1MΩ	<b>ZA9903AB4</b>
400V <sub>rms</sub>	1V	1000V	1000V	4MΩ	<b>ZA9903AB5</b>

<sup>1)</sup> 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	Order No.
1.000A <sub>rms</sub>	1mA	2A	10A <sup>2)</sup>	0.10Ω	<b>ZA9904AB1</b>
10.00A <sub>rms</sub>	10mA	20A	20A <sup>2)</sup>	0.01Ω	<b>ZA9904AB2</b>

<sup>2)</sup> Without fuse, overload condition only up to 1 minute maximum

## Optical Probes for Current Meters Type FUA919SZ



- ▶ 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.

### 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
Temperature range:	-20 ... 60°C
Connecting cable:	3m long with ALMEMO® connector
Max. distance from meas. instrument:	15m

01/2005 We reserve the right to make technical changes.

### Types:

Optical probe head with removable adhesive tape

Optical probe head with magnetic mounting (Ø32 x 8mm)

(only for meters with pulse LED) for measurements in test laboratories and for portable operation

Optical probe head with adjustable stand (max. span 400mm) and suction cup fixture for mobile operation at supply meters

**Order No. FUA919SZB**

**Order No. FUA919SZC**

**Order No. FUA919SZD**

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