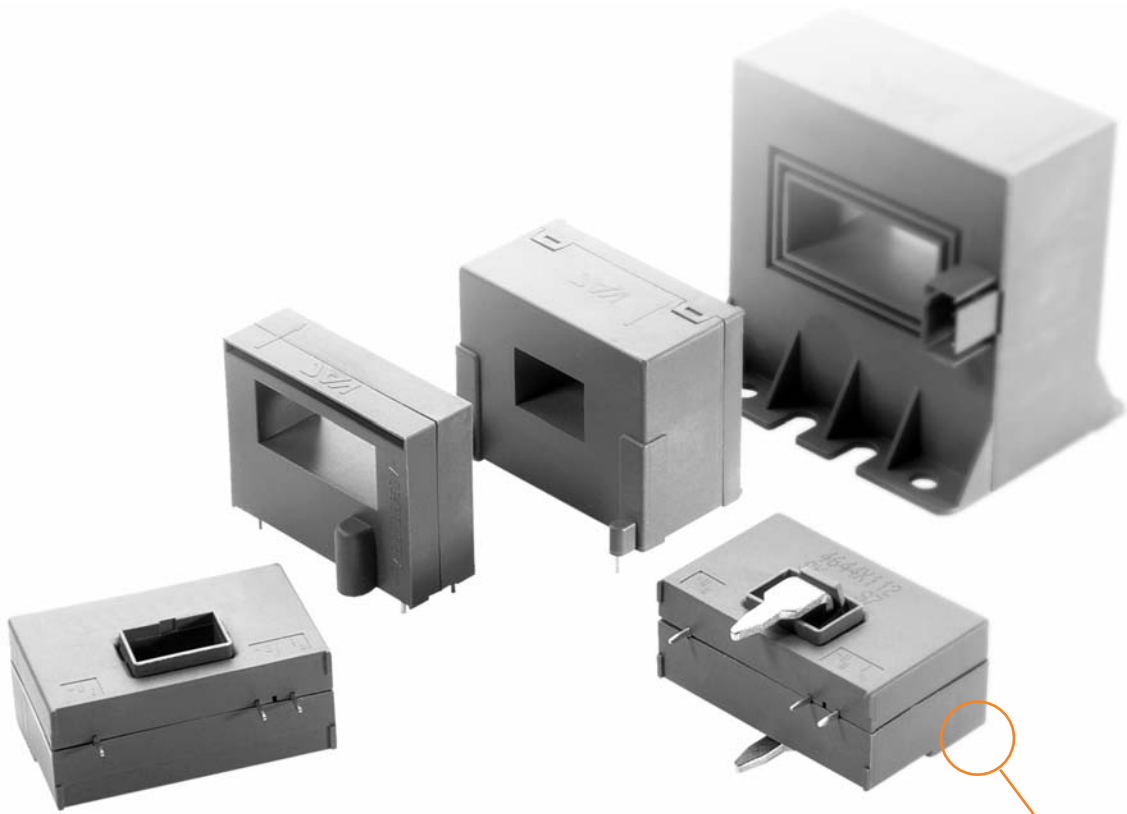




# **CURRENT SENSORS**

**WITH MAGNETIC FIELD PROBE  
INDUSTRIAL APPLICATIONS**

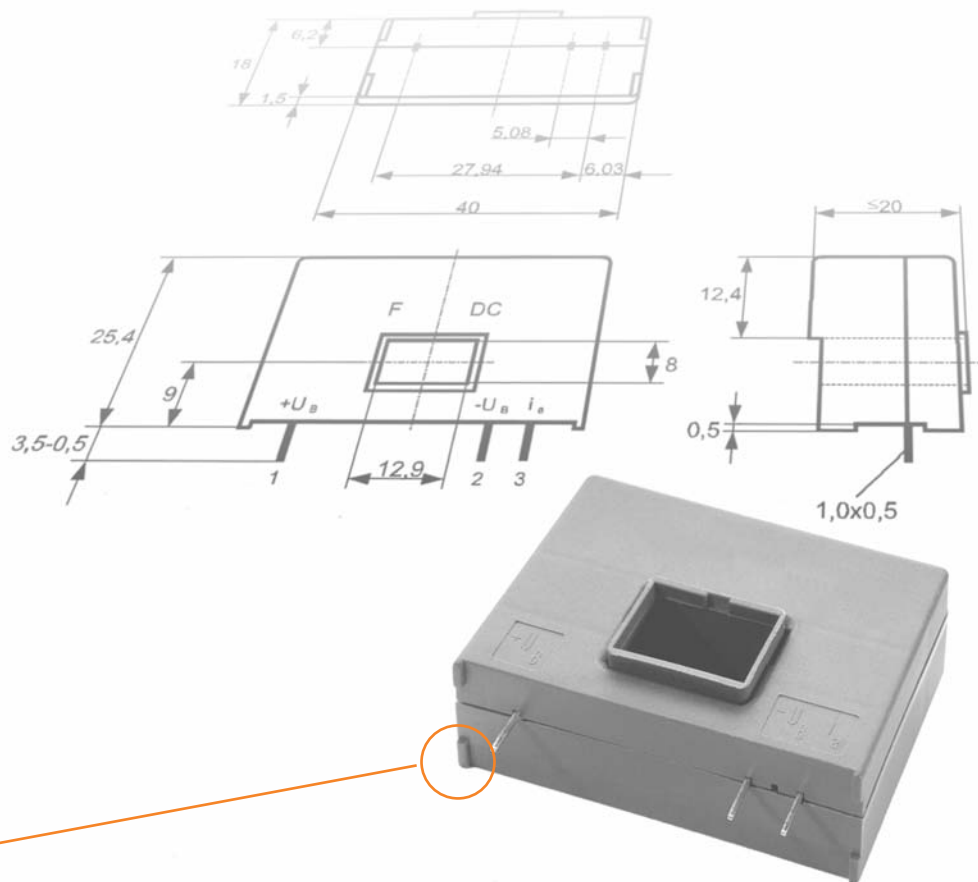
ADVANCED MATERIALS – THE KEY TO PROGRESS

**VAC**  
VACUUMSCHMELZE

# CURRENT SENSORS

## WITH MAGNETIC FIELD PROBE

### INDUSTRIAL APPLICATIONS



## 1. PREFACE

This brochure covers the standard current sensor range of VACUUMSCHMELZE GmbH & Co. KG (VAC) for the floating measurement of currents. Customized solutions are available on request.

VAC customers benefit from our comprehensive knowledge along the entire process chain. It starts with the material properties and goes over the dimensioning, the production technology and organization up to the world-wide procurement of purchased parts. VAC has decades of experience in the development, manufacturing and application of current sensors.

VAC current sensors apply in lowest up to high performance classes both in industry and in automotive applications:

- three phases drives, servo drives, generators
- power converters for DC drives
- battery operated applications
- uninterruptible power supplies
- switched mode power supplies
- welding inverters
- battery energy management

Our sensors are developed according to strictest international standards. Some types are UL approved. We also possess worldwide ISO 9001:2000 qualification.

## 2. TECHNOLOGIES

For current measurement, the market offers different technologies, like open- and closed loop hall effect sensors with galvanic separation, or shunts without galvanic separation.

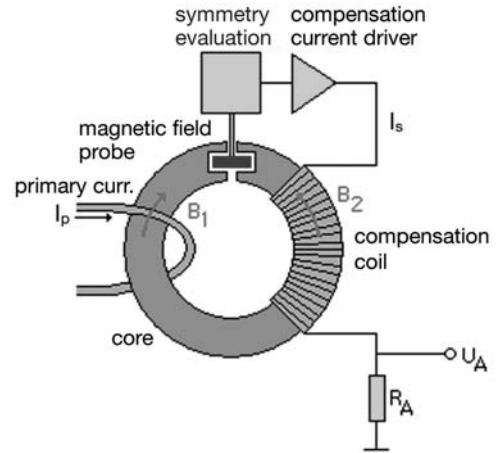
As the only manufacturer worldwide, VAC offers current sensors, which use a soft-magnetic probe in place of the hall generator as the magnetic field detector. In relation to conventional hall effect compensation sensors, our products offer some advantages:

- very low offset current with negligible long-term drift
- practically no temperature dependence of the offset current
- very small hysteresis of the offset current
- high usable temperature range (e.g. up to 110 °C in an IGBT module)
- the magnetic module can be separated from the electronics
- no electronics adjustment necessary
- attractively priced

### 3. FUNCTIONAL PRINCIPLE OF VAC CURRENT SENSORS

Two major advantages of the compensation current sensors are their principle-related high linearity and their excellent dynamic properties. The current  $I_p$  to be measured is magnetically coupled to the compensation current through a soft magnetic core. The magnetic flux of this core is measured by a magnetic field detector and controlled to zero by the electronics, generating a compensation current  $I_s$  in the compensation winding. This current is proportional to the primary current  $I_p$ .

When using a Hall generator as the magnetic field detector, which is the common method, an offset voltage and the associated drift occurs. For this reason VAC has developed a sensor using a low-drift soft magnetic metallic field detector. This has made it possible to reduce the offset current and its drift considerably. A smoother run of inverter-controlled motors even at low torque operation is the result. This preserves the bearings, prolongs the service life and leads to higher accuracy, especially in machine tools.



The type range of the VAC sensors offers a suitable solution for every current range and performance class.

The current sensors presented here are designed for the use in appliances and systems in stationary operation. In the case of traction – or automotive – applications please contact us.

| Class    | Power [kW]             | $I_{N, rms}$ [A]           | $I_{Npi}$ [A]                                            |
|----------|------------------------|----------------------------|----------------------------------------------------------|
| Micro    | $\leq 4$               | $\leq 12$                  | $\leq 30$<br>$\leq 42$                                   |
| Low-End  | $> 4 \dots \leq 40$    | $> 12 \dots \leq 105$      | $> 30 \dots \leq 260$<br>$> 42 \dots \leq 370$           |
| Midrange | $> 40 \dots \leq 200$  | $> 105 \dots \leq 430$     | $> 260 \dots \leq 1.075$<br>$> 370 \dots \leq 1.505$     |
| High End | $> 200 \dots \leq 600$ | $> 430 \dots \leq 1.080$   | $> 1.075 \dots \leq 2.700$<br>$> 1.505 \dots \leq 3.780$ |
| Mega     | $> 600$                | $> 1.080 \dots \leq 1.600$ | $> 2.700 \dots \leq 4.000$<br>$> 3.780 \dots \leq 5.600$ |



## 4. TYPE RANGE

### 4.1 ACTIVE SCURRENT SENSORS (with integrated electronics)

| Partnumber<br>Type T60404-N ...                                                     |           | $I_{PN, rms}$ | $I_{P, max}$ | $T_A$       | $V_C$      | $K_N$        | $f$      | $X$<br>@ $I_{PN}$ ,<br>$T_A = 25^\circ C$ | Primary connection |                                  | Secondary connection |           | Integrated electronics | Potted | Incapsulated | Screw-on mounting | Drawing |
|-------------------------------------------------------------------------------------|-----------|---------------|--------------|-------------|------------|--------------|----------|-------------------------------------------|--------------------|----------------------------------|----------------------|-----------|------------------------|--------|--------------|-------------------|---------|
|                                                                                     |           | [A]           | [A]          | [°C]        | [V]        |              | [kHz]    | [%]                                       | Pins               | Centre hole for cable or bus bar | Pins                 | Connector |                        |        |              |                   |         |
|  | 4644-X300 | 1-5-8-12-25   | 10-17-25-50  | -40 ... +85 | $\pm 15 V$ | (1...5):1000 | DC...200 | 0,5                                       | •                  |                                  | •                    |           | •                      |        | •            |                   | 7       |
|                                                                                     |           | 1-5-8-12-30   | 10-17-25-64  | -40 ... +70 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|                                                                                     |           | 1-5-8-12-50   | 10-17-25-64  | -40 ... +50 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|  | 4644-X400 | 7,5-15-30     | 23-46-92     | -40 ... +85 | $\pm 15 V$ | (1...4):2000 | DC...100 | 0,5                                       | •                  |                                  | •                    |           | •                      |        | •            |                   | 8       |
|                                                                                     |           | 7,5-15-40     | 23-46-92     | -40 ... +70 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|                                                                                     |           | 7,5-15-54     | 23-46-92     | -40 ... +50 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|  | 4644-X101 | 50            | 150          | -40 ... +85 | $\pm 15 V$ | 1 : 2000     | DC...100 | 0,5                                       |                    | •                                | •                    |           | •                      |        | •            |                   | 3       |
|                                                                                     |           | 100           | 150          | -40 ... +70 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|                                                                                     |           | 120           | 150          | -40 ... +55 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|  | 4644-X100 | 50            | 70           | -40 ... +85 | $\pm 15 V$ | 1 : 1000     | DC...100 | 0,5                                       |                    | •                                | •                    |           | •                      |        | •            |                   | 3       |
|                                                                                     |           | 50            | 92           | -40 ... +70 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|                                                                                     |           | 50            | 92           | -40 ... +70 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|  | 4644-X111 | 50            | 150          | -40 ... +85 | $\pm 15 V$ | 1 : 2000     | DC...100 | 0,5                                       | •                  |                                  | •                    |           | •                      |        | •            |                   | 4       |
|                                                                                     |           | 100           | 150          | -40 ... +70 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|                                                                                     |           | 120           | 150          | -40 ... +55 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|  | 4644-X112 | 50            | 70           | -40 ... +85 | $\pm 15 V$ | 1 : 1000     | DC...100 | 0,5                                       | •                  |                                  | •                    |           | •                      |        | •            |                   | 4       |
|                                                                                     |           | 50            | 92           | -40 ... +70 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|                                                                                     |           | 50            | 92           | -40 ... +70 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|  | 4644-X201 | 125           | 350          | -40 ... +85 | $\pm 15 V$ | 1 : 2000     | DC...100 | 0,5                                       |                    | •                                | •                    |           | •                      |        | •            |                   | 5       |
|                                                                                     |           | 200           | 300          | -40 ... +85 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|                                                                                     |           | 200           | 350          | -40 ... +70 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|  | 4644-X202 | 250           | 350          | -40 ... +55 | $\pm 15 V$ | 1 : 2000     | DC...100 | 0,5                                       |                    | •                                | •                    |           | •                      |        | •            |                   | 5       |
|                                                                                     |           | 125           | 200          | -40 ... +70 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|                                                                                     |           | 125           | 175          | -40 ... +85 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|  | 4644-X200 | 125           | 200          | -40 ... +70 | $\pm 15 V$ | 1 : 1000     | DC...100 | 0,5                                       |                    | •                                | •                    |           | •                      |        | •            |                   | 5       |
|                                                                                     |           | 125           | 175          | -40 ... +85 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|                                                                                     |           | 125           | 175          | -40 ... +85 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|  | 4644-X202 | 125           | 200          | -40 ... +70 | $\pm 15 V$ | 1 : 1000     | DC...100 | 0,5                                       |                    | •                                | •                    |           | •                      |        | •            |                   | 5       |
|                                                                                     |           | 125           | 175          | -40 ... +85 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |
|                                                                                     |           | 125           | 175          | -40 ... +85 |            |              |          |                                           |                    |                                  |                      |           |                        |        |              |                   |         |

 = preferred type

| Partnumber<br>Type T60404-N ...                                                                                                                                            |           | I <sub>PN</sub> , rms                  | I <sub>P</sub> , max                         | T <sub>A</sub>                                                                           | V <sub>C</sub>         | K <sub>N</sub> | f        | X<br>@I <sub>PN</sub> ,<br>T <sub>A</sub> =<br>25°C | Primary<br>connection               |      | Secondary<br>connection |  | Integrated electronics | Potted | Incapsulated | Screw-on mounting | Drawing |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------------------------------------|----------------------------------------------|------------------------------------------------------------------------------------------|------------------------|----------------|----------|-----------------------------------------------------|-------------------------------------|------|-------------------------|--|------------------------|--------|--------------|-------------------|---------|
|                                                                                                                                                                            |           | [A]                                    | [A]                                          | [°C]                                                                                     | [V]                    | [kHz]          | [%]      | Pins                                                | Centre hole for cable<br>or bus bar | Pins | Connector               |  |                        |        |              |                   |         |
|                                                                                           | 4644-X271 | 125<br>200<br>200<br>250               | 350<br>300<br>350<br>350                     | -40 ... +85<br>-40 ... +85<br>-40 ... +70<br>-40 ... +55                                 | ±15 V                  | 1 : 2000       | DC...100 | 0,5                                                 |                                     | •    | •                       |  | •                      |        | •            |                   | 6       |
|                                                                                           | 4644-X052 | 250<br>400<br>500<br>200<br>320<br>400 | 700<br>700<br>700<br>560<br>560<br>560       | -40 ... +105<br>-40 ... +85<br>-40 ... +70<br>-40 ... +105<br>-40 ... +85<br>-40 ... +70 | ±15 V<br><br><br>±12 V | 1 : 2000       | DC...50  | 0,5                                                 |                                     | •    | •<br>Molex              |  | •                      |        | •            | •                 | 2       |
| <br>    | 4644-X053 | 250<br>400<br>500<br>200<br>320<br>400 | 700<br>700<br>700<br>560<br>560<br>560       | -40 ... +105<br>-40 ... +85<br>-40 ... +70<br>-40 ... +105<br>-40 ... +85<br>-40 ... +70 | ±15 V<br><br><br>±12 V | 1 : 2000       | DC...50  | 0,5                                                 |                                     | •    | •<br>Molex              |  | •                      | •      |              | •                 | 2       |
|                                                                                                                                                                            | 4644-X020 | 200                                    | 400                                          | -40 ... +70                                                                              | ±15 V                  | 1 : 2000       | DC...50  | 0,5                                                 |                                     | •    | •                       |  | •                      |        | •            |                   | 1       |
|                                                                                                                                                                            | 4644-X021 | 200                                    | 300                                          | -40 ... +85                                                                              | ±15 V                  | 1 : 4000       | DC...30  | 0,5                                                 |                                     | •    | •                       |  | •                      |        | •            |                   | 1       |
|                                                                                         | 4644-X031 | 200                                    | 300                                          | -40 ... +85                                                                              | ±15 V                  | 1 : 4000       | DC...30  | 0,5                                                 |                                     | •    | •<br>Comatel            |  | •                      |        | •            | •                 | 2       |
|                                                                                                                                                                            | 4644-X030 | 200                                    | 400                                          | -40 ... +70                                                                              | ±15 V                  | 1 : 2000       | DC...50  | 0,5                                                 |                                     | •    | •<br>Comatel            |  | •                      |        | •            | •                 | 2       |
|                                                                                                                                                                            | 4644-X050 | 400<br>320                             | 425<br>340                                   | -40 ... +85<br>-40 ... +85                                                               | ±15 V<br>±12 V         | 1 : 5000       | DC...50  | 0,5                                                 |                                     | •    | •<br>Molex              |  | •                      |        | •            | •                 | 2       |
|                                                                                                                                                                            | 4644-X040 | 400<br>320                             | 625<br>500                                   | -40 ... +85<br>-40 ... +85                                                               | ±15 V<br>±12 V         | 1 : 5000       | DC...50  | 0,5                                                 |                                     | •    | •<br>Comatel            |  | •                      |        | •            | •                 | 2       |
|                                                                                                                                                                            | 4644-X060 | 400<br>320                             | 625<br>500                                   | -40 ... +85<br>-40 ... +85                                                               | ±15 V<br>±12 V         | 1 : 5000       | DC...50  | 0,5                                                 |                                     | •    | •<br>Molex              |  | •                      |        | •            | •                 | 2       |
| <br> | 4644-X055 | 250<br>400<br>500<br>200<br>320<br>400 | 700<br>700<br>700<br>560<br>560<br>560       | -40 ... +105<br>-40 ... +85<br>-40 ... +70<br>-40 ... +105<br>-40 ... +85<br>-40 ... +70 | +15 V<br><br><br>+12 V | 1 : 2000       | DC...50  | 0,5                                                 |                                     | •    | •<br>Molex              |  | •                      | •      |              | •                 | 2       |
|                                                                                                                                                                            | 4644-X056 | 500                                    | 1000                                         | -40 ... +75                                                                              | ± 24 V                 | 1 : 3000       | DC...50  | 0,5                                                 |                                     | •    | •<br>Molex              |  | •                      | •      |              | •                 | 2       |
|                                                                                         | 4644-X054 | 250<br>400<br>700<br>200<br>320<br>400 | 1250<br>1250<br>1250<br>1000<br>1000<br>1000 | -40 ... +105<br>-40 ... +85<br>-40 ... +70<br>-40 ... +105<br>-40 ... +85<br>-40 ... +70 | ±15 V<br><br><br>±12 V | 1 : 3000       | DC...50  | 0,5                                                 |                                     | •    | •<br>Molex              |  | •                      | •      |              | •                 | 2       |

## 4.2 PASSIVE CURRENT SENSORS

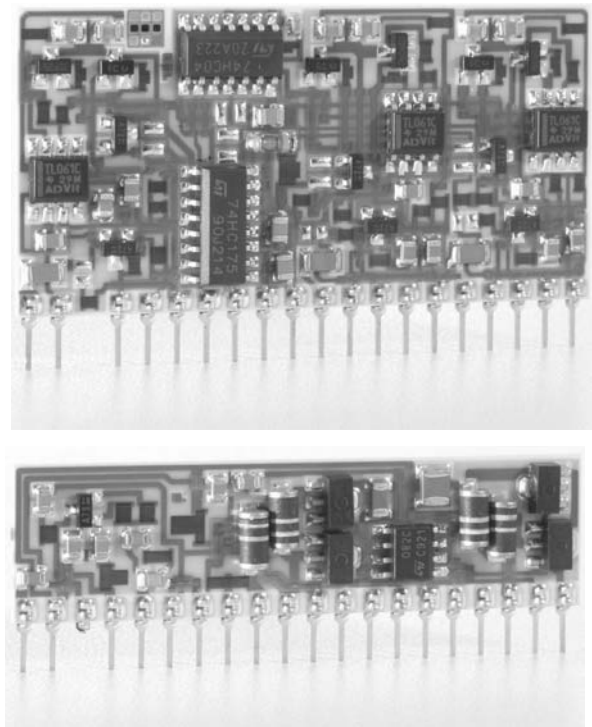
(with separated electronics)

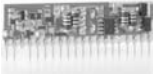
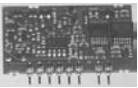


| Partnumber<br>Type T60404-M ...                                                     |           | $I_{PN}$ , rms          | $I_{Pmax}$ | $T_A$       | $V_C$         | $K_N$        | f        | X<br>@ $I_{PN}$ ,<br>$T_A=25^{\circ}C$ | Primary connection |                                     | Secondary connection |           | Electronics |           |           |            |              |  |   | Screw-on mounting | Crawling |
|-------------------------------------------------------------------------------------|-----------|-------------------------|------------|-------------|---------------|--------------|----------|----------------------------------------|--------------------|-------------------------------------|----------------------|-----------|-------------|-----------|-----------|------------|--------------|--|---|-------------------|----------|
|                                                                                     |           | [A]                     | [A]        | [°C]        | [V]           |              | [kHz]    | [%]                                    | Pins               | Centre hole for cable<br>or bus bar | Pins                 | Connector | Integrated  | Separated | Number    |            |              |  |   |                   |          |
|                                                                                     |           |                         |            |             |               |              |          |                                        |                    |                                     |                      |           |             |           | One phase | Two phases | Three phases |  |   |                   |          |
|  | 4645-X010 | 3-6-10-20<br>6-12-20-40 | 27<br>60   | -40 ... +85 | +5 V<br>±15 V | (1...6):1000 | DC...100 | 0,5                                    | •                  |                                     | •                    |           |             | •         | 1,4       | 2          | 3            |  | • |                   | 9        |
|                                                                                     | 4645-X011 | 6-12-20-40              | 55         | -40 ... +85 | ±15 V         | (1...6):3000 | DC...100 | 0,5                                    | •                  |                                     | •                    |           |             | •         | 1         | 2          | 3            |  | • |                   | 9        |
|                                                                                     | 4645-X012 | 6-12-20-40              | 60         | -40 ... +85 | ±15 V         | (1...6):1000 | DC...100 | 0,5                                    | •                  |                                     | •                    |           |             | •         | 1         | 2          | 3            |  | • |                   | 9        |
|  | 4645-X211 | 10-16-25-50             | 90         | -40 ... +85 | +5 V          | (1...5):1000 | DC...100 | 0,5                                    | •                  |                                     | •                    |           |             | •         | 4         |            |              |  | • |                   | 11       |
|  | 4645-X050 | 100                     | 160        | -40 ... +85 | ±15 V         | 1 : 1000     | DC...100 | 0,5                                    |                    | •                                   | •                    |           |             | •         | 1         | 2          | 3            |  | • | •                 | 10       |
|                                                                                     | 4645-X051 | 100                     | 142        | -40 ... +85 | ±15 V         | 1 : 2000     | DC...100 | 0,5                                    |                    | •                                   | •                    |           |             | •         | 1         | 2          | 3            |  | • | •                 | 10       |
|  | 4645-X070 | 200                     | 400        | -40 ... +85 | ±15 V         | 1 : 2000     | DC...50  | 0,5                                    |                    | •                                   | •                    |           |             | •         | 1         | 2          | 3            |  | • | •                 | 1        |
|                                                                                     | 4645-X072 | 200                     | 400        | -40 ... +85 | ±15 V         | 1 : 3000     | DC...30  | 0,5                                    |                    | •                                   | •                    |           |             | •         | 1         | 2          | 3            |  | • | •                 | 1        |

 = preferred type

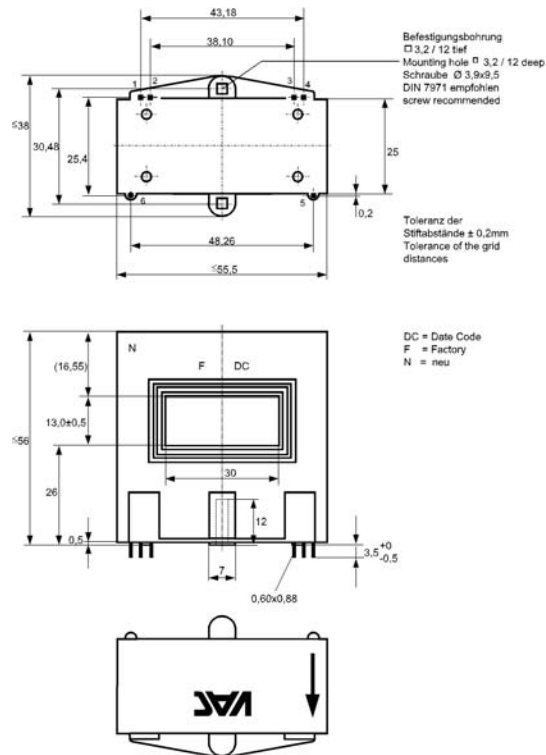
**4.3 ELECTRONICS**  
(for passive current sensors)



| Partnumber<br>Type T60404-Q ...                                                     |           | connectable magnetic modules | $I_C$<br>[mA] | $V_C$<br>[V]              | $P_{VE0}$<br>[mW] | $P_{VE, max}$<br>[W] | Number |
|-------------------------------------------------------------------------------------|-----------|------------------------------|---------------|---------------------------|-------------------|----------------------|--------|
|  | 5790-X013 | 1                            | 14            | $\pm 15\text{ V} \pm 5\%$ | 420               | 1                    | 1      |
|  | 5790-X023 | 2                            | 19            | $\pm 15\text{ V} \pm 5\%$ | 570               | 1                    | 2      |
|  | 5790-X101 | 3                            | 50            | $\pm 15\text{ V} \pm 5\%$ | 750               | 2                    | 3      |
|  | 5790-X052 | 1                            | 35            | $+5\text{ V} \pm 5\%$     | 175               |                      | 4      |

## 4.4 DIMENSIONAL DIAGRAMS OF SENSORS

Drawing No. 1



### active current sensors:

T60404-N4644-X020

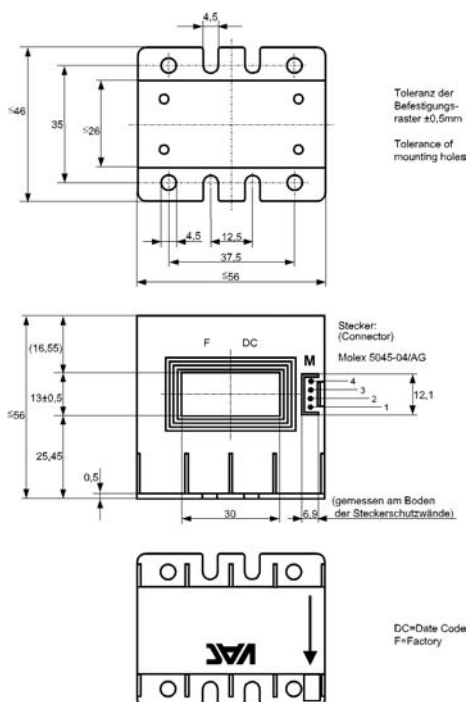
T60404-N4644-X021

### passive current sensors:

T60404-M4645-X070

T60404-M4645-X072

Drawing No. 2



potted version



encapsulated version

### active current sensors:

T60404-N4644-X053

T60404-N4644-X054

T60404-N4644-X055

T60404-N4644-X056

### active current sensors:

T60404-N4644-X052

T60404-N4644-X030

T60404-N4644-X031

T60404-N4644-X040

T60404-N4644-X050

T60404-N4644-X051

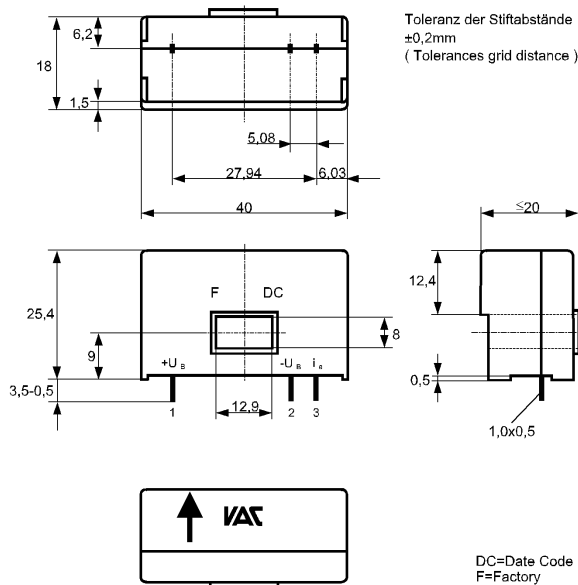
T60404-N4644-X060

### passive current sensors:

not available in this casing

#### 4.4 DIMENSIONAL DIAGRAMS OF SENSORS

Drawing No. 3



**active current sensors:**

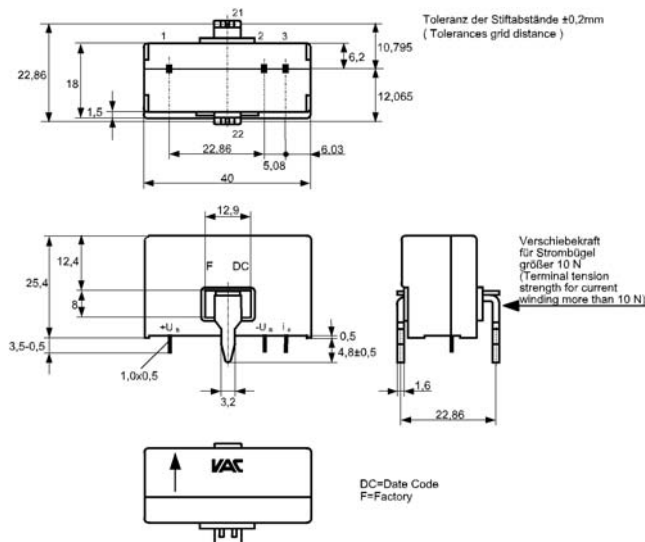
T60404-N4644-X101

T60404-N4644-X100

**passive current sensors:**

not available in this casing

Drawing No. 4



**active current sensors:**

T60404-N4644-X111

T60404-N4644-X112

**passive current sensors:**

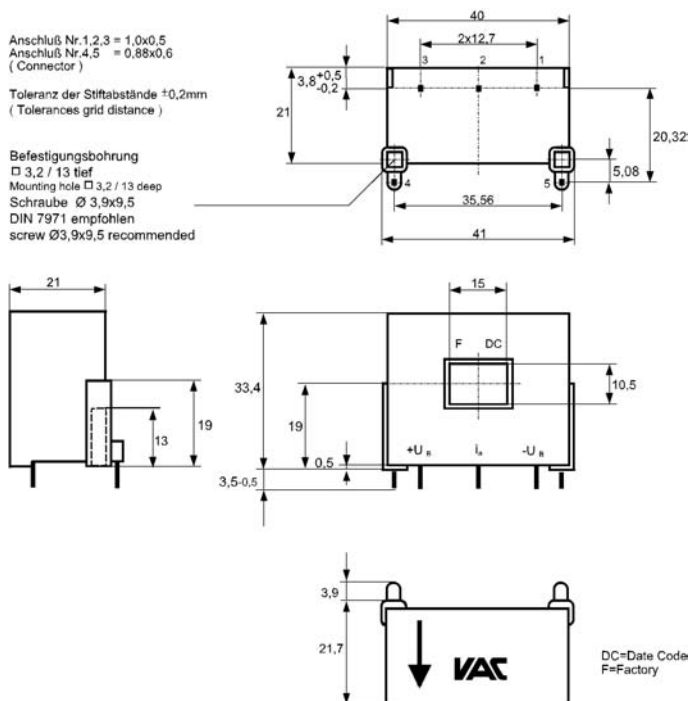
not available in this casing

## Drawing No. 5

Anschluß Nr.1,2,3 = 1,0x0,5  
Anschluß Nr.4,5 = 0,88x0,6  
(Connector)

Toleranz der Stiftabstände  $\pm 0,2\text{mm}$   
(Tolerances grid distance)

Befestigungsbohrung  
 $\square 3,2 / 13$  tief  
Mounting hole  $\square 3,2 / 13$  deep  
Schraube  $\varnothing 3,9 \times 9,5$   
DIN 7971 empfohlen  
screw  $\varnothing 3,9 \times 9,5$  recommended



### active current sensors:

T60404-N4644-X200

T60404-N4644-X201

T60404-N4644-X202

### passive current sensors:

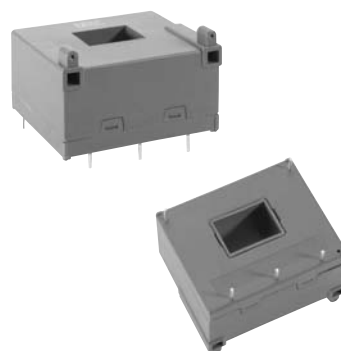
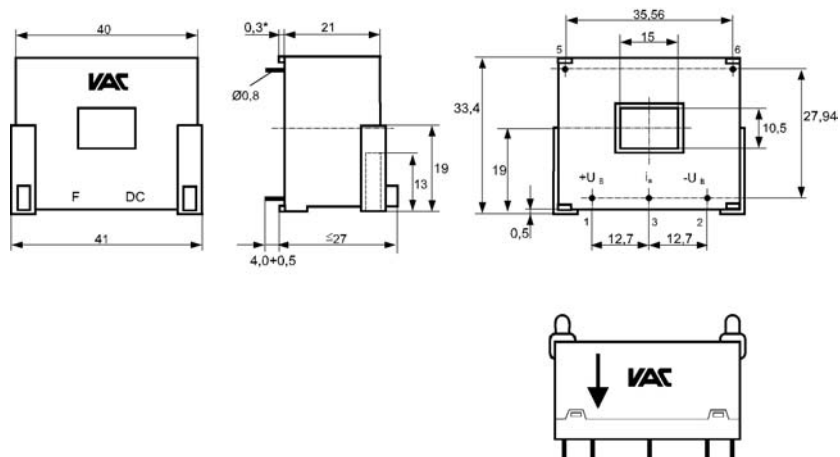
not available in this casing

## Drawing No. 6

DC=Date Code  
F=Factory

\*=vorläufig  
(preliminary)

Toleranz der Stiftabstände  $\pm 0,3\text{mm}$   
(Tolerances grid distance)



### active current sensors:

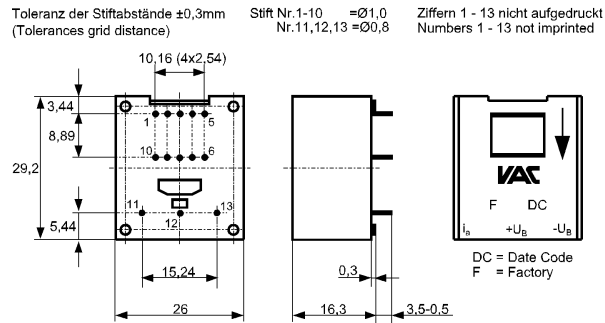
T60404-N4644-X271

### passive current sensors:

not available in this casing

## 4.4 DIMENSIONAL DIAGRAMS OF SENSORS

Drawing No. 7



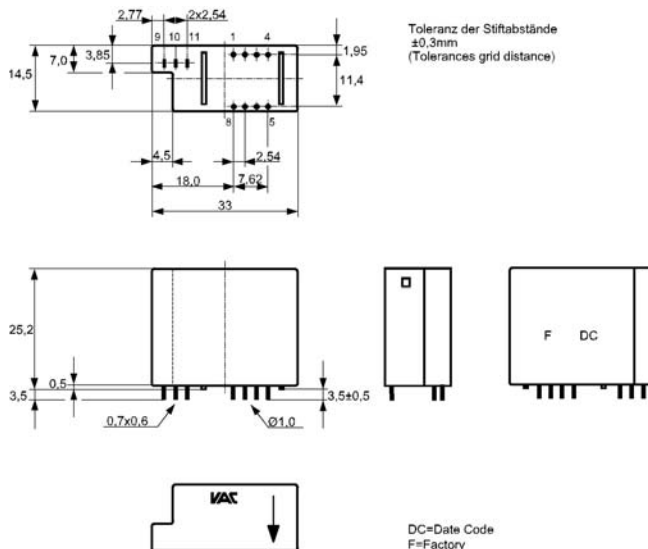
**active current sensors:**

T60404-N4644-X300

**passive current sensors:**

not available in this casing

Drawing No. 8



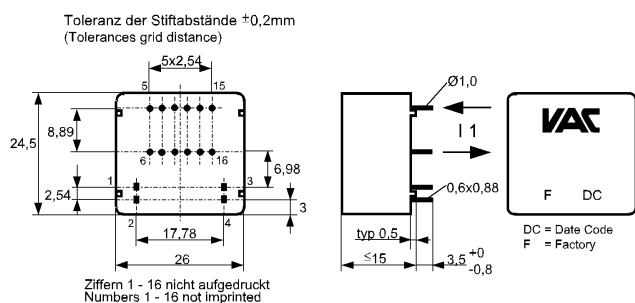
**active current sensors:**

T60404-N4644-X400

**passive current sensors:**

not available in this casing

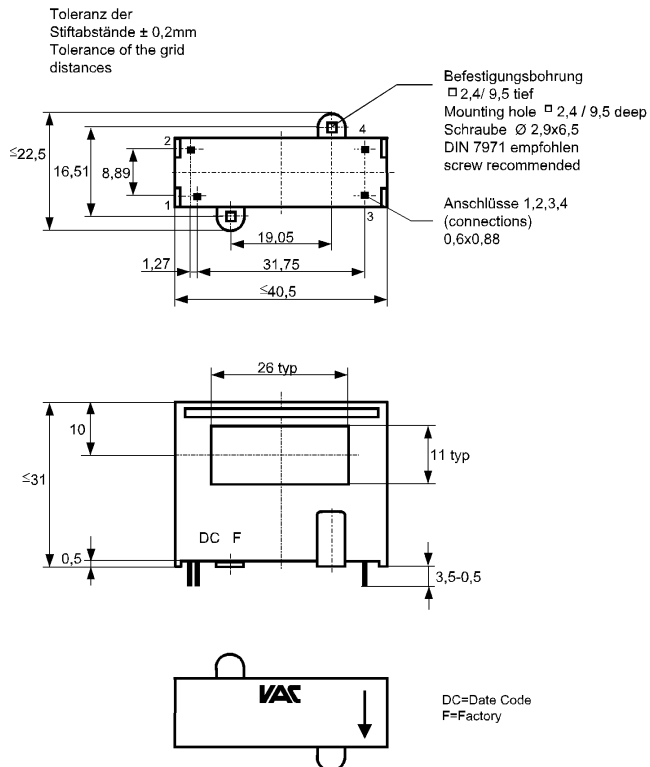
## Drawing No. 9



**active current sensors:**  
not available in this casing

**passive current sensors:**  
T60404-N4645-X010  
T60404-N4645-X011  
T60404-N4645-X012

## Drawing No. 10

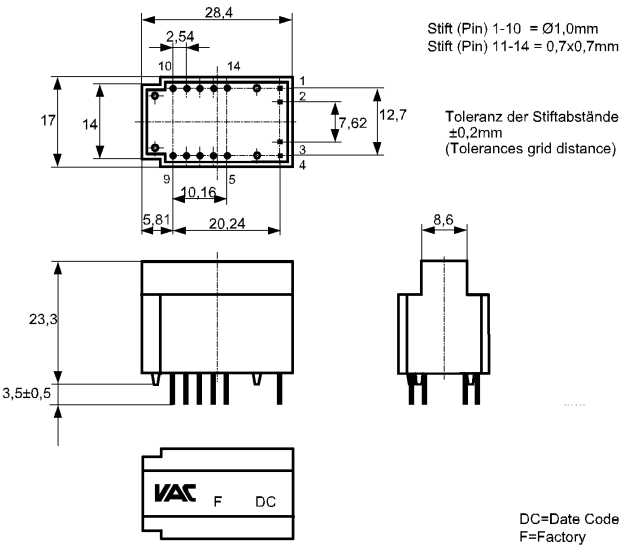


**active current sensors:**  
not available in this casing

**passive current sensors:**  
T60404-N4645-X050  
T60404-N4645-X051

4.4 DIMENSIONAL DIAGRAMS OF SENSORS

Drawing No. 11



**active current sensors:**  
not available in this casing

**passive current sensors:**  
T60404-N4645-X211

## 5. ABBREVIATIONS AND TERMINOLOGY

| Unit                          |                  | Description                                                              |
|-------------------------------|------------------|--------------------------------------------------------------------------|
| $C_k$                         | pF               | Maximum possible coupling capacity (primary - secondary)                 |
| $\Delta I_0 / \Delta V_C$     | mA/V             | Supply voltage rejection ratio                                           |
| $\Delta t (I_{P,max})$        | $\mu s$          | Delay time at $di/dt = 100 \text{ A/ms}$                                 |
| $\Delta V_0 / \Delta T_A$     | $\mu V/^\circ C$ | Offset voltage drift @ $T_A = -40 \dots +85^\circ C$                     |
| $\Delta V_{out} / \Delta T_A$ | V/ $\mu s$       | Slew rate output voltage                                                 |
| $\Delta \Phi (S1-S2)$         | nVs              | Magnetic flux sensor                                                     |
| $\epsilon_L$                  | %                | Linearity                                                                |
| f                             | kHz              | Frequency range                                                          |
| $I_0$                         | mA               | Offset current @ $I_P=0$ , $T_A=25^\circ C$                              |
| $I_{0ges}$                    | A                | Offset current (including $I_0$ , $I_{0t}$ , $I_{0T}$ )                  |
| $I_{0H}$                      | mA               | Hysteresis current @ $I_P=0$ caused by primary current $3 \times I_{PN}$ |
| $I_{0t}$                      | mA               | Offset current drift                                                     |
| $I_{0T}$                      | mA               | Offset current temperature drift @ $T_A = -40 \dots +85^\circ C$         |
| $I_C$                         | mA               | Supply current                                                           |
| $I_{comp}$                    | mA               | Compensation current                                                     |
| $i_{oss}$                     | mA               | Offset ripple                                                            |
| $I_{P,max}$                   | A                | maximum measuring range @ $R_M = 100 \Omega$                             |
| $I_{PN}$                      | A                | Primary rated current, RMS                                               |
| $I_{S,max}$                   | mA               | Maximum output current                                                   |
| $I_{SN}$                      | A                | Output rated current, RMS                                                |
| $K_N$                         |                  | Transformation ratio                                                     |
| m                             | g                | Mass                                                                     |
| $P_{VE0}$                     | mW               | No load power losses                                                     |
| $P_{VE,max}$                  | W                | Maximum permissible power loss @ $T_A=70^\circ C$                        |
| $R(S1-S2)$                    | $\Omega$         | Winding resistance magnetic probe coil                                   |
| $R_M$                         | $\Omega$         | Load resistance                                                          |
| $R_P$                         | $\Omega$         | Primary coil resistance per turn @ $T_A=25^\circ C$                      |
| $R_S$                         | $\Omega$         | Secondary coil resistance @ $T_A=85^\circ C$                             |
| $R_S(K1-K2)$                  | $\Omega$         | Winding resistance compensation winding                                  |

| Unit       |            | Description                                           |
|------------|------------|-------------------------------------------------------|
| $T_A$      | $^\circ C$ | Ambiente temperature                                  |
| $t_r$      | $\mu s$    | Response time                                         |
| $T_S$      | $^\circ C$ | Storage temperature range                             |
| $V_0$      | V          | Offset voltage vs. reference voltage                  |
| $V_b$      | V          | Working voltage                                       |
| $V_c$      | V          | Supply voltage                                        |
| $V_{Ctot}$ | V          | Maximum supply voltage (without function)             |
| $V_d$      | kV         | Test voltage, RMS, 1s                                 |
| $V_e$      | kV         | Partial discharge voltage                             |
| $V_{K1}$   | V          | Voltage at K1                                         |
| $V_{out}$  | V          | Output voltage                                        |
| $V_{Ref}$  | V          | Reference voltage                                     |
| X          | %          | Measuring accuracy @ $I_{PN}$ , $T_A = 25^\circ C$    |
| $X_{Ti}$   | %          | Temperatur drift of X @ $T_A = -40 \dots +85^\circ C$ |



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