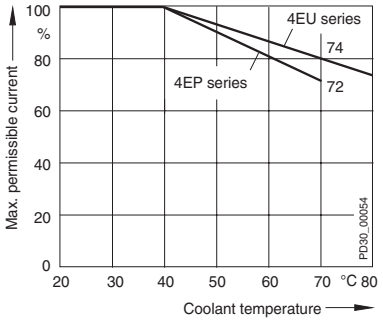
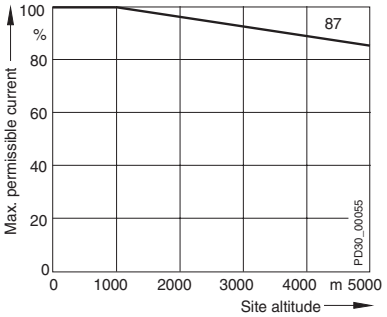
## *Deviations of rated values at site altitudes > 1000 m*

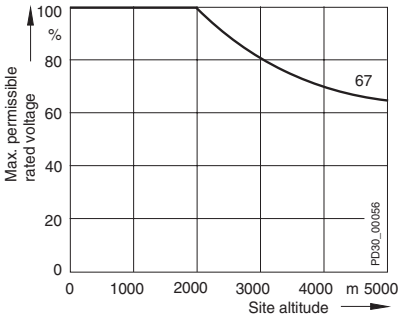
### Reduction of the rated voltage and rated current, depending on the site altitude and coolant temperature




Deviation of the permissible direct current of rated direct current $I_{dn}$, or permissible alternating current of rated alternating current $I_n$ (at coolant temperatures ≠ 40°C)
Characteristic curve 74 applies to reactors 4EU, 4ET, 4PK
Characteristic curve 72 applies to reactors 4EP, 4EM, 4EF11




Deviation of permissible direct current of rated direct current $I_{dn}$, or permissible alternating current of rated alternating current $I_n$ (at site altitudes > 1000 m above sea level)




Reduction of rated voltage for insulation (at site altitudes > 2000 m above sea level)

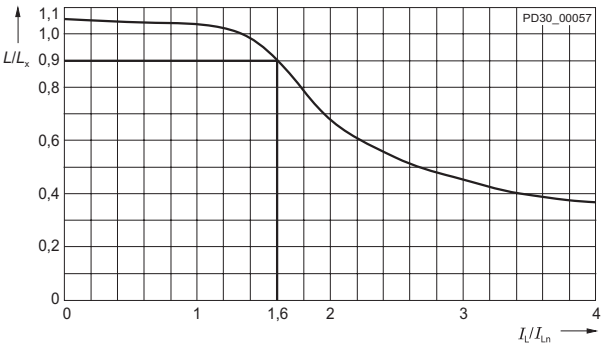
## *Inductance curve*

### Commutating reactors and mains reactors

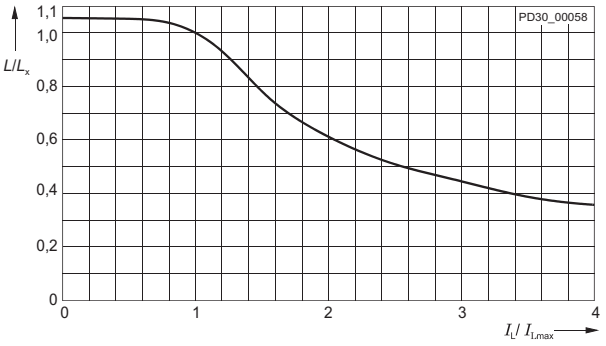
Commutating reactors and mains reactors differ greatly with regard to the inductance curve. The inductance is almost constant through to the rated current $I_{Ln}$,

- Mains reactors still have 90% of their rated inductance at a 1.6-fold rated current $I_{Ln}$.
- Commutating reactors have a residual inductance of 60% at a 2.0-fold rated current $I_{Ln}$.

Typical inductance curves over the reactor current are shown in the following illustrations:




Typical curve of the inductance of a **mains reactor** over the reactor current




Typical curve of the inductance of a **commutating reactor** over the reactor current

### *Voltage drop $\Delta U$ or reference voltage drop $u_D$*

In the case of **three-phase reactors**, the voltage drop $\Delta U$ per reactor phase when loaded with the maximum continuous thermal current $I_{thmax}$ and line frequency $f$ = 50 Hz or 60 Hz.

The percent voltage drop $u_D$ can be calculated using the following formula:

For converter connection B6

$$u_D = \frac{\Delta U \times 100 \times \sqrt{3}}{U_N} \quad \text{in \%}$$

The inductance per reactor phase is as follows:

$$L_x = \frac{\Delta U}{I_{thmax} \times \omega}$$

$\omega = 2 \pi \times f$

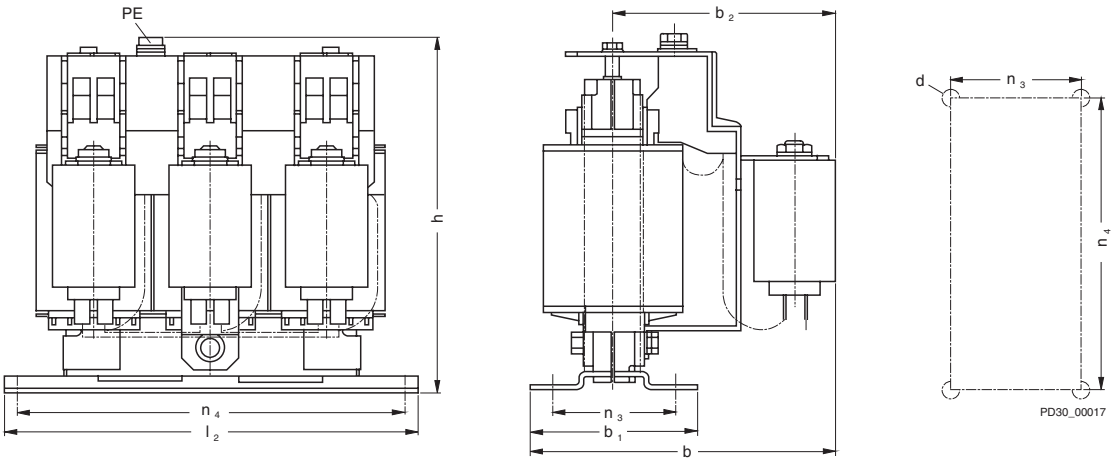
with $f$ = line frequency (50 Hz or 60 Hz)

### *Recommended supply voltage $U_N$, reference voltage drop $u_D$ and insulation rating*

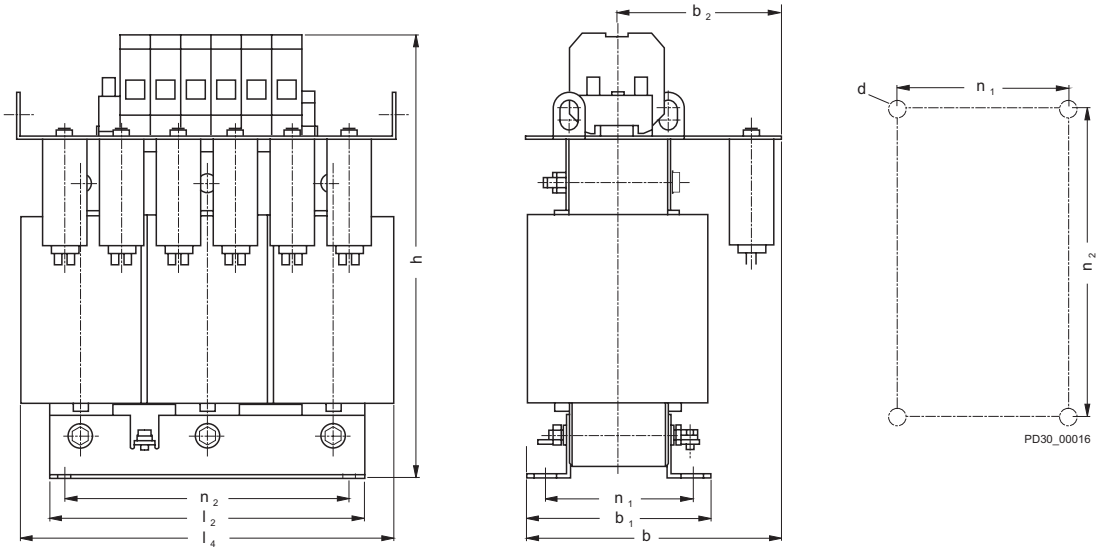
The "Selection and ordering data" table specifies a recommended supply voltage $U_N$ for the reactors. The percent voltage drops $u_D$ assigned to the reactors apply to the relevant recommended supply voltage $U_N$.

The rated voltage for the insulation specified in the "Selection and ordering data" table also allows the use of reactors at voltages that deviate from the recommended supply voltage $U_N$, but that are smaller or the same as the rated voltage of the insulation. The reference voltage drop $u_D$ then changes and can be calculated using the formula shown in the Section "Voltage drop $\Delta U$ or reference voltage drop $u_D$".

A reactor with the reference voltage drop $u_D$ specified as a percent value has the same effect on the system as a transformer with the same $u_K$.




**4EF11** (for drives from 1.5 kW to 7.5 kW)




**4EF11** (for drives from 11 kW to 75.0 kW)

Drawing example, solution with 3 capacitors possible whereby the outline dimensions do not change

| for filters with $I_{thmax}$ to | $b_{max}$ | $b_1$ | $b_{2\,max}$ | d | $h_{max}$ | $l_2$ | $n_3$ | $n_4$ | Ground |
|---|---|---|---|---|---|---|---|---|---|
| **4EF11 sinewave filter for drives with 1.5 kW to 7.5 kW drive power, user-defined arrangement** | | | | | | | | | |
| 6 A | 133 | 73 | 98 | M5 | 157 | 178 | 53 | 166 | M6 |
| 10 A | 148 | 88 | 105 | M5 | 157 | 178 | 68 | 166 | M6 |
| 17.5 A | 175 | 119 | 112 | M6 | 182 | 219 | 89 | 201 | M6 |

| for filters with $I_{thmax}$ to | $b_{max}$ | $b_1$ | $b_2$ | d | $h_{max}$ | $l_2$ | $l_{4\,max}$ | $n_1$ | $n_2$ | Ground |
|---|---|---|---|---|---|---|---|---|---|---|
| **4EF11 sinewave filter for drive with 11 kW to 75 kW drive power, for arrangement of the filter on horizontal surfaces** | | | | | | | | | | |
| 26 A | 145 | 91 | 100 | M6 | 253 | 189 | 225 | 70 | 176 | M6 |
| 38 A | 169 | 115 | 112 | M6 | 253 | 189 | 225 | 94 | 176 | M6 |
| 48 A | 168 | 118 | 112 | M8 | 300 | 220 | 260 | 86 | 200 | M6 |
| 63 A | 183 | 133 | 120 | M8 | 300 | 220 | 260 | 101 | 200 | M6 |
| 90 A | 208 | 148 | 134 | M8 | 362 | 249 | 295 | 118 | 224 | M6 |
| 150 A | 224 | 168 | 136 | M8 | 418 | 299 | 357 | 138 | 264 | M8 |