

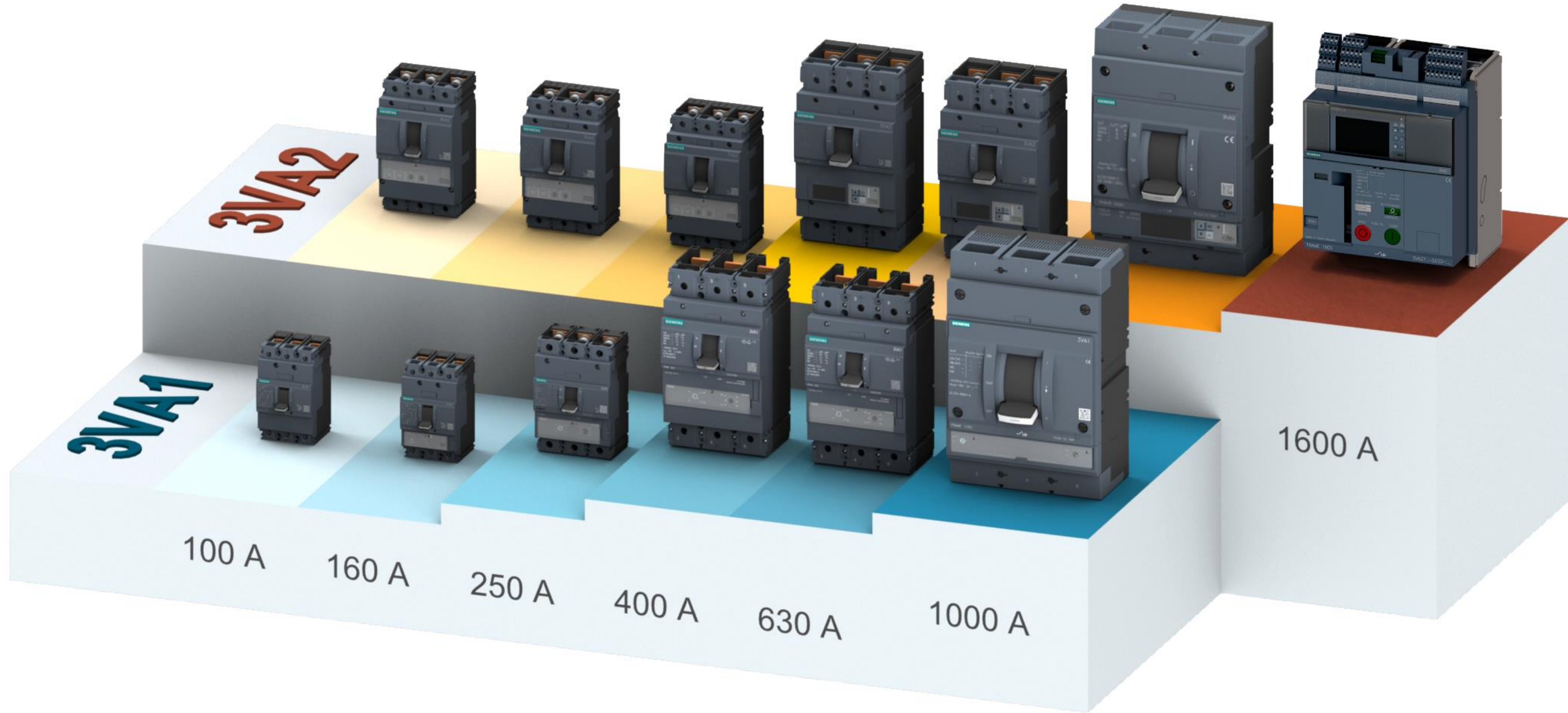


3VA moulded case circuit breakers

3VA moulded case circuit breakers



Overview

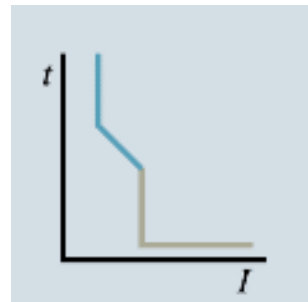


3VA1 moulded case circuit breakers

- Rated current 16 ÷ 1 000 A
- Rated short-circuit ultimate breaking capacity 16 ÷ 110 kA @ AC 415 V
- $I_{cu} = I_{cs}$
- Thermomagnetic trip unit
- 1P, 2P, 3P, 4P design
- Rotary mechanism
- Possibility of disconnector
- Use for DC applications
- Possibility of use up to 400 Hz

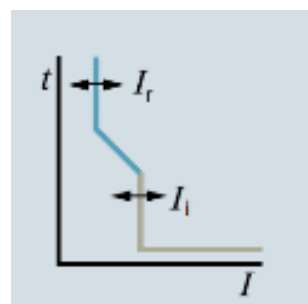
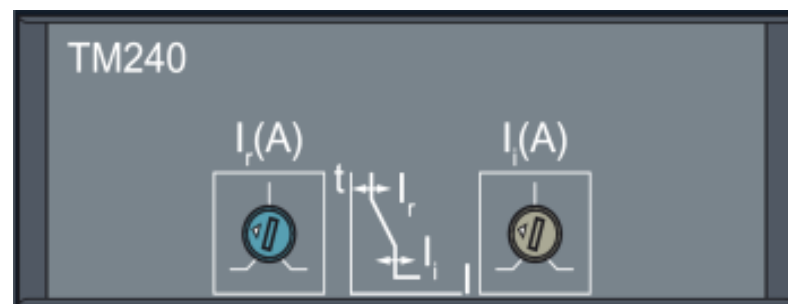


Overview of trip units TMTU



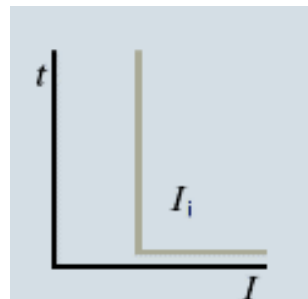
Trip unit TM210 (FTFM)

- Fixed thermal release
- Fixed short-circuit release ($10 \times I_n$)
- Replacement of BC160 – char. L



Trip unit TM240 (ATAM)

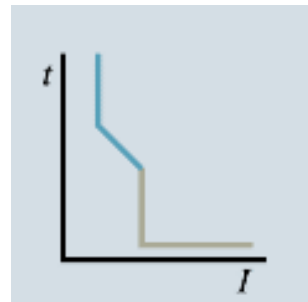
- Possibility of setting of thermal release
- Possibility of setting of short-circuit release
- Replacement of BC160 – char. D



Trip unit TM110, TM120 (AM)

- Motor protection - only short-circuit release
- Replacement of BC160 – char. N

Trip unit TM210



Trip unit TM210 (FTFM)

- Fixed thermal release
- Fixed short-circuit release ($10 \times I_n$)
- Replacement of BC160 – char. L

| | 100 A | 160 A | 250 A | 400 A | 630 A |
|--|--------------------------------------|---|-------|-------|-------|
| Fixed thermal release Fixed short-circuit release | 3-pole design 4-pole design | 1-pole design 2-pole design 3-pole design 4-pole design | – | – | – |
| Protection of N conductor (4-pole design) | Without protection of N conductor | Without protection of N conductor 50 % I_n 100 % I_n | – | – | – |

Trip unit TM210

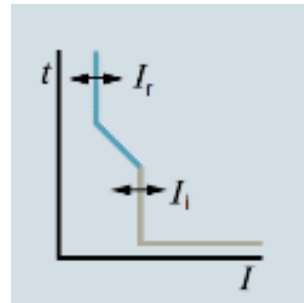
Parameters

3VA11

| I_n [A] | I_r [A] | I_i [A] | I_N ¹⁾ [%] |
|--------------|--------------|--------------|----------------------------|
| 16 | 16 | 320 | 100, OFF |
| 20 | 20 | 320 | 100, OFF |
| 25 | 25 | 320 | 100, OFF |
| 32 | 32 | 320 | 100, OFF |
| 40 | 40 | 400 | 100, OFF |
| 50 | 50 | 500 | 100, OFF |
| 63 | 63 | 630 | 100, OFF |
| 80 | 80 | 800 | 100, OFF |
| 100 | 100 | 1 000 | 50, 100, OFF |
| 125 | 125 | 1 250 | 50, 100, OFF |
| 160 | 160 | 1 600 | 50, 100, OFF |

1) for 4-pole circuit breaker

Trip unit TM240



Trip unit TM240 (ATAM)

- Possibility of setting of thermal release
- Possibility of setting of short-circuit release
- Smooth setting of values
- Setting of reduced current $I_r = 0.7 \div 1 I_n$
- Replacement of BC160 – char. D

| | 100 A | 160 A | 250 A | 400 A | 630 A | 1000 A |
|--|-------|--|--|--|--|---|
| Adjustable thermal release Adjustable short-circuit release | – | 3-pole design 4-pole design | 3-pole design 4-pole design | 3-pole design 4-pole design | 3-pole design 4-pole design | 3-pole design 4-pole design |
| Protection of N conductor (4-pole design) | – | Without protection of N conductor 50 % I _n 100 % I _n | Without protection of N conductor 50 % I _n 100 % I _n | Without protection of N conductor 50 % I _n 100 % I _n | Without protection of N conductor 50 % I _n 100 % I _n | Without protection of N conductor 100 % I _n |

Trip unit TM240

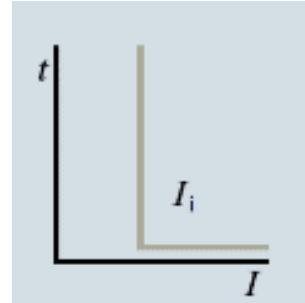
Specification

| | I_n [A] | I_r ¹⁾ [A] | I_i ¹⁾ [A] | I_N ²⁾ [%] |
|-------|--------------|----------------------------|--|----------------------------|
| 3VA11 | 16 | 11 ÷ 13 ÷ 14 ÷ 16 | 160 ÷ 192 ÷ 224 ÷ 256 ÷ 288 ÷ 320 | 0, 100 |
| | 20 | 14 ÷ 16 ÷ 18 ÷ 20 | 160 ÷ 192 ÷ 224 ÷ 256 ÷ 288 ÷ 320 | 0, 100 |
| | 25 | 18 ÷ 20 ÷ 23 ÷ 25 | 160 ÷ 192 ÷ 224 ÷ 256 ÷ 288 ÷ 320 | 0, 100 |
| | 32 | 22 ÷ 26 ÷ 29 ÷ 32 | 160 ÷ 192 ÷ 224 ÷ 256 ÷ 288 ÷ 320 | 0, 100 |
| | 40 | 28 ÷ 32 ÷ 36 ÷ 40 | 200 ÷ 240 ÷ 280 ÷ 320 ÷ 360 ÷ 400 | 0, 100 |
| | 50 | 35 ÷ 40 ÷ 45 ÷ 50 | 250 ÷ 300 ÷ 350 ÷ 400 ÷ 450 ÷ 500 | 0, 100 |
| | 63 | 44 ÷ 50 ÷ 57 ÷ 63 | 315 ÷ 378 ÷ 441 ÷ 504 ÷ 567 ÷ 630 | 0, 100 |
| | 80 | 56 ÷ 64 ÷ 72 ÷ 80 | 400 ÷ 480 ÷ 560 ÷ 640 ÷ 720 ÷ 800 | 0, 100 |
| | 100 | 70 ÷ 80 ÷ 90 ÷ 100 | 500 ÷ 600 ÷ 700 ÷ 800 ÷ 900 ÷ 1 000 | 0, 50, 100 |
| | 125 | 88 ÷ 100 ÷ 113 ÷ 125 | 625 ÷ 750 ÷ 875 ÷ 1 000 ÷ 1 125 ÷ 1 250 | 0, 50, 100 |
| 3VA12 | 160 | 112 ÷ 128 ÷ 144 ÷ 160 | 800 ÷ 960 ÷ 1 120 ÷ 1 280 ÷ 1 440 ÷ 1 600 | 0, 50, 100 |
| | 200 | 140 ÷ 160 ÷ 180 ÷ 200 | 1 000 ÷ 1 200 ÷ 1 400 ÷ 1 600 ÷ 1 800 ÷ 2 000 | 0, 50, 100 |
| | 250 | 175 ÷ 200 ÷ 225 ÷ 250 | 1 250 ÷ 1 500 ÷ 1 750 ÷ 2 000 ÷ 2 250 ÷ 2 500 | 0, 50, 100 |
| 3VA13 | 320 | 220 ÷ 260 ÷ 290 ÷ 320 | 1 600 ÷ 1 920 ÷ 2 240 ÷ 2 560 ÷ 2 880 ÷ 3 200 | 0, 50, 100 |
| | 400 | 280 ÷ 320 ÷ 360 ÷ 400 | 2 000 ÷ 2 400 ÷ 2 800 ÷ 3 200 ÷ 3 600 ÷ 4 000 | 0, 50, 100 |
| 3VA14 | 500 | 350 ÷ 400 ÷ 450 ÷ 500 | 2 500 ÷ 3 000 ÷ 3 500 ÷ 4 000 ÷ 4 500 ÷ 5 000 | 0, 50, 100 |
| | 630 | 440 ÷ 500 ÷ 570 ÷ 630 | 2 520 ÷ 3 150 ÷ 3 780 ÷ 4 410 ÷ 5 040 | 0, 50, 100 |
| 3VA15 | 630 | 440 ÷ 500 ÷ 570 ÷ 630 | 3 150 ÷ 3 780 ÷ 4 410 ÷ 5 040 ÷ 5 670 ÷ 6 300 | 0, 100 |
| | 800 | 560 ÷ 640 ÷ 720 ÷ 800 | 4 000 ÷ 4 800 ÷ 5 600 ÷ 6 400 ÷ 7 200 ÷ 8 000 | 0, 100 |
| | 1 000 | 700 ÷ 800 ÷ 900 ÷ 1 000 | 5 000 ÷ 6 000 ÷ 7 000 ÷ 8 000 ÷ 9 000 ÷ 10 000 | 0, 100 |

1) setting of I_r value is continuous, the values are printed on trip unit

2) for 4-pole circuit breaker

Trip unit TM110M



Trip unit TM110 (AM)

- Motor protection - only short-circuit release
- Fixed value of short-circuit current (16x I_n)
- Replacement of BC160 – char. N

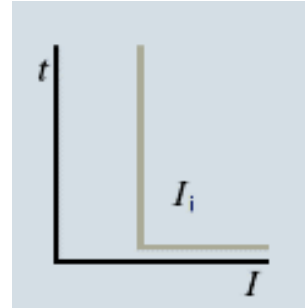
| | 100 A | 160 A | 250 A | 400 A | 630 A | 1000 A |
|-----------------------------|-------|---------------|-------|-------|-------|--------|
| Fixed short-circuit release | - | 3-pole design | - | - | - | - |

Trip unit TM110M

Specifications

| | I_n [A] | I_i [A] |
|-------|--------------|--------------|
| 3VA11 | 1 | 16 |
| | 2 | 32 |
| | 4 | 64 |
| | 8 | 128 |
| | 12,5 | 200 |

Trip unit TM120M



Trip unit TM120 (AM)

- Motor protection - only short-circuit release
- Possibility of setting of short-circuit release
- Replacement of BC160 – char. N

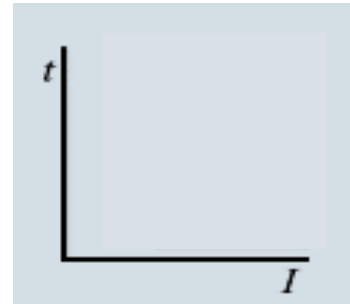
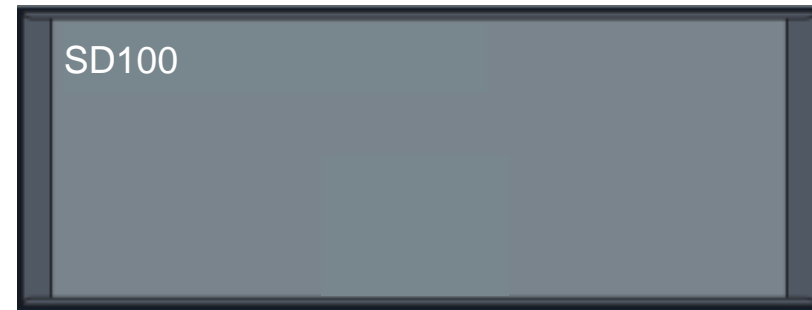
| | 100 A | 160 A | 250 A | 400 A | 630 A | 1 000 A |
|----------------------------------|-------|---------------|---------------|---------------|---------------|---------------|
| Adjustable short-circuit release | - | 3-pole design | 3-pole design | 3-pole design | 3-pole design | 3-pole design |

Trip unit TM120M

Specifications

| | I_n [A] | $I_i = x I_n$ | | | | | | | | | | | |
|-------|--------------|---------------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | | $5x I_n$ | $6x I_n$ | $7x I_n$ | $8x I_n$ | $9x I_n$ | $10x I_n$ | $11x I_n$ | $12x I_n$ | $13x I_n$ | $14x I_n$ | $15x I_n$ | $16x I_n$ |
| 3VA11 | 20 | – | – | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 | 320 |
| | 32 | – | – | 220 | 256 | 288 | 320 | 352 | 384 | 416 | 448 | 480 | 510 |
| | 40 | – | – | 280 | 320 | 360 | 400 | 440 | 480 | 520 | 560 | 600 | 640 |
| | 50 | – | – | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 |
| | 63 | – | – | 440 | 504 | 567 | 630 | 693 | 756 | 819 | 882 | 945 | 1 010 |
| | 80 | – | – | 560 | 640 | 720 | 800 | 880 | 960 | 1 040 | 1 120 | 1 200 | 1 280 |
| | 100 | – | – | 700 | 800 | 900 | 1 000 | 1 100 | 1 200 | 1 300 | 1 400 | 1 500 | 1 600 |
| | 125 | – | – | 875 | 1 000 | 1 125 | 1 250 | 1 375 | 1 500 | 1 625 | 1 750 | 1 875 | 2 000 |
| 3VA12 | 160 | – | – | 1 120 | 1 280 | 1 440 | 1 600 | 1 760 | 1 920 | 2 080 | 2 240 | 2 400 | 2 560 |
| | 200 | – | 1 200 | 1 400 | 1 600 | 1 800 | 2 000 | 2 200 | 2 400 | 2 600 | 2 800 | – | – |
| 3VA13 | 250 | – | – | – | 2 000 | 2 250 | 2 500 | 2 750 | 3 000 | 3 250 | 3 500 | 3 750 | 4 000 |
| | 320 | – | – | 2 240 | 2 560 | 2 880 | 3 200 | 3 520 | 3 840 | 4 160 | 4 480 | – | – |
| 3VA14 | 400 | – | 2 400 | 2 800 | 3 200 | 3 600 | 4 000 | 4 400 | 4 800 | – | – | – | – |
| | 500 | 2 500 | 3 000 | 3 500 | 4 000 | 4 500 | 5 000 | – | – | – | – | – | – |
| 3VA15 | 630 | – | – | – | 5 040 | 5 670 | 6 300 | 6 930 | 7 560 | 8 190 | 8 820 | 9 450 | – |
| | 800 | – | 4 800 | 5 600 | 6 400 | 7 200 | 8 000 | 8 800 | 9 600 | – | – | – | – |

Disconnection up to 630 A



Switch-disconnectors SD100

- They are used, for example, as main switches, switch-disconnectors in subdistribution or end device switchboards
- The switch-disconnectors must always be backup protected
- They meet the requirement for safe disconnection



| | 100 A | 160 A | 250 A | 400 A | 630 A | 1 000 A |
|---------------------|-------|--------------------------------|--------------------------------|--------------------------------|---|---------|
| Switch-disconnector | - | 3-pole design 4-pole design | 3-pole design 4-pole design | 3-pole design 4-pole design | 3-pole design 4-pole design (4P max. 500 A) | - |

Disconnection up to 630 A

Specifications

| According to IEC 60947-3 | | | | 3VA11 | 3VA12 | 3VA13 | 3VA14 | |
|------------------------------------|---------------|----------|------|----------------------------|----------------------------|----------------------------|-------|-----|
| Rated normal current at 50° C | | I_U | [A] | 63, 100, 125, 160 | 250 | 400 | 500 | 630 |
| Number of poles | | | | 3, 4 | 3, 4 | 3, 4 | 4 | 3 |
| Utilization category | AC-21A | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | AC-22A | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | AC-23A | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | DC-21A | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | DC-22A | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | DC-23A | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Rated operating voltage, max. | AC (50/60 Hz) | U_e | [V] | 690 | 690 | 690 | 690 | 690 |
| | DC | U_e | [V] | 3-pole: 500 4-pole: 600 | 3-pole: 500 4-pole: 600 | 3-pole: 500 4-pole: 600 | 600 | 500 |
| Rated short-time withstand current | t = 1 s | I_{cw} | [kA] | 2 | 3 | 4.8 | - | - |

Use of 3VA1 circuit breakers in DC applications

| 3VA10 | | 3VA11 | | | 3VA12 | | | 3VA13 | | | | 3VA14 | | | | 3VA15 | | | Disconnection only „+“ pole | | Disconnection „+“ and „-“ pole | | | | | | |
|---|----|-----------------------|-------|----|------------------------|-----|-------|------------------------|-----|-------|----|------------------------|----|-------|----|----------------------------|----|-------|-----------------------------|-----|--------------------------------|-----|------------|--|--|--|--|
| 100 A (16 ÷ 100 A) | | 160 A (16 ÷ 160 A) | | | 250 A (160 ÷ 250 A) | | | 400 A (320 ÷ 400 A) | | | | 630 A (500 ÷ 630 A) | | | | 1 000 A (630 ÷ 1 000 A) | | | earthed *) | | earthed *) | | IT network | | | | |
| according to IEC 60947 I _{CU} =I _{CS} in kA | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | N | S | N | S | M | H | S | M | H | S | M | H | C | S | M | H | C | M | H | C | | | | | | | |
| 125 V | | | 125 V | | | | 125 V | | | 125 V | | | | 125 V | | | | 250 V | | | | | | | | | |
| 16 | 25 | 30 | 16 | 25 | 30 | 30 | 55 | 85 | 100 | 8 | 16 | 25 | 25 | 8 | 16 | 25 | 25 | 35 | 50 | 100 | | | | | | | |
| 250 V | | | 250 V | | | | 250 V | | | 250 V | | | | 250 V | | | | 500 V | | | | | | | | | |
| 25 | 36 | 55 | 36 | 55 | 85 | 100 | 55 | 85 | 100 | 8 | 16 | 25 | 25 | 8 | 16 | 25 | 25 | 35 | 50 | 100 | | | | | | | |
| 500 V | | | 500 V | | | | 500 V | | | 500 V | | | | 500 V | | | | 750 V | | | | | | | | | |
| 25 | 36 | 55 | 36 | 55 | 85 | 100 | 55 | 85 | 100 | 8 | 16 | 25 | 25 | 8 | 16 | 25 | 25 | 35 | 50 | 100 | | | | | | | |
| 600 V | | | 600 V | | | | 600 V | | | 600 V | | | | 600 V | | | | 750 V | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | 35 | | | 50 | 100 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | 1000 V**) | | | | | | |
| 8 | 16 | 25 | 16 | 25 | 36 | 55 | 25 | 36 | 55 | 8 | 16 | 25 | 25 | 8 | 16 | 25 | 25 | 25 | 35 | 50 | 50 | | | | | | |

GF insulation state monitor
 *) the minus pole is earthed
 **) only for I_n=630/800 A

Use of 3VA1 circuit breakers in application with a higher frequency 20 ÷ 400 Hz

| 3VA10 / 3VA11 Frequency | Correction factor for thermal release |
|----------------------------|---------------------------------------|
| < 150 Hz | 1.0 |
| 150 ÷ 400 Hz | 0.9 |

| 3VA13/3VA14 Frequency | Correction factor for thermal release |
|--------------------------|---------------------------------------|
| ≤ 100 Hz | 1.0 |
| 100 ÷ 150 Hz | 0.95 |
| 200 Hz | 0.90 |
| 300 ÷ 400 Hz | 0.85 |

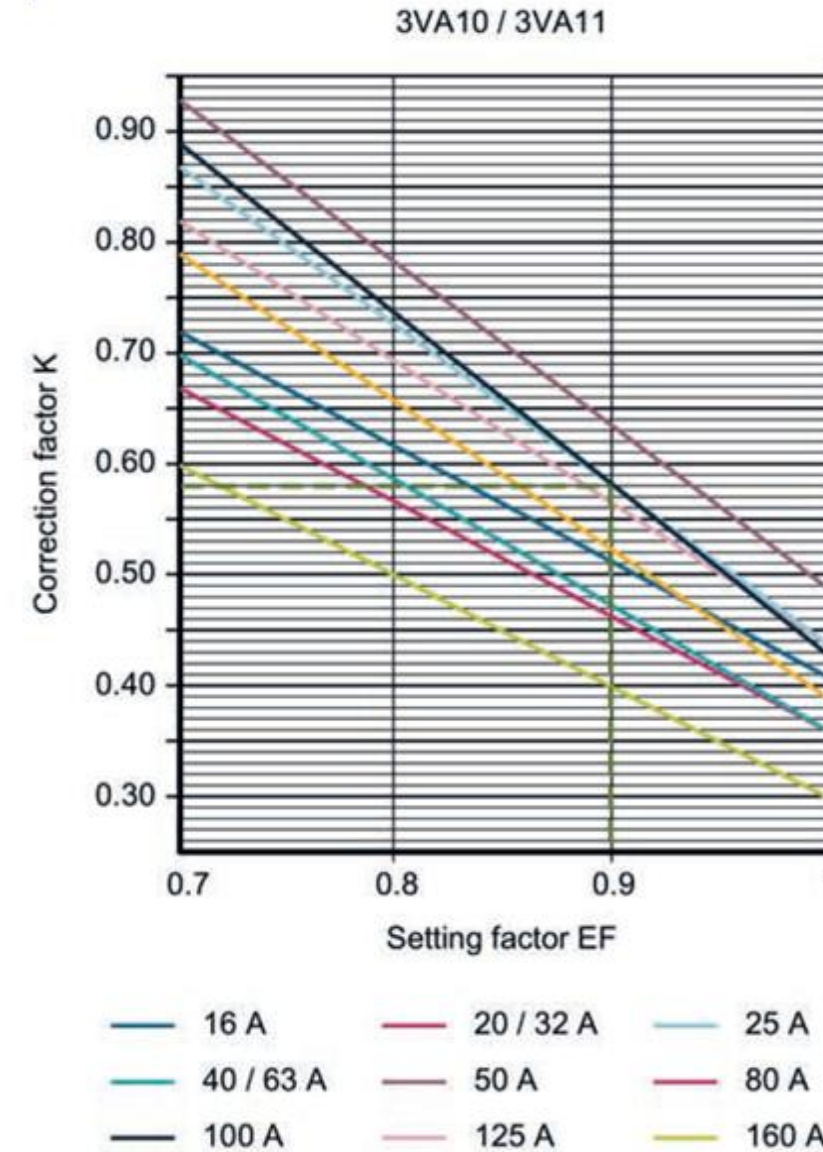
| 3VA12 Frequency | Correction factor for thermal release |
|--------------------|---------------------------------------|
| < 100 Hz | 1.0 |
| 100 ÷ 250 Hz | 0.95 |
| 250 ÷ 400 Hz | 0.90 |

| | Correction factor for short-circuit release | | | | | | | | | | |
|----------------|---|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|
| | DC | 20 Hz | 50 Hz | 60 Hz | 100 Hz | 150 Hz | 200 Hz | 250 Hz | 300 Hz | 350 Hz | 400 Hz |
| 3VA10 3VA11 | 0.7 | 1.05 | 1 | 1 | 1 | 0.95 | 0.9 | 0.85 | 0.8 | 0.75 | 0.7 |
| 3VA12 | 0.85 | 1 | 1 | 1 | 0.8 | 0.75 | 0.6 | 0.65 | 0.6 | 0.57 | 0.55 |
| 3VA13 3VA14 | 0.8 | 1 | 1 | 0.95 | 0.91 | 0.83 | 0.8 | 0.75 | 0.7 | 0.65 | 0.6 |
| 3VA15 | 0.9 | 1.1 | 1 | 0.95 | 0.75 | 0.73 | 0.7 | 0.68 | 0.65 | 0.63 | 0.6 |

Temperature compensation of thermomagnetic trip units

Example: Determination of reduced rated current I_r depending on the ambient temperature

- For 3VA1 circuit breaker with rated current I_n 100 A equipped with thermomagnetic trip unit TM240 must be actual tripping current for different working temperature set to the required operating current $I = 90$ A.



- Ambient temperature $60\text{ }^\circ\text{C}$
- Setting factor $EF_{(50\text{ }^\circ\text{C})} = \frac{I}{I_n} = \frac{90}{100} = 0.9$
- Correction factor $K = 0.58$ (read from the graph)
- Temperature compensation $TK_{(60\text{ }^\circ\text{C})} = \left(K * \frac{T_U - 50\text{ }^\circ\text{C}}{100} \right) + 1 = \left(0.58 * \frac{60\text{ }^\circ\text{C} - 50\text{ }^\circ\text{C}}{100} \right) + 1 = \left(0.58 * \frac{10}{100} \right) + 1 = 1.058$
- Determination of reduced current $I_{r(60\text{ }^\circ\text{C})} = I_n * EF_{(50\text{ }^\circ\text{C})} * TK = 100 * 0.9 * 1.058 = \mathbf{95\text{ A}}$

3VA2 moulded case circuit breakers up to 1 000 A

- Rated current 100 ÷ 1 000 A
- Rated short-circuit ultimate breaking capacity 55 ÷ 150 kA @ AC 415 V
- $I_{cu} = I_{cs}$
- Electronic trip units
- 3P, 4P design
- Rotary mechanism
- Possibility of data communication
- Possibility of measuring function



Overview of trip units ETU



Trip unit of ETU3xx series

- Setting by means of rotary switches.
- Line protection: ETU320 LI (replacement of DTV3)
ETU330 LIG
ETU350 LSI (replacement of MTV8, MTV9)
- Motor protection: ETU350M LSI (replacement of MTV8)



Trip unit of ETU5xx series

- Setting by means of push-buttons and display, possibility of data communication.
- Line and generator protection: ETU550 LSI
ETU560 LSI G
- Motor protection: ETU550M LSI



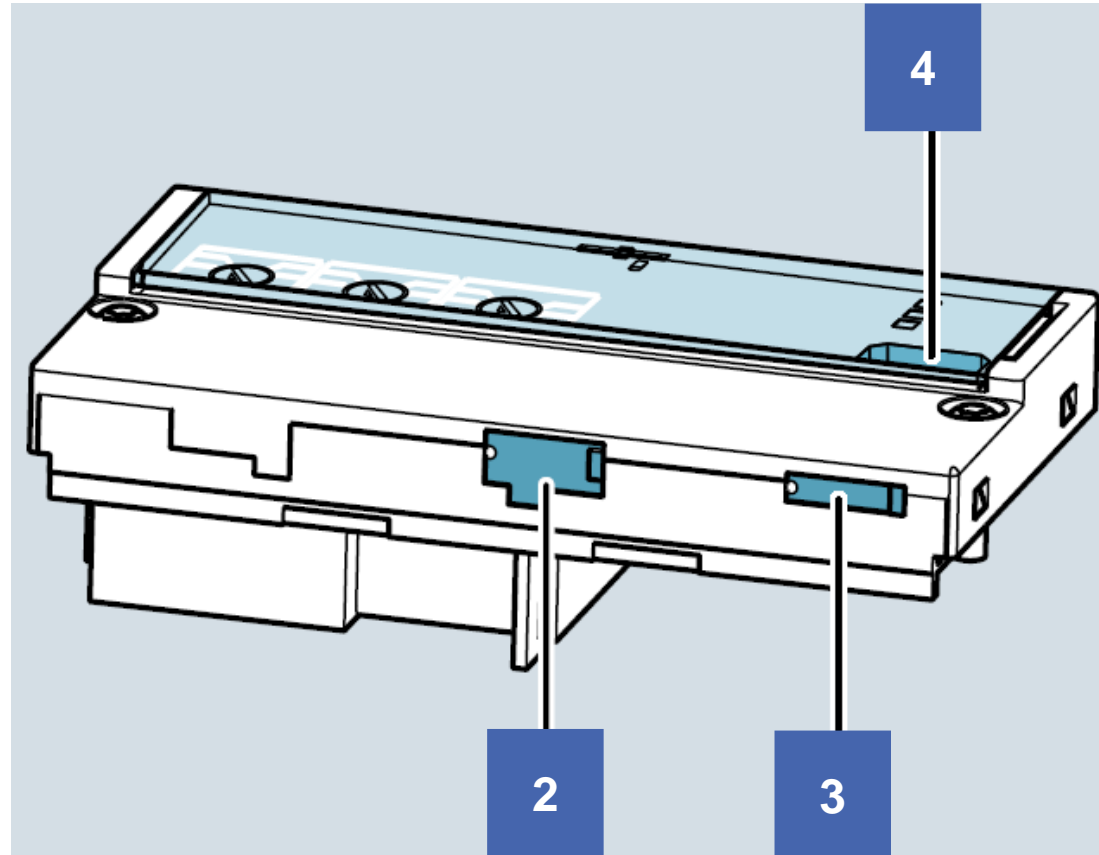
Trip unit of ETU8xx series

- Setting by means of push-buttons and display, possibility of data communication and measuring function.
- Line and generator protection: ETU850 LSI
ETU860 LSI G
- Motor protection: ETU860M LSI G

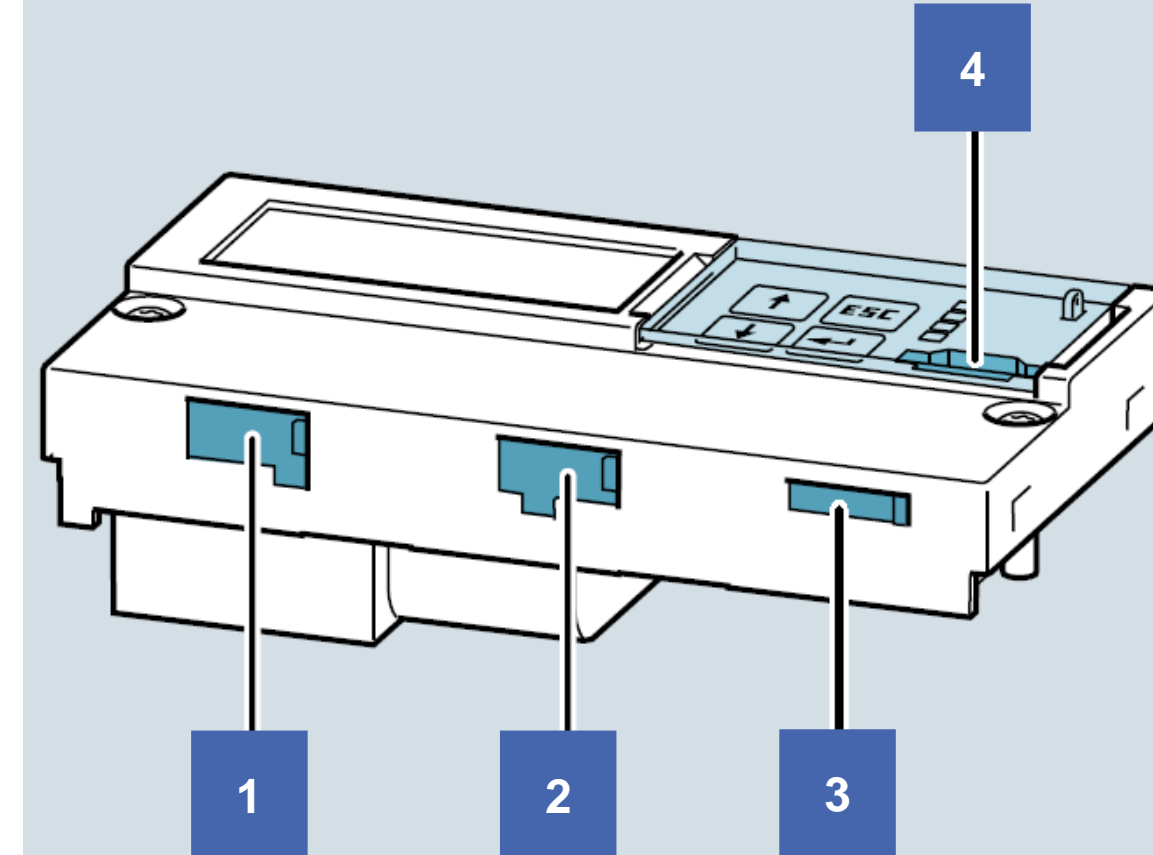
Overview of trip units ETU

Description of trip units ETU

- 1 Possibility to connect external current transformer for N conductor
- 2 Possibility to connect an external function module EFB300
- 3 Possibility to connect residual current device RCD820
- 4 Possibility to connect test device TD300 or TD500



ETU3xx



ETU5xx or ETU8xx

Overview of trip units ETU

Description of trip units ETU3xx

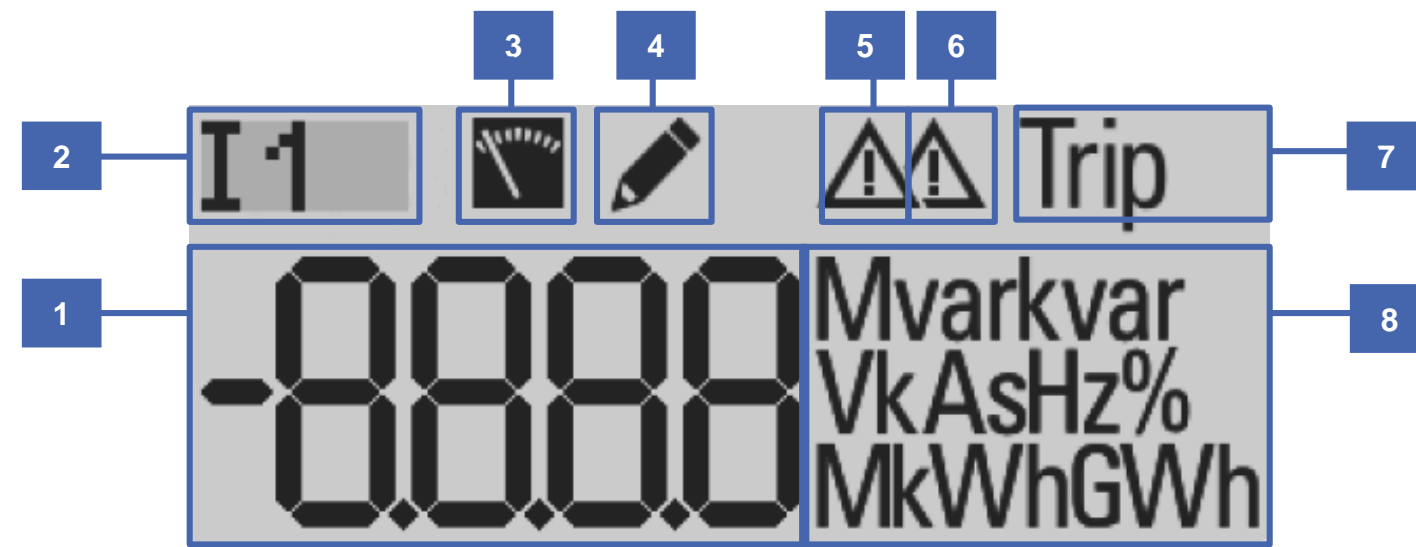


Trip unit of ETU3xx series

- Characteristics LI, LIG and LSI
- Maximum 5 rotary switches, which are colour-coded:
 - Thermal release ●
 - Short-circuit and selective release ●
 - Protection of N conductor ●
- LED signalling
 - ACT
 - AL1 ($I > 90 \% I_r$)
 - AL2 ($I > 105 \% I_r$)

Overview of trip units ETU

Description of trip units ETU5xx and ETU8xx



- 1 Display of value
- 2 Display of value name
- 3 Icon indicating that the measured values are displayed
- 4 Parameter editing mode
- 5 Alarm AL1 ($I > 90\% I_r$)
- 6 Alarm AL2 ($I > 105\% I_r$)
- 7 Indication of TRIP by trip unit
- 8 Display of units

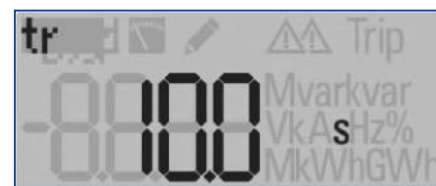
Standard display



Display of signalling



Display of parameters

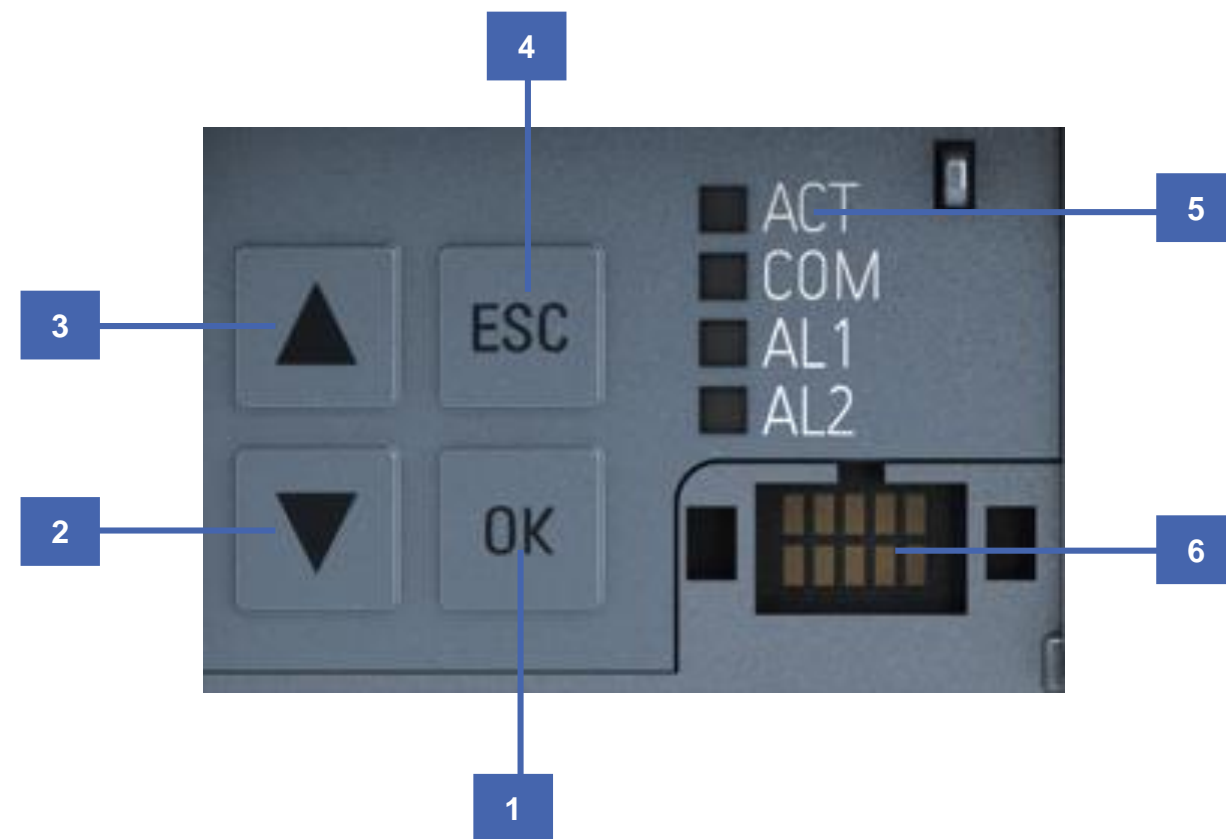


Display of measured values



Overview of trip units ETU

Description of trip units ETU5xx and ETU8xx



- 1 Go to the parameter edit mode. Parameter confirmation in the parameter edit mode.
- 2 Return to the previous screen. Parameter decrease in the parameter edit mode.
- 3 Go to the next screen. Parameter increase in the parameter edit mode.
- 4 To to the default view or return from the edit mode without changing the parameter
- 5 LED indication
- 6 Possibility to connect test device

Description of trip units ETU

Description of trip units ETU5xx and ETU8xx

- Overview of measured values
- Overview of adjustable parameters

| | | ETU550 LSI | ETU560 LSI G | ETU850 LSI | ETU860 LSI G |
|-------------------------------|---------------------------------|------------|--------------|------------|--------------|
| | I 1 / A | ✓ | ✓ | ✓ | ✓ |
| | I 2 / A | ✓ | ✓ | ✓ | ✓ |
| | I 3 / A | ✓ | ✓ | ✓ | ✓ |
| | I N / A | ✓ | ✓ | ✓ | ✓ |
| | I g / A | - | ✓ | - | ✓ |
| | U 12 / V | - | - | ✓ | ✓ |
| | U 23 / V | - | - | ✓ | ✓ |
| | U 31 / V | - | - | ✓ | ✓ |
| | f / Hz | - | - | ✓ | ✓ |
| | P / W | - | - | ✓ | ✓ |
| | Q / kvar | - | - | ✓ | ✓ |
| | PF | - | - | ✓ | ✓ |
| | W / Wh | - | - | ✓ | ✓ |
| | I _r / A | ✓ | ✓ | ✓ | ✓ |
| | t _r / s | ✓ | ✓ | ✓ | ✓ |
| | T _c / T _p | - | - | - | - |
| | ThM | ✓ | ✓ | ✓ | ✓ |
| | I _{sd} / A | ✓ | ✓ | ✓ | ✓ |
| | t _{sd} / s | ✓ | ✓ | ✓ | ✓ |
| | I ² t _{sd} | ✓ | ✓ | ✓ | ✓ |
| ZSI S | ✓ | ✓ | ✓ | ✓ | |
| ZSI G | - | ✓ | - | ✓ | |
| I _i / A | ✓ | ✓ | ✓ | ✓ | |
| I _N / A | ✓ | ✓ | ✓ | ✓ | |
| I _g / A | - | ✓ | - | ✓ | |
| t _g / s | - | ✓ | - | ✓ | |
| I ² t _g | - | ✓ | - | ✓ | |
| I _g A / A | - | ✓ | - | ✓ | |

Description of trip units ETU

Description of trip units ETU3xx and ETU5xx

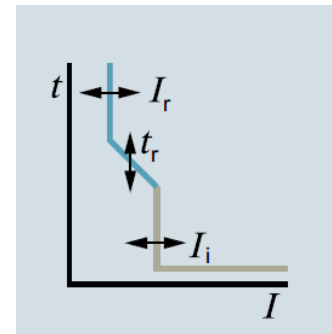
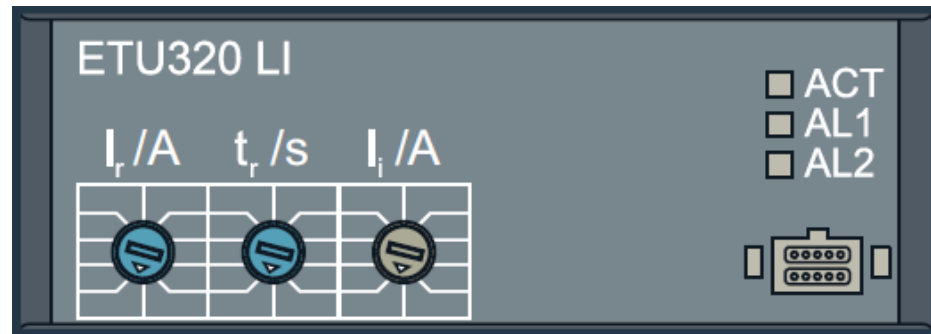
- LED indication

| LED | ETU | < 20 % I _n | > 20 % I _n | > 90 % I _r | > 105 % I _r | > 90 % T | Missing ETU power supply – MF unfunctional | No data communication | Non-functional data communication | Connected data communication |
|-----|------|-----------------------|-----------------------|-----------------------|------------------------|----------|--|-----------------------|-----------------------------------|------------------------------|
| ACT | ETU3 | □ | ☀ | ☀ | ☀ | ☀ | – | – | – | – |
| | ETU5 | □ | ☀ | ☀ | ☀ | ☀ | – | – | – | – |
| | ETU8 | □ | ☀ | ☀ | ☀ | ☀ | ☀ | – | – | – |
| COM | ETU3 | – | – | – | – | – | – | – | – | – |
| | ETU5 | □ | □ | – | – | – | – | □ | ☀ | ☀ |
| | ETU8 | □ | □ | – | – | – | – | □ | ☀ | ☀ |
| AL1 | ETU3 | □ | □ | ☀ | ☀ | ☀ | – | – | – | – |
| | ETU5 | □ | □ | ☀ | ☀ | ☀ | – | – | – | – |
| | ETU8 | □ | □ | ☀ | ☀ | ☀ | – | – | – | – |
| AL2 | ETU3 | □ | □ | □ | ☀ | ☀ | – | – | – | – |
| | ETU5 | □ | □ | □ | ☀ | ☀ | – | – | – | – |
| | ETU8 | □ | □ | □ | ☀ | ☀ | – | – | – | – |

☀ LED is flashing



Trip unit ETU320 LI

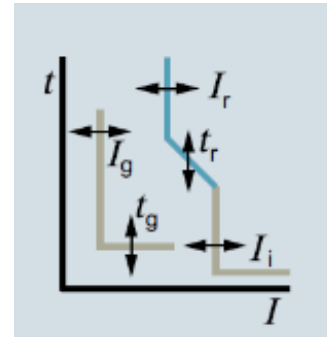
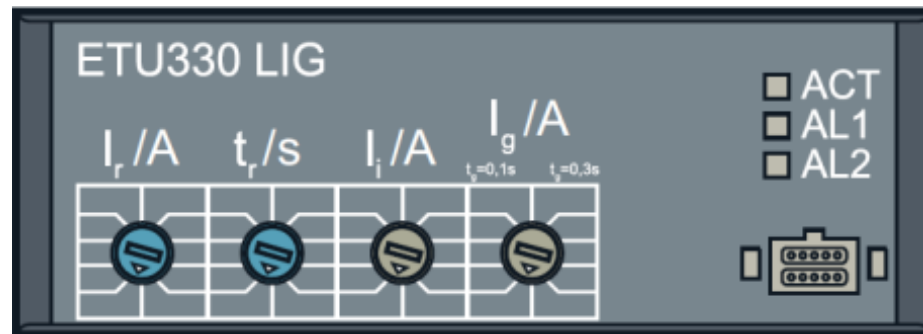


- Line protection – replacement of DTV3
- Setting by means of rotary switches
- Step setting
- Possibility of setting of thermal release (including delay)
- Possibility of setting of short-circuit release

| | | I_n | I_r | t_r | I_i | $I_N^{1)}$ | |
|---------------------|--------|-------------|--------------|---------------|--------------------------|-------------------------------|-------------------------------|
| Class M, H, C, L | 100 A | 25 A | 10 ÷ 25 A | 0.5 ÷ 17 s | 38 ÷ 300 A | $I_N=1 \times I_r$; OFF | |
| | | 40 A | 16 ÷ 40 A | 0.5 ÷ 17 s | 60 ÷ 480 A | | |
| | | 63 A | 25 ÷ 63 A | 0.5 ÷ 17 s | 95 ÷ 756 A | | |
| | | 100 A | 40 ÷ 100 A | 0.5 ÷ 17 s | 150 ÷ 1 200 A | | |
| | 160 A | 25 A | 10 ÷ 25 A | 0.5 ÷ 17 s | 38 ÷ 300 A | $I_N=0.5; 1 \times I_r$; OFF | |
| | | 40 A | 16 ÷ 40 A | 0.5 ÷ 17 s | 60 ÷ 480 A | | |
| | | 63 A | 25 ÷ 63 A | 0.5 ÷ 17 s | 95 ÷ 756 A | | |
| | | 100 A | 40 ÷ 100 A | 0.5 ÷ 17 s | 150 ÷ 1 200 A | | |
| 250 A | 160 A | 63 ÷ 160 A | 0.5 ÷ 17 s | 240 ÷ 1 600 A | $I_N=1 \times I_r$; OFF | | |
| | 250 A | 100 ÷ 250 A | 0.5 ÷ 15 s | 375 ÷ 2 500 A | | | |
| | 400 A | 250 A | 100 ÷ 250 A | 0.5 ÷ 17 s | | 375 ÷ 3 000 A | $I_N=0.5; 1 \times I_r$; OFF |
| | | 400 A | 160 ÷ 400 A | 0.5 ÷ 17 s | | 600 ÷ 4 000 A | |
| Class M, H, C | 630 A | 400 A | 160 ÷ 400 A | 0.5 ÷ 17 s | 600 ÷ 4 800 A | $I_N=0.5; 1 \times I_r$; OFF | |
| | | 630 A | 250 ÷ 630 A | 0.5 ÷ 12 s | 945 ÷ 5 670 A | | |
| Class M, H, C | 1 000A | 630 A | 250 ÷ 630 A | 0.5 ÷ 17 s | 945 ÷ 7 560 A | $I_N=0.5; 1 \times I_r$; OFF | |
| | | 800 A | 320 ÷ 800 A | 0.5 ÷ 17 s | 1200 ÷ 8 000 A | | |
| | | 1 000 A | 400 ÷ 1 000A | 0.5 ÷ 17 s | 1500 ÷ 10 000 A | | |

1) for 4-pole circuit breaker

Trip unit ETU330 LIG

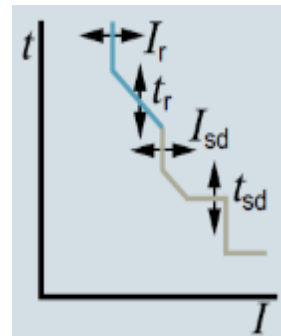
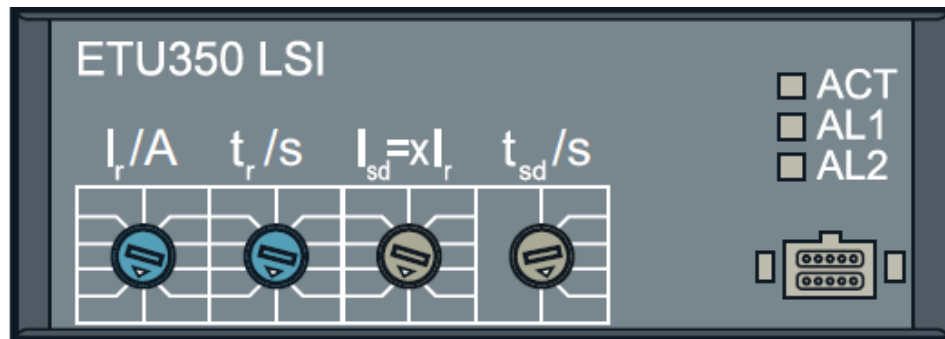


- Line protection
- Setting by means of rotary switches
- Step setting
- Possibility of setting of thermal release (including delay)
- Possibility of setting of short-circuit release
- Possibility of earth fault protection setting

| | | I_n | I_r | t_r | I_i | I_g | t_g | $I_N^{1)}$ |
|---------------------|---------|------------|---------------|---------------|------------------|-----------------------------|-----------------------------|-----------------------------|
| Class M, H, C, L | 100 A | 25 A | 10 ÷ 25 A | 0.5 ÷ 17 s | 38 ÷ 300 A | 15 ÷ 25 A | 0.1; 0.3 s | $I_N=1 \times I_r$; OFF |
| | | 40 A | 16 ÷ 40 A | 0.5 ÷ 17 s | 60 ÷ 480 A | 16 ÷ 40 A | | |
| | | 63 A | 25 ÷ 63 A | 0.5 ÷ 17 s | 95 ÷ 756 A | 16 ÷ 63 A | | |
| | | 100 A | 40 ÷ 100 A | 0.5 ÷ 17 s | 150 ÷ 1 200 A | 20 ÷ 100 A | | $I_N=0.5$; 1 x I_r ; OFF |
| | 160 A | 25 A | 10 ÷ 25 A | 0.5 ÷ 17 s | 38 ÷ 300 A | 15 ÷ 25 A | | $I_N=1 \times I_r$; OFF |
| | | 40 A | 16 ÷ 40 A | 0.5 ÷ 17 s | 60 ÷ 480 A | 16 ÷ 40 A | | |
| | | 63 A | 25 ÷ 63 A | 0.5 ÷ 17 s | 95 ÷ 756 A | 16 ÷ 63 A | | |
| | | 100 A | 40 ÷ 100 A | 0.5 ÷ 17 s | 150 ÷ 1 200 A | 20 ÷ 100 A | | |
| 250 A | 160 A | 63 ÷ 160 A | 0.5 ÷ 17 s | 240 ÷ 1 600 A | 32 ÷ 160 A | $I_N=0.5$; 1 x I_r ; OFF | | |
| | 250 A | 63 ÷ 160 A | 0.5 ÷ 17 s | 240 ÷ 1 920 A | 32 ÷ 160 A | | | |
| Class M, H, C, | 400 A | 160 A | 100 ÷ 250 A | 0.5 ÷ 15 s | 375 ÷ 2 500 A | 50 ÷ 250 A | $I_N=0.5$; 1 x I_r ; OFF | |
| | | 250 A | 100 ÷ 250 A | 0.5 ÷ 15 s | 375 ÷ 3 000 A | 50 ÷ 250 A | | |
| Class M, H, C, | 400 A | 400 A | 160 ÷ 400 A | 0.5 ÷ 17 s | 600 ÷ 4 000 A | 80 ÷ 400 A | $I_N=0.5$; 1 x I_r ; OFF | |
| | | 400 A | 160 ÷ 400 A | 0.5 ÷ 17 s | 600 ÷ 4 000 A | 80 ÷ 400 A | | |
| Class M, H, C | 630 A | 630 A | 250 ÷ 630 A | 0.5 ÷ 12 s | 945 ÷ 5 670 A | 126 ÷ 630 A | $I_N=0.5$; 1 x I_r ; OFF | |
| | | 630 A | 250 ÷ 630 A | 0.5 ÷ 12 s | 945 ÷ 5 670 A | 126 ÷ 630 A | | |
| Class M, H, C | 1 000 A | 630 A | 250 ÷ 630 A | 0.5 ÷ 17 s | 945 ÷ 7 560 A | 126 ÷ 630 A | $I_N=0.5$; 1 x I_r ; OFF | |
| | | 800 A | 320 ÷ 800 A | 0.5 ÷ 17 s | 1 200 ÷ 8 000 A | 160 ÷ 800 A | | |
| | | 1 000 A | 400 ÷ 1 000 A | 0.5 ÷ 17 s | 1 500 ÷ 10 000 A | 200 ÷ 1 000 A | | |

1) for 4-pole circuit breaker

Trip unit ETU350 LSI

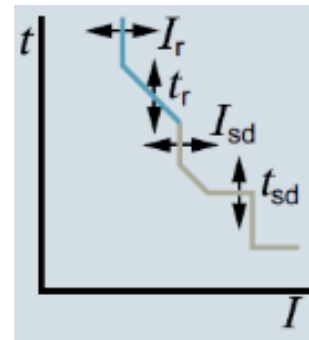
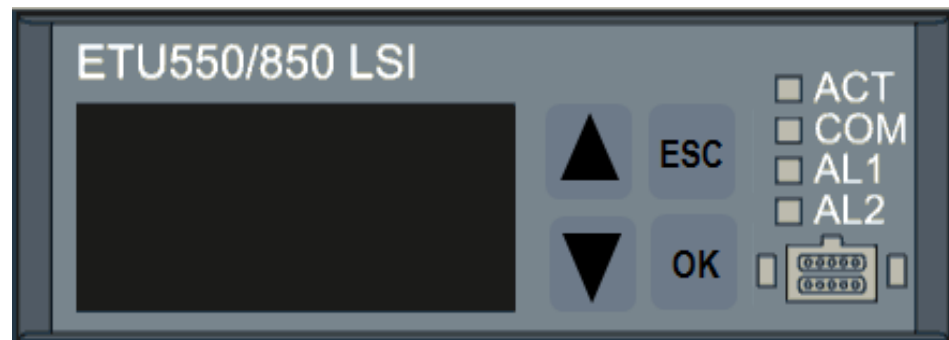


- Line protection – replacement of MTV8, MTV9
- Setting by means of rotary switches
- Step setting
- Possibility of setting of thermal release (including delay)
- Possibility of setting of selective release (including delay)
- Fixed value of short-circuit release

| | | I_n | I_r | t_r | I_{sd} | t_{sd} | I_i | $I_N^{1)}$ | | | | | | | | |
|---------------------|---------|--------------|------------|-----------------|-----------------|----------------|-----------------|--------------------------|-------------------------------|--------------------------|-----------------|-------------------------------|-------------------------------|-----------|---------|-------------------------------|
| Class M, H, C, L | 100 A | 25 A | 10 ÷ 25 A | 0.5 ÷ 17 s | 1.5 ÷ 10x I_r | 0 ÷ 0.4 s | 300 A | $I_N=1 \times I_r$; OFF | | | | | | | | |
| | | 40 A | 16 ÷ 40 A | 0.5 ÷ 17 s | | | 480 A | | | | | | | | | |
| | | 63 A | 25 ÷ 63 A | 0.5 ÷ 17 s | | | 756 A | | | | | | | | | |
| | | 100 A | 40 ÷ 100 A | 0.5 ÷ 17 s | | | 1 200 A | | | | | | | | | |
| | 160 A | 25 A | 10 ÷ 25 A | 0.5 ÷ 17 s | | | 1.5 ÷ 10x I_r | 0 ÷ 0.4 s | 300 A | $I_N=1 \times I_r$; OFF | | | | | | |
| | | 40 A | 16 ÷ 40 A | 0.5 ÷ 17 s | | | | | 480 A | | | | | | | |
| | | 63 A | 25 ÷ 63 A | 0.5 ÷ 17 s | | | | | 756 A | | | | | | | |
| | | 100 A | 40 ÷ 100 A | 0.5 ÷ 17 s | | | | | 1 200 A | | | | | | | |
| 250 A | 160 A | 63 ÷ 160 A | 0.5 ÷ 17 s | 1.5 ÷ 10x I_r | 0 ÷ 0.4 s | 1 600 A | | | $I_N=0.5; 1 \times I_r$; OFF | | | | | | | |
| | 250 A | 100 ÷ 250 A | 0.5 ÷ 15 s | | | 1 920 A | | | | | | | | | | |
| 400 A | 250 A | 100 ÷ 250 A | 0.5 ÷ 17 s | | | 1.5 ÷ 9x I_r | | | | 0 ÷ 0.4 s | 2 500 A | $I_N=0.5; 1 \times I_r$; OFF | | | | |
| | 400 A | 160 ÷ 400 A | 0.5 ÷ 17 s | | | | | | | | 3 000 A | | | | | |
| 630 A | 400 A | 160 ÷ 400 A | 0.5 ÷ 17 s | | | | 1.5 ÷ 10x I_r | 0 ÷ 0.4 s | | | 4 000 A | | $I_N=0.5; 1 \times I_r$; OFF | | | |
| | 630 A | 250 ÷ 630 A | 0.5 ÷ 12 s | | | | | | | | 4 800 A | | | | | |
| 1 000 A | 630 A * | 250 ÷ 630 A | 1.5 ÷ 10 s | | | | | | | | 1.5 ÷ 10x I_r | | | 0 ÷ 0.4 s | 5 670 A | $I_N=0.5; 1 \times I_r$; OFF |
| | 800 A | 320 ÷ 800 A | 1.5 ÷ 10 s | | | | | | | | | | | | 7 560 A | |
| | 1 000 A | 400 ÷ 1 000A | 1.5 ÷ 10 s | 8 000 A | | | | | | | | | | | | |
| | | | | | | | | | 10 000 A | | | | | | | |

1) for 4-pole circuit breaker

Trip unit ETU550, ETU850 LSI

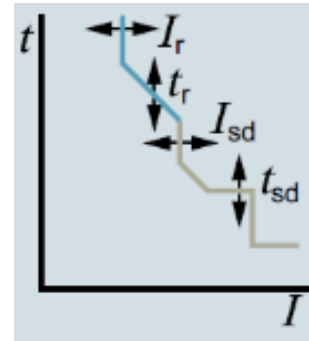


- Line protection
- Setting by means of display and push-buttons (setting by 1 ampere)
- Possibility of setting of thermal release (including delay)
- Possibility of setting of selective release (including delay)
- Possibility of setting of short-circuit release

| | | I_n | I_r | t_r | I_{sd} | t_{sd} | I_i | $I_N^{1)}$ | $I_N^{2)}$ |
|------------------------|-------|-------------|-------------|---------------|---------------|---------------|---------------|---------------|------------|
| Class M, H, C, L | 100 A | 25 A | 10 ÷ 25 A | 0.5 ÷ 25 s | 15 ÷ 250 A | 0.05 ÷ 0.5 s | 38 ÷ 300 A | 10 ÷ 40 A | 10 ÷ 40 A |
| | | 40 A | 16 ÷ 40 A | 0.5 ÷ 25 s | 24 ÷ 400 A | | 60 ÷ 480 A | 16 ÷ 63 A | 16 ÷ 63 A |
| | | 63 A | 25 ÷ 63 A | 0.5 ÷ 25 s | 38 ÷ 630 A | | 95 ÷ 756 A | 25 ÷ 100 A | 25 ÷ 100 A |
| | | 100 A | 40 ÷ 100 A | 0.5 ÷ 25 s | 60 ÷ 1 000 A | | 150 ÷ 1 200 A | 20 ÷ 160 A | 20 ÷ 100 A |
| | 160 A | 25 A | 10 ÷ 25 A | 0.5 ÷ 25 s | 15 ÷ 250 A | | 38 ÷ 300 A | 10 ÷ 40 A | 10 ÷ 40 A |
| | | 40 A | 16 ÷ 40 A | 0.5 ÷ 25 s | 24 ÷ 400 A | | 60 ÷ 480 A | 16 ÷ 63 A | 16 ÷ 63 A |
| | | 63 A | 25 ÷ 63 A | 0.5 ÷ 25 s | 38 ÷ 630 A | | 95 ÷ 756 A | 25 ÷ 100 A | 25 ÷ 100 A |
| | | 100 A | 40 ÷ 100 A | 0.5 ÷ 25 s | 60 ÷ 1 000 A | | 150 ÷ 1 200 A | 20 ÷ 160 A | 20 ÷ 160 A |
| | | 160 A | 63 ÷ 160 A | 0.5 ÷ 20 s | 96 ÷ 1 600 A | | 240 ÷ 1 600 A | 32 ÷ 250 A | 32 ÷ 160 A |
| | | 250 A | 160 A | 63 ÷ 160 A | 0.5 ÷ 25 s | | 96 ÷ 1 600 A | 240 ÷ 1 920 A | 32 ÷ 250 A |
| Class M, H, C, | 400 A | 250 A | 100 ÷ 250 A | 0.5 ÷ 15 s | 150 ÷ 2 500 A | 375 ÷ 2 500 A | 50 ÷ 400 A | 50 ÷ 250 A | |
| | | 400 A | 100 ÷ 250 A | 0.5 ÷ 25 s | 150 ÷ 2 500 A | 375 ÷ 3 000 A | 50 ÷ 400 A | 50 ÷ 400 A | |
| | 400 A | 160 ÷ 400 A | 0.5 ÷ 17 s | 240 ÷ 4 000 A | 600 ÷ 4 000 A | 80 ÷ 630 A | 80 ÷ 400 A | | |
| Class M, H, C | 630 A | 400 A | 160 ÷ 400 A | 0.2 ÷ 25 s | 240 ÷ 4 000 A | 600 ÷ 6 000 A | 80 ÷ 630 A | 80 ÷ 500 A | |
| | | 500 A | 200 ÷ 500 A | 0.5 ÷ 20 s | 300 ÷ 5 000 A | 750 ÷ 7 000 A | 100 ÷ 800 A | 100 ÷ 500 A | |
| | | 630 A | 250 ÷ 630 A | 0.5 ÷ 12 s | 378 ÷ 5 670 A | 945 ÷ 5 670 A | 126 ÷ 1 000 A | 126 ÷ 630 A | |

1) with external current transformer for N conductor 2) for 4-pole circuit breaker

Trip unit ETU550, ETU850 LSI

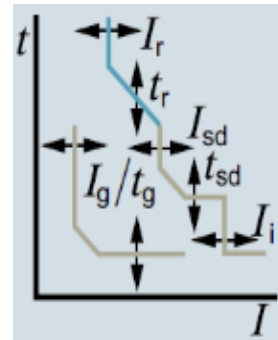
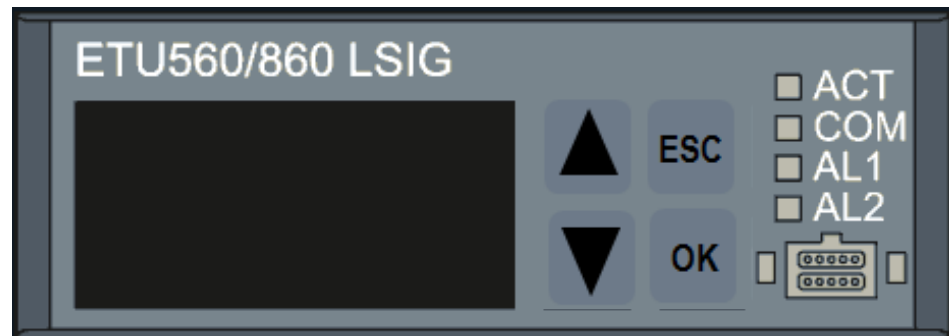


- Line protection
- Setting by means of display and push-buttons (setting by 1 ampere)
- Possibility of setting of thermal release (including delay)
- Possibility of setting of selective release (including delay)
- Possibility of setting of short-circuit release

| | | I_n | I_r | t_r | I_{sd} | t_{sd} | I_i | $I_N^{1)}$ | $I_N^{2)}$ |
|------------------|--------|---------|--------------|------------|----------------|--------------|-----------------|---------------|---------------|
| Class M, H, C | 1000 A | 630 A | 250 ÷ 630 A | 0.5 ÷ 25 s | 378 ÷ 6 300 A | 0.05 ÷ 0.5 s | 945 ÷ 7 560 A | 126 ÷ 1 000 A | 126 ÷ 630 A |
| | | 800 A | 320 ÷ 800 A | 0.5 ÷ 25 s | 480 ÷ 8 000 A | | 1200 ÷ 8 000 A | 160 ÷ 1 280 A | 160 ÷ 800 A |
| | | 1 000 A | 400 ÷ 1 000A | 0.5 ÷ 25 s | 600 ÷ 10 000 A | | 1500 ÷ 10 000 A | 200 ÷ 1 600 A | 200 ÷ 1 000 A |

1) with external current transformer for N conductor 2) for 4-pole circuit breaker

Trip unit ETU560, ETU860 LSIG

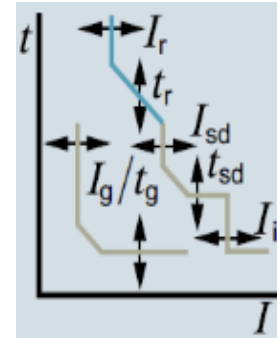


- Line protection
- Setting by means of display and push-buttons (setting by 1 ampere)
- Possibility of setting of thermal release (including delay)
- Possibility of setting of selective release (including delay)
- Possibility of setting of short-circuit release
- Possibility of earth fault protection setting

| | | I_n | I_r | t_r | I_{sd} | t_{sd} | I_i | I_g | t_g | $I_N^{1)}$ | $I_N^{2)}$ |
|------------------------|-------|-------------|-------------|---------------|---------------|---------------|---------------|---------------|--------------|------------|------------|
| Class M, H, C, L | 100 A | 25 A | 10 ÷ 25 A | 0.5 ÷ 25 s | 15 ÷ 250 A | 0.05 ÷ 0.5 s | 38 ÷ 300 A | 5 ÷ 25 A | 0.05 ÷ 0.8 s | 10 ÷ 40 A | 10 ÷ 40 A |
| | | 40 A | 16 ÷ 40 A | 0.5 ÷ 25 s | 24 ÷ 400 A | | 60 ÷ 480 A | 8 ÷ 40 A | | 16 ÷ 63 A | 16 ÷ 63 A |
| | | 63 A | 25 ÷ 63 A | 0.5 ÷ 25 s | 38 ÷ 630 A | | 95 ÷ 756 A | 13 ÷ 63 A | | 25 ÷ 100 A | 25 ÷ 100 A |
| | | 100 A | 40 ÷ 100 A | 0.5 ÷ 25 s | 60 ÷ 1 000 A | | 150 ÷ 1 200 A | 20 ÷ 100 A | | 20 ÷ 160 A | 20 ÷ 100 A |
| | 160 A | 25 A | 10 ÷ 25 A | 0.5 ÷ 25 s | 15 ÷ 250 A | | 38 ÷ 300 A | 5 ÷ 25 A | | 10 ÷ 40 A | 10 ÷ 40 A |
| | | 40 A | 16 ÷ 40 A | 0.5 ÷ 25 s | 24 ÷ 400 A | | 60 ÷ 480 A | 8 ÷ 40 A | | 16 ÷ 63 A | 16 ÷ 63 A |
| | | 63 A | 25 ÷ 63 A | 0.5 ÷ 25 s | 38 ÷ 630 A | | 95 ÷ 756 A | 13 ÷ 63 A | | 25 ÷ 100 A | 25 ÷ 100 A |
| | | 100 A | 40 ÷ 100 A | 0.5 ÷ 25 s | 60 ÷ 1 000 A | | 150 ÷ 1 200 A | 20 ÷ 100 A | | 20 ÷ 160 A | 20 ÷ 160 A |
| | | 160 A | 63 ÷ 160 A | 0.5 ÷ 20 s | 96 ÷ 1 600 A | | 240 ÷ 1 600 A | 32 ÷ 160 A | | 32 ÷ 250 A | 32 ÷ 160 A |
| | 250 A | 160 A | 63 ÷ 160 A | 0.5 ÷ 25 s | 96 ÷ 1 600 A | | 240 ÷ 1 920 A | 32 ÷ 160 A | | 32 ÷ 250 A | 32 ÷ 250 A |
| 250 A | | 100 ÷ 250 A | 0.5 ÷ 15 s | 150 ÷ 2 500 A | 375 ÷ 2 500 A | 50 ÷ 250 A | 50 ÷ 400 A | 50 ÷ 250 A | | | |
| Class M, H, C, | 400 A | 250 A | 100 ÷ 250 A | 0.5 ÷ 25 s | 150 ÷ 2 500 A | 375 ÷ 3 000 A | 50 ÷ 250 A | 50 ÷ 400 A | 50 ÷ 400 A | | |
| | | 400 A | 160 ÷ 400 A | 0.5 ÷ 17 s | 240 ÷ 4 000 A | 600 ÷ 4 000 A | 80 ÷ 400 A | 80 ÷ 630 A | 80 ÷ 400 A | | |
| Class M, H, C | 630 A | 400 A | 160 ÷ 400 A | 0.2 ÷ 25 s | 240 ÷ 4 000 A | 600 ÷ 6 000 A | 80 ÷ 400 A | 80 ÷ 630 A | 80 ÷ 500 A | | |
| | | 500 A | 200 ÷ 500 A | 0.5 ÷ 20 s | 300 ÷ 5 000 A | 750 ÷ 7 000 A | 100 ÷ 500 A | 100 ÷ 800 A | 100 ÷ 500 A | | |
| | | 630 A | 250 ÷ 630 A | 0.5 ÷ 12 s | 378 ÷ 5 670 A | 945 ÷ 5 670 A | 126 ÷ 630 A | 126 ÷ 1 000 A | 126 ÷ 630 A | | |

1) with external current transformer for N conductor 2) for 4-pole circuit breaker

Trip unit ETU560, ETU860 LSIG



- Line protection
- Setting by means of display and push-buttons (setting by 1 ampere)
- Possibility of setting of thermal release (including delay)
- Possibility of setting of selective release (including delay)
- Possibility of setting of short-circuit release
- Possibility of earth fault protection setting

| | | I_n | I_r | t_r | I_{sd} | t_{sd} | I_i | I_g | t_g | $I_N^{1)}$ | $I_N^{2)}$ |
|------------------|---------|---------|--------------|------------|----------------|--------------|-----------------|---------------|--------------|---------------|---------------|
| Class M, H, C | 1 000 A | 630 A | 250 ÷ 630 A | 0.5 ÷ 25 s | 378 ÷ 6 300 A | 0.05 ÷ 0.5 s | 945 ÷ 7 560 A | 126 ÷ 630 A | 0.05 ÷ 0.8 s | 126 ÷ 1 000 A | 126 ÷ 630 A |
| | | 800 A | 320 ÷ 800 A | 0.5 ÷ 25 s | 480 ÷ 8 000 A | | 1200 ÷ 8 000 A | 160 ÷ 800 A | | 160 ÷ 1 280 A | 160 ÷ 800 A |
| | | 1 000 A | 400 ÷ 1 000A | 0.5 ÷ 25 s | 600 ÷ 10 000 A | | 1500 ÷ 10 000 A | 200 ÷ 1 000 A | | 200 ÷ 1 600 A | 200 ÷ 1 000 A |

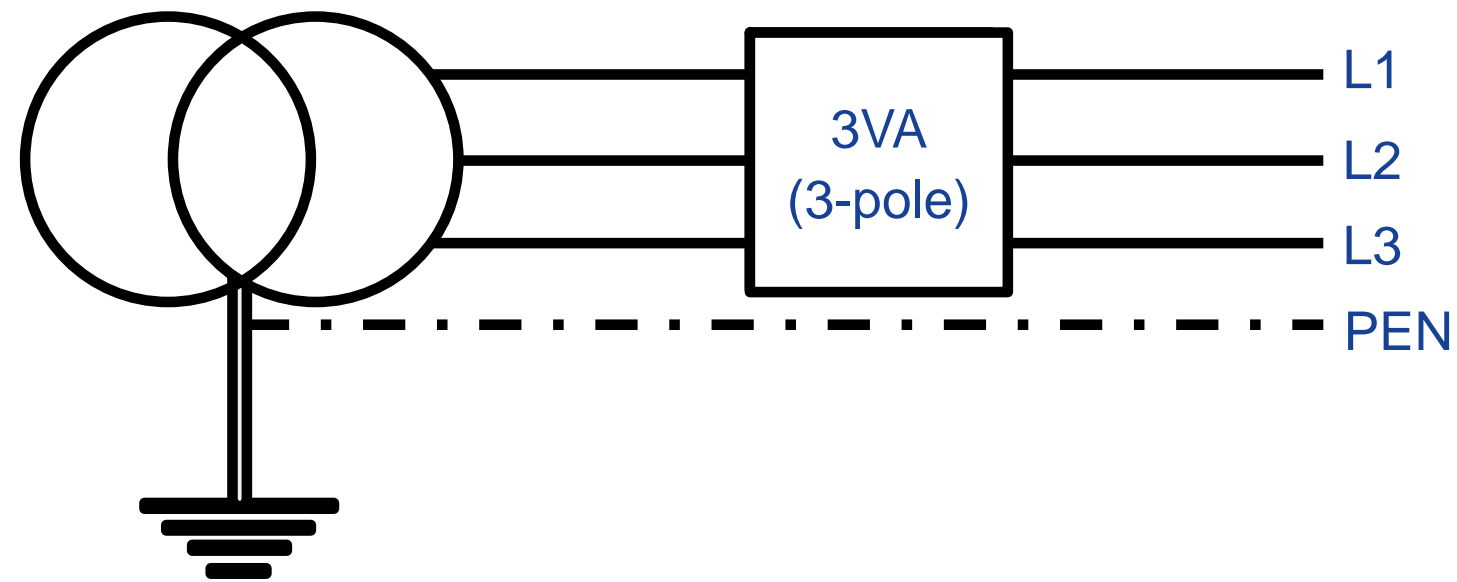
1) with external current transformer for N conductor 2) for 4-pole circuit breaker

Trip units ETU

Ground fault protection – monitoring principle

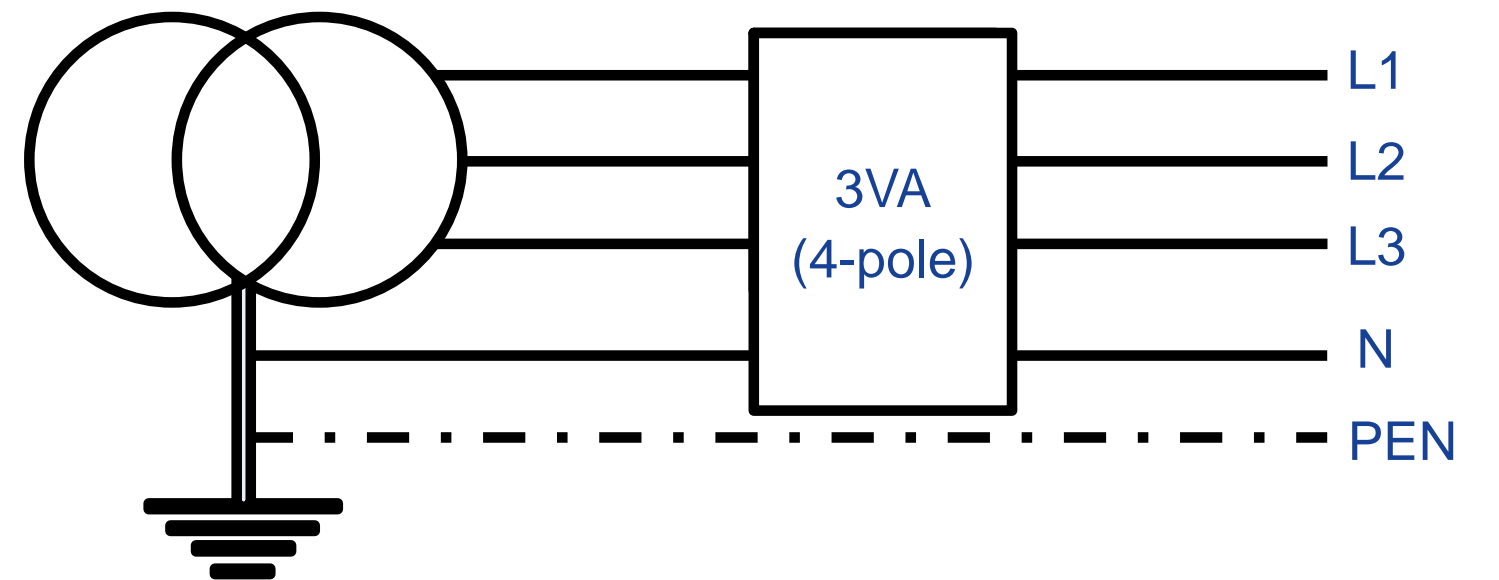
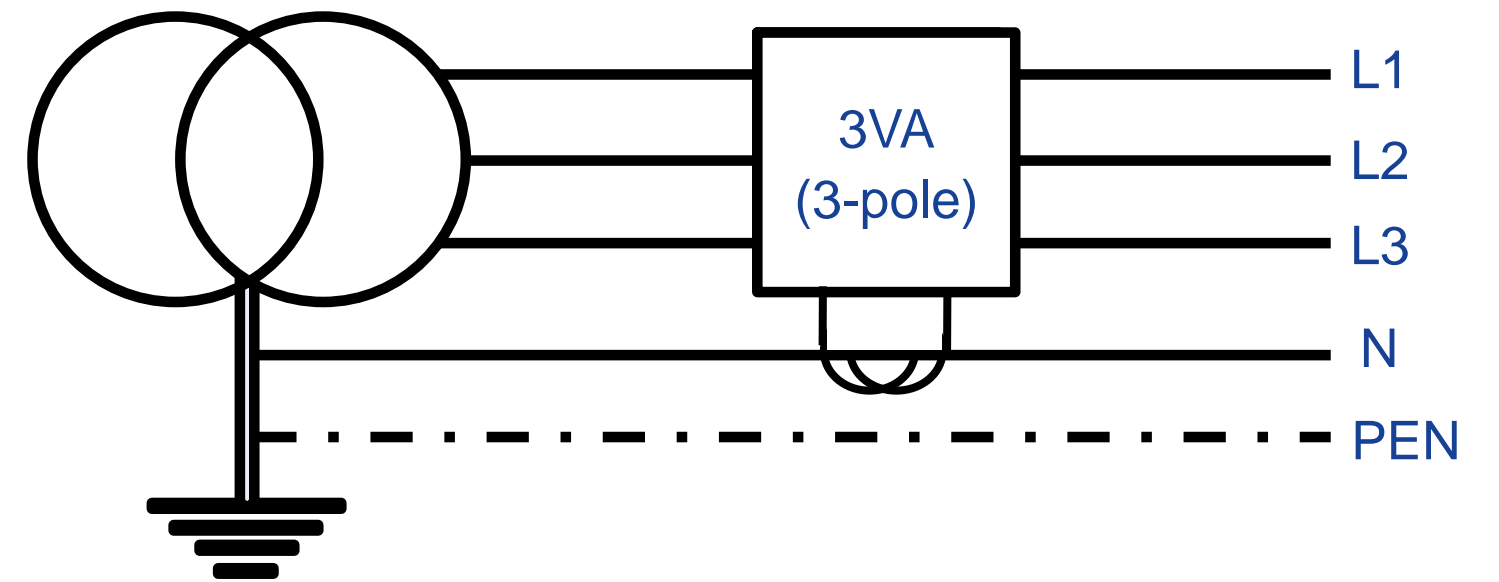
Use in TN-C networks:

- Without N conductor
- Vector sum $L1 + L2 + L3$



Use in TN-S networks:

- Vector sum $L1 + L2 + L3 + N$
- Without protection of N conductor or with protected N conductor

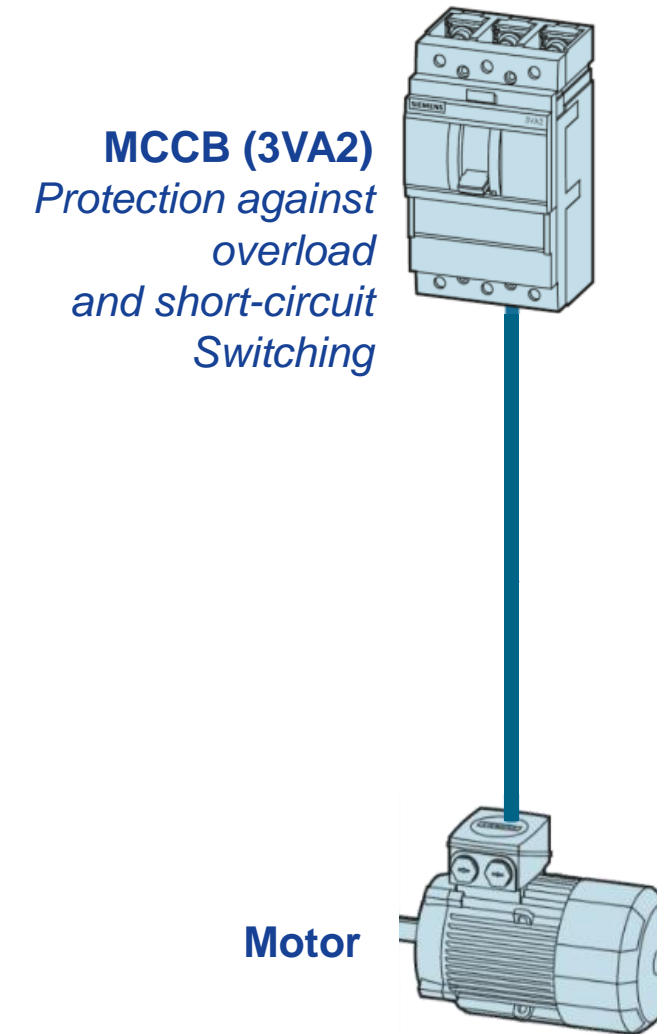
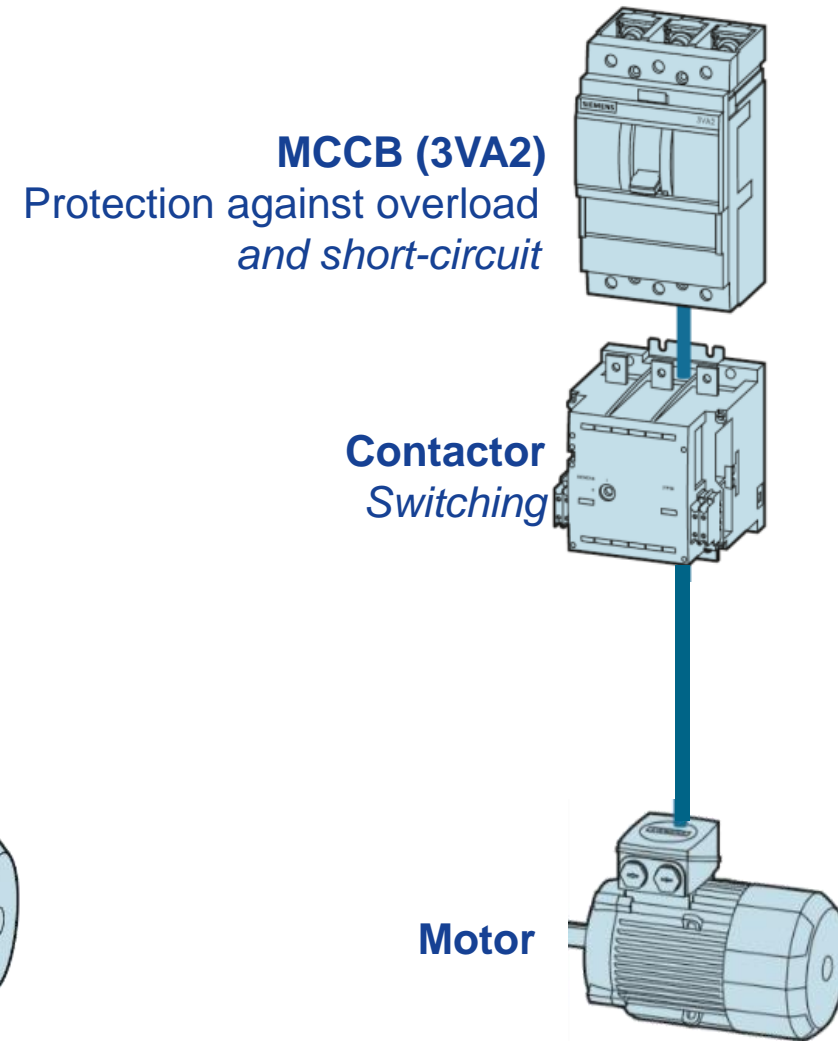
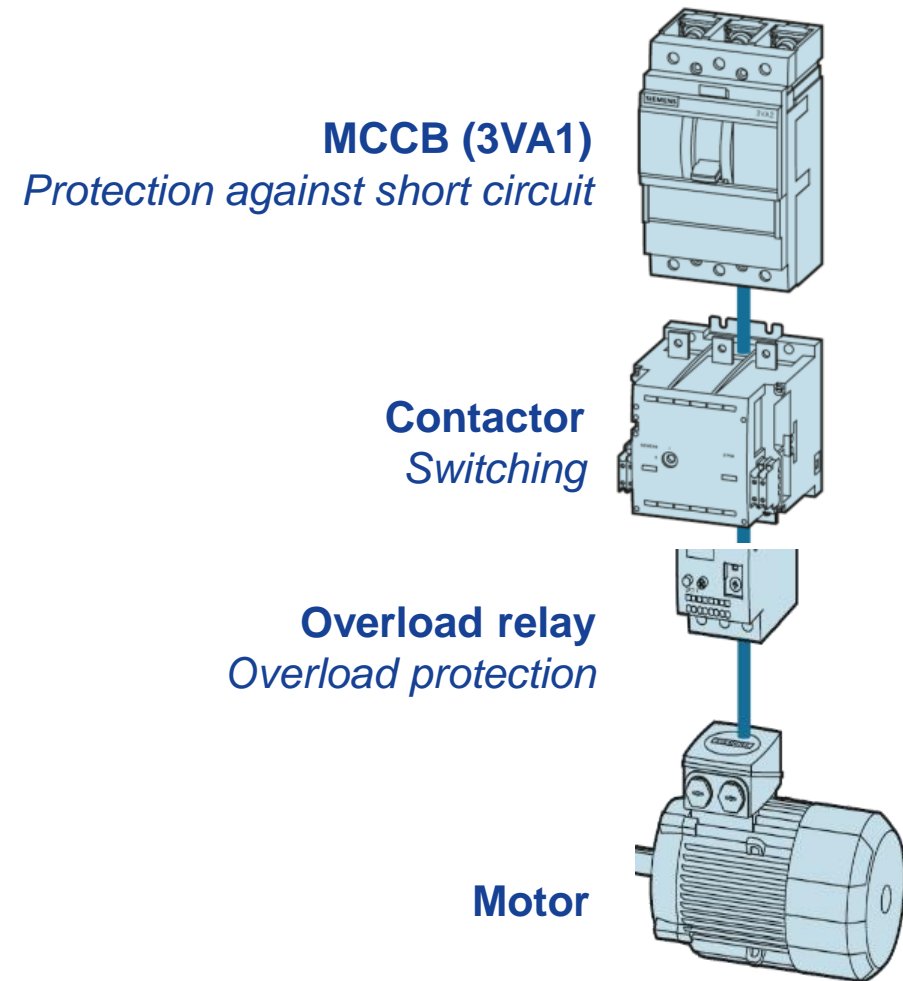


Motor protection

- 3VA1 - motor protection (only short-circuit release)
- 3VA2 – motor protection
- $I_n = 1 \div 800 \text{ A}$
- Use for IE3 motors up to 200 kW (AC-3)

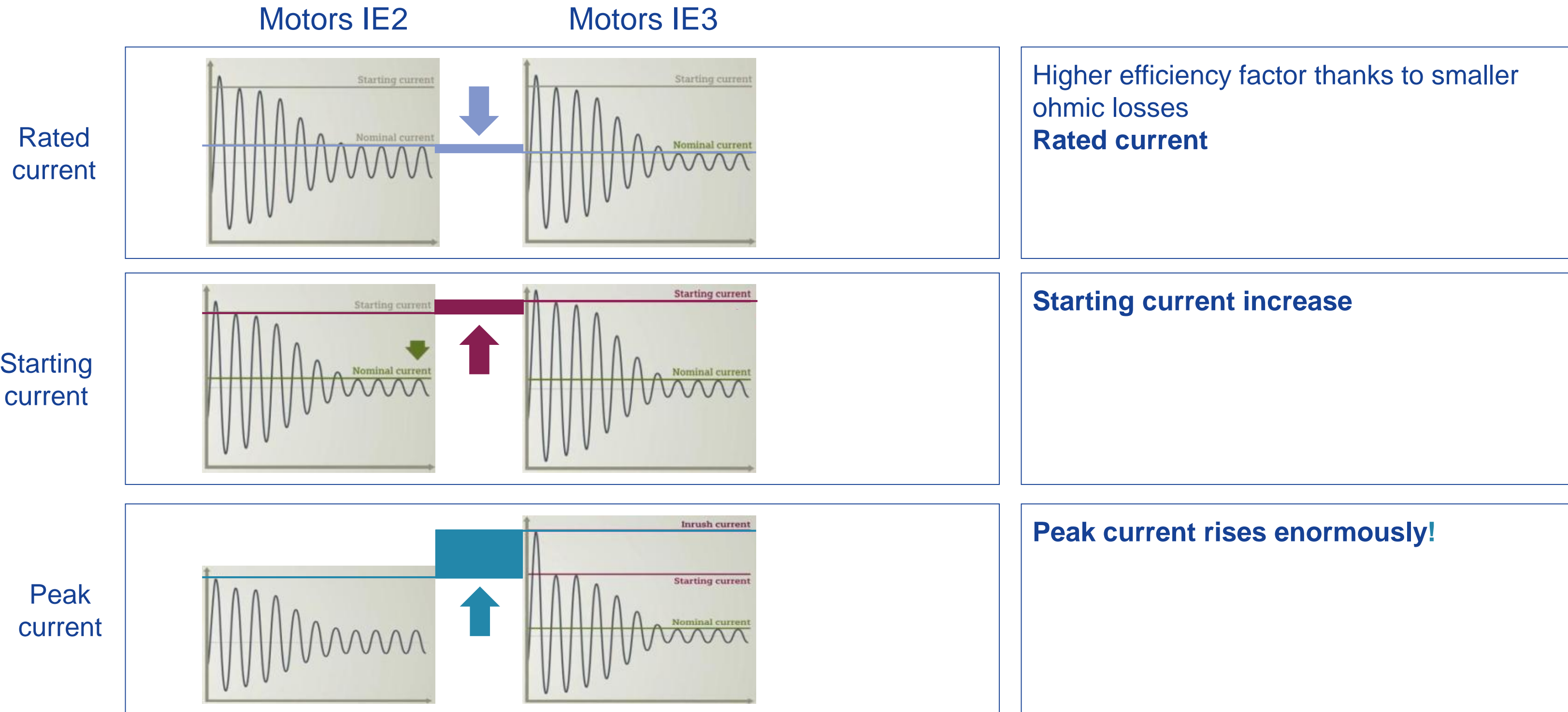


Trip units ETU – motor protection



Trip units ETU – motor protection

Motor protection – IE3 standard



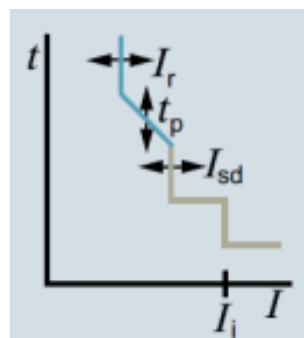
Trip units ETU – motor protection

Overview of trip units

| | 3VA1 | 3VA2 | 3VA2 | 3VA2 |
|------------------------------------|---|---------------------------|--------------------------------------|--------------------------------------|
| | TM110M, TM120M | ETU350M | ETU550M | ETU860M |
| | Motor protection – only short-circuit release | Motor protection | Motor protection | Motor protection |
| I_i | $16x I_n, (7 \div 16)x I_n$ | $15x I_n$ | $(3 \div 15)x I_n$ | $(3 \div 15)x I_n$ |
| Breaking class T_C ¹⁾ | - | 10A, 10 / 10E 20 / 20E | 10A, 10 / 10E, 20 / 20E, 30 / 30E | 10A, 10 / 10E, 20 / 20E, 30 / 30E |
| Break time T_P | - | - | 3 ÷ 30 s | 3 ÷ 30 s |

1) according to IEC 60947-4-1

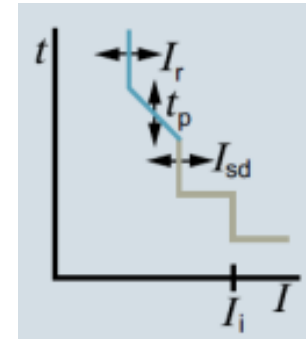
Trip unit ETU350M LSI



- Motor protection
- Setting by means of rotary switches
- Possibility of setting of thermal release (including breaking class)
- Possibility of setting of selective release
- The value of the short-circuit release is fixed

| | | I_n | I_r | T_c | | | I_{sd} | t_{sd} | I_i |
|---------------|---------------|-------------|-------------|-------|----------|----------|-----------------|----------|---------|
| | | | | 10A | 10 / 10E | 20 / 20E | | | |
| Class M, C | 100 A (3VA20) | – | – | – | – | – | – | – | – |
| | 160 A (3VA21) | 25 A | 10 ÷ 25 A | 4 | 8 | 17 | $3 \div 15 I_r$ | 30 ms | 375 A |
| | | 40 A | 16 ÷ 40 A | | | 17 | | | 600 A |
| | | 63 A | 25 ÷ 63 A | | | 17 | | | 945 A |
| | | 100 A | 40 ÷ 100 A | | | 17 | | | 1 500 A |
| | 250 A (3VA22) | 160 A | 63 ÷ 160 A | | | 17 | | | 2 400 A |
| | | 200 A | 100 ÷ 200 A | | | 15 | | | 3 000 A |
| | 400 A (3VA23) | 250 A | 100 ÷ 250 A | | | 17 | | | 3 750 A |
| | | 400 A | 160 ÷ 400 A | | | 17 | | | 6 000 A |
| | 630 A (3VA24) | 400 A | 160 ÷ 400 A | | | 17 | | | 6 000 A |
| 500 A | | 250 ÷ 500 A | 15 | | | 7 500 A | | | |

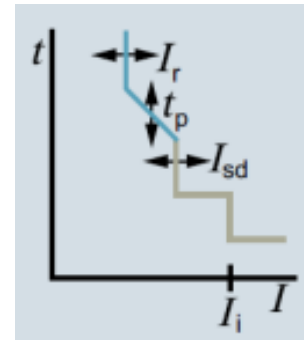
Trip unit ETU350M LSI



- Motor protection
- Setting by means of rotary switches
- Possibility of setting of thermal release (including breaking class)
- Possibility of setting of selective release
- The value of the short-circuit release is fixed

| | | I_n | I_r | T_c | | | I_{sd} | t_{sd} | I_i |
|------------|-----------------|-------|-------------|-------|----------|----------|--------------------------|----------|----------|
| | | | | 10A | 10 / 10E | 20 / 20E | | | |
| Class M, C | 1 000 A (3VA25) | 630 A | 250 ÷ 630 A | 4 | 8 | 17 | $(3 \div 15) \times I_r$ | 30 ms | 9 450 A |
| | | 800 A | 320 ÷ 800 A | | | 15 | | | 12 000 A |

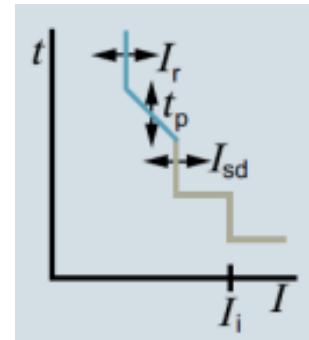
Trip unit ETU550M LSI



- Motor protection
- Setting by means of display and push-buttons (setting by 1 ampere)
- Possibility of setting of thermal release
- Possibility of setting of selective release
- Possibility of setting of short-circuit release
- Setting of breaking class T_c or time T_p and phase asymmetry

| | | I_n | I_r | I_{sd} | t_{sd} | I_i |
|---------------|-----------------|---------------|-------------|--------------------|----------|------------------|
| Class M, C | 100 A (3VA20) | – | – | – | – | – |
| | 160 A (3VA21) | 25 A | 10 ÷ 25 A | (1.2 ÷ 15) × I_n | 30 ms | 75 ÷ 375 A |
| | | 40 A | 16 ÷ 40 A | | | 120 ÷ 600 A |
| | | 63 A | 25 ÷ 63 A | | | 189 ÷ 945 A |
| | | 100 A | 40 ÷ 100 A | | | 300 ÷ 1 500 A |
| | 250 A (3VA22) | 160 A | 63 ÷ 160 A | | | 480 ÷ 2 400 A |
| | | 200 A | 80 ÷ 200 A | | | 600 ÷ 3 000 A |
| | | 400 A (3VA23) | 100 ÷ 250 A | | | 750 ÷ 3 750 A |
| | 630 A (3VA24) | 400 A | 160 ÷ 400 A | | | 1 200 ÷ 6 000 A |
| | | 500 A | 250 ÷ 500 A | | | 1 500 ÷ 7 500 A |
| | | 630 A | 250 ÷ 630 A | | | 1 890 ÷ 9 450 A |
| | 1 000 A (3VA25) | 800 A | 320 ÷ 800 A | | | 2 400 ÷ 12 000 A |

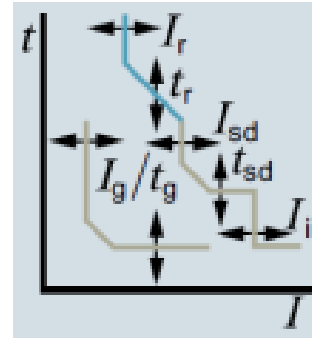
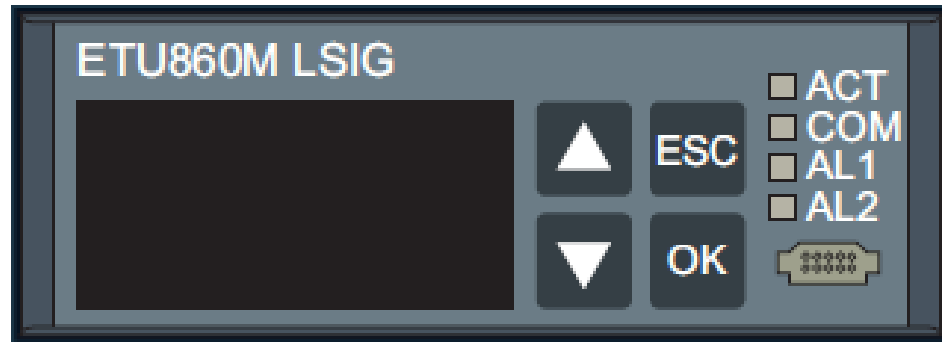
Trip unit ETU550M LSI



- Motor protection
- Setting by means of display and push-buttons (setting by 1 ampere)
- Possibility of setting of thermal release
- Possibility of setting of selective release
- Possibility of setting of short-circuit release
- Setting of breaking class T_c or time T_p and phase asymmetry

| | | I_n | T_c | | | | | T_p | I | | | |
|---------------|-----------------|-------|-------|----------|----------|----|-----|----------|-----------------|---|---|---|
| | | | 10A | 10 / 10E | 20 / 20E | 30 | 30E | | | | | |
| Class M, C | 100 A (3VA20) | — | — | — | — | — | — | — | — | | | |
| | 160 A (3VA21) | 25 A | 4 | 8 | 17 | 24 | 24 | 3 ÷ 30 s | OFF, (5 ÷ 50) % | | | |
| | | 40 A | | | 17 | 24 | 24 | 3 ÷ 30 s | | | | |
| | | 63 A | | | 17 | 24 | 24 | 3 ÷ 30 s | | | | |
| | | 100 A | | | 17 | 24 | 24 | 3 ÷ 25 s | | | | |
| | 250 A (3VA22) | 160 A | | | 17 | 20 | — | 3 ÷ 20 s | | | | |
| | | 200 A | | | 12 | 15 | — | 3 ÷ 15 s | | | | |
| | | 250 A | | | 17 | 24 | 24 | 3 ÷ 30 s | | | | |
| | 400 A (3VA23) | 400 A | | | 17 | 24 | 24 | 3 ÷ 25 s | | | | |
| | | 500 A | | | 12 | 13 | — | 3 ÷ 15 s | | | | |
| | 630 A (3VA24) | 630 A | | | 17 | 24 | 24 | 3 ÷ 24 s | | | | |
| | | 800 A | | | 12 | 15 | — | 3 ÷ 15 s | | | | |
| | 1 000 A (3VA25) | — | | | — | — | — | — | | — | — | — |

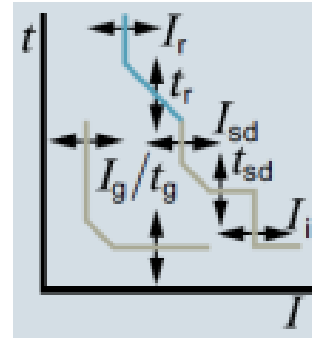
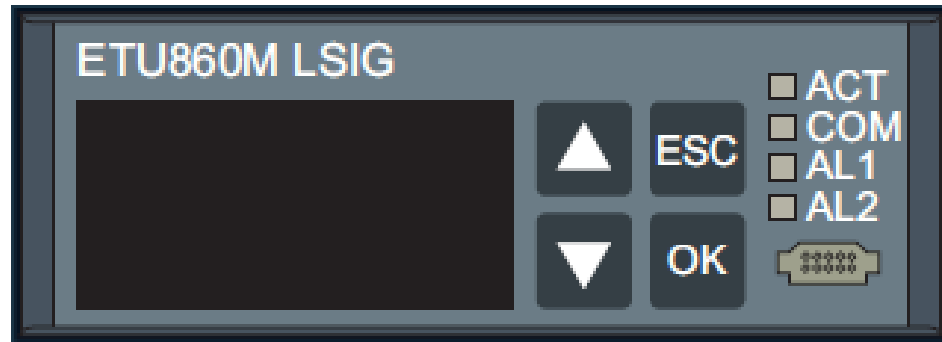
Trip unit ETU860M LSIG



- Motor protection
- Setting by means of display and push-buttons (setting by 1 ampere)
- Possibility of setting of thermal release
- Possibility of setting of selective release
- Possibility of setting of short-circuit release and earth fault protection
- Setting of breaking class T_c or time T_p and phase asymmetry
- Setting of blocking protection and no-load protection

| | | I_n | I_r | I_{sd} | t_{sd} | I_i | I_g | t_g |
|-----------------|---------------|---------------|------------------|----------------------------|----------|------------------|------------------|-------------|
| Class M, C | 100 A (3VA20) | — | — | — | — | — | — | — |
| | 160 A (3VA21) | 25 A | 10 ÷ 25 A | $(1.2 \div 15) \times I_n$ | 30 ms | 75 ÷ 375 A | 5 ÷ 25 A, OFF | 50 ÷ 800 ms |
| | | 40 A | 16 ÷ 40 A | | | 120 ÷ 600 A | 8 ÷ 40 A, OFF | |
| | | 63 A | 25 ÷ 63 A | | | 189 ÷ 945 A | 13 ÷ 63 A, OFF | |
| | | 100 A | 40 ÷ 100 A | | | 300 ÷ 1 500 A | 20 ÷ 100 A, OFF | |
| | 250 A (3VA22) | 160 A | 63 ÷ 160 A | | | 480 ÷ 2 400 A | 32 ÷ 160 A, OFF | |
| | | 200 A | 80 ÷ 200 A | | | 600 ÷ 3 000 A | 50 ÷ 250 A, OFF | |
| | | 400 A (3VA23) | 250 A | | | 100 ÷ 250 A | 750 ÷ 3 750 A | |
| | 630 A (3VA24) | 400 A | 160 ÷ 400 A | | | 1 200 ÷ 6 000 A | 80 ÷ 400 A, OFF | |
| | | 500 A | 250 ÷ 500 A | | | 1 500 ÷ 7 500 A | 100 ÷ 500 A, OFF | |
| 1 000 A (3VA25) | 630 A * | 250 ÷ 630 A | 1 890 ÷ 9 450 A | | | 126 ÷ 630 A, OFF | | |
| | 800 A | 320 ÷ 800 A | 2 400 ÷ 12 000 A | 180 ÷ 800 A, OFF | | | | |

Trip unit ETU860M LSIG



- Motor protection
- Setting by means of display and push-buttons (setting by 1 ampere)
- Possibility of setting of thermal release
- Possibility of setting of selective release
- Possibility of setting of short-circuit release and earth fault protection
- Setting of breaking class T_c or time T_p and phase asymmetry
- Setting of blocking protection and no-load protection

| | | I_n | T_c | | | | | T_p | I | I_b | t_b | $I_{<<}$ | $t_{<<}$ | |
|---------------|--------------------|------------------|-------|----------|----------|----|-----|----------|-----------------|--------------------|----------|---------------------|-----------|--------------------|
| | | | 10A | 10 / 10E | 20 / 20E | 30 | 30E | | | | | | | |
| Class M, C | 100 A (3VA20) | — | — | — | — | — | — | — | — | — | 1 ÷ 10 s | (0.3 ÷ 0.9) × I_r | 1 ÷ 200 s | |
| | 160 A (3VA21) | 25 A | 4 | 8 | 17 | 24 | 24 | 3 ÷ 30 s | OFF, (5 ÷ 50) % | 30 ÷ 250 A, OFF | | | | |
| | | 40 A | | | 17 | 24 | 24 | 3 ÷ 30 s | | 48 ÷ 400 A, OFF | | | | |
| | | 63 A | | | 17 | 24 | 24 | 3 ÷ 30 s | | 76 ÷ 630 A, OFF | | | | |
| | | 100 A | | | 17 | 24 | 24 | 3 ÷ 25 s | | 120 ÷ 1 000 A, OFF | | | | |
| | 250 A (3VA22) | 160 A | | | 17 | 20 | — | 3 ÷ 20 s | | 162 ÷ 1 600 A, OFF | | | | |
| | | 200 A | | | 12 | 15 | — | 3 ÷ 15 s | | 240 ÷ 2 000 A, OFF | | | | |
| | | 400 A (3VA23) | | | 250 A | 17 | 24 | 24 | | 3 ÷ 30 s | | | | 300 ÷ 2 500 A, OFF |
| | | | | | 400 A | 17 | 24 | 24 | | 3 ÷ 25 s | | | | 480 ÷ 4 000 A, OFF |
| | 630 A (3VA24) | 500 A | | | 12 | 15 | — | 3 ÷ 15 s | | 600 ÷ 5 000 A, OFF | | | | |
| | | 630 A | | | 17 | 24 | 24 | 3 ÷ 24 s | | 756 ÷ 6 300 A, OFF | | | | |
| | 1 000 A (3VA25) | 800 A | | | 12 | 15 | — | 3 ÷ 15 s | | 960 ÷ 8 000 A, OFF | | | | |

Trip units ETU – motor protection

Protection against phase asymmetry

- The phase asymmetry ratio is calculated from the average value of the three phases L1, L2 and L3 and the maximum deviation of the phase current from this value. If the phase asymmetry ratio exceeds the set value, the circuit breaker switches off at the break time t_{unbal} .

| | 3VA2 ETU350M Protection of motors | 3VA2 ETU550M Protection of motors | 3VA2 ETU860M Protection of motors |
|------------------------------------|--|---|---|
| Asymmetry ratio | 40 % fix | (5 ÷ 50) % (default setting 40 %) | (5 ÷ 50) % (default setting 40 %) |
| Protection against phase asymmetry | ON | ON/OFF (default setting ON) | ON/OFF (default setting ON) |
| Delay $t_{unbalance}$ | 0.7 s for starting 4 s for continuous operation | 0.7 ÷ 60 s for starting 4 ÷ 420 s for continuous operation | 0.7 ÷ 60 s for starting 4 ÷ 420 s for continuous operation |

Trip units ETU – motor protection

- Blocking protection
- If the motor is blocked (reaches the stalling torque), a high current is generated in the rotor and stator – almost as high as the starting current, but not as high as the short-circuit current. Without blocking protection, it takes up to 30 s or more (depending on the current and TP settings) before the circuit breaker trips. This leads to unnecessary thermal load on the motor.
- The blocking protection is automatically deactivated during starting up until the motor reaches the operating speed (t_{start}). t_{start} equals t_b .
- Example of use: stone crushers (too big or too hard stones) or belt conveyors (clogging the conveyor with goods).

| | |
|------------------|--|
| | 3VA2 |
| | ETU860M |
| | Protection of motors |
| I_b | $(1.2 \div 10) \times I_n$ in A (default setting 10) |
| Delay t_b | 1 ÷ 10 s (default setting 1 s) |
| Stall protection | ON/OFF (default setting ON) |



Trip units ETU – motor protection

No-load protection

- When a load is disconnected from the motor, for example when the chain or drive belt breaks, the current drops below the normal operating current of the motor. The integrated no-load protection detects this condition and trips the circuit breaker

| | |
|--------------------|---|
| | 3VA2 |
| | ETU860M |
| | Protection of motors |
| $I_{<<}$ | $(0.3 \div 0.9) \times I_r$ (default setting 0.9) |
| Delay $t_{<<}$ | 1 ÷ 200 s (default setting 1 s) |
| No-load protection | ON/OFF (default setting OFF) |



Trip units ETU – motor protection

Motor switching according to IEC 60947-4-1

| | I_n | I_r | P (kW) | I (A) | Electrical endurance of circuit breaker at AC-3 (cycles) |
|-------|-------|-------------|--------|-------|--|
| 3VA21 | 25 A | 10 ÷ 25 A | 11 | 22 | 10 000 |
| | 40 A | 16 ÷ 40 A | 18.5 | 35 | 10 000 |
| | 63 A | 25 ÷ 63 A | 22 | 41 | 10 000 |
| | | | 30 | 55 | 7 500 |
| | 100 A | 40 ÷ 100 A | 37 | 66 | 5 000 |
| | | | 45 | 80 | 5 000 |
| 55 | | | 97 | 5 000 | |
| 3VA22 | 160 A | 63 ÷ 160 A | 75 | 132 | 6 500 |
| 3VA23 | 250 A | 100 ÷ 250 A | 90 | 160 | 4 000 |
| | | | 110 | 195 | 4 000 |
| 3VA24 | 400 A | 160 ÷ 400 A | 160 | 280 | 3 000 |
| | 500 A | 250 ÷ 500 A | 200 | 350 | 2 500 |



Thank you for your attention

