

TECHNICAL MANUAL

Molded case circuit breakers
AV POWER



AV AVERES

1 DESCRIPTION

The molded case circuit breaker AV POWER is designed for infrequent routine close/open operations and overload/short-circuit protection in the distribution networks and electric motors. The molded case circuit breakers are used in electrical installations at rated voltage of up to 690V AC, at frequency of 50 Hz, under currents from 10 to 1600 A.

The molded case circuit breakers are produced according to IEC 60947-2:2016.

Application area: protection of distribution networks and electric motors against the main parameters.

Types of trip units:

TM – Thermomagnetic trip unit;

ETU2.0 – electronic trip unit;

ETU2.2 – electronic trip unit (RS485 communication type);

ETU4.0 – electronic trip unit (LCD display);

ETU4.2 electronic trip unit (RS485 communication type).

ETU6.0 – electronic trip unit (LCD display);

ETU6.2 – electronic trip unit (RS485 communication type).

The molded case circuit breakers AV POWER can be equipped with accessories: shunt release, undervoltage release, auxiliary and alarm contacts, extended rotary handle and motor mechanism. Additionally, the ETU2.2, ETU4.2, ETU6.2 electronic trip units are equipped with a communication module for data transfer to standard databusses. When using the ETU2.2, ETU4.2, ETU6.2 electronic trip units, the remote control and protection circuits can be created as a part of the SCADA systems. For this purpose there are various communication modules and protocol converters. There are remote programming and indication panels for local control.

Accessories are not included in the delivery scope of the molded case circuit breakers AV POWER, except for the AV-TX2 communication module, which is included in the package with the ETU2.2 and ETU6.2 trip units.

The user purchases this equipment independently and completes the molded case circuit breaker AV POWER in accordance with the features of the protected object.

2 TECHNICAL DATA

Type code:

AV POWER-X/X XXX XX X

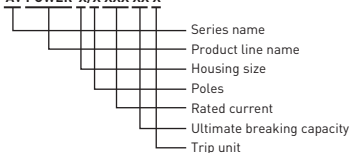


Table 1

| AV POWER TM | | AV POWER-1 | AV POWER-2 | AV POWER-3 | AV POWER-4 |
|--|------------|--|---|------------------------------------|------------------|
| Number of poles | | 3P/4P | | | |
| Rated current, In [A] | | 10, 16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 140, 160 | 100, 125, 140, 160, 180, 200, 225, 250 | 250, 315, 350, 400, 500, 630 | 630, 700, 800 |
| Rated insulation voltage, Ui [V] | | AC800 | | AC1000 | AC800 |
| Rated impulse voltage, Uimp [kV] | | 8 | 8 | 12 | 8 |
| Rated operational voltage, Ue [V] | | AC400/AC690 | | | |
| Rated ultimate breaking capacity, Icu [kA] AC 50/60 Hz | 400 V | 35/80 | | 35/100 | |
| | 500 V | 18/50 | | 30/65 | |
| | 690 V | 8/25 | | 8/30 | |
| Rated breaking capacity, Ics [kA] AC 50/60 Hz | 400 V | 35/75 | | 35/80 | |
| | 500 V | 12,5/40 | 20/50 | 20/50 | 20/40 |
| | 690 V | 5/10 | 5,5/12,5 | 5,5/15 | 5,5/20 |
| Utilization category | | A | | | |
| Endurance (without maintenance) | mechanical | 25 000 | | 10 000 | |
| | electrical | 10 000 | | 8 000 | 7 000 |
| Power consumption, W | | 20 | 35 | 43 | 62 |

Continuation to table 1

| AV POWER TM | | AV POWER-1 | AV POWER-2 | AV POWER-3 | AV POWER-4 |
|----------------------------|-------------------------|-------------------------|------------|------------|------------|
| Protection types | | | | | |
| Type of trip unit | | TM | TM | TM | TM |
| Accessories | | | | | |
| Alarm contact | | x | x | x | x |
| Auxiliary contact | | x | x | x | x |
| Shunt release | | x | x | x | x |
| Undervoltage release | | x | x | x | x |
| Accessories | Outer connecting plates | x | x | x | x |
| | Interphase barriers | 92/122 | 105/140 | 150/198 | 210/280 |
| Size | Width, mm (3P/4P) | 77/102 92/122(80 kA) | 105/140 | 150/198 | 210/280 |
| | Height, mm | 130/155 | 165 | 257 | 275 |
| | Depth, mm | 61,5/79 | 73/90,5 | 103 | 105 |
| Operating temperature, ° C | | - 25 to +40 | | | |

Table 2

| AV POWER ETU | | AV POWER-1 | AV POWER-2 | AV POWER-3 | AV POWER-4 | AV POWER-5 |
|--|-------|---------------------|------------|------------|------------|-----------------------------|
| Number of poles | | 3P/4P | | | | |
| Rated current, In [A] | | 32, 63, 100, 160 | 250 | 400, 630 | 1000 | 800, 1000, 1250, 1600 |
| Rated insulation voltage, Ui [V] | | AC800 | | AC1000 | AC800 | AC1000 |
| Rated impulse voltage, Uimp [kV] | | 8 | 8 | 12 | 8 | 12 |
| Rated operational voltage, Ue [V] | | AC400/AC690 | | | | |
| Rated ultimate breaking capacity, Icu [kA] AC 50/60 Hz | 400 V | 50/100 | | | | 70 |
| | 500 V | 20/65 | 40/65 | | | 50 |
| | 690 V | 10/30 | 30/40 | | | 25 |

Continuation to table 2

| AV POWER ETU | | AV POWER-1 | AV POWER-2 | AV POWER-3 | AV POWER-4 | AV POWER-5 |
|--|-------------------------|----------------------|---------------|---------------|---------------|---------------|
| Rated breaking capacity, Ics [kA] AC 50/60 Hz | 400 V | 50/75 | | | | 70 |
| | 500 V | 20/40 | 40/65 | | | 50 |
| | 690 V | 10/20 | 30/40 | | | 25 |
| Utilization category | | A | | B | | |
| Endurance (without maintenance) | me- chani- cal | 25 000 | | 10 000 | | |
| | elec- trical | 10 000 | | 8 000 | 7 000 | 3000 |
| Power consumption, W | | 33 | 62 | 168 | 248 | 248 |
| Type of protection | | | | | | |
| Type of trip unit | | Electronic trip unit | | | | |
| Accessories | | | | | | |
| Alarm contact | | x | x | x | x | x |
| Auxiliary contact | | x | x | x | x | x |
| Shunt release | | x | x | x | x | x |
| Undervoltage release | | x | x | x | x | x |
| Accessories | Outer connecting plates | x | x | x | x | x |
| | Interphase barriers | x | x | x | x | x |
| Sizes | Width, mm (3P/4P) | 92/122 | 105/140 | 150/198 | 210/280 | 216/290 |
| | Height, mm | 155 | 165 | 257 | 275 | 288 |
| | Depth, mm | 79 | 90,5 | 103 | 105 | 155 |
| Operating temperature, °C | | -5 to +40 | | | | |

Table 3

| Parameter | Value |
|---|------------|
| Degree of protection on the side of front panel | IP30 |
| Altitude above sea level, m | Up to 2000 |
| Service life, not less than, years | 15 |

2.1 Thermomagnetic trip unit (TM)

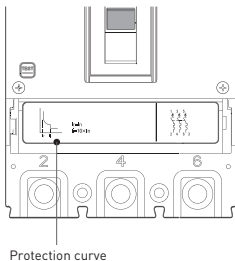


Fig.1

Table 4 - Characteristics

| Rated current (A) | Tripping time (ambient air temperature + 40 °C) | | Instantaneous tripping current (A) |
|---------------------|--|---------------------------|------------------------------------|
| | 1.05In (cold) non-tripping time | 1.3In (hot) tripping time | |
| $I_n \leq 63$ | ≥ 1 hour | < 1 hour | $10I_n \pm 20\%$ |
| $63 < I_n \leq 800$ | ≥ 2 hours | < 2 hours | |

Housing dielectric strength factor against the altitude above sea level

Table 5

| Parameter | Value | | | | |
|---------------------------------------|-------|------|------|------|------|
| | 2000 | 2500 | 3000 | 4000 | 5000 |
| Altitude above sea level | 2000 | 2500 | 3000 | 4000 | 5000 |
| Power-frequency withstand voltage (V) | 3000 | 3000 | 2500 | 2200 | 2000 |
| Insulation voltage | 800 | 800 | 700 | 600 | 500 |
| Maximum operational voltage (V) | 690 | 690 | 600 | 500 | 440 |
| Switching capacity adjustment factor | 1 | 1 | 0,86 | 0,72 | 0,63 |
| Operate current adjustment factor | 1 | 1 | 0,95 | 0,95 | 0,9 |

Table 6 - Ambient temperature adjustment factor

| Model | +40 °C | +45 °C | +50 °C | +55 °C | +60 °C |
|------------|---------|----------|----------|----------|----------|
| AV POWER-1 | 1,0 xIn | 0,94 xIn | 0,88 xIn | 0,81 xIn | 0,74 xIn |
| AV POWER-2 | 1,0 xIn | 0,96 xIn | 0,91 xIn | 0,85 xIn | 0,78 xIn |
| AV POWER-3 | 1,0 xIn | 0,97 xIn | 0,94 xIn | 0,90 xIn | 0,86 xIn |
| AV POWER-4 | 1,0 xIn | 0,97 xIn | 0,94 xIn | 0,90 xIn | 0,86 xIn |

2.2 Electronic trip units

Table 7

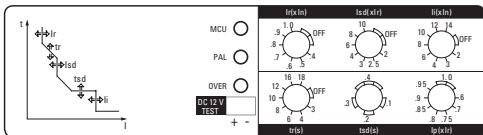
| Controller model | ETU 2.0 | ETU 2.2 | ETU 4.0 | ETU 4.2 | ETU 6.0 | ETU 6.2 |
|---------------------------|--|---|--------------------------------------|---|---------|---|
| Current protection | Overload protection, overload trip delay time setting. Short-circuit protection, short-circuit trip delay time setting. Instantaneous short-circuit protection. Earth leakage protection (optional) | | | | | |
| Other types of protection | Overload alarm does not trigger (on request). Neutral protection (optional). Phase imbalance protection (on request). | | | | | |
| Display | LED display | | Digital display. Malfunction display | | | |
| Communication | | Communication protocol Modbus-RTU. Interface: RS-485. | | Communication protocol Modbus-RTU. Interface: RS-485. | | Communication protocol Modbus-RTU. Interface: RS-485. |

Continuation to table 7

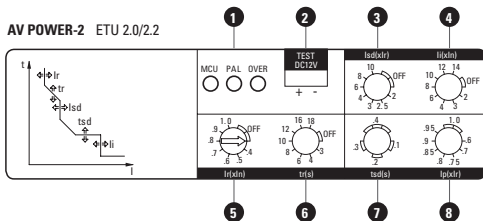
| Controller model | ETU 2.0 | ETU 2.2 | ETU 4.0 | ETU 4.2 | ETU 6.0 | ETU 6.2 |
|------------------|------------------------------------|---------|---------|---------|-------------------------------------|---------|
| Request | | | | | Request parameter, trouble shooting | |
| Function | Functional tests. Self-diagnostics | | | | | |

2.2.1 Electronic trip unit ETU2.0/ETU2.2

AV POWER-1 ETU 2.0/2.2



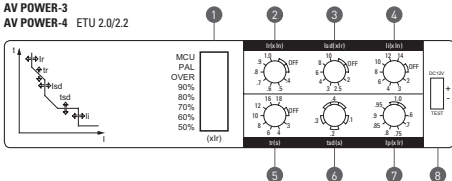
AV POWER-2 ETU 2.0/2.2



1. MCU – Operation LED light.
- PAL – Pre-overload/fault LED light.
- OVER – Overload LED light.
2. TEST- testing port: testing of controller.
3. Current setpoint I_{sd} .
4. Instantaneous current setpoint I_i .
5. Thermal protection current setpoint I_r .
6. Overcurrent trip time delay setpoint.
7. Short-circuit current trip delay time setpoint.
8. Setting of pre-alarm/earth leakage protection I_p/I_g .

AV POWER-3

AV POWER-4 ETU 2.0/2.2



1. MCU –Green - trip unit power on
- PAL – Pre-overload /fault LED light:
 - Yellow lights up all the time is $I \geq I_p$
 - Constant yellow light, if $I \geq 1.15 I_r$
- Overload LED light:
 - OVER: Red constantly, $I \geq I_r * 112\%$
 - 90%: Yellow constantly, $I \geq I_r * 90\%$
 - 80%: Green constantly, $I \geq I_r * 80\%$
 - 70%: Green constantly, $I \geq I_r * 70\%$
 - 60%: Green constantly, $I \geq I_r * 60\%$
 - 50%: Green constantly, $I \geq I_r * 50\%$
2. Thermal protection current setpoint I_r .
3. Current setpoint I_{sd} .
4. Instantaneous current setpoint I_i .
5. Overcurrent trip time delay setpoint.
6. Short-circuit current trip delay time setpoint.
7. Setting of pre-alarm/earth leakage protection I_p/I_g .
8. TEST - testing port: testing of controller.

Table 8 - Overload protection, Ir

| | | | | | | | | | | | |
|--|--------------------------|--|------|------|------|------|------|------|------|-----|----------------------------|
| Overload breaking current setpoints $I_r \pm 10\%$ | | (0,4; 0,5; 0,6; 0,7; 0,8; 0,9; 1,0)xIn + OFF | | | | | | | | | |
| Tripping time T_p $T_r = \frac{(6 I_r)^2}{I^2} t_r$ | Electric current | Operate time | | | | | | | | | |
| | $\leq 1.05I_r$ | During 2 hours of operation without tripping | | | | | | | | | |
| | $1.3I_r$ | Tripping during one hour of operation | | | | | | | | | |
| | Value of the DIP setting | Setting the time factor, tr,c.u. | 3 | 4 | 6 | 8 | 10 | 12 | 16 | 18 | OFF |
| | $I=1,5I_r$ | Tripping time, tr, sec | 48 | 64 | 96 | 728 | 160 | 192 | 256 | 288 | The alarm doesn't activate |
| | $I=2I_r$ | Tripping time, tr, sec | 27 | 36 | 54 | 72 | 90 | 108 | 144 | 162 | |
| | $I=6I_r$ | Tripping time, tr, sec | 3 | 4 | 6 | 8 | 10 | 12 | 16 | 18 | |
| $I=7I_r$ | Tripping time, tr, sec | 2.08 | 2.77 | 4.17 | 5.55 | 6.94 | 8.33 | 11.1 | 12.5 | | |

Table 9 - Protection against maximum currents

| | | | | | | | | |
|---|-----------------------------|--------------------------------------|-------------------------------------|------------|------------|------------|--|--|
| Breaking current value $I_{sd} \pm 10\%$ | | (2; 2,5; 3; 4; 5; 6; 8; 10)xIr + OFF | | | | | | |
| Tripping time $t_{sd} \pm 15\%$ | $I_{sd} \leq I < 1.5I_{sd}$ | Dependence | $I^2 T_{sd} = (1.5I_{sd})^2 t_{sd}$ | | | | | |
| Tripping time t_{sd} | $1.5I_{sd} \leq I < I_i$ | Time setpoint t_{sd} , sec | 0.1 | 0.2 | 0.3 | 0.4 | | |
| | | Acceptable deviation, sec | $\pm 0,03$ | $\pm 0,04$ | $\pm 0,06$ | $\pm 0,08$ | | |

Table 10 - Instant short-circuit protection

| | |
|---|--------------------------------------|
| Setpoint operating current $I_i \pm 15\%$ | (2; 3; 4; 6; 8; 10; 12; 14)xIn + OFF |
| Break time t_i , sec | 0.05 |

Table 11 - Earth leakage protection

| | | | | | |
|---|---|------------|------------|------------|------------|
| Earth leakage setpoint I_g , $\pm 10\%$ | [0,2; 0,3; 0,4; 0,5; 0,6; 0,7; 0,8; 0,9; 1]In + OFF | | | | |
| Tripping characteristics | $I \leq 0.9I_g$ no tripping; $I \geq 1.1I_g$ tripping | | | | |
| Tripping time t_g | Tripping time, sec | 0.1 | 0.2 | 0.3 | 0.4 |
| | Acceptable deviation, sec | $\pm 0,03$ | $\pm 0,04$ | $\pm 0,06$ | $\pm 0,08$ |

Table 12 - Pre-alarm about overload

| | |
|---------------------------|--|
| Current setting I_p | [0,6; 0,7; 0,75; 0,8; 0,85; 0,9; 0,95; 1,0]xI _r |
| Operating characteristics | Alarm between 0.9xI _p — 1.1xI _p |

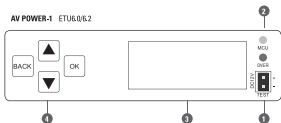
For the three-pole version, the overload pre-alarm function is included in the basic scope of delivery. For the four-pole version, the earth leakage protection function is included in the basic scope of delivery. Factory settings $I_p = 0.9I_r$.

ETU-2.0 / ETU-2.2. Factory settings

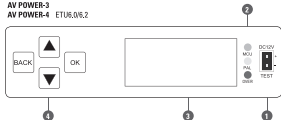
Table 13

| Protective characteristics | | | Notes |
|---|--------------------------------------|--------------------|-----------------------------|
| Protection against overload | Current setpoint I_r | 1,0xI _n | |
| | Delay time setpoint t_r | 18s | At $I = 6I_r$ |
| Protection against overcurrent | Current setpoint I_r | 6xI _r | |
| | Delay time setpoint t_r | 0,1xs | At $1.5I_{sd} \leq I < I_i$ |
| Protection against short-circuit instantaneous currents | Current setpoint I_r | 10xI _n | |
| Earth leakage protection | Earth leakage current setpoint I_g | 0,6xI _n | |
| | Delay time setpoint t_r | 0,4s | |
| Pre-alarm | Pre-alarm current setpoint I_p | 0,9xI _r | 0,4 s delay |

2.2.2 Electronic trip unit ETU4.0/ETU4



AV POWER-2
AV POWER-3
AV POWER-4 ETU6.0/6.2



1. TEST – Testing port
2. MCU – Operation LED light
PAL – Pre-overload/fault LED light
OVER - Overload LED light
3. LCD display
4. Keys: «Cancel/Back»; «Down/Flip»; « Zoom in/Page»;
«Setting /Confirm»

Return to the previous menu.
Return to the previous value
of the selected parameter.

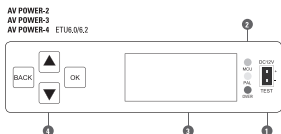
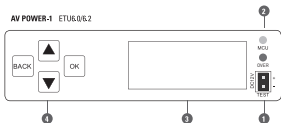


Select the current menu.
Move to the submenu.
Confirm the value
of the selected parameter.

Select the submenu in the main menu.
Select the parameter in the submenu.
Change the parameter.

Select the submenu in the main menu.
Select the parameter in the submenu.
Change the parameter.

2.2.3 Electronic trip unit ETU6.0/ETU6.2



1. TEST – Testing port
2. MCU – Operation LED light
PAL – Pre-overload/fault LED light
OVER - Overload LED light
3. LCD display
4. Keys: «Cancel/Back»; «Down/Flip»; « Zoom in/Page»; «Setting/Confirm»

Return to the previous menu.
Return to the previous value
of the selected parameter.



Select the current menu.
Move to the submenu.
Confirm the value
of the selected parameter.

Select the submenu in the main menu.
Select the parameter in the submenu.
Change the parameter.

Table 14 - Overload protection, Ir

| | | | |
|---|--|--|--------------------|
| Overload breaking current setpoints $I_r \pm 10\%$ | | [0,4~ 1,0]xIn + OFF Minimal step 1A | |
| Tripping time T_p $T_r = \frac{(6I_r)^2}{I^2} t_r$ | Electric current | Operate time | |
| | $\leq 1.05I_r$ | During 2 hours of operation without tripping | |
| | $1.3I_r$ | Tripping during one hour of operation | |
| | $6.0I_r$ | Time setting, sec | Minimal step 1 sec |
| Thermal memory | 10 min + OFF (reset when power is off) | ON/OFF | |

Table 15 - Protection against maximum currents

| | | | |
|--|-----------------------------|------------------------------|-------------------------------------|
| Breaking current value $I_{sd} \pm 10\%$ | | [2~10]xIr + OFF | |
| Tripping time $t_{sd} \pm 20\%$ | $I_{sd} \leq I < 1.5I_{sd}$ | Dependence | $I^2 T_{sd} = [1.5I_{sd}]^2 t_{sd}$ |
| Tripping time t_{sd} | $1.5I_{sd} \leq I < I_i$ | Time setpoint t_{sd} , sec | 0,05-1 (minimal step 0,05 sec) |
| | | Acceptable deviation, sec | $\pm 15\%$ |
| Thermal memory | | 5 min (can be disabled) | ON/OFF |

Table 16 - Instant short-circuit protection

| | |
|---|-----------------------------------|
| Setpoint operating current $I_i \pm 15\%$ | [2-14]xIn + OFF (minimal step 1A) |
| Break time t_i , sec | 0.05 |

Table 17 - Earth leakage protection

| | |
|-----------------------------------|---|
| Earth leakage setpoint $\pm 10\%$ | (0,2~ 1)xIn + OFF (minimal step 1A) |
| Tripping characteristics | $I \leq 0.9I_g$ no tripping; $I \geq 1.1I_g$ tripping |
| Tripping time t_g | 0.1c ~ 0.8S + alarm (0.1 sec minimal step) |

Table 18 - Pre-alarm about overload

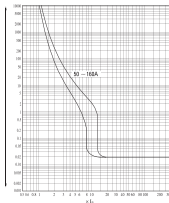
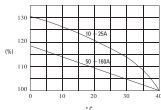
| | |
|---------------------------|---|
| Current setting I_p | $(0,6; 0,7; 0,75; 0,8; 0,85; 0,9; 0,95; 1,0) \times I_r$ |
| Operating characteristics | Alarm between $0,9 \times I_p - 1,1 \times I_p$ |
| | Delay time 0.1 – 1.0 sec |
| Asymmetry current | 30-70% |
| | $\{I_{max} - I_{min} / I_{max} * 100\% \} \leq$ no actions |
| | $\{I_{max} - I_{min} / I_{max} * 100\% \} >$ and $I_{max} > I_r$ tripping with 10 sec delay |

Table 19 - ETU-6.0/ETU-6.2. Factory settings

| Protective characteristics | | | Note |
|--|--------------------------------------|------------------|-------------------------------|
| Protection against overloads | Current setpoint I_r | $1,0 \times I_n$ | |
| | Delay time setpoint t_r | 18s | When $I = 6I_r$ |
| Protection against overcurrent | Current setpoint I_{sd} | $6 \times I_r$ | |
| | Delay time setpoint t_{sd} | $0,1 \times s$ | When $1,5I_{sd} \leq I < I_i$ |
| Protection against short-circuit instantaneous current | Current setpoint I_i | $10 \times I_n$ | |
| Earth leakage protection | Earth leakage current setpoint I_g | $0,6 \times I_n$ | |
| | Delay time setpoint t_g | 0,4s | |
| Pre-alarm | Pre-alarm current setpoint I_p | $0,9 \times I_r$ | 0,4 s delay |

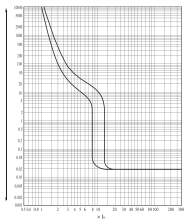
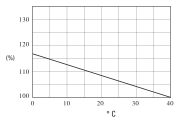
2.3 Tripping curves of the molded case circuit breakers

Thermomagnetic trip unit
POWER-1

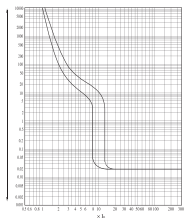
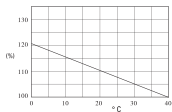


Note: short-circuit current breaking setpoint, ≤ 50 A, is equal to $500 A \pm 20\%$

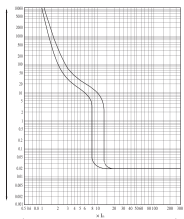
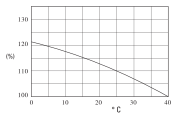
POWER-2



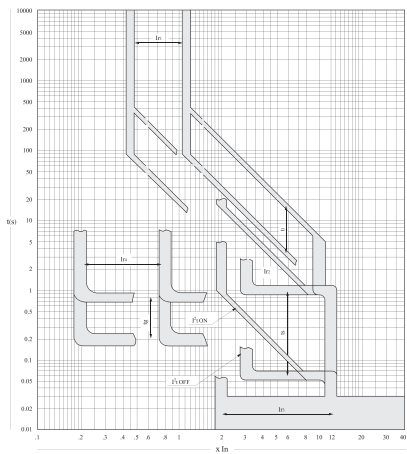
POWER-3



POWER-4



Electronic trip unit



3 COMMUNICATION EQUIPMENT

The molded case circuit breakers AV POWER with the electronic trip unit ETU can be combined into a communication network.

Additional modules are available to convert to different protocols, MODBUS to Profibus, DP.

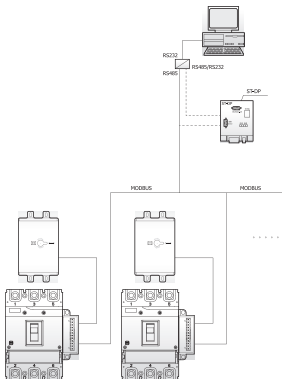


Fig. 2

The molded case circuit breaker AV POWER in conjunction with the electronic trip unit ETU can work with a communication interface, MODBUS communication interface.

The molded case circuit breaker AV POWER in conjunction with the electronic trip unit ETU can be connected off-line to the AV-CM display, which shows the current operating current of the molded case circuit breaker and the causes of tripping.

The molded case circuit breaker AV POWER in conjunction with the electronic trip unit ETU can be used for operation in a group communication network. It can be connected directly to the corresponding fieldbus, with various fieldbus protocols. Upon the request of the customer, the ST-DP protocol can be used.

The AV-DP conversion module converts the ST-DP protocol to MODBUS, and then connects to the data bus.

When setting parameters via the communication interface, the communication module has a higher priority.

4 OVERALL DIMENSIONS

Interphase barriers

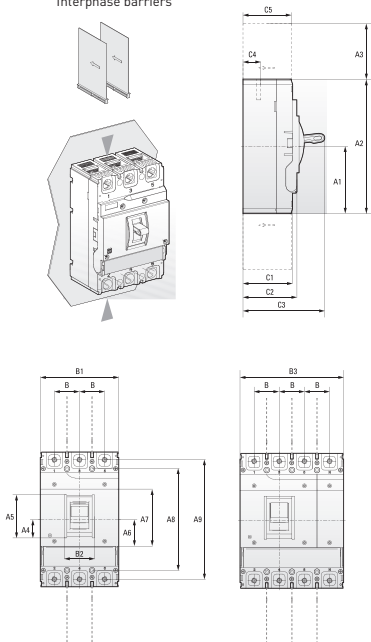
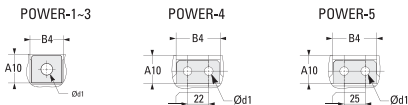
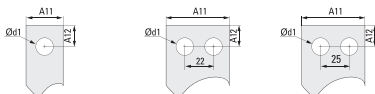


Fig. 3 - Overall dimensions of AV POWER-1 (2) (3) (4)

Terminals



Cross- section of the conductor



Installation dimensions

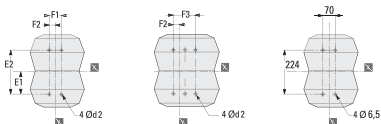


Fig. 4 - Connection dimensions

Table 20

| Model | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | A11 | A12 |
|---------------------|--------|-------|-------|------|------|------|------|-----|-------|------|-----|------|
| Power-1 TR | 65 | 130 | 50 | 20,9 | 29,7 | 29,5 | 54,5 | 111 | 116 | 15,8 | 13 | 7 |
| Power-1 ETU, TR80kA | 77,5 | 155 | 50 | 22,5 | 42,6 | 28 | 58 | 132 | 137 | 17,8 | 13 | 8,5 |
| Power-2 | 82,5 | 165 | 80 | 21 | 47,5 | 28,5 | 62 | 143 | 144 | 20,5 | 24 | 10 |
| Power 3 | 128,5 | 257 | 105,8 | 35,2 | 82,5 | 51 | 109 | 194 | 228 | 28,5 | 30 | 13 |
| Power-4 | 137,5 | 275 | 110 | 37,9 | 81,8 | 51 | 102 | 243 | 243 | 29 | 45 | 13 |
| Power-5 | 143,75 | 287,5 | 107 | - | 130 | - | 189 | 224 | 258,5 | 30 | 50 | 15,5 |

Table 21

| Model | B | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | C5 |
|---------------------------|----|-----|------|-----|------|------|-----|-------|------|----|
| Power-1 TR | 25 | 77 | 24,5 | 102 | 18 | 56 | 61 | 81,5 | 18 | 55 |
| Power-1 ETU, TR80kA | 30 | 92 | 28,5 | 122 | 18 | 72 | 79 | 101 | 23,5 | 73 |
| Power-2 | 35 | 105 | 32,6 | 140 | 24,5 | 66 | 73 | 99,5 | 24,6 | 65 |
| Power 3 | 48 | 150 | 58 | 198 | 32 | 94,5 | 103 | 151,5 | 26 | 93 |
| Power-4 | 70 | 210 | 61,5 | 280 | 46 | 97 | 105 | 156,5 | 25 | 93 |
| Power-5 | 70 | 216 | 75 | - | 51 | 137 | 158 | 232 | 32,5 | - |

Table 22

| Model | E1 | E2 | F1 | F2 | F3 | d1 | d2 |
|---------------------------|-------|-----|----|------|----|-----|-----|
| Power-1 TR | 55,5 | 111 | 25 | 12,5 | 50 | 6,5 | 4 |
| Power-1 ETU, TR80kA | 66 | 132 | 30 | 15 | 60 | 6,5 | 4,5 |
| Power-2 | 71,5 | 143 | 35 | 17,5 | 70 | 8,5 | 4,5 |
| Power 3 | 97 | 194 | 48 | 24 | 96 | 11 | 7 |
| Power-4 | 121,5 | 243 | 70 | 35 | 70 | 9 | 7 |
| Power-5 | - | 224 | 70 | - | - | M10 | 6,5 |

5 SCOPE OF DELIVERY

The molded case circuit breakers are supplied in one group package. For all available documentation, scan the QR-code on the insert or on the inside of the package.

6 MOUNTING AND CONNECTION

The molded case circuit breakers shall be installed and connected by qualified electrical personnel. Before mounting, make sure, that there are not any external damages.

For the 1-st size, AV Power-1/3 80kA TR, accessories marked «for ETU» shall be used. Connection options with copper and aluminum wires are supported. Do not connect copper and aluminum wires to one terminal concurrently.

Minimum permissible safety areas up to the molded case circuit breaker.

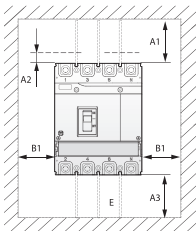


Fig. 5

A1: Upper distance to conducting surfaces (including ground busses).

A2: Upper distance to non-conducting surfaces.

A3: Lower distance from the molded case circuit breaker terminal to the lower surface.

B1: Distance from the molded case circuit breaker to the side surface (including the ground busses).

B2: Distance between the molded case circuit breakers.

Note: E – Interphase barriers shall be installed.

Table 23

| Model | A1 | A2 | A3 | B1 |
|---------|-----|----|----|----|
| Power-1 | 50 | 25 | 25 | 25 |
| Power-2 | 80 | 25 | 25 | 25 |
| Power 3 | 106 | 25 | 25 | 25 |
| Power-4 | 110 | 25 | 25 | 25 |

Mounting methods of additional accessories depend on the type of the devices. Auxiliary and alarm contacts, as well as trip units shall be installed in special sockets behind the dummy panel, which is mounted with the screws to the housing of the molded case circuit breaker. The conductors from these accessories shall be led to the housing of the molded case circuit breaker from the sides through special sockets. The extended rotary handle and motor mechanism shall be mounted to the housing of the molded case circuit breaker. The communication modules and the indication and programming module shall be installed separately from the molded case circuit breaker and connected to it with the wires from the kit.

7 TRANSPORTATION AND STORAGE

7.1 The molded case circuit breakers can be transported by any means of enclosed transport that ensures protection of packed products against mechanical and atmospheric impacts.

7.2 The molded case circuit breakers shall be stored indoors in the original package at the ambient temperature from -60 to +40 C. The relative humidity is 50% at high temperatures and 90% at low temperatures.

8 MANUFACTURER'S WARRANTY

The manufacturer guarantees that the molded case circuit breaker corresponds to the requirements of IEC 60947-2:2016 provided that the consumer follows the operating, transportation and storage conditions.

Warranty period: 10 years from the date of sale specified in the product receipt.

Shelf life: 10 years from the date of manufacture, indicated on the package or housing.

Service life: 10 years.

Manufacturer: For information, refer to the product package.

Importer and EKF trademark service representative:

EKF ELECTRICAL SOLUTION – FZCO, Dubai Silicon Oasis, DDP, Building A2, Dubai, United Arab Emirates.

Importer and EKF trademark service representative on the territory of the

Russian Federation: OOO «Electroresheniya», 2B Otradnaya Str., bld. 9, 5th floor, Moscow 127273, Russia. Tel.: +7 (495) 788-88-15.

Importer and EKF trademark service representative on the territory of the

Republic of Kazakhstan: TOO «Energoresheniya Kazakhstan», Kazakhstan, Almaty, Bostandyk district, Turgut Ozal st., 247, apt 4.

10 YEAR WARRANTY

9 CERTIFICATE OF ACCEPTANCE

The molded case circuit breaker AV POWER has been approved for operation.

Date of manufacture:

For information, refer to the product package.

Stamp of technical control.

