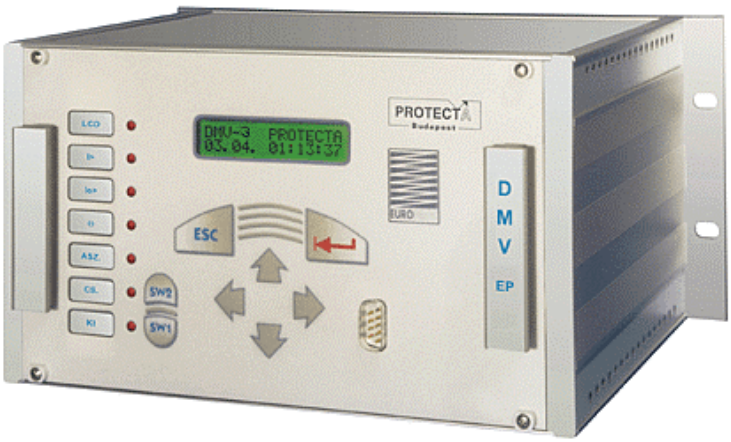
# DMV-EP

## COMPLEX NUMERICAL MOTOR PROTECTION




### *Field of application*

The ***EuroProt*** type complex protection in respect of hardware and software is a modular device. The modules are assembled and configured according to the requirements, then the functions are determined - within the hardware limitations - by the software. This document describes the individual characteristics of a specific application: the factory configuration ***DMV-EP*** complex motor protection. The general description of the members of the ***EuroProt*** type complex protection family can be found in document "***EuroProt*** complex protection, hardware and software description and user's manual" (further "*EuroProt manual*").

The numerical motor protection ***DMV-EP*** of PROTECTA Electronics Co. Ltd. can be applied mainly for comprehensive protection of large, medium voltage, three-phase motors in industrial plants and auxiliary systems of electric power stations.

As an option the included control (SCADA) functions can extend the device to the complex field unit of the medium voltage network.

### *Main features*

The ***DMV-EP*** complex motor protection is a member of the ***EuroProt*** device family of PROTECTA Co. Ltd. It is a fully numerical type, microprocessor-based device.

- the general motor protection functions can be applied in any combinations:
  - three-phase definite time overcurrent protection (I>),
  - zero sequence overcurrent protection high current setting stage ( $3I_0$>>),
  - zero sequence overcurrent protection low current setting stage ( $3I_0$>),

  - negative phase sequence protection (asymmetry protection),
  - thermal overload protection,
  - overcurrent protection during motor starting,
  - locked rotor protection,
  - protection against low load (loss of load protection),
  - zero sequence overvoltage protection,
  - over/undervoltage protection.
- the generated signals and trip commands of the functions can be marshaled to output relay contacts and LED signals or PROTLOG logic equations;
- application of microprocessor technology;
- simple commissioning by displayed motor operation information;
- simple setting of parameters by local LCD or by a computer connected to one of the serial ports;
- Supervisory and control functions of the device:
  - The supervisory and control functions are performed by a dedicated micro-controller of the CPU module or by an optional control module,
  - The high resolution optional graphic LCD can perform comprehensive local man-machine operator functions,
  - The supervisory and control functions are:
    - Control of the field:
    - by local or remote operation,
    - by interlocking functions,
    - by generation of status signals,
    - by logging of events,
    - by communication with the protection functions,
    - by communication with the intelligent graphic display;
    - Sending messages from the protection functions to the supervisory and control system of the substation;
    - Receiving and performing commands from the supervisory and control system of the substation;
    - Receiving and performing commands from the local LCD.
- The device is programmed to continuous self-monitoring functions, which can be extended to the CB control circuits as well.
- In all versions of the device the same software-configuration is loaded. The individual functions can be enabled and parameterised according to the needs and the hardware version. The versions are determined by the hardware configuration.
- The events are logged by the device, which can store up to 50 evaluated events, and up to 300 digital event sequences with 1 ms time resolution.
- A real-time clock is integrated in the device with battery RAM support. This clock can be synchronised by external PC or by the supervisory and control system. Additionally a Word Time Synchroniser (GPS-OP) device made by PROTECTA Co. Ltd. is available as well.
- The disturbance recorder of the CPU module can store up to 11 disturbances, the total registering time is about 10 s.
- The device realises several measuring functions based on the available analogue signals.
- Up to eight independent parameter packages can be stored and selected in the device.

## *Technical Data*

| **Setting ranges:** | |
|---|---|
| Motor rated current, $I_n$<br>in per cent of the main C.T. rated current, In / $I_{CT}$ | 30 to 120 %, step 2 % |
| No load operation minimum threshold current (fixed) | $I_{IDLE}$ / $I_n$ = 15 % |
| Phase fault O.C. relay starting current, I> / $I_{CT}$<br>time delay setting, t (I>) | 50 to 1500 %, step 10 %<br>0 to 60000 ms, step 10 ms |
| Earth fault O.C. relay starting current, 3Io> / $I_{CT}$<br>time delay setting, t($3I_o$>) | 10 to 100 %, step 2 %<br>0 to 60000 ms, step 10 ms |
| Motor rated temperature rising related to the ambient temperature when the motor load is the In rated current | Θn = 10 to 125°C, step 1°C |
| Overheating alarm signal setting value in per cent of the motor rated temperature rising | Θp / Θn=60 to 160 %, step 1 % |
| Thermal overloading (overheating) trip setting value in per cent of the motor rated temperature rising | Θt / Θn=80 to 180 %, step 1 % |
| Temperature rising limit to block the restart command in per cent of the motor rated temperature rising | Θb / Θn=60 to 160 %, 1 % |
| Time constant for rotating motor temperature rising and cooling | $T_R$ = 2 to 200 min., step 1 min. |
| Standing motor cooling time constant in per cent of the time constant for rotating motor | $T_C$ / $T_R$ (Tcool / Trise) = 100 to 500 %, step 100 % |
| Negative sequent current weighting | 0 to 6, step 1 |
| Asymmetry protection starting value, fixed | $I_2$ / $I_n$ = 15 % |
| Asymmetry protection inverse definite minimum time relay, maximum time delay at fixed starting current<br>IDMT type<br><br>IDMT time multiplier<br>IDMT $I_n/I_{nm}$<br>IDMT Min. delay | <br><br>0, 1, 2 (inverse, very inverse, ext. inverse)<br>1 to 256 steps 1 s<br>10 to 104, step 1 %<br>50 to 500, step 1 ms |
| Asymmetry protection inverse definite minimum time relay, minimum time delay at very high $I_2$ currents | t asmin=50 to 500 ms, step 50 ms |
| Loss of load protection starting current in per cent of the motor rated current | $I_t$ < / In = 30 to 60 %, step 5 % |
| Loss of load protection time delay | t($I_t$) = 1 to 10 s, step 1 s |
| Starting period setting value | $t_{st}$ = 5 to 100 s, step 5 s |
| Fault during starting period, setting current | $I_{st}$ / $I_{CT}$=200 to 1200 %, 10 % |
| At heavy starting setting, the heating current during the starting period, | $I^2$ / 2, fixed |
| Stalled rotor protection at the end of the starting period | 2x$I_n$, (if t > $t_{st}$) |
| Current relays, resetting ratio | 95 %, fixed |

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| General technical specification see in **EuroProt system information sheet** |
| Type tests see in **EuroProt system information sheet** |
| Design and sizes see in **EuroProt system information sheet** |

## *Options*

- Interface to a SCADA system (see the **EuroProt system information sheet**)
- Need of output contacts with 4 A DC breaking capability
- Additional digital input modules (in the modularity of 8 pcs)
- Graphic LCD

## *Ordering information*

- Type of protection [DMV-EP]
- Rated C.T. current [1 A, 5 A]
- C.T. type of zero sequence current [main C.T., toroidal type C.T.]
- In case of toroidal type C.T., its ratio [150/1A or others]
- Auxiliary DC voltage [220 V, 110 V, or other]