

Numerical Motor Protection

Forming part of the PROCOM range of modular relays, the IMM8000 range is designed to protect medium to high power MV motors.

IMM 8000



In addition to the standard protection functions, the IMM8000 relays include monitoring, measurement and recording of the electrical quantities of the distribution network. The IMM8002 also allows the connection of three temperature sensors (RTDs). The relay can be set locally, using either the keypad or via the RS232 connection, or remotely via an RS485 link or current loop. The calculation of the electrical quantities is achieved using Fourier transforms. The adjustment, reading, measurement and recording features are all available locally or remotely.

Functions

- Short-circuits between phases [50]
- Earth-fault [51N]
- Locked rotor [51LR]/[51STALL]
- Under-voltage [27]/[27ST]
- Re-acceleration [27RC]
- Over-voltage [59]
- Thermal Overload [49]
- Over-temperature (IMM8002) [26] (IMM 8002 option)
- Pump un-priming [37P]/[37I]
- Imbalance, loss-of-phase or phase reversal [46]
- Too Long Start [48]
- Starting inhibited by temperature [5-49] or abnormal voltage [5-27] [5-59]
- Number of starts protection [5-66]

GENERAL CHARACTERISTICS

Auxiliary voltage

- Auxiliary voltage ranges
- Burden

19 to 70 or 85 to 255 Vdc or Vac, 50/60 Hz
10W (DC), 15VA (AC)

Measuring inputs

- Phase CTs (In=1A and 5 A)

Measurement from 0 to 20 In
Burden at In < 0.2VA
Rating (permanent) = 3xIn (Transient) = 100xIn for 1 second
Measures primary currents from 10A to 10kA

- Earth-fault CT (In=1A and 5A)

Measurement from 0 to 2.4 In
Burden at IN < 0.2VA
Permanent rating = In₀
Transient rating = 50 In₀ for 1second
Measures primary currents from 10A to 10kA
Display of the primary current from 50 to 100A
Permanent withstand = 100A
Transient withstand = 12,500A for 1second on 100/1 CBCT
0 to 200kA
Class 2
5VA 5P15
Permanent withstand 1.5 Un; transient withstand = 2 Un for 10s
Burden < 0.2VA
Primary voltage setting of 0.10 kV to 100kV
50 or 60 Hz measurement from 40 to 70 Hz, precision 0.02 Hz

CBCTs 50/1 or 100/1 In₀

- Display of primary currents (I1, I3)
- Display class
- Recommended CTs
- VTs 100,110, 120 or 240 V
- Rated frequency

Logical inputs

- Activation

Contact with internal or external voltage (24VDC)

Output Contacts

- Relay WD

NC contact, 10A / 250V AC rated currents
20 A for 1mn

- Relays P, T, A, B

Changeover contact, 10A/250V AC rated currents
20 A for 1mn

- Ratings

DC breaking capacity = 50W (at L/R = 40 ms)
AC breaking capacity=1,250VA; I<3A
(at cos φ = 0.4)

Communication (MODBUS®)

- Transmission
- Speed transmission

Asynchronous series, 2 wires RS 485
or 4 wires 0-20 mA current loop
1,200 to 19,200 baud (limited to 4,200 baud for current loop)

Programming

- Display
- Configuration software

French or English
Windows® 95, 98, 2000, French, English

Environment

- Transient impulse
- Shock
- Dielectric withstand
- DB25
- Insulation resistance
- EMC
- Susceptibility
- Operating temperature
- Vibrations
- Environmental protection

IEC 801.4 classifies 4 (equivalent IEC 1000-4-4 classifies 4)
IEC 255-5 (5 kV – 1.2/50 μs)
IEC 255-5 (2 kV – 1 min)
IEC 255-5 (500 V – 1 min)
IEC 255-5 (> 1,000 MΩ under 500V)
EN 55022
IEC 255-22 (1/2/3/4)
-10 to + 55 °C (IEC 68-2)
IEC 255.21.1 classifies 2
IP 51 (CEI 529)

Dimensions

- Height, length and depth
- Weight

173x186x275mm (flush mounted) / 206x186x275mm (rack mounted)
5 kg

Thermal image [49]

- Thermal Threshold pick-up I_{ref}
- Thermal Alarm Pick-up
- Heating time constant C_{HOT}
- Cooling time constant C_{COLD}
- Factor for negative sequence current

1.07 In, equivalent to a thermal state θ_N of 114%
80 to 100% θ_N
4 to 180 min
4 to 1,080 min
3 for Ineg ≥ 0.3 In and 9 for Ineg < 0.3 In

IMM8000

Temperature sensors (IMM8002) [26]

- Number and type 3 probes Pt100, Ni100, Ni120 or Cu10
- Alarm threshold 2 to 200°C

Number of starts protection [5-49] [5-27] [5-59] [5-66]

- Number of authorised starts (N) from 1 to 8
- Time during which N starts are authorized 15 to 60 min
- Time during which new start is inhibited 15 to 60 min
- Hot starting control 40 to 100% $\Theta_N / U >$: 70% to 150% $U_N / U <$: 20% to 120% U_N
Number of authorised starts exceeded

Too long start [48]

- Operating parameter $I >$ at extremely inverse (EI) time
- Running threshold 2 to 10 I_n
- Starting time 1 to 240 seconds

Locked rotor after starting [51STALL]

- Operating parameter $I >$ at independent time (inhibited during starting)
- Locked rotor threshold 2 to 5 I_n
- Locked rotor time 1 to 100 seconds

Locked rotor during starting [51LR]

- Operating parameter $I >$ at independent time
- Locked rotor threshold 1.5 I_n
- Locked rotor time 1 to 100 seconds

Unbalance, loss of phase or inversion of phase [46]

- Operating parameter $I_{neg} >$ at extremely inverse time
- Threshold 0.15 to 0.50 I_n

Overcurrent [50]

- Operating parameter $I_n >$ at instantaneous time
- Threshold 1.4 I_{ST}
- Operating time 70 ms + / - 30 ms at 1.5 I_{set}

Earth fault [51N]

- Operating parameter $I_0 >$ with inverse time
- Low-set and high-set thresholds $I_0 >>$ at independent time: 0,1 to 1s/0.25s if [50] out of service
0.1 to 1.6 I_n (residual connection) / 0.01 to 0.16 I_n (CBCT)

Pump Unpriming [37P] [37I]

- Operating parameter $I <$ or $P <$ at independent time
- Threshold S_n 10 to 50% S_n
- Current threshold 15 to 70% I_n
- Starting time 1 to 1,000 seconds
- Operating time 1 to 100 seconds

Undervoltage [27 ST] [27]

- Operating parameter $U_{ST} <$ or $U <$ at independent time
- Thresholds 20% to 120% U_n
- Operating time 0.1 to 100 seconds

Re-acceleration [27RC]

- Operating parameter $U_{RC} <$ at independent time
- Threshold 20 to 120% U_n
- Operating time 0.1 to 100 seconds

Overvoltage [59]

- Operating parameter $U >$ and $U >>$ at independent time
- Thresholds 70 to 150% U_n
- Operating time: 0.1 to 100 seconds

Tripping circuit failure

- Operating parameter Trip circuit
- Time delay 0.1 to 1s

Counters

- Number of starts 0 to 100,000
- Number of trips 0 to 100,000
- Active & reactive power 0 to 1,000 GWh and – 1000 to + 1000 GVARh

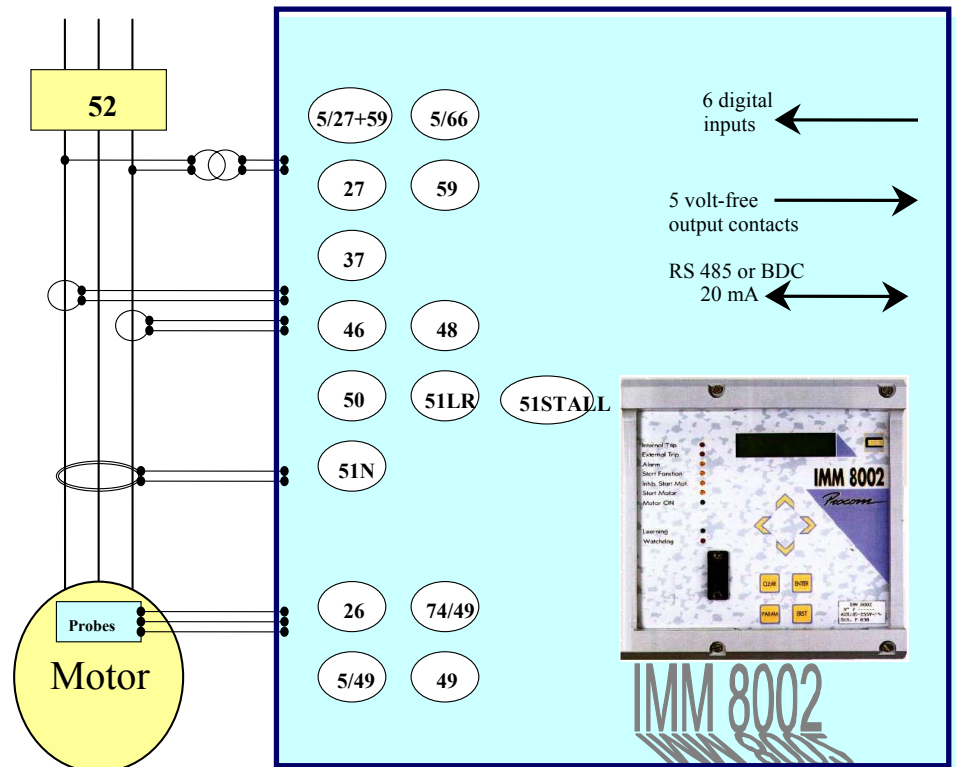
Electrical Characteristics

- 2 ranges of auxiliary voltage (AC or DC).
- Configuration and setting by local operator or local or remote PC.
- Reading and safeguard of the configuration on PC
- Measurement of various electrical quantities:
 - Average and instantaneous values of I1, I3 and Io, values expressed in primary currents
 - Phase-phase voltages
- Measurement of the starting current
- Recording of running and starting time
- Measurement of the duration of the last start carried out
- Measurement of the negative sequence current
- Measurement of the thermal state
- Measurement of the active and reactive power
- Power-factor
- Temperature measurement (option)
- Indication of the number of authorised starts
- Measurement of the frequency
- One of two setting groups can be selected locally or remotely.
- Too long start and locked rotor protection.
- Assistance with motor maintenance (counting of the numbers of starts, trips, and operating hours).
- Easy Modbus® Communication
- Software of configuration and communication under Windows® 95, 98, NT, 2000
- Event logging with 10ms resolution
- Remote reading of measurements, metering, alarms and the parameter settings.
- Event reporting
- Self-diagnosis: RAM, ROM, EEPROM, output contacts, A/D converter, auxiliary voltage, software execution or hardware anomaly
- Cut-off temperature detection connection sensor

Physical Characteristics

- Height 4U
- User interface with access to all the functions
- Backlight display (2 lines of 16 characters)
- 5 volt-free output contacts: self-monitoring, start authorisation, tripping and 2 indications
- 6 logical inputs: motor starting sensor, external trip, re-acceleration, speed, emergency restarting, thermal overcurrent state
- 1 watchdog LED
- 7 indicator LEDs
- 1 LED displaying the parameter setting mode

Simplified functional diagram



Only documents supplied with our acknowledgment are to be considered as binding



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