AQ-M257 Motor protection device

Description

The AQ-M257 motor protection device offers a modular protection and control solution for larger and more important motors that require differential protection. You can add up to nine (9) I/O or communication modules into the device for extensive monitoring and control applications. You can also connect up to sixteen (16) RTD signals for thermal alarming and tripping. AQ-M257 communicates using various protocols, including the IEC 61850 substation communication standard.

The AQ-M257 motor protection device has two (2) software options: AQ-M257A (the “A” variant) is designed for asynchronous machines, and AQ-M257B (the “B” variant) is designed for synchronous machines. For more details on the software options, please see the order code below.

Highlights:

- Differential protection.
- A large I/O capacity.
- Five (5) thermal models (time constant accurate).
- Soft start protection beginning from 6 Hz.
- Wye-delta started motor supervision.
- Two-speed motor protection.
- Optional power and energy measurement accuracy of up to 0.2 %.
- Asynchronous and synchronous motors.

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Technical data

PROTECTION (AQ-M257A)

- Non-directional overcurrent (I>; 50/51) - 4 stages (INST, DT or IDMT)
- Non-directional earth fault (IO>; 50N/51N) - 4 stages (INST, DT or IDMT)
- Directional overcurrent (Idir>; 67) - 4 stages (INST, DT or IDMT)
- Directional earth fault (IOdir>; 67N/32N) - 4 stages (INST, DT or IDMT)
- Negative sequence overcurrent/ Phase current reversal/ Current unbalance (I2>; 46/46R/46L) - 4 stages (INST, DT or IDMT)
- Harmonic overcurrent (Ih>; 50H/51H/68H) - 4 stages (INST, DT or IDMT)
- Circuit breaker failure protection (CBFP; 50BF/52BF)
- High-impedance or low-impedance restricted earth fault/ Cable end differential (IOd>; 87N)
- Overvoltage (U>; 59) - 4 stages (INST, DT or IDMT)
- Undervoltage (U<; 27) - 4 stages (INST, DT or IDMT)
- Neutral overvoltage (UO>; 59N) - 4 stages (INST, DT or IDMT)
- Sequence voltage (U1/U2>/<; 47/27P/59PN) - 4 stages (INST, DT or IDMT)
- Overfrequency and underfrequency (f>/<; 81O/81U) - 8 stages (INST or DT)
- Rate-of-change of frequency (df/dt>/<; 81R) - 8 stages (INST or DT)
- Power protection (P, Q, S>/<; 32) - 4 stages (DT)
- Generator/transformer differential (Idx>; 87T/87G/87M/87N)
- Pole slip/Out-of-step protection (78)
- Motor status monitoring
- Machine thermal overload (TM>; 49M)
- Motor start/ Locked rotor monitoring (Ist>; 48/14)
- Frequent start (N>; 66)
- Non-directional undercurrent (I<; 37)
- Mechanical jam (Im>; 51M)
- Voltage memory
- Resistance temperature detectors (RTD)
- Programmable stage (PGx>/<; 99)
- Arc protection (IArc>/IOArc>; 50Arc/50NArc) (optional)

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PROTECTION (AQ-M257B)

- Non-directional overcurrent (I>; 50/51) - 4 stages (INST, DT or IDMT)
- Non-directional earth fault (IO>; 50N/51N) - 4 stages (INST, DT or IDMT)
- Directional overcurrent (Idir>; 67) - 4 stages (INST, DT or IDMT)
- Directional earth fault (IOdir>; 67N/32N) - 4 stages (INST, DT or IDMT)
- Negative sequence overcurrent/ Phase current reversal/ Current unbalance (I2>; 46/46R/46L) - 4 stages (INST, DT or IDMT)
- Harmonic overcurrent (Ih>; 50H/51H/68H) - 4 stages (INST, DT or IDMT)
- Circuit breaker failure protection (CBFP; 50BF/52BF)
- High-impedance or low-impedance restricted earth fault/ Cable end differential (IOd>; 87N)
- Overvoltage (U>; 59) - 4 stages (INST, DT or IDMT)
- Undervoltage (U<; 27) - 4 stages (INST, DT or IDMT)
- Neutral overvoltage (UO>; 59N) - 4 stages (INST, DT or IDMT)
- Overfrequency and underfrequency (f>/<; 81O/81U) - 8 stages (INST or DT)
- Rate-of-change of frequency (df/dt>/<; 81R) - 8 stages (INST or DT)
- Power protection (P, Q, S>/<; 32) - 4 stages (DT)
- Generator/transformer differential (Idx>; 87T/87G/87M/87N)
- Underexcitation (Q<; 40)
- Underimpedance (Z<; 21U)
- Underreactance (X<; 21/40)
- Voltage-restrained overcurrent (Iv>; 51V)
- Inadvertent energizing (I>U<I.A.E.; 50/27)
- Volts-per-hertz overexcitation (V/Hz>; 24)
- Power factor protection (PF<; 55)
- Pole slip/Out-of-step protection (78)
- Motor status monitoring
- Machine thermal overload (TM>; 49M)
- Motor start/ Locked rotor monitoring (Ist>; 48/14)
- Frequent start (N>; 66)
- Non-directional undercurrent (I<; 37)
- Mechanical jam (Im>; 51M)
- Voltage memory
- Resistance temperature detectors (RTD)
- Programmable stage (PGx>/<; 99)
- Arc protection (IArc>/IOArc>; 50Arc/50NArc) (optional)

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CONTROL

- Number of objects to control and monitor: 10
- Number of indicators to monitor: 10
- Number of setting groups: 8

MEASURING AND MONITORING

- Phase, sequence and residual currents (IL1, IL2, IL3, I01, I02)
- Phase, sequence and residual voltages (UL1, UL2, UL3, UL12, UL23, UL31, U0)
- Frequency (f)
- Power (P, Q, S, pf) and Energy (E+, E-, Eq+, Eq-)
- Power and energy class 0.5
- Power and energy measurement accuracy of up to 0.2 % (optional)
- Current transformer supervision - 2 instances
- Voltage transformer supervision (60)
- Circuit breaker wear monitoring
- Total harmonic distortion (current)
- Total harmonic distortion (voltage)
- Running hour counter
- Measurement recorder
- Measurement value recorder
- Event recorder (max. 15 000 permanent event records)
- Disturbance recorder (max. 100 records á 5 seconds at 3.2 kHz sampling)

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HARDWARE

- Current inputs: 10
- Voltage inputs: 4
- Digital inputs (fixed): 3
- Digital outputs (fixed): 5
- Number of empty slots: 9
- Digital inputs: +8/16/24/32/40/48/56/64/72 (optional)
- Digital outputs: +5/10/15/20/25/30 (optional)
- High-speed high-current output module (optional)
- Milliampere I/O module (4 mA inputs + 1 mA output) (optional)
- Milliampere I/O module (4 mA outputs + 1 mA input) (optional)
- RTD input module (8 RTD inputs) (optional)
- Arc protection module (4 sensors + 2 HSO + 1 BI) (optional)
- Communication media (see "Communication" below)
- External I/O modules (see "Accessories" below)

COMMUNICATION

Communication inputs

- RJ-45 100 Mbps Ethernet (front panel, fixed)
- RJ-45 100 Mbps Ethernet and RS-485 (rear panel, fixed)
- Double RJ-45 Ethernet & IRIG-B communication module (optional)
- Double ST Ethernet & IRIG-B communication module (optional)
- Double SFP Ethernet & IRIG-B communication module (optional)
- Double LC (HSR/PRP) Ethernet communication module (optional)
- Double RJ-45 (HSR/PRP) Ethernet communication module (optional)
- RS-232 & serial fiber communication module (optional)

Communication protocols

- IEC 61850 (edition 1)
- IEC 61850 (edition 2)
- IEC 60870-5-101/104
- IEC 60870-5-103
- Modbus/RTU and Modbus/TCP
- DNP3
- SPA

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ACCESSORIES

- AX007 External 6-channel 2-/3-wire RTD input module (pre-configured)
- AX008 External 8-channel thermocouple and mA input module (pre-configured)
- AX013 Raising frame (120 mm)
- AX014 Raising frame (40 mm)
- AX015 Wall mounting bracket

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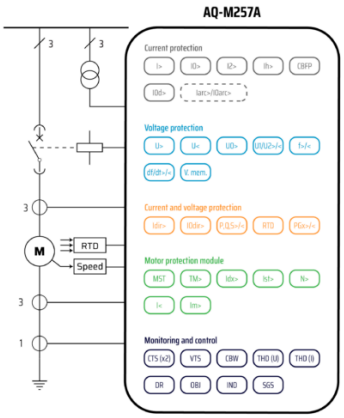
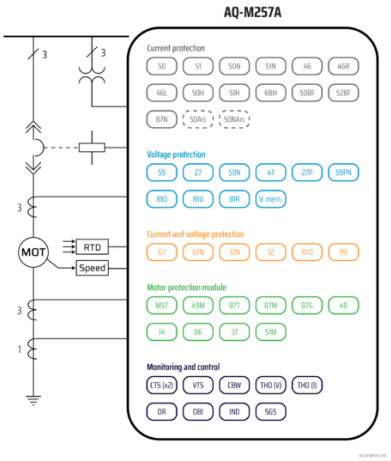
Application Drawing





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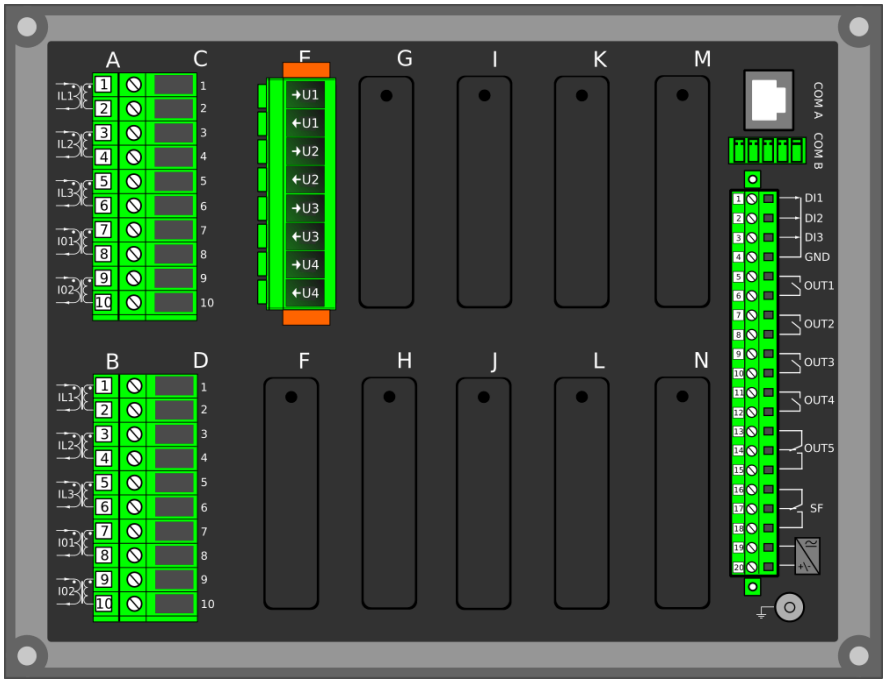
Device Rear Image



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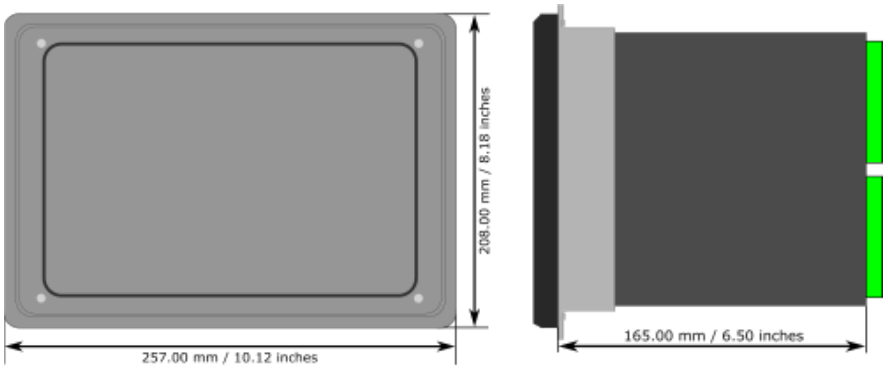
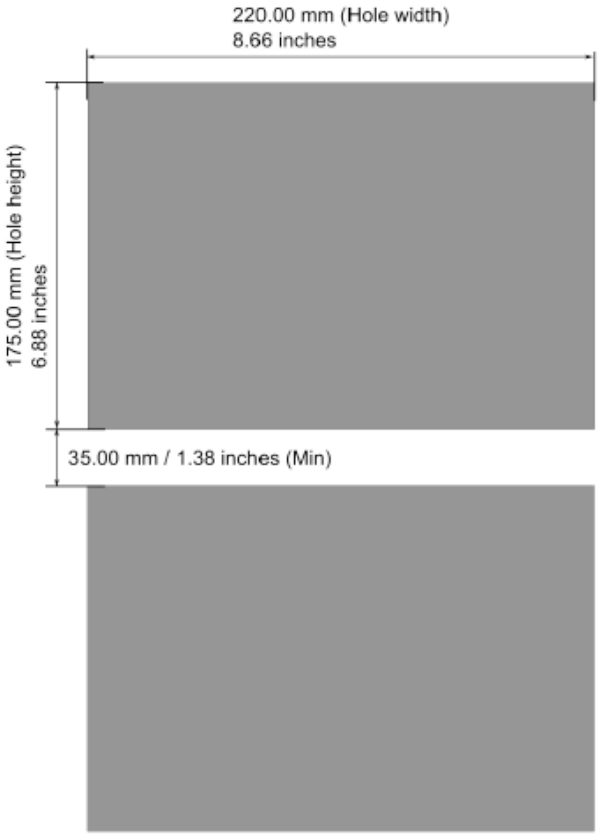
Device and Cut-out Image





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Order Code

AQ - M 2 5 7 X - P X X X A X A - X X X X X X X X X

Model
M Motor Protection

Device size
5 1/2 of 19" rack

Analog measurement
7 10 Current measurement channels and 4 voltage measurement channel

Functionality package
A Asynchronous machine
B Synchronous machine
C Synchronous machine with excitation

Mounting
P Panel mounting

Auxiliary voltage
H 80...265 VAC/DC
L 18...72 VDC

Measurement accuracy
0 Power/Energy measurement accuracy 0.5%
2 Power/Energy measurement accuracy 0.2%

Terminals
A Standard
B Ring lug terminals

Reserved for future use
A N/A

Digital inputs on power supply module
A 3 Digital inputs, 24 V nominal threshold
B 3 Digital inputs, 110 V nominal threshold
C 3 Digital inputs, 220 V nominal threshold

Reserved for future use
A N/A

Slots F, G, H, I, J, K, L, M, N (9 pcs)
A Empty
B 8 Digital inputs
C 5 Output relays ****
D Arc protection with 4 point sensor channels, 2 x HSO, 1 x BI *
F 8 x RTD input **
G 2 x RJ-45 100Mb Ethernet & IRIG-B * / ***
H 2 x ST 100Mb Ethernet & IRIG-B * / ***
I 4 x mA outputs - 1 x mA input **
J Double LC 100Mb Ethernet (HSR, PRP redundant protocols) * / ***
K Double RJ45 100Mb Ethernet (HSR, PRP redundant protocols) * / ***
L RS-232 - Serial fiber (Plastic-Plastic) * / ***
M RS-232 - Serial fiber (Plastic-Glass) * / ***
N RS-232 - Serial fiber (Glass-Plastic) * / ***
O RS-232 - Serial fiber (Glass-Glass) * / ***

* One card at most per IED
** Two cards at most per IED
*** Can only be applied to the two last slots
**** Five cards at most per IED

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