

AQ-G257 Generator Protection Device

Description



AQ-G257 is well-suited for large machines that require complete generator protection and 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-G257 communicates using various protocols, including communication according to the IEC 61850 standard.

AQ-G257 has two software options: the “A” variant (AQ-G257A) includes all the standard generator protection functions, while the “B” variant (AQ-G257B) also includes the synchronizer function. For more details on the software options, please see the order code below.

CONFIGURE AQ-GS257A IN THE PRODUCT CONFIGURATOR

CONFIGURE AQ-G257B IN THE PRODUCT CONFIGURATOR

Highlights:

- Complete synchronous machine protection
- Integrated differential protection
- Power measurement accuracy of up to 0.2 %

Technical data

PROTECTION

- Non-directional overcurrent ($I_{>}$; 50/51) - 4 stages
- Non-directional earth fault ($I_{O>}$; 50N/51N) - 4 stages
- Directional overcurrent ($I_{dir>}$; 67) - 4 stages
- Directional earth fault ($I_{Odir>}$; 67N/32N) - 4 stages
- Negative sequence overcurrent/ Phase current reversal/ Current unbalance ($I_{2>}$; 46/46R/46L) - 4 stages
- Harmonic overcurrent ($I_h>$; 50H/51H/68H) - 4 stages
- Circuit breaker failure protection (CBFP; 50BF/52BF)
- High-impedance or low-impedance restricted earth fault/ Cable end differential ($I_{Od>}$; 87N)
- Overvoltage ($U_{>}$; 59) - 4 stages
- Undervoltage ($U_{<}$; 27) - 4 stages
- Neutral overvoltage ($U_{O>}$; 59N) - 4 stages
- Low-voltage ride-through (LVRT; 27T)
- Sequence voltage ($U_{1/U2>/<}$; 47/27P/59PN) - 4 stages
- Overfrequency and underfrequency ($f_{>/<}$; 81O/81U) - 8 stages
- Rate-of-change of frequency ($df/dt_{>/<}$; 81R) - 8 stages
- Power protection (P, Q, S $_{>/<}$; 32) - 4 stages
- Generator/motor/transformer differential ($I_{dx>}$; 87T/87G/87M/87N)
- 100 % stator earth fault ($U_{O3rd>}$; 64S)
- Underexcitation (Q $_{<}$; 40)
- Underimpedance (Z $_{<}$; 21U)
- Underreactance (X $_{<}$; 21/40)
- Voltage-restrained overcurrent ($I_{v>}$; 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)
- Machine thermal overload (TM $_{>}$; 49M)
- Resistance temperature detectors (RTD)
- Programmable stage (PS $x_{>/<}$; 99)
- Arc protection ($I_{Arc>/IOArc>}$; 50Arc/50NArc) (optional)

CONTROL (AQ-G257A)

- Number of objects to control and monitor: 10
- Number of indicators to monitor: 10
- Number of setting groups: 8
- Vector jump ($\Delta\phi$; 78)
- Synchrocheck ($\Delta V/\Delta a/\Delta f$; 25)

CONTROL (AQ-G257B)

- Number of objects to control and monitor: 10
- Number of indicators to monitor: 10
- Number of setting groups: 8
- Vector jump ($\Delta\phi$; 78)
- Synchrocheck ($\Delta V/\Delta a/\Delta f$; 25)
- Synchronizer ($\Delta V/\Delta a/\Delta f$; 25)

MONITORING

- Current transformer supervision - 2 instances
- Voltage transformer supervision (VTS; 60)
- Circuit breaker wear monitoring
- Total harmonic distortion (current)
- Total harmonic distortion (voltage)
- 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)

MEASUREMENTS

- Phase, sequence and residual currents (IL1, IL2, IL3, IO1, IO2)
- 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 measurement accuracy of 0.5 %
- Power and energy measurement accuracy of up to 0.2 % (optional)

HARDWARE

Standard hardware

- Current inputs: 10
- Voltage inputs: 4
- Digital inputs: 3
- Digital outputs: 5
- Number of empty slots: 9

Optional hardware modules

- Digital input module (8 x DI)
- Digital output module (5 x DO)
- High-speed high-current output module (3 x out)
- Milliampere input module (4 x mA in, 1 x mA out)
- Milliampere output module (4 x mA out, 1 x mA in)
- RTD input module (8 RTD inputs)
- Arc protection module (4 x channels, 2 x HSO, 1 x BI)
- Communication media (see "Communication" below)
- External I/O modules (see "Accessories" below)

COMMUNICATION

Standard communication ports

- RJ-45 100 Mbps Ethernet (front panel)
- RJ-45 100 Mbps Ethernet and RS-485 (rear panel)

Optional communication modules

- Double RJ-45 Ethernet & IRIG-B communication module
- Double ST Ethernet & IRIG-B communication module
- Double SFP Ethernet & IRIG-B communication module
- Double LC (HSR/PRP) Ethernet communication module
- Double RJ-45 (HSR/PRP) Ethernet communication module
- RS-232 & serial fiber communication module

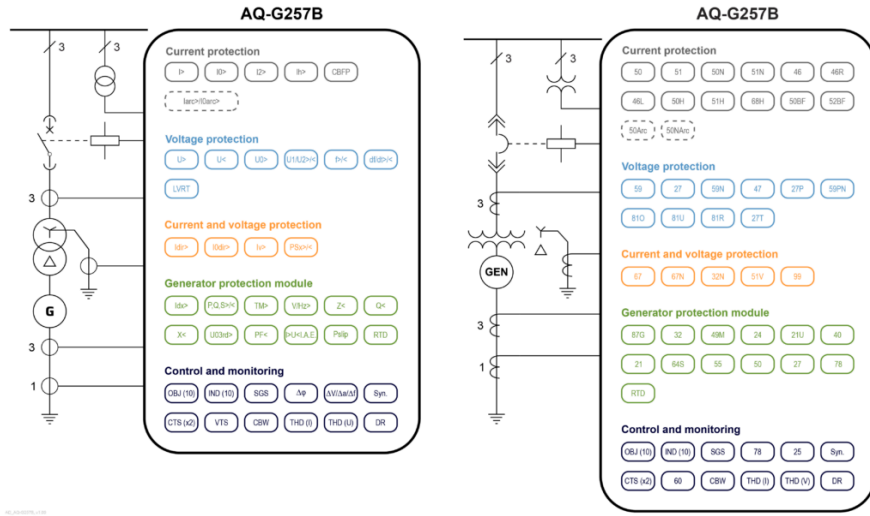
Communication protocols

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

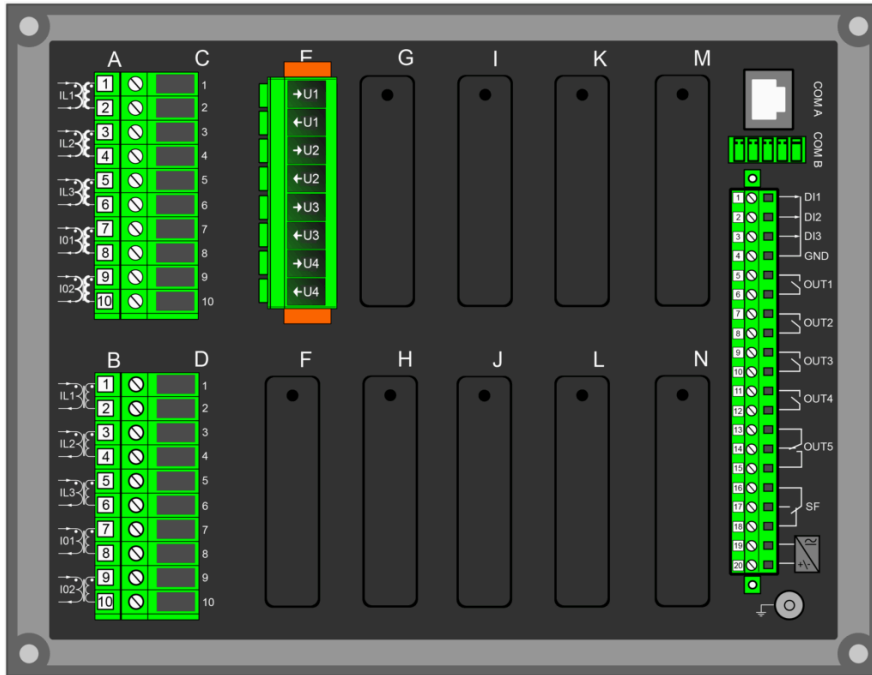
ACCESSORIES

- 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
- AX020 SFP module (2 km, MM)
- AX021 SFP module (40 km, SM)
- AX022 SFP module (120 km, SM)

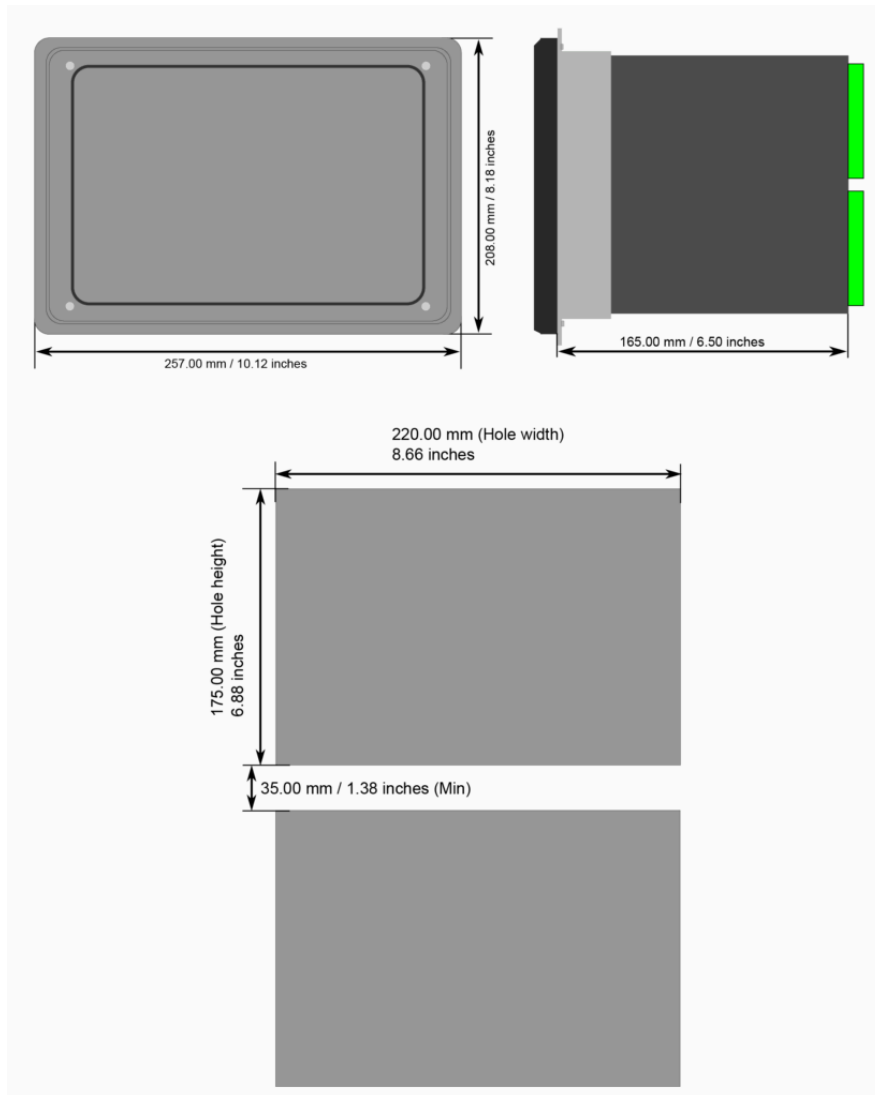
Application Drawing



Device Rear Image



Device and Cut-out Image



Order Code

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

Model	
G Generator protection	
Device size	
5 1/2 of 19" rack	
Analog measurement	
7 10 Current measurement channels and 4 voltage measurement channels	
Functionality package	
A Protection	
B Protection + Synchronizer	
C Protection + Excitation control ***	
D Protection + Excitation control + PSS ***	
E Protection + Excitation control + Synchronizer ***	
F Protection + Excitation control + Synchronizer + PSS ***	
Mounting	
P Panel mounted	
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 current terminals	
C Standard current terminals, spring cage voltage and I/O terminals	
D Ring-lug current terminals, spring cage voltage and I/O 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 (max. 6 pcs)	
D Arc protection with 4 point sensor channels, 2 x HSO, 1 x BI (max. 1 pcs)	
F 8 x RTD input (max. 2 pcs)	
G 2 x RJ-45 100Mb Ethernet & IRIG-B (max. 1 pcs) *	
H 2 x ST 100Mb Ethernet & IRIG-B (max. 1 pcs) *	
I 4 x mA outputs - 1 x mA input (max. 2 pcs)	
J Double LC 100Mb Ethernet (HSR, PRP redundant protocols) (max. 1 pcs) *	
K Double RJ45 100Mb Ethernet (HSR, PRP redundant protocols) (max. 1 pcs) *	
L RS-232 - Serial fiber (Plastic-Plastic) (max. 1 pcs) *	
M RS-232 - Serial fiber (Plastic-Glass) (max. 1 pcs) *	
N RS-232 - Serial fiber (Glass-Plastic) (max. 1 pcs) *	
O RS-232 - Serial fiber (Glass-Glass) (max. 1 pcs) *	
Q 2 x SFP 100Mb Ethernet & IRIG-B (max. 4 pcs) **	
R 3 x High-speed high current output (max. 3 pcs)	
T 4 x mA inputs - 1 x mA output (max. 2 pcs)	

* Can only be applied to the two last slots.
 ** Can only be applied to the four last slots. Requires an SFP adapter. See "Accessories" list.
 *** Requires the AQ-GC30 IGBT rectifier bridge unit