

AQ-F215 Feeder protection device



Description

The AQ-F215 feeder protection device offers a modular feeder protection and control solution for applications that require both current-based and voltage-based protections as well as complete measurements. You can add up to three (3) I/O or communication cards into the device for more comprehensive monitoring and control applications. The AQ-F215 feeder protection device communicates using various protocols, including the IEC 61850 substation communication standard.

Highlights:

- Current-based and voltage-based protections.
- Cable-end differential protection.
- Low-impedance restricted earth fault protection.
- Harmonics protection and control.
- A 5-shot scheme-controlled auto-recloser.
- Power and energy measurement accuracy of up to 0.2 %.

Technical data

PROTECTION

- Non-directional overcurrent ($I_{>}$; 50/51) - 4 stages (INST, DT or IDMT)
- Non-directional earth fault ($I_{O>}$; 50N/51N) - 4 stages (INST, DT or IDMT)
- Directional overcurrent ($I_{dir>}$; 67) - 4 stages (INST, DT or IDMT)
- Directional earth fault ($I_{Odir>}$; 67N/32N) - 4 stages (INST, DT or IDMT)
- Intermittent earth fault ($I_{Oint>}$; 67NT)
- Negative sequence overcurrent/ Phase current reversal/ Current unbalance ($I_{2>}$; 46/46R/46L) - 4 stages (INST, DT or IDMT)
- Harmonic overcurrent ($I_{h>}$; 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 ($I_{Od>}$; 87N)
- Voltage-restrained overcurrent ($I_{v>}$; 51V)
- Overvoltage ($U_{>}$; 59) - 4 stages (INST, DT or IDMT)
- Undervoltage ($U_{<}$; 27) - 4 stages (INST, DT or IDMT)
- Neutral overvoltage ($U_{O>}$; 59N) - 4 stages (INST, DT or IDMT)
- Sequence voltage ($U_{1/U2>/<}$; 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) - 1 stage (DT)
- Overpower ($P_{>}$; 32O)
- Underpower ($P_{<}$; 32U)
- Reverse power (P_r ; 32R)
- Line thermal overload ($TF_{>}$; 49F)
- Resistance temperature detectors (RTD)
- Voltage memory
- Programmable stage ($PG_{x>/<}$; 99)
- Arc protection ($I_{Arc>/IOArc>}$; 50Arc/50NArc) (optional)

CONTROL

- Number of objects to control and monitor: 5
- Number of indicators to monitor: 5
- Number of setting groups: 8
- Cold load pick-up
- Switch-on-to-fault
- Auto-recloser (0 → 1; 79)
- Zero sequence recloser
- Vector jump ($\Delta\phi$; 78)
- Synchrocheck ($\Delta V/\Delta a/\Delta f$; 25)

MEASURING AND MONITORING

- Phase, sequence and residual currents (IL1, IL2, IL3, IO1, IO2)
- Phase, sequence and residual voltages (UL1, UL2, UL3, U12, U23, U31, 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
- Voltage transformer supervision (60)
- Circuit breaker wear monitoring
- Total harmonic distortion (current)
- Total harmonic distortion (voltage)
- Fault locator (21FL)
- 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)

HARDWARE

- Current inputs: 5
- Voltage inputs: 4
- Digital inputs (fixed): 3
- Digital outputs (fixed): 5
- Number of empty slots: 3
- Digital inputs: +8/16/24 (optional)
- Digital outputs: +5/10 (optional)
- Milliampere I/O module (4 mA outputs + 1 mA input)
- Arc protection module (4 sensors + 2 HSO + 1 BI)
- 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)
- 2 x RJ-45 100 Mbps Ethernet with an IRIG-B input (optional)
- 2 x ST 100 Mbps Ethernet with an IRIG-B input (optional)
- 2 x LC 100 Mbps Ethernet (PRP/HSR) (optional)
- RS-232 serial fiber (PP/PG/GP/GG) (optional)

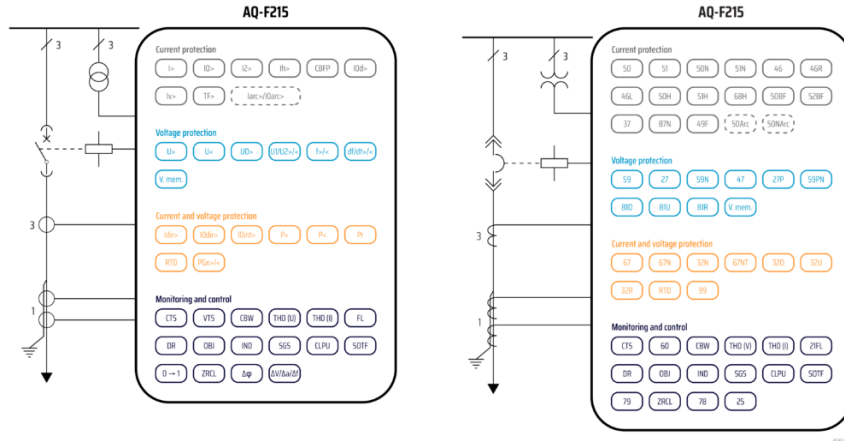
Communication protocols

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

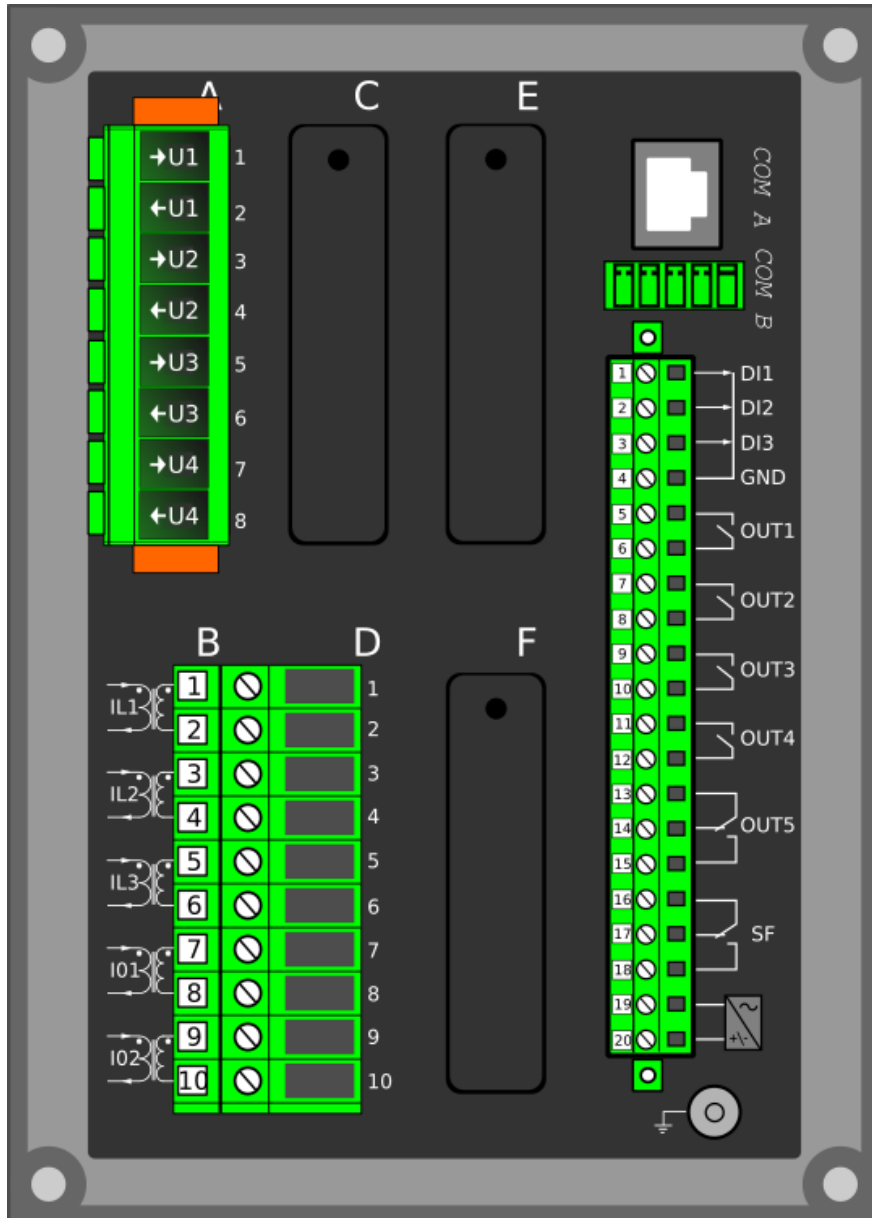
ACCESSORIES

- AX007 External 6-channel 2-/3-wire RTD input module (pre-configured)
- AX008 External 8-channel thermocouple and mA input module (pre-configured)
- AX009 Raising frame (87 mm)
- AX010 Raising frame (40 mm)
- AX011 Combiflex frame
- AX012 Wall mounting bracket

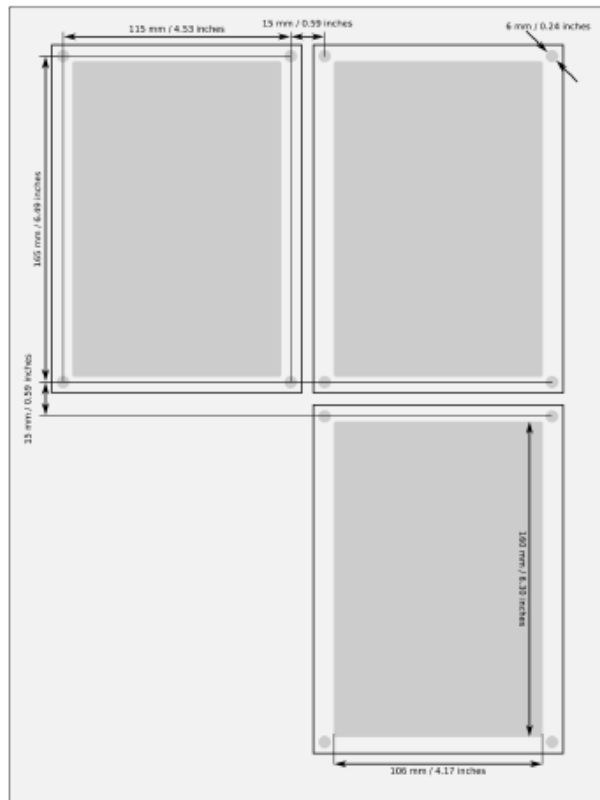
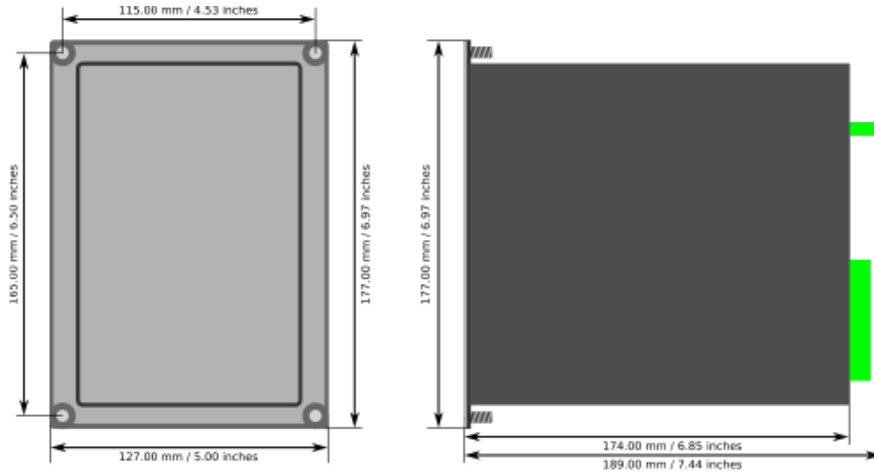
Application Drawing



Device Rear Image



Device and Cut-out Image



Order Code

AQ - F 2 1 5 - P X X X A X A - X X X

Model	
F Feeder protection	
Device size	
1 1/4 of 19" rack	
Analog measurement	
5 5 Current measurement channels and 4 voltage measurement channels	
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 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	
D 2 Digital inputs , 24 V nominal threshold	
E 2 Digital inputs , 110 V nominal threshold	
F 2 Digital inputs , 220 V nominal threshold	
Reserved for future use	
A N/A	
Slots C, E, F (3 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 last slot
 **** Can't be applied when type "L" (18...72 VDC) auxiliary voltage is selected