

AQ-F215 Feeder Protection Device

Description



AQ-F215 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. AQ-F215 communicates using various protocols, including communication according to the IEC 61850 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
- Non-directional earth fault ($I_{0>}$; 50N/51N) - 4 stages
- Directional overcurrent ($I_{dir>}$; 67) - 4 stages
- Directional earth fault ($I_{0dir>}$; 67N/32N) - 4 stages
- Intermittent earth fault ($I_{0int>}$; 67NT)
- 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 ($I_{0d>}$; 87N)
- Overvoltage ($U_{>}$; 59) - 4 stages
- Undervoltage ($U_{<}$; 27) - 4 stages
- Neutral overvoltage ($U_{0>}$; 59N) - 4 stages
- Sequence voltage ($U_1/U_2>/<$; 47/27P/59PN) - 4 stages
- Overfrequency and underfrequency ($f>/<$; 81O/81U) - 8 stages
- Rate-of-change of frequency ($df/dt>/<$; 81R) - 8 stages
- Voltage-restrained overcurrent ($I_{v>}$; 51V)
- Overpower ($P_{>}$; 32O)
- Underpower ($P_{<}$; 32U)
- Reverse power (P_r ; 32R)
- Line thermal overload ($TF_{>}$; 49F)
- Resistance temperature detectors (RTD)
- Arc protection ($I_{Arc>}/I_{0Arc>}$; 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 (CLPU)
- Switch-on-to-fault (SOTF)
- Auto-recloser ($O \rightarrow 1$; 79)
- Zero sequence recloser ($U_{0>}$ RECL; 79N)
- Vector jump ($\Delta\phi$; 78)
- Synchrocheck ($\Delta V/\Delta a/\Delta f$; 25)

MONITORING

- Current transformer supervision
- Voltage transformer supervision (VTS; 60)
- Circuit breaker wear monitoring
- Total harmonic distortion (current)
- Fault locator (Z1FL)
- 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, UO)
- 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: 5
- Voltage inputs: 4
- Digital inputs: 3
- Digital outputs: 5
- Number of empty slots: 3

Optional hardware modules

- Digital input module (8 x DI)
- Digital output module (5 x DO)
- 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 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 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

AQ-F215

Current protection

I> I0> I2> I3> CSFP ISD>

TF> $I_{acc} > I_{Dacc}$

Voltage protection

U> U< U0> U12>+ Iph ISB>+

Current and voltage protection

ISD>+ ISD0>+ ISD2>+ I3> P> P<

Pr RTD

Control and monitoring

DBU (S) IN0 (S) SOB CLPU SOFF 0 → 1

50% REC Ap 50% max CTS VTS CBW

THD (S) FL DR

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Current protection

5I 5I1 5IN 5IN1 4E 4E1 4E2 4E3 50H 50H1 50H2 50SF 50SF1 50SF2 50N 4SF 50Acc 50NAcc

Voltage protection

5U 2U 5UN 4U 2UP 50PN 51D 51U 51R

Current and voltage protection

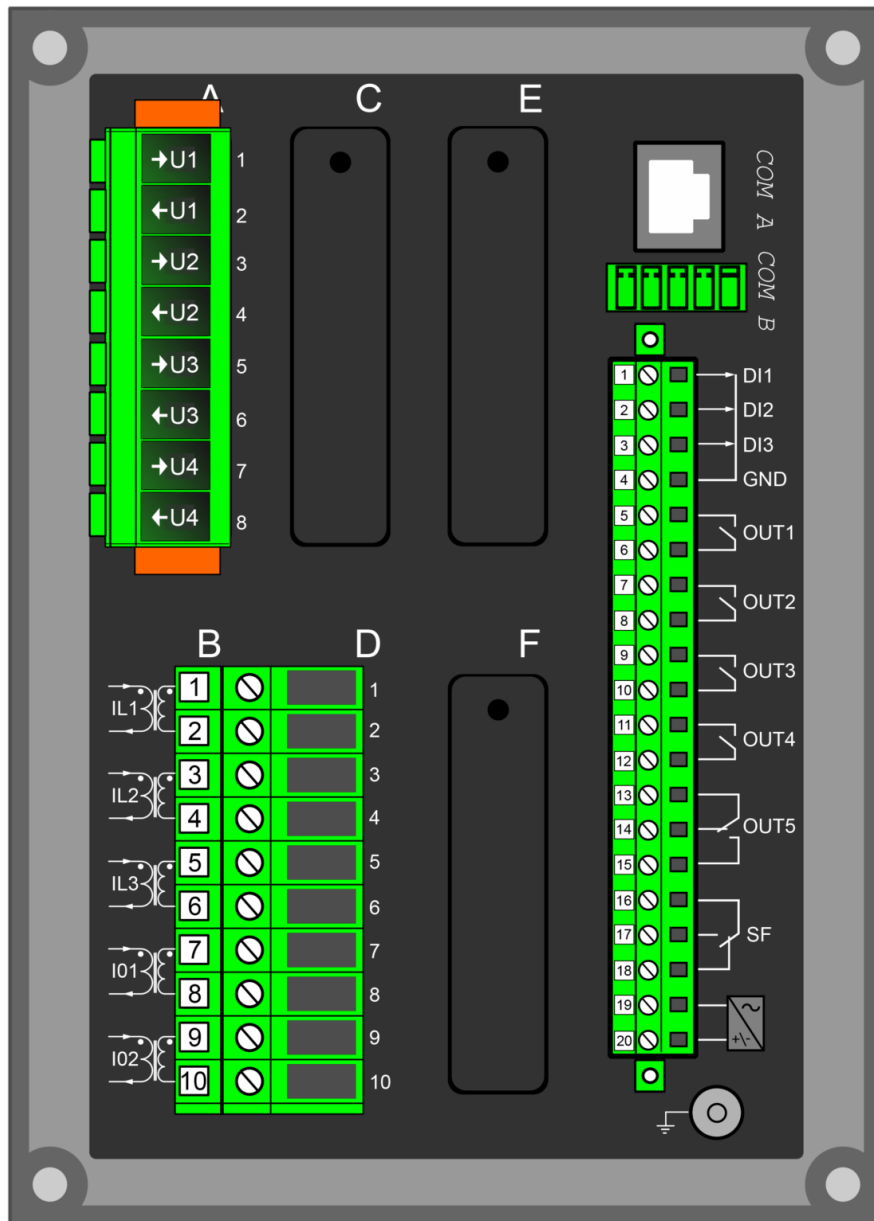
6I 6I1 3IN 6IN1 51V 3SD 3SD1 3SD2 RTD

Control and monitoring

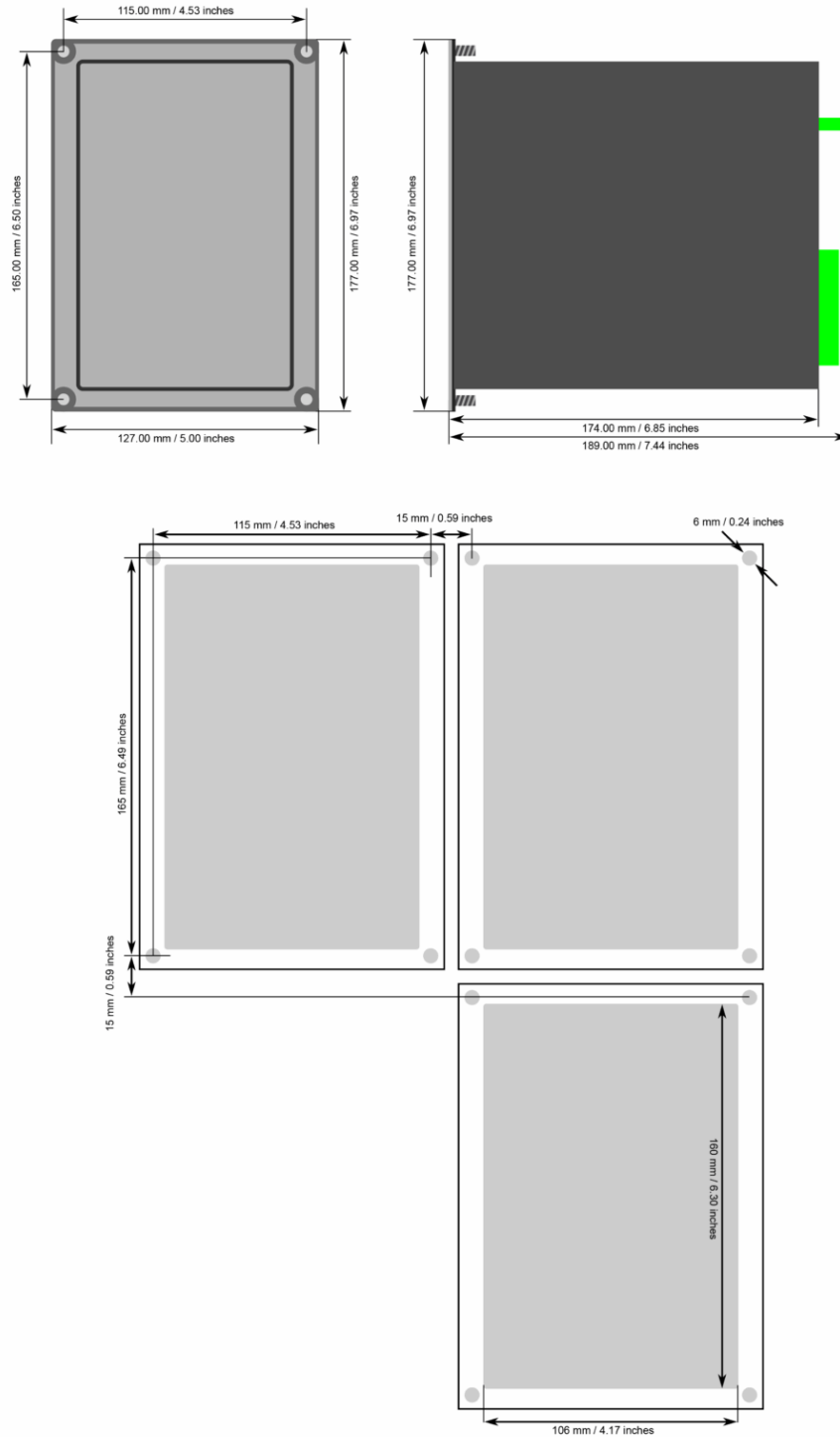
DBU (S) IN0 (S) SOB CLPU SOFF 79 79N 79 25 CTS 60 CBW

THD (S) 21FL DR

Device Rear Image



Device and Cut-out Image



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 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
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 (max. 2 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) *

* Can only be applied to the last slot