

AQ-R215 Railway protection device

Description



AQ-R215 Railway protection device is a three-phase feeder protection device that can be run either in Standard feeder mode or in Railway mode. In the Railway mode the device provides a single-phase overcurrent, earth fault, and voltage protection. Each protection stage can be independently set to the frequency of 16.67 Hz or of 50/60 Hz. When in the Standard mode the functionality of AQ-R215 is identical to that of the AQ-F215 feeder protection device. In this mode the relay can also be dynamically set to run on a frequency between 6 and 75 Hz.

You can add up to three (3) I/O or communication cards into the device for more demanding control, alarm and indication needs. AQ-R215 Railway protection device communicates using various protocols, including the IEC 61850 substation communication standard.

Highlights:

- Single-phase protection for any frequency range between 6 and 75 Hz.
- Double busbar control.
- Directional overcurrent and voltage protection.
- Low-impedance restricted earth fault protection.
- Harmonics protection and control.
- 5-shot scheme-controlled auto-recloser.

Technical data

PROTECTION

Railway mode

- Railway directional overcurrent ($I_{drw}>$) - 8 stages (INST, DT or IDMT)
- Railway non-directional overcurrent ($I>$; 50/51) - 4 stages (INST, DT or IDMT)
- Railway voltage ($U_{rw}>/<$; 27/59) - 4 stages (INST, DT or IDMT)

Standard mode

- 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)
- Harmonic overcurrent ($I_h>$; 50H/51H/68H) - 4 stages (INST, DT or IDMT)
- Negative sequence overcurrent/ Phase current reversal/ Current unbalance ($I_2>$; 46/46R/46L) - 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)
- Overvoltage ($U>$; 59) - 4 stages (INST, DT or IDMT)
- Undervoltage ($U<$; 27) - 4 stages (INST, DT or IDMT)
- Neutral overvoltage ($U_{O0}>$; 59N) - 4 stages (INST, DT or IDMT)
- Sequence voltage ($U_1/U_2>/<$; 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)
- Resistance temperature detectors (RTD)
- Line thermal overload ($TF>$; 49F)
- Voltage memory
- Programmable stage ($PGx>/<$; 99)
- Arc protection ($I_{Arc}>/I_{OArc}>$; 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
- Vector jump ($\Delta\phi$; 78)
- Auto-recloser (0 → 1; 79)
- Zero sequence recloser
- 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 (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)

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) (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)
- 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)

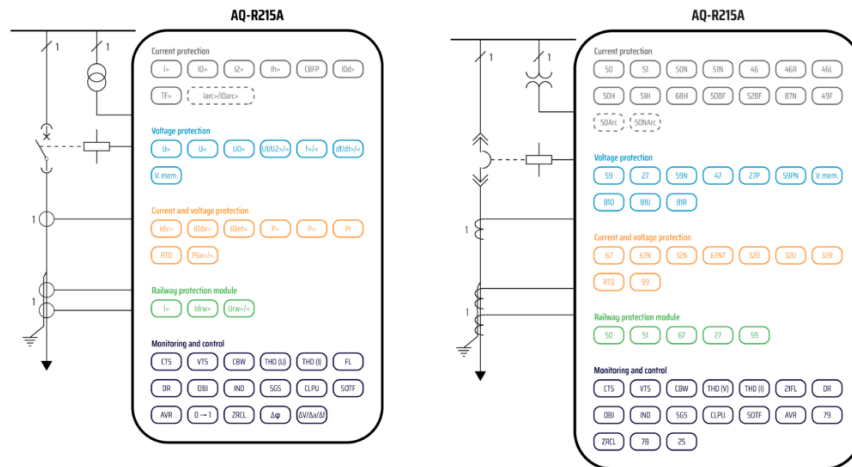
Communication protocols

- 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

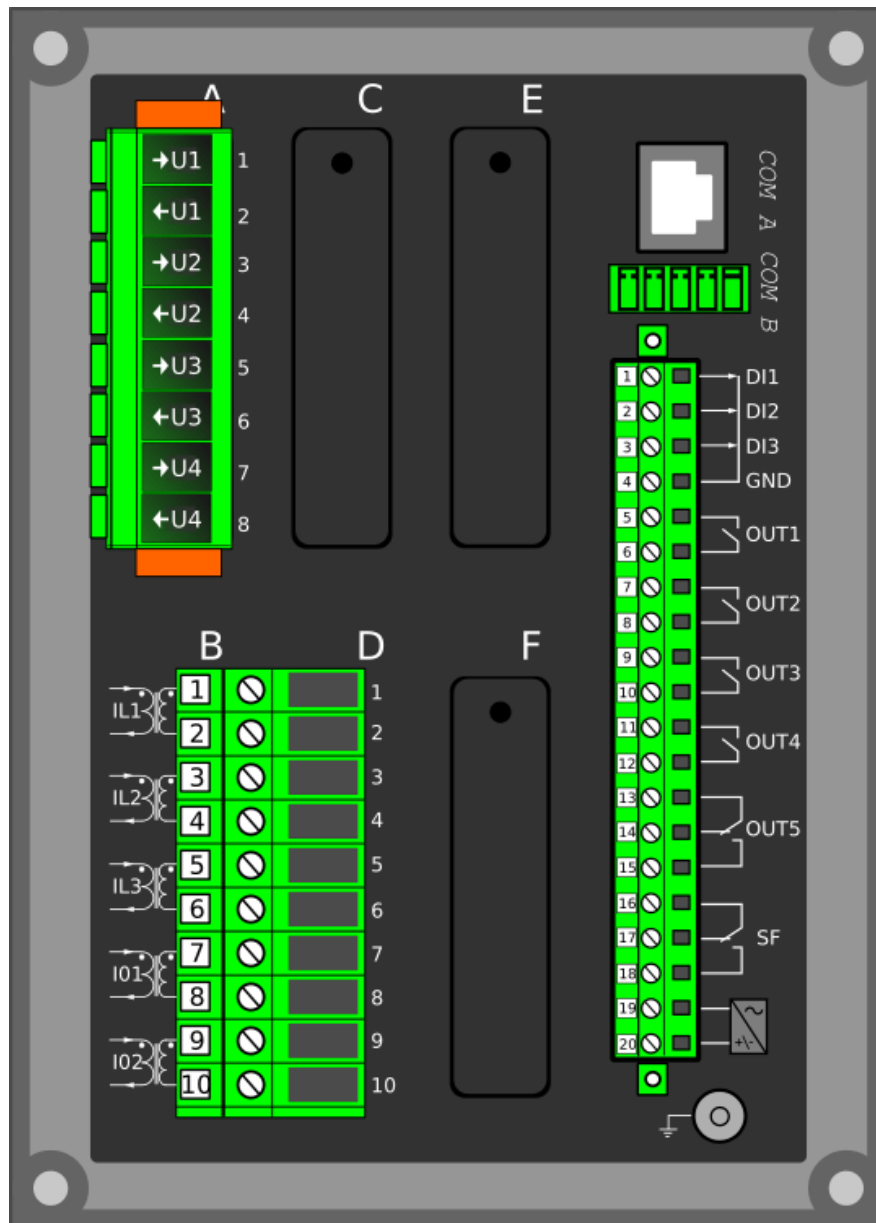
Application Drawing



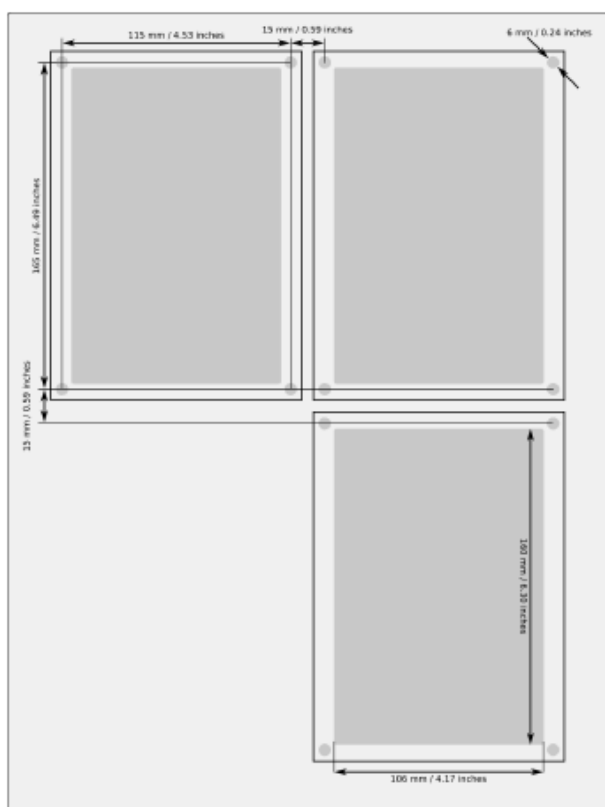
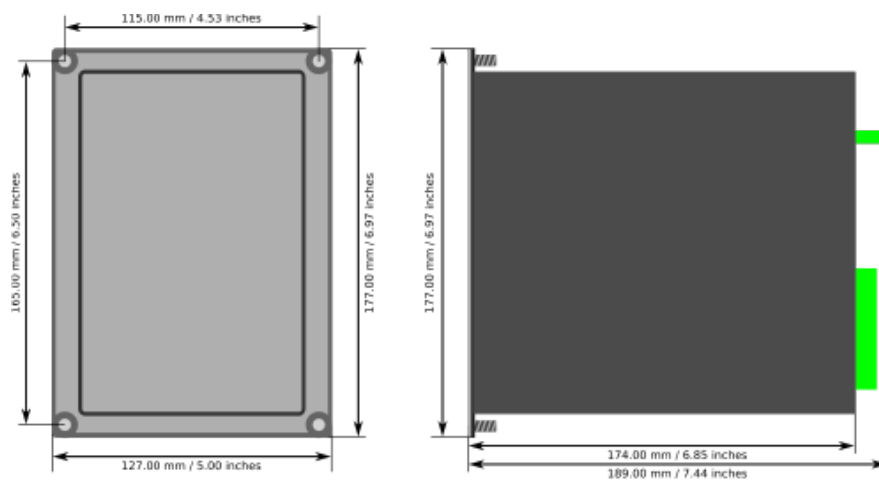
Note! AQ-R215 allows for a configuration for both single-phase and three-phase protection.

ARCTEQ

Device Rear Image



Device and Cut-out Image



Order Code

	AQ - R 2 1 5 - P X X X A X A - X X X
Model	
R Railway 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 pos)	
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