

# AQ 200 series - Protection, control and monitoring IEDs

The AQ 200 series IEDs provide optimal performance for main medium voltage or back-up high voltage protection, control and monitoring applications. The AQ 200 series integrates protection, control, monitoring, measuring, communication and extensive diagnostics information in a one compact package. Fully modular hardware construction gives a high level of flexibility; additional I/O or communication cards can be simply plugged in according to application needs.

The AQ 200 is developed using the latest available technologies providing a totally new dimension and options to protection engineers. Maximum usability of the IED is guaranteed by features such as graphical interfaces, highly customizable HMI, file storage of pdf or other supportive documents and extensive user log information. Easy to use and powerful configuration and setting software tools are provided free of charge. The AQ 200 comes uniquely with up to class 0.2S measurement accuracy eliminating the need for external transducers or metering devices.

The AQ 200 communicates using variety of standard protocols including IEC 61850 substation communication standard.

## AQ 200 - Benefits

### Full product range

- Overcurrent and earth-fault, machine, voltage and feeder protection and variety of monitoring and measuring IEDs
- Integrated protection, control, measurement, monitoring, communication and extensive diagnostic functions
- Versatile, customer oriented protective function design

### Ultimate usability

- Large customizable HMI with configurable Mimic diagram
- Integrated file storage for protection documentation and note pages for user comments
- Extensive log and diagnostics information of all executed and received events
- 16 freely configurable multi-colour LEDs

### Performance

- Sub-cycle instantaneous trip times
- Distinctive protection accuracy
- Fast integrated arc protection
- Fast power up for protection
- Powerful PLC programming included for the most demanding applications allowing for extensive customization

### High recording capacity

- 60MB memory for disturbance records and user files
- Up to 15000 events in permanent flash memory

### Software Tools

- Easy to use and powerful AQtivate 200 freeware for setting and configuration
- AQviewer freeware for comtrade file analysis

### Wide range of standard serial or Ethernet based communication protocols

- IEC 61850
- IEC 103, Modbus, DNP 3.0
- NTP, Precision Time Protocol (PTP) according to IEEE 1588



### Exclusive features

- Measurement accuracy of up to class 0.2S - direct cost savings by eliminating external transducers and metering devices
- Frequency independent protection at 6...75Hz
- Download test reports, manuals or comment files to IED memory
- Safe Setting mode for secure setting change and commission or maintenance testing

Protection functions	IEC	ANSI	Feeder protection				Machine protection		Transformer protection	Busbar protection	Control, monitoring and measuring		
			AQ F201	AQ F210	AQ F205	AQ F215	AQ M210	AQ M215	AQ T216	AQ V211	AQ P215	AQ S215	AQ S214
Three phase overcurrent protection stages INST, DT or IDMT	I>...I>>>>	50/51	✓ 3 stages	✓	✓	✓	✓	✓	✓				
(Sensitive) Earth-fault protection stages INST, DT or IDMT	I0>...I0>>>>	50/51N (S)	✓ 3 stages	✓	✓	✓	✓	✓	✓				
Harmonic overcurrent protection / inrush blocking stages INST, DT or IDMT	I <sub>h1</sub> >...I <sub>h3</sub> >>>>	50/51h/68	✓ 1 stage	✓	✓	✓	✓	✓	✓				
Cold-load pick-up block	CLPU	68	✓	✓	✓	✓							
Current unbalance / broken conductor protection stages INST, DT or IDMT	I2 (I2/1)	46R/46L 46	✓ 1 stage	✓	✓	✓	✓	✓	✓				
Thermal overload protection	T>	49		✓	✓	✓			✓				
Restricted earth fault protection (high impedance, low impedance)	I0d>	87N	✓ High-imp	✓	✓	✓	✓	✓	✓ 2 stages				
Directional three-phase overcurrent protection stages DT or IDMT	IDir >...IDir >>>>	67			✓	✓							
Directional (sensitive) residual overcurrent protection stages DT or IDMT	I0Dir >... I0Dir >>>>	67N			✓	✓		✓					
Overvoltage protection stages INST, DT or IDMT	U>...U>>>>	59			✓	✓		✓	✓				
Undervoltage protection stages INST, DT or IDMT	U<...U<<<<	27			✓	✓		✓	✓				
Positive sequence under/overvoltage protection stages INST, DT or IDMT	U1/2	59P/27P/47			✓	✓		✓	✓				
Residual voltage protection stages INST, DT or IDMT	U0>...U0>>>>	59N			✓	✓		✓	✓				
Frequency protection stages INST, DT or IDMT	f >/ f < (8)	81O/U			✓	✓		✓	✓				
Reverse/under/over power protection stages INST, DT or IDMT	P</>	32			✓	✓		✓					
Transformer differential protection, 2-winding	I <sub>dx</sub> >, I <sub>dx</sub> >>	87T						✓					
Motor thermal overload protection	T>	49M					✓	✓					
Motor start-up supervision element	ISt>	14 48					✓	✓					
Restart inhibit / frequent starts	N>	66 86					✓	✓					
Undercurrent monitor	I<	37					✓	✓					
Load jam monitor	I <sub>m</sub> >	51m					✓	✓					
Auto-reclose	0 -> 1	79		✓	✓	✓						✓	
Fuse failure	VTS	60			✓	✓		✓	✓			✓	✓
CT supervision	CTS		✓	✓	✓	✓	✓	✓	✓ 2 stages			✓	
Switch onto fault logic	SOTF		✓	✓	✓	✓							
Breaker failure protection	CBFP	50BF	✓	✓	✓	✓	✓	✓	✓ 2 stages	✓			
Arc protection	IL>	50ARC		option		option	option	option	option				
<b>Measuring and monitoring</b>													
Phase, sequence and residual currents (I <sub>Lx</sub> , I <sub>0x</sub> , I <sub>2x</sub> , I <sub>1x</sub> )			✓	✓	✓	✓	✓	✓	✓		✓	✓	
Phase, sequence and residual voltage (U <sub>x</sub> , U <sub>12</sub> , U <sub>23</sub> , U <sub>31</sub> , U <sub>0</sub> ) and frequency					✓	✓		✓		✓	✓	✓	
Power (P, Q, S, pf) and Energy (E <sub>+</sub> , E <sub>-</sub> , E <sub>q+</sub> , E <sub>q-</sub> ) class 0.5					✓	✓		✓				✓	
Power (P, Q, S, pf) and Energy (E <sub>+</sub> , E <sub>-</sub> , E <sub>q+</sub> , E <sub>q-</sub> ) class 0.25						option		option			✓	option	
Circuit breaker wear			✓	✓	✓	✓	✓	✓	✓	✓		✓	
Trip circuit supervision (TCS)			✓	✓	✓	✓	✓	✓	✓	✓		✓	
<b>Control</b>													
Controllable objects			1	5	5	5	5	5	5	5		5	5
<b>Hardware</b>													
Current inputs			5	5	5	5	5	5	10		5	5	
Voltage inputs					4	4		4		4	4	4	
Digital inputs standard			3	3	11	3	3	3	3	3	3	3	3
Output relays standard			6	6	11	6	6	6	6	6	6	6	6
Digital inputs optional				8/16/24/32		8/16/24	8/16/24/32	8/16/24	8/16	8/16/24/32/40	8/16/24	8/16/24	8/16/24/32/40/48
Output relays optional				5/10/15/20		5/10/15	5/10/15/20	5/10/15	5/10	5/10/15/20/25	5/10/15	5/10/15	5/10/15/20/25/30
External RTD inputs (optional)			12	12	12	12	12	12	12	12	12	12	12
<b>Event recording</b>													
Disturbance recorder			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Max no. permanent event records			15 000	15 000	15 000	15 000	15 000	15 000	15 000	15 000	15 000	15 000	15 000
<b>Communication interface</b>													
RJ 45 Ethernet 100Mb (front), RJ 45 Ethernet 100Mb and RS 485 (rear)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2 x Fiber optic or RJ45 Ethernet 100Mb				option		option	option	option	option	option	option	option	option
<b>Communication protocols</b>													
IEC 61850				✓		✓	✓	✓	✓	✓	✓	✓	✓
IEC 60870-5-103			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modbus RTU and Modbus TCP/IP			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DNP 3.0 and DNP 3.0 over TCP/IP			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓