# HighPROTEC Features Overview



(✔ = Standard, ○ = Option)

| Protection functions | ANSI | MCA4-2 | MRA4-2 | MRI4-2 | MRU4-2 | MCDTV4-2 | MRDT4-2 | MCDGV4-2 | MCDLV4-2 | MRMV4-2 | MRM4-2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Phase Distance Protection | 21P | | | | | | | ✔ | | | |
| Overexcitation V/Hz | 24 | | | | | ✔ | | ✔ | ✔ | | |
| Synchro check | 25 | ✔ | ✔ | | ✔ | ✔ | | ✔ | ✔ | | |
| Undervoltage | 27 | ✔ | ✔ | | ✔ | ✔ | | ✔ | ✔ | ✔ | |
| Power protection: P, Q, Qr, S, Pr | 32F, 37F, 32Q, 37Q, 37QR, 32S, 37S, 37R | ✔ | ✔ | | | ✔ | | ✔ | ✔ | ✔ | |
| QU protection (undervoltage- directional reactive power protection) | 27&32Q< | ✔ | ✔ | | | ✔ | | ✔ | ✔ | | |
| I< underload protection steps | 37 | | | | | | | | | ✔ | ✔ |
| Loss of excitation | 40 | | | | | | | ✔ | | | |
| Negative sequence elements (current/DEFT/INV) | 46 | ✔ | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Negative/positive sequence elements (voltage) | 47 | ✔ | ✔ | | ✔ | ✔ | | ✔ | ✔ | ✔ | |
| Motor - Start supervision | 48 | | | | | | | | | ✔ | ✔ |
| Overload protection with thermal replica | 49 | ✔ | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Circuit breaker failure protection | 50BF / 62BF | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Phase current elements (non-directional) | 50/51 | | | ✔ | | | ✔ | | ✔ | | |
| Phase current elements (non-directional and directional) | 67 | ✔ | ✔ | | | ✔ | | ✔ | | | |
| Earth current elements (non-directional) | 50N / 51N | | | ✔ | | | ✔ | | | ✔ | ✔ |
| Earth current elements (non-directional and directional) | 67N | ✔ | ✔ | | | ✔ | | ✔ | ✔ | | |
| Inrush detection IH2 (2nd harmonic) | | ✔ | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | | |
| Voltage controlled current protection | 51C | ✔ | ✔ | | | ✔ | | ✔ | ✔ | | |
| Voltage restraint current protection | 51V | ✔ | ✔ | | | ✔ | | ✔ | ✔ | | |
| Negative sequence elements (current/IEC/ANSI curves) | 51Q | ✔ | ✔ | | | ✔ | | ✔ | ✔ | ✔ | ✔ |
| Motor - JAM protection | 50J | | | | | | | | | ✔ | ✔ |
| Motor - Locked rotor protection | 51 LRS / 51 LR | | | | | | | | | ✔ | ✔ |
| Power factor cos (φ) | 55 | ✔ | ✔ | | | ✔ | | ✔ | ✔ | ✔ | |
| Overvoltage | 59 | ✔ | ✔ | | ✔ | ✔ | | ✔ | ✔ | ✔ | |
| Residual voltage elements | 59N | ✔ | ✔ | | ✔ | ✔ | | ✔ | ✔ | ✔ | |
| 100% stator earth fault protection | 59TN / 27TN | | | | | | | ✔ | | | |
| Voltage transformer supervision | 60FL | ✔ | ✔ | | ✔ | ✔ | | ✔ | ✔ | ✔ | |
| Current transformer supervision | 60L | ✔ | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Rotor earth fault | 64 | | | | | | | | | | |
| Generator Rotor Protection | 64N, 40 / 76 | | | | | | | | | | |
| Motor - Start supervision | 66 | | | | | | | | | ✔ | ✔ |
| Out of Step Tripping / Power Swing Blocking (Pole Slip Protection) | 68 / 78 | | | | | | | ✔ | | | |
| Trip circuit supervision | 74TC | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Vector surge | 78 | ✔ | ✔ | | ✔ | ✔ | | ✔ | ✔ | ✔ | |
| Auto reclosing | 79 | ✔ | ✔ | ✔ | | | | | ✔ | | |
| Underfrequency / Overfrequency | 81 O/U | ✔ | ✔ | | ✔ | ✔ | | ✔ | ✔ | ✔ | |
| Frequency gradient (ROCOF) | 81R | ✔ | ✔ | | ✔ | ✔ | | ✔ | ✔ | ✔ | |
| Lockout function | 86 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Generator differential protection | 87G | | | | | ✔ | ✔ | ✔ | ✔ | | |
| Transformer differential protection | 87T | | | | | ✔ | ✔ | ✔ | ✔ | | |
| Cable / Line differential protection | 87L | | | | | | | | ✔ | | |
| Restricted earth fault elements | 87N (64REF) | | | | | ✔ | ✔ | ✔ | | | |
| Breaker Wear Monitor | BKM | ✔ | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Protection parameter sets | | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Reverse interlocking | | ✔ | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Event, failure and disturbance recorder | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Trend recording | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| **Control** | | | | | | | | | | | |
| Control function for 1 / up to 6 switchgear(s) | | 6 | 1 | 1 | 1 | 6 | 2 | 6 | 6 | 1 | 1 |
| Logic (up to 80 equations) | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| **Measuring functions** | | | | | | | | | | | |
| Currents | | ✔ | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Thermal overload θ | | ✔ | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Voltages | | ✔ | ✔ | | ✔ | ✔ | | ✔ | ✔ | ✔ | |
| Frequency | | ✔ | ✔ | | ✔ | ✔ | | ✔ | ✔ | ✔ | |
| **Hardware** | | | | | | | | | | | |
| Number of binary output relays (depends on type of device) | | 7/13 | 7/13 | 6 | 6 | 11/11 | 7/13 | 11/11/11/16 | 7/13/20 | 7/13 | 6/4 |
| Number of digital inputs (depends on type of device) | | 8/16 | 8/16 | 8 | 8 | 16/8 | 8/16 | 16/8/24/16 | 8/16/24 | 8/8 | 8/4 |
| Number of analog inputs and outputs (depends on type of device) | | | | | | 0/2+2 | | 0/2+2/0/0 | | 0+4 | 0+1 |
| **Communication** | | | | | | | | | | | |
| IEC61850 (RJ45 or fiber optic [FO] LC) | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| MODBUS RTU (via fiber optic [FO] ST or RS485) | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Modbus TCP (RJ45 or fiber optic [FO] LC) | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| IEC60870-5-103 (via fiber optic [FO] ST or RS485) | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Profibus DP (via fiber optic [FO] ST or RS485) | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| DNP3.0 RTU (via fiber optic [FO] ST or RS485) | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| DNP3.0 TCP (RJ45 or fiber optic [FO] LC) | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| IRIG-B interface (time synchronization) | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |