

ESX CANbus controller approvals

| Functional Safety | | |
|---|---|---|
| DIN V VDE 19250 | Principles for safety requirements | Requirement category AK 4 |
| DIN V VDE 0801 and appendix A1 | Principles for computers in safety-related systems | Requirement category AK 4 detection of 1 error |
| EN 954-1 | Safety of machinery Safety-related parts of control systems | Category 3 detection of 1 error |
| IEC 61508 | Functional safety of electrical/electronic/programmable electronic safety-related systems | Safety integrity level SIL 2 with hardware fault tolerance 1 and high demand mode of operation |
| Environmental Tests | | |
| EN 60204-1 | Safety of machinery - electrical equipment of machines | |
| IEC 60529 DIN 40050-9 | IP Protection classes | IP 65 (6 --> totally protected against dust/5 --> protected against jets of water form all directions) (opt. IP 67) |
| IEC 68-2-1 | Environmental testing: Cold | 96h with -40°C, maximum output current, maximum power supply |
| IEC 68-2-2 | Environmental testing: Dry heat | 96h with +70°C, maximum output current, minimum power supply |
| IEC 68-2-3 | Environmental testing: Damp heat constant | 21 days with 40 °C and 93% RH |
| IEC 68-2-6 | Environmental testing: Vibration sinusoidal | 10 Hz to 500 Hz / 1 Okt./min with 5g 10 sweeps bidirectional |
| IEC 68-2-14 | Environmental testing: Change of temperature | -40 °C --> +85 °C, 10 cycles, duration time 1h, temp. change 30 s |
| IEC 68-2-27 | Environmental testing: Shock | 15g/11ms 3 shocks/axis |
| IEC 68-2-29 | Environmental testing: Bump | Bump 20g/6ms 1000 shocks/axis |
| IEC 68-2-30 DIN 50017-KFw | Environmental testing: Damp heat cyclic | +25 °C to 55 °C with 93% r. h. 6 cycles (each cycle 24 h) |
| IEC 68-2-32 | Environmental testing: Free fall | 1 m free fall on steelplate, 6 axis |
| IEC 68-2-52 DIN 50021-SS | Sodium chloride | 5% NaCl, 6 cycles à 24h, 35°C, 8h/16h |
| Life cycle test | Life cycle | 52 days operation time with 65°C |
| Life cycle test | Life cycle thermographic | Thermographic with MTBF-calculation (60 °C); life time > 10years |
| EMC | | |
| 95/54/EG (e1) | Emission | 30 MHz to 1 GHz |
| 95/54/EG (e1) | Immunity | Stripline, 1-1000 MHz, 200 V/m, 80%AM sine wave 1kHz |
| FCC, 47 CFR Part 15 Subpart B | Compliance with FCC Docket 92-152 'Harmonization of Rules for Digital Devices Incorporate International Standards' using CISPR 22 | Class A |
| ISO7637 | Road vehicles, electrical disturbance by conduction and coupling | Testlevel IV for all testpulses (12V and 24V) except load dump |
| IEC/CISPR 25 VDE 0879-2 | Limits and methods of measurement of radio disturbance; characteristics for the protection of receivers used on board vehicles | 0.15 to 108 MHz |
| EN 50081-1; EN 55011 IEC/CISPR 11 | EMC emission | 30 MHz - 1 GHz, Groupe 1 Class B |
| EN 50082-2 (EN61000-6-2 starting 2002) | EMC immunity | ESD, emission, radio frequency, magnetic field, burst, surge |
| KBA (Krafftahrtbundesamt) | Certification of national government for vehicles | EMC corresponding to 95/54/EG ISO 9000 incl. traffic certificate |