

QUINT4-PS/1AC/24DC/10 - Power supply unit



2904601

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Primary-switched QUINT POWER power supply with free choice of output characteristic curve, SFB (selective fuse breaking) technology, and NFC interface, input: 1-phase, output: 24 V DC/10 A

Product description

The fourth generation of the high-performance QUINT POWER power supplies ensures superior system availability by means of new functions. Signaling thresholds and characteristic curves can be individually adjusted via the NFC interface. The unique SFB technology and preventive function monitoring of the QUINT POWER power supply increase the availability of your application.

Your advantages

- SFB technology trips standard circuit breakers selectively, loads that are connected in parallel continue working
- Preventive function monitoring indicates critical operating states before errors occur
- Signaling thresholds and characteristic curves that can be adjusted via NFC maximize system availability
- Easy system extension thanks to static boost; starting of difficult loads thanks to dynamic boost
- High degree of immunity, thanks to integrated gas-filled surge arrester and mains failure bridging time of more than 20 milliseconds
- Robust design thanks to metal housing and wide temperature range from -40°C to +70°C
- Worldwide use thanks to the wide range input and international approval package

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2904601

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Technical data

Input data

| | |
|----------------------------------|----------------------------------------------------------------------------|
| Control input (configurable) Rem | Output power ON/OFF (SLEEP MODE) |
| Default | Output power ON (>40 k Ω /24 V DC/open bridge between Rem and SGnd) |

AC operation

| | |
|------------------------------------------|------------------------------------------------------------------------------|
| Network type | Star network |
| Nominal input voltage range | 100 V AC ... 240 V AC |
| Input voltage range | 100 V AC ... 240 V AC -15 % ... +10 % |
| Derating | < 100 V AC (1 %/V) |
| Electric strength, max. | 300 V AC 60 s |
| Typical national grid voltage | 120 V AC 230 V AC |
| Voltage type of supply voltage | AC |
| Inrush current | typ. 12 A (at 25 °C) |
| Inrush current integral (I^2t) | < 0.7 A ² s |
| Inrush current limitation | 12 A (after 1 ms) |
| AC frequency range | 50 Hz ... 60 Hz -10 % ... +10 % |
| Frequency range (f_N) | 50 Hz ... 60 Hz -10 % ... +10 % 16.7 Hz (acc. to EN 50163) |
| Mains buffering time | typ. 42 ms (120 V AC) typ. 44 ms (230 V AC) |
| Current consumption | 3.4 A (100 V AC) 2.8 A (120 V AC) 1.5 A (230 V AC) 1.5 A (240 V AC) |
| Nominal power consumption | 274 VA |
| Protective circuit | Transient surge protection; Varistor, gas-filled surge arrester |
| Power factor (cos phi) | 0.94 |
| Switch-on time | < 1 s |
| Typical response time | 300 ms (from SLEEP MODE) |
| Input fuse | 8 A (slow-blow, internal) |
| Recommended breaker for input protection | 10 A ... 16 A (Characteristic B, C, D, K or comparable) |
| Discharge current to PE | < 3.5 mA 0.7 mA (264 V AC, 60 Hz) |

DC operation

| | |
|--------------------------------|---------------------------------------|
| Nominal input voltage range | 110 V DC ... 250 V DC |
| Input voltage range | 110 V DC ... 250 V DC -18 % ... +40 % |
| Derating | < 110 V DC (1 %/V) |
| Voltage type of supply voltage | DC |
| Current consumption | 3 A (110 V DC) |

QUINT4-PS/1AC/24DC/10 - Power supply unit



2904601

<https://www.phoenixcontact.com/gb/products/2904601>

| | |
|--|------------------|
| | 1.3 A (250 V DC) |
|--|------------------|

Output data

| | |
|----------------------------------------------------|-------------------------------------------------------------------|
| Efficiency | typ. 92.5 % (120 V AC) |
| | typ. 93.4 % (230 V AC) |
| Output characteristic | U/I Advanced |
| | Smart HICCUP |
| | FUSE MODE |
| Nominal output voltage | 24 V DC |
| Setting range of the output voltage (U_{Set}) | 24 V DC ... 29.5 V DC (constant capacity) |
| Nominal output current (I_N) | 10 A |
| Static Boost ($I_{Stat.Boost}$) | 12.5 A |
| Dynamic Boost ($I_{Dyn.Boost}$) | 20 A (5 s) |
| Selective Fuse Breaking (I_{SFB}) | 60 A (15 ms) |
| Magnetic circuit breaker tripping | A1...A6 / B2...B6 / C1...C3 / Z1...Z6 |
| Derating | > 60 °C ... 70 °C (2.5 %/K) |
| Feedback voltage resistance | ≤ 35 V DC |
| Protection against overvoltage at the output (OVP) | ≤ 32 V DC |
| Control deviation | < 0.5 % (Static load change 10 % ... 90 %) |
| | < 4 % (Dynamic load change 10 % ... 90 %, (10 Hz)) |
| | < 0.25 % (change in input voltage ±10 %) |
| Residual ripple | < 80 mV _{PP} (with nominal values) |
| Short-circuit-proof | yes |
| No-load proof | yes |
| Output power | 240 W |
| | 300 W |
| | 480 W |
| Apparent power | 336 VA (120 V, $U_{OUT} = 24$ V, $I_{OUT} = \text{stat. Boost}$) |
| | 345 VA (230 V, $U_{OUT} = 24$ V, $I_{OUT} = \text{stat. Boost}$) |
| Maximum no-load power dissipation | < 3 W (120 V AC) |
| | < 3 W (230 V AC) |
| Power loss nominal load max. | < 20 W (120 V AC) |
| | < 17 W (230 V AC) |
| Power dissipation SLEEP MODE | < 3 W (120 V AC) |
| | < 3 W (230 V AC) |
| Crest factor | typ. 1.50 (120 V AC) |
| | typ. 1.67 (230 V AC) |
| Rise time | < 1 s ($U_{Out} = 10$ % ... 90 %) |
| Connection in parallel | yes, for redundancy and increased capacity |
| Connection in series | yes |

Signal

| | |
|--------------------|---------------------------------------------|
| Signal ground SGnd | Reference potential for Out1, Out2, and Rem |
|--------------------|---------------------------------------------|

Signal Out 1 (configurable)

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| | |
|-----------------------------------|----------------------------------------------------------|
| Digital | 24 V DC 20 mA |
| Default | 24 V DC 20 mA 24 V DC for $U_{Out} > 0.9 \times U_{Set}$ |
| Signal Out 2 (configurable) | |
| Analog | 4 mA ... 20 mA $\pm 5\%$ (Load $\leq 400 \Omega$) |
| Default | 24 V DC 20 mA 24 V DC for $P_{Out} < P_N$ |
| Signal relay 13/14 (configurable) | |
| Default | closed ($U_{out} > 0.9 U_{Set}$) |
| Digital | 24 V DC 1 A |
| | 30 V AC/DC 0.5 A |

Connection data

Input

| | |
|------------------------------------------------------------------------------------|----------------------|
| Connection method | Screw connection |
| Conductor cross section, rigid min. | 0.2 mm ² |
| Conductor cross section, rigid max. | 2.5 mm ² |
| Conductor cross section flexible min. | 0.2 mm ² |
| Conductor cross section flexible max. | 2.5 mm ² |
| Single conductor/flexible terminal point with ferrule with plastic sleeve, min. | 0.25 mm ² |
| Single conductor/flexible terminal point with ferrule with plastic sleeve, max. | 2.5 mm ² |
| Single conductor/flexible terminal point with ferrule without plastic sleeve, min. | 0.25 mm ² |
| Single conductor/flexible terminal point with ferrule without plastic sleeve, max. | 2.5 mm ² |
| Conductor cross section AWG min. | 24 |
| Conductor cross section AWG max. | 14 |
| Stripping length | 6.5 mm |
| Tightening torque, min | 0.5 Nm |
| Tightening torque max | 0.6 Nm |

Output

| | |
|------------------------------------------------------------------------------------|----------------------|
| Connection method | Screw connection |
| Conductor cross section, rigid min. | 0.2 mm ² |
| Conductor cross section, rigid max. | 2.5 mm ² |
| Conductor cross section flexible min. | 0.2 mm ² |
| Conductor cross section flexible max. | 2.5 mm ² |
| Single conductor/flexible terminal point with ferrule with plastic sleeve, min. | 0.25 mm ² |
| Single conductor/flexible terminal point with ferrule with plastic sleeve, max. | 2.5 mm ² |
| Single conductor/flexible terminal point with ferrule without plastic sleeve, min. | 0.25 mm ² |
| Single conductor/flexible terminal point with ferrule without plastic sleeve, max. | 2.5 mm ² |

QUINT4-PS/1AC/24DC/10 - Power supply unit



2904601

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| | |
|----------------------------------|--------|
| Conductor cross section AWG min. | 24 |
| Conductor cross section AWG max. | 14 |
| Stripping length | 6.5 mm |
| Tightening torque, min | 0.5 Nm |
| Tightening torque max | 0.6 Nm |

Signal

| | |
|------------------------------------------------------------------------------------|----------------------|
| Connection method | Push-in connection |
| Conductor cross section, rigid min. | 0.2 mm ² |
| Conductor cross section, rigid max. | 1 mm ² |
| Conductor cross section flexible min. | 0.2 mm ² |
| Conductor cross section flexible max. | 1.5 mm ² |
| Single conductor/flexible terminal point with ferrule with plastic sleeve, min. | 0.2 mm ² |
| Single conductor/flexible terminal point with ferrule with plastic sleeve, max. | 0.75 mm ² |
| Single conductor/flexible terminal point with ferrule without plastic sleeve, min. | 0.2 mm ² |
| Single conductor/flexible terminal point with ferrule without plastic sleeve, max. | 1.5 mm ² |
| Conductor cross section AWG min. | 24 |
| Conductor cross section AWG max. | 16 |
| Stripping length | 8 mm |

Signaling

| | |
|--------------------|---------------------------------------------------|
| Types of signaling | LED |
| | Floating signal contact |
| | Active signal output Out1 (digital, configurable) |
| | Active signal output Out2 (analog, configurable) |
| | Remote contact |
| | Signal ground SGnd |

Signal output

| | |
|------------------|------------------------------------------------------|
| P _{Out} | > 100 % (LED lights up yellow, output power > 240 W) |
| | > 75 % (LED lights up green, output power > 180 W) |
| | > 50 % (LED lights up green, output power > 120 W) |
| U _{Out} | > 0.9 × U _{Set} (LED lights up green) |
| | < 0.9 × U _{Set} (LED flashes green) |

Electrical properties

| | |
|---------------------------------|--------------------------|
| Number of phases | 1.00 |
| Insulation voltage input/output | 4 kV AC (type test) |
| | 2 kV AC (routine test) |
| Insulation voltage output / PE | 0.5 kV DC (type test) |
| | 0.5 kV DC (routine test) |
| Insulation voltage input / PE | 3.5 kV AC (type test) |

QUINT4-PS/1AC/24DC/10 - Power supply unit



2904601

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| | |
|---------------------|------------------------------------------------------|
| | 2.4 kV AC (routine test) |
| Switching frequency | 90.00 kHz ... 110.00 kHz (Auxiliary converter stage) |
| | 50.00 kHz ... 245.00 kHz (Main converter stage) |
| | 35.00 kHz ... 700.00 kHz (PFC stage) |

Product properties

| | |
|------------------------------------|---------------------------|
| Product type | Power supply |
| Product family | QUINT POWER |
| MTBF (IEC 61709, SN 29500) | > 1251000 h (25 °C) |
| | > 783000 h (40 °C) |
| | > 377000 h (60 °C) |
| Environmental protection directive | RoHS Directive 2011/65/EU |
| | WEEE |
| | Reach |

Insulation characteristics

| | |
|---------------------|---|
| Protection class | I |
| Degree of pollution | 2 |

Life expectancy (electrolytic capacitors)

| | |
|-----------------|----------|
| Current | 5 A |
| Temperature | 40 °C |
| Time | 286000 h |
| Additional text | 120 V AC |

Life expectancy (electrolytic capacitors)

| | |
|-----------------|----------|
| Current | 5 A |
| Temperature | 40 °C |
| Time | 283000 h |
| Additional text | 230 V AC |

Life expectancy (electrolytic capacitors)

| | |
|-----------------|----------|
| Current | 10 A |
| Temperature | 25 °C |
| Time | 377000 h |
| Additional text | 120 V AC |

Life expectancy (electrolytic capacitors)

| | |
|-----------------|----------|
| Current | 10 A |
| Temperature | 25 °C |
| Time | 454000 h |
| Additional text | 230 V AC |

Life expectancy (electrolytic capacitors)

| | |
|-------------|----------|
| Current | 10 A |
| Temperature | 40 °C |
| Time | 133000 h |

QUINT4-PS/1AC/24DC/10 - Power supply unit



2904601

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| | |
|-------------------------------------------|----------|
| Additional text | 120 V AC |
| Life expectancy (electrolytic capacitors) | |
| Current | 10 A |
| Temperature | 40 °C |
| Time | 160000 h |
| Additional text | 230 V AC |

Dimensions

| | |
|---------------------|--------|
| Dimensional drawing | |
| Width | 50 mm |
| Height | 130 mm |
| Depth | 125 mm |

Installation dimensions

| | |
|----------------------------------|---------------|
| Installation distance right/left | 5 mm / 5 mm |
| Installation distance top/bottom | 50 mm / 50 mm |

Alternative assembly

| | |
|--------|--------|
| Width | 122 mm |
| Height | 130 mm |
| Depth | 53 mm |

Mounting

| | |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mounting type | DIN rail mounting |
| Assembly instructions | alignable: $P_N \geq 50\%$, 5 mm horizontally, 15 mm next to active components, 50 mm vertically alignable: $P_N < 50\%$, 0 mm horizontally, 40 mm vertically top, 20 mm vertically bottom |
| Mounting position | horizontal DIN rail NS 35, EN 60715 |
| With protective coating | No |

Material specifications

| | |
|--------------------------------------------------------------------|------------------------|
| Flammability rating according to UL 94 (housing / terminal blocks) | V0 |
| Housing material | Metal |
| Hood version | Stainless steel X6Cr17 |
| Side element version | Aluminum |

Environmental and real-life conditions

QUINT4-PS/1AC/24DC/10 - Power supply unit



2904601

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Ambient conditions

| | |
|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Degree of protection | IP20 |
| Ambient temperature (operation) | -25 °C ... 70 °C (> 60 °C Derating: 2,5 %/K) |
| Ambient temperature (storage/transport) | -40 °C ... 85 °C |
| Ambient temperature (start-up type tested) | -40 °C |
| Maximum altitude | ≤ 5000 m (> 2000 m, observe derating) |
| Climatic class | 3K3 (in acc. with EN 60721) |
| Max. permissible relative humidity (operation) | ≤ 95 % (at 25 °C, non-condensing) |
| Shock | 18 ms, 30g, in each space direction (according to IEC 60068-2-27) |
| Vibration (operation) | 5 Hz ... 100 Hz resonance search 2.3g, 90 min., resonance frequency 2.3g, 90 min. (according to DNV GL Class C) |

Standards and regulations

| | |
|----------------------------------------------------------------------------------------|------------------------------------|
| Rail applications | EN 50121-3-2 |
| | EN 50121-4 |
| | EN 50121-5 |
| | EN 50163 |
| | IEC 62236-3-2 |
| | IEC 62236-4 |
| | IEC 62236-5 |
| HART FSK Physical Layer Test Specification Compliance | Output voltage U_{Out} compliant |
| Standard – Limitation of mains harmonic currents | EN 61000-3-2 |
| Standard - Electrical safety | IEC 61010-2-201 (SELV) |
| Standard – Safety extra-low voltage | IEC 61010-1 (SELV) |
| | IEC 61010-2-201 (PELV) |
| Standard - Safe isolation | IEC 61558-2-16 |
| | IEC 61010-2-201 |
| Standard - safety for equipment for measurement, control, and laboratory use | IEC 61010-1 |
| Standard - Safety of transformers | EN 61558-2-16 |
| Standard - power supply devices for low voltage with DC output | EN 61204-3 |
| Battery charging | DIN 41773-1 |
| Approval - requirement of the semiconductor industry with regard to mains voltage dips | SEMI F47-0706, EN 61000-4-11 |

Overvoltage category

| | |
|------------|----------------|
| EN 61010-1 | II (≤ 5000 m) |
| EN 62477-1 | III (≤ 2000 m) |

Approvals

| | |
|-----------------------|------------------------------|
| CSA | CAN/CSA-C22.2 No. 60950-1-07 |
| | CSA-C22.2 No. 107.1-01 |
| Shipbuilding approval | DNV GL, PRS, BV, LR, ABS |
| SIQ | BG (type approved) |

QUINT4-PS/1AC/24DC/10 - Power supply unit



2904601

<https://www.phoenixcontact.com/gb/products/2904601>

| | |
|--------------|----------------------------------------------------------------------------------|
| UL approvals | UL Listed UL 508 |
| | UL/C-UL Recognized UL 60950-1 |
| | UL ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D (Hazardous Location) |

EMC data

| | |
|-------------------------------------|----------------------------------------------------------------------------------------------------|
| Low Voltage Directive | Conformance with Low Voltage Directive 2014/35/EC |
| EMC requirements for noise emission | EN 61000-6-3 |
| | EN 61000-6-4 |
| EMC requirements for noise immunity | EN 61000-6-1 |
| | EN 61000-6-2 |
| Electromagnetic compatibility | Conformance with EMC Directive 2014/30/EU |
| EMC requirements, power plant | IEC 61850-3 |
| | EN 61000-6-5 |
| Conducted noise emission | EN 55016 |
| | EN 61000-6-3 (Class B) |
| Noise emission | Additional basic standard EN 61000-6-5 (immunity in power station), IEC/EN 61850-3 (energy supply) |
| Noise emission | EN 55016 |
| | EN 61000-6-3 (Class B) |
| DNV GL conducted interference | Class A |
| Additional text | Area power distribution |
| DNV GL noise radiation | Class B |
| Additional text | Bridge and deck area |

Harmonic currents

| | |
|-----------------------|------------------------|
| Standards/regulations | EN 61000-3-2 |
| | EN 61000-3-2 (Class A) |
| Frequency range | 0 kHz ... 2 kHz |

Flicker

| | |
|-----------------------|-----------------|
| Standards/regulations | EN 61000-3-3 |
| | EN 61000-3-3 |
| Frequency range | 0 kHz ... 2 kHz |

Electrostatic discharge

| | |
|-----------------------|--------------|
| Standards/regulations | EN 61000-4-2 |
|-----------------------|--------------|

Electrostatic discharge

| | |
|-------------------|----------------------|
| Contact discharge | 8 kV (Test Level 4) |
| Discharge in air | 15 kV (Test Level 4) |
| Comments | Criterion A |

Electromagnetic HF field

| | |
|-----------------------|--------------|
| Standards/regulations | EN 61000-4-3 |
|-----------------------|--------------|

Electromagnetic HF field

QUINT4-PS/1AC/24DC/10 - Power supply unit



2904601

<https://www.phoenixcontact.com/gb/products/2904601>

| | |
|---------------------|-----------------------|
| Frequency range | 80 MHz ... 1 GHz |
| Test field strength | 20 V/m (Test Level 3) |
| Frequency range | 1 GHz ... 6 GHz |
| Test field strength | 10 V/m (Test Level 3) |
| Comments | Criterion A |

Fast transients (burst)

| | |
|-----------------------|--------------|
| Standards/regulations | EN 61000-4-4 |
|-----------------------|--------------|

Fast transients (burst)

| | |
|----------|------------------------------------|
| Input | 4 kV (Test Level 4 - asymmetrical) |
| Output | 4 kV (Test Level 4 - asymmetrical) |
| Signal | 4 kV (Test Level 4 - asymmetrical) |
| Comments | Criterion A |

Surge voltage load (surge)

| | |
|-----------------------|-----------------------------------------------------------------------------------|
| Standards/regulations | EN 61000-4-5 |
| Input | typ. 3 kV (Test Level 4 - symmetrical) typ. 6 kV (Test Level 4 - asymmetrical) |
| Output | 1 kV (Test Level 3 - symmetrical) 2 kV (Test Level 3 - asymmetrical) |
| Signal | 4 kV (Test Level 4 - asymmetrical) |
| Comments | Criterion A |

Conducted interference

| | |
|-----------------------|--------------|
| Standards/regulations | EN 61000-4-6 |
|-----------------------|--------------|

Conducted interference

| | |
|-----------------|---------------------|
| I/O/S | asymmetrical |
| Frequency range | 0.15 MHz ... 80 MHz |
| Comments | Criterion A |
| Voltage | 10 V (Test Level 3) |

Power frequency magnetic field

| | |
|-----------------------|---------------------------|
| Standards/regulations | EN 61000-4-8 |
| Frequency | 16.7 Hz 50 Hz 60 Hz |
| Test field strength | 100 A/m |
| Additional text | 60 s |
| Comments | Criterion A |
| Frequency | 50 Hz 60 Hz |
| Frequency range | 50 Hz ... 60 Hz |
| Test field strength | 1 kA/m |
| Additional text | 3 s |
| Frequency | 0 Hz |

QUINT4-PS/1AC/24DC/10 - Power supply unit



2904601

<https://www.phoenixcontact.com/gb/products/2904601>

| | |
|---------------------|----------|
| Test field strength | 300 A/m |
| Additional text | DC, 60 s |

Voltage dips

| | |
|-----------------------|------------------------------------------------------------------|
| Standards/regulations | EN 61000-4-11 |
| Voltage | 230 V AC |
| Frequency | 50 Hz |
| Voltage dip | 70 % |
| Number of periods | 0.5 / 1 / 25 / 30 periods |
| Additional text | Test Level 2 |
| Comments | Criterion A: 0.5 / 1 / 25 / 30 periods |
| Voltage dip | 40 % |
| Number of periods | 5 / 10 / 50 periods |
| Additional text | Test Level 2 |
| Comments | Criterion A |
| Voltage dip | 0 % |
| Number of periods | 0,5 / 1 / 5 / 50 / 250 periods |
| Additional text | Test Level 2 |
| Comments | Criterion A: 0.5 / 1 period Criterion B: 5 / 50 / 250 periods |

Pulse-shape magnetic field

| | |
|-----------------------|--------------|
| Standards/regulations | EN 61000-4-9 |
| Test field strength | 1000 A/m |
| Comments | Criterion A |

Attenuated sinusoidal oscillations (ring wave)

| | |
|-----------------------|-------------------------------------------------------------------------|
| Standards/regulations | EN 61000-4-12 |
| Input | 2 kV (Test Level 4 - symmetrical) 4 kV (Test Level 4 - asymmetrical) |
| Comments | Criterion A |

Asymmetrical conducted disturbance variables

| | |
|-----------------------|------------------------------------|
| Standards/regulations | EN 61000-4-16 |
| Test level 1 | 15 Hz 150 Hz (Test Level 4) |
| Voltage | 30 V 3 V |
| Test level 2 | 150 Hz 1.5 kHz (Test Level 4) |
| Voltage | 3 V |
| Test level 3 | 1.5 kHz 15 kHz (Test Level 4) |
| Voltage | 3 V 30 V |
| Test level 4 | 15 kHz 150 kHz (Test Level 4) |
| Voltage | 30 V |
| Test level 5 | 16.7 Hz 50 Hz 60 Hz (Test Level 4) |
| Voltage | 30 V (Permanent) |
| Test level 6 | 150 Hz 180 Hz (Test Level 4) |
| Voltage | 30 V (Permanent) |

QUINT4-PS/1AC/24DC/10 - Power supply unit



2904601

<https://www.phoenixcontact.com/gb/products/2904601>

| | |
|--------------|------------------------------------|
| Test level 7 | 16.7 Hz 50 Hz 60 Hz (Test Level 4) |
| Voltage | 300 V (1 s) |
| Comments | Criterion A |

Attenuated oscillating wave

| | |
|------------------------------|---------------------------------------------|
| Standards/regulations | EN 61000-4-18 |
| Input, output (test level 1) | 100 kHz 1 MHz (Test Level 3 - symmetrical) |
| Voltage | 1 kV |
| Input, output (test level 2) | 10 MHz |
| Voltage | 1 kV |
| Input, output (test level 3) | 100 kHz 1 MHz (Test Level 3 - asymmetrical) |
| Voltage | 2.5 kV |
| Signals (test level 1) | 100 kHz 1 MHz (Test Level 3 - symmetrical) |
| Voltage | 1 kV |
| Signals (test level 2) | 100 kHz 1 MHz (Test Level 3 - asymmetrical) |
| Voltage | 2.5 kV |
| Comments | Criterion A |

Attenuated oscillating magnetic field

| | |
|-----------------------|---------------|
| Standards/regulations | EN 61000-4-10 |
| Test field strength | 110 A/m |
| Test level 1 | 100 kHz |
| Test field strength | 110 A/m |
| Test level 2 | 1 MHz |
| Comments | Criterion A |

Criteria

| | |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Criterion A | Normal operating behavior within the specified limits. |
| Criterion B | Temporary impairment to operational behavior that is corrected by the device itself. |
| Criterion C | Temporary adverse effects on the operating behavior, which the device corrects automatically or which can be restored by actuating the operating elements. |

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