



"Compact" range starter kits Kit 12 Part number 88970081



- Each standard kit includes:
 - 1 standard Millennium 3 (CD12 or 20)
 - 1 USB link cable: PC → Millennium 3
 - 1 interactive CD ROM including the software workshop, application library and technical brochures, the library of specific functions
- For alternative packages see page 70

| | Type | Input | Output | Supply |
|----------|--------|-----------------------------------|----------|---------------|
| 88970080 | Kit 12 | 8 digital (including 4 analogue) | 4 relays | 24 V DC |
| 88970081 | Kit 12 | 8 digital | 4 relays | 100 →240 V AC |
| 88970082 | Kit 20 | 12 digital (including 6 analogue) | 8 relays | 24 V DC |
| 88970083 | Kit 20 | 12 digital | 8 relays | 100 →240 V AC |

General environment characteristics for CB, CD, XD, XB, XR and XE product types

| | |
|---|--|
| Certifications | UL, CSA GL: except for 88 970 32x (pending) |
| Conformity with the low voltage directive | In accordance with 73/23/EEC: EN (IEC) 61131-2 (Open equipment) |
| Conformity with the EMC directive | In accordance with 89/336/EEC: EN (IEC) 61131-2 (Zone B) EN (IEC) 61000-6-2, EN (IEC) 61000-6-3 (*) EN (IEC) 61000-6-4 (*) Except configuration (88 970 1.1 or 88 970 1.2) + (88 970 250 or 88 970 270) + 88 970 241 class A (class B: using in metallic cabinet) |
| Earthing | None |
| Protection rating | In accordance with IEC/EN 60529: IP40 on front panel IP20 on terminal block |
| Overvoltage category | 3 in accordance with IEC/EN 60664-1 |
| Pollution | Degree: 2 in accordance with IEC/EN 61131-2 |
| Maximum utilisation altitude | Operation: 2000 m Transport: 3,048 m |
| Mechanical resistance | Immunity to vibrations IEC/EN 60068-2-6, Fc test Immunity to shock IEC/EN 60068-2-27, Fa test |
| Resistance to electrostatic discharge | Immunity to ESD IEC/EN 61000-4-2, level 3 |
| Resistance to HF interference | Immunity to radiated electrostatic fields IEC/EN 61000-4-3, Immunity to fast transients (burst immunity) IEC/EN 61000-4-4, level 3 Immunity to shock waves IEC/EN 61000-4-5 Radio frequency in common mode IEC/EN 61000-4-6, level 3 Voltage dips and breaks (AC) IEC/EN 61000-4-11 Immunity to damped oscillatory waves IEC/EN 61000-4-12 |
| Conducted and radiated emissions | Class B (*) in accordance with EN 55022/11 group 1 (*) Except configuration (88 970 1.1 or 88 970 1.2) + (88 970 250 or 88 970 270) + 88 970 241 class A (class B in metallic cabinet) |
| Operating temperature | -20 →+55°C (+40°C in a non-ventilated enclosure) in accordance with IEC/EN 60068-2-1 and IEC/EN 60068-2-2 |
| Storage temperature | -40 →+70°C in accordance with IEC/EN 60068-2-1 and IEC/EN 60068-2-2 |
| Relative humidity | 95% max. (no condensation or dripping water) in accordance with IEC/EN 60068-2-30 |
| Mounting | On symmetrical DIN profile, 35 x 7.5 mm and 35 mm x 15 or panel (2 x 4 mm Ø) |
| Screw terminals connection capacity | Flexible wire with ferrule = 1 conductor: 0.25 to 2.5 mm ² (AWG 24...AWG 14) 2 conductors 0.25 to 0.75 mm ² (AWG 24...AWG 18) Semi-rigid wire = 1 conductor: 0.2 to 2.5 mm ² (AWG 25...AWG 14) Rigid wire = 1 conductor: 0.2 to 2.5 mm ² (AWG 25...AWG 14) 2 conductors 0.2 to 1.5 mm ² (AWG 25...AWG 16) Tightening torque = 0.5 N.m (4.5 lb-in) (tighten using screwdriver diam. 3.5 mm) |

Processing characteristics of CB, CD, XD & XB product types

| | |
|--------------------|---|
| LCD display | CD, XD: Display with 4 lines of 18 characters |
| Programming method | Ladder or function blocks/SFC (Grafset) |
| Program size | Ladder: 120 lines Function blocks: CB, CD: typically 350 blocks |

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| | XB, XD: typically 700 blocks | |
| Program memory | Flash EEPROM | |
| Removable memory | EEPROM | |
| Data memory | 368 bits/200 words | |
| Back-up time in the event of power failure | Program and settings in the controller: 10 years Program and settings in the plug-in memory: 10 years Data memory: 10 years | |
| Cycle time | Ladder: typically 20 ms Function blocks: 6 →90 ms | |
| Response time | Input acquisition time + 1 to 2 cycle times | |
| Clock data retention | 10 years (lithium battery) at 25°C | |
| Clock drift | Drift < 12 min/year (at 25°C) 6 s/month (at 25°C with user-definable correction of drift) | |
| Timer block accuracy | 1% ± 2 cycle times | |
| Start up time on power up | < 1,2 s | |

Characteristics of products with AC power supplied

Supply

| | | |
|--------------------------------|--|---|
| Nominal voltage | 24 V AC | 100 →240 V AC |
| Operating limits | -15% / +20% or 20.4 VAC→28.8 VAC | -15% / +10% or 85 VAC→264 VAC |
| Supply frequency range | 50/60 Hz (+4% / -6%) or 47→53 Hz/57 < 63 Hz | 50/60 Hz (+4% / -6%) or 47 →53 Hz/57 < 63 Hz |
| Immunity from micro power cuts | 10 ms (repetition 20 times) | 10 ms (repetition 20 times) |
| Max. absorbed power | CB12-CD12-XD10-XB10: 4 VA CB20-CD20: 6 VA XD10 with extension - XD26-XB26: 7.5 VA XD26-XB26 with extension: 10 VA | CB12-CD12-XD10-XB10: 7 VA CB20-CD20: 11 VA XD10-XB10 with extension-XD26-XB26: 12 VA XD26-XB26 with extension: 17 VA |
| Isolation voltage | 1780 V AC | 1780 V AC |

Inputs

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| Input voltage | 24 V AC (-15% / +20%) | 100 →240 V AC (-15% / +10%) |
| Input current | 4,4 mA @ 20,4 V AC 5,2 mA @ 24,0 V AC 6,3 mA @ 28,8 V AC | 0,24 mA @ 85 V AC 0,75 mA @ 264 V AC |
| Input impedance | 4.6 kΩ | 350 kΩ |
| Logic 1 voltage threshold | ≥ 14 V AC | ≥ 79 V AC |
| Making current at logic state 1 | >2 mA | >0.17 mA |
| Logic 0 voltage threshold | ≤ 5 V AC | ≤ 20 V AC (≤ 28 V AC: XE10, XR06, XR10, XR14) |
| Release current at logic state 0 | <0.5 mA | <0.5 mA |
| Response time with LADDER programming | 50 ms State 0 →1 (50/60 Hz) | 50 ms State 0 < 1 (50/60 Hz) |
| Response time with function blocks programming | Configurable in increments of 10 ms 50 ms min. up to 255 ms State 0 →1 (50/60 Hz) | Configurable in increments of 10 ms 50 ms min. up to 255 ms State 0 →1 (50/60 Hz) |
| Maximum counting frequency | In accordance with cycle time (Tc) and input response time (Tr) : 1/ ((2 x Tc) + Tr) | In accordance with cycle time (Tc) and input response time (Tr) : 1/ ((2 x Tc) + Tr) |
| Sensor type | Contact or 3-wire PNP | Contact or 3-wire PNP |
| Input type | Resistive | Resistive |
| Isolation between power supply and inputs | None | None |
| Isolation between inputs | None | None |
| Protection against polarity inversions | Yes | Yes |
| Status indicator | On LCD screen for CD and XD | On LCD screen for CD and XD |

Characteristics of relay outputs common to the entire range

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| Max. breaking voltage | 5 →30 V DC 24 →250 V AC | |
| Breaking current | CB-CD-XB10-XD10-XR06-XR10: 8 A XD26-XB26: 8 x 8 A relays, 2 x 5 A relays XE10: 4 x 5 A relays XR14: 4 x 8 A relays, 2 x 5 A relays | |
| Electrical durability for 500 000 operating cycles | Usage category DC-12: 24 V, 1.5 A Usage category DC-13: 24 V (L/R = 10 ms), 0.6 A Usage category AC-12: 230 V, 1.5 A Usage category AC-15: 230 V, 0.9 A | |
| Max. Output Common Current | 12A for O8,O9,OA | |
| Minimum switching capacity | 10 mA (at minimum voltage of 12 V) | |
| Minimum load | 12 V, 10 mA | |
| Maximum rate | Off load: 10 Hz At operating current: 0.1 Hz | |
| Mechanical life | 10,000,000 operations (cycles) | |
| Voltage for withstanding shocks | In accordance with IEC/EN 60947-1 and IEC/EN 60664-1: 4 kV | |
| Response time | Make 10 ms Release 5 ms | |
| Built-in protections | Against short-circuits: None Against overvoltages and overloads: None | |
| Status indicator | On LCD screen for CD and XD | |

Characteristics of product with DC power supplied

Supply

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|--------------------------------|--|--|
| Nominal voltage | 12 V DC | 24 V DC |
| Operating limits | -13% / +20% or 10.4 V DC < 14.4 V DC (including ripple) | -20% / +25% or 19.2 V DC < 30 V DC (including ripple) |
| Immunity from micro power cuts | ≤ 1 ms (repetition 20 times) | ≤ 1 ms (repetition 20 times) |

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| Max. absorbed power | CB12 with solid state outputs: 1.5 W CD12: 1.5 W CD20: 2.5 W XD26-XB26: 3 W XD26-XB26 with extension: 5 W XD26 with solid state outputs: 2.5 W | CB12-CD12-CD20 with solid state outputs - XD10-XB10 with solid state outputs: 3 W XD10-XB10 with relay outputs: 4 W XD26-XB26 with solid state outputs: 5 W CB20-CD20 with relay outputs-XD26 with relay outputs: 6 W XD10-XB10 with extension: 8 W XD26-XB26 with extension: 10 W |
| Protection against polarity inversions | Yes | Yes |
| Digital inputs (I1 to IA and IH to IY) | | |
| Input voltage | 12 V DC (-13% / +20%) | 24 V DC (-20% / +25%) |
| Input current | 3,9 mA @ 10,44 V DC 4,4 mA @ 12,0 V DC 5,3 mA @ 14,4 VDC | 2,6 mA @ 19,2 V DC 3,2 mA @ 24 V DC 4,0 mA @ 30,0 VDC |
| Input impedance | 2.7 kΩ | 7.4 kΩ |
| Logic 1 voltage threshold | ≥ 7 V DC | ≥ 15 V DC |
| Making current at logic state 1 | ≥2 mA | ≥2.2 mA |
| Logic 0 voltage threshold | ≤ 3 V DC | ≤ 5 V DC |
| Release current at logic state 0 | <0.9 mA | <0.75 mA |
| Response time | 1 →2 cycle times + 6 ms | 1 →2 cycle times + 6 ms |
| Maximum counting frequency | I1 & I2: Ladder (1 kHz) & FBD (Up to 6 kHz) I3 to IA & IH to IY: in accordance with cycle time (Tc) and input response time (Tr) : $1 / ((2 \times Tc) + Tr)$ | I1 & I2: Ladder (1 kHz) & FBD (Up to 6 kHz) I3 to IA & IH to IY: in accordance with cycle time (Tc) and input response time (Tr) : $1 / ((2 \times Tc) + Tr)$ |
| Sensor type | Contact or 3-wire PNP | Contact or 3-wire PNP |
| Conforming to IEC/EN 61131-2 | Type 1 | Type 1 |
| Input type | Resistive | Resistive |
| Isolation between power supply and inputs | None | None |
| Isolation between inputs | None | None |
| Protection against polarity inversions | Yes | Yes |
| Status indicator | On LCD screen for CD and XD | On LCD screen for CD and XD |
| Analogue or digital inputs (IB to IG) | | |
| CB12-CD12-XD10-XB10 | 4 inputs IB →IE | 4 inputs IB →IE |
| CB20-CD20-XB26-XD26 | 6 inputs IB →IG | 6 inputs IB →IG |
| Inputs used as analogue inputs | | |
| Measurement range | (0 →10 V) or (0 →V power supply) | (0 →10 V) or (0 →V power supply) |
| Input impedance | 14 kΩ | 12 kΩ |
| Input voltage | 14.4 V DC max | 30 V DC max |
| Value of LSB | 14 mV | 29 mV |
| Input type | Common mode | Common mode |
| Resolution | 10 bit at maximum input voltage | 10 bit at maximum input voltage |
| Conversion time | Controller cycle time | Controller cycle time |
| Accuracy at 25°C | ± 5% | ± 5% |
| Accuracy at 55°C | ± 6.2% | ± 6.2% |
| Repeat accuracy at 55 °C | ± 2% | ± 2% |
| Isolation between analogue channel and power supply | None | None |
| Cable length | 10 m maximum, with shielded cable (sensor not isolated) | 10 m maximum, with shielded cable (sensor not isolated) |
| Protection against polarity inversions | Yes | Yes |
| Potentiometer control | 2.2 kΩ/0.5 W (recommended) 10 kΩ max. | 2.2 kΩ/0.5 W (recommended) 10 kΩ max. |
| Inputs used as digital inputs | | |
| Input voltage | 12 V DC (-13% / +20%) | 24 V DC (-20% / +25%) |
| Input current | 0,7 mA @ 10,44 VDC 0,9 mA @ 12,0 VDC 1,0 mA @ 14,4VDC | 1,6 mA @ 19,2 VDC 2,0 mA @ 24,0 V DC 2,5 mA @ 30,0 VDC |
| Input impedance | 14 kΩ | 12 kΩ |
| Logic 1 voltage threshold | ≥ 7 V DC | ≥ 15 VDC |
| Making current at logic state 1 | ≥0.5 mA | ≥1.2 mA |
| Logic 0 voltage threshold | ≤ 3 V DC | ≤ 5 V DC |
| Release current at logic state 0 | ≤0.2 mA | ≤0.5 mA |
| Response time | 1 →2 cycle times | 1 →2 cycle times |
| Maximum counting frequency | In accordance with cycle time (Tc) and input response time (Tr) : $1 / ((2 \times Tc) + Tr)$ | In accordance with cycle time (Tc) and input response time (Tr) : $1 / ((2 \times Tc) + Tr)$ |
| Sensor type | Contact or 3-wire PNP | Contact or 3-wire PNP |
| Conforming to IEC/EN 61131-2 | Type 1 | Type 1 |
| Input type | Resistive | Resistive |
| Isolation between power supply and inputs | None | None |
| Isolation between inputs | None | None |
| Protection against polarity inversions | Yes | Yes |
| Status indicator | On LCD screen for CD and XD | On LCD screen for CD and XD |
| Characteristics of relay outputs common to the entire range | | |
| Max. breaking voltage | 5 →30 V DC 24 →250 V AC | |
| Max. Output Common Current | 12A for O8,O9,OA | |
| Breaking current | CB-CD-XD10-XB10-XR06-XR10: 8 A XD26-XB26: 8 x 8 A relays, 2 x 5 A relays XE10: 4 x 5 A relays XR14: 4 x 8 A relays, 2 x 5 A relays | |
| Electrical durability for 500 000 operating cycles | Usage category DC-12: 24 V, 1.5 A Usage category DC-13: 24 V (L/R = 10 ms), 0.6 A Usage category AC-12: 230 V, 1.5 A Usage category AC-15: 230 V, 0.9 A | |

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|--|---|---|
| Minimum switching capacity | 10 mA (at minimum voltage of 12 V) | |
| Minimum load | 12 V, 10 mA | |
| Maximum rate | Off load: 10 Hz At operating current: 0.1 Hz | |
| Mechanical life | 10,000,000 operations (cycles) | |
| Voltage for withstanding shocks | In accordance with IEC/EN 60947-1 and IEC/EN 60664-1: 4 kV | |
| Response time | Make 10 ms Release 5 ms | |
| Built-in protections | Against short-circuits: None Against overvoltages and overloads: None | |
| Status indicator | On LCD screen for CD and XD | |
| Digital / PWM solid state output | | |
| PWM solid state output* | CB12: O4 XD26: O4 →O7 | CD12-XD10-XB10: O4 CD20-XD26-XB26: O4 →O7 |
| * Only available with "FBD" programming language | * Only available with "FBD" programming language | |
| Breaking voltage | 10.4 →30 VDC | 19.2 →30 VDC |
| Nominal voltage | 12-24 V DC | 24 V DC |
| Nominal current | 0.5 A | 0.5 A |
| Max. breaking current | 0,625 A | 0,625 A |
| Voltage drop | ≤ 2 V for I = 0.5 A (at state 1) | ≤ 2 V for I = 0.5 A (at state 1) |
| Response time | Make ≤ 1 ms Release ≤ 1 ms | Make ≤ 1 ms Release ≤ 1 ms |
| Built-in protections | Against overloads and short-circuits: Yes Against overvoltages (*) : Yes Against inversions of power supply: Yes (*) In the absence of a volt-free contact between the output of the logic controller and the load | Against overloads and short-circuits: Yes Against overvoltages (*) : Yes Against inversions of power supply: Yes (*) In the absence of a volt-free contact between the output of the logic controller and the load |
| Min. load | 1 mA | 1 mA |
| Maximum incandescent load | 0,2 A / 12 V DC 0,1 A / 24 V DC | 0,1 A / 24 V DC |
| Galvanic isolation | No | No |
| PWM frequency | 14.11 Hz 56.45 Hz 112.90 Hz 225.80 Hz 451.59 Hz 1806.37 Hz | 14.11 Hz 56.45 Hz 112.90 Hz 225.80 Hz 451.59 Hz 1806.37 Hz |
| PWM cyclic ratio | 0 →100% (256 steps for CD, XD and 1024 for XA) | 0 →100% (256 steps for CD, XD and 1024 for XA) |
| PWM accuracy at 120 Hz | < 5% (20% →80%) load at 10 mA | < 5% (20% →80%) load at 10 mA |
| PWM accuracy at 500 Hz | < 10% (20% →80%) load at 10 mA | < 10% (20% →80%) load at 10 mA |
| Status indicator | On LCD screen for CD and XD | On LCD screen for CD and XD |