

## "Compact" range without display CB12 Part number 88970840



- Version without display or key settings
- More cost effective solution
- Industrial temperature range (-20 °C → +55 °C)
- Analogue inputs 0-10 VDC or 0-20 mA/Pt100 with converters

### Part numbers

|          | Type | Inputs                           | Outputs                               | Supply  |
|----------|------|----------------------------------|---------------------------------------|---------|
| 88970840 | CB12 | 8 digital (including 4 analogue) | 4 solid state 0.5 A (including 1 PWM) | 12 V DC |

### Specifications

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

|  |   |
|--|---|
| Certifications   | CE, UL, CSA, GL   |
| Conformity to standards (with the low voltage directive and EMC directive) | IEC/EN 61131-2 (Open equipment)<br>IEC/EN 61131-2 (Zone B)<br>IEC/EN 61000-6-2,<br>IEC/EN 61000-6-3 (*)<br>IEC/EN 61000-6-4<br>(*) 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 a metal enclosure)   |
| Earthing   | None  |
| Protection rating  | In accordance with IEC/EN 60529 :<br>IP40 on front panel<br>IP20 on terminal block  |
| Overvoltage category   | 3 in accordance with IEC/EN 60664-1   |
| Pollution  | Degree : 2 in accordance with IEC/EN 61131-2  |
| Max operating Altitude   | Operation : 2000 m<br>Transport : 3,048 m   |
| Mechanical resistance  | Immunity to vibrations IEC/EN 60068-2-6, Fc test<br>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<br>IEC/EN 61000-4-3,<br>Immunity to fast transients (burst immunity)<br>IEC/EN 61000-4-4, level 3<br>Immunity to shock waves<br>IEC/EN 61000-4-5<br>Radio frequency in common mode<br>IEC/EN 61000-4-6, level 3<br>Voltage dips and breaks (AC)<br>IEC/EN 61000-4-11<br>Immunity to damped oscillatory waves<br>IEC/EN 61000-4-12   |
| Conducted and radiated emissions   | Class B (*) in accordance with EN 55022, EN 55011 (CISPR22, CISPR11) group 1<br>(*) 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 =<br>1 conductor : 0.25 to 2.5 mm <sup>2</sup> (AWG 24...AWG 14)<br>2 conductors 0.25 to 0.75 mm <sup>2</sup> (AWG 24...AWG 18)<br>Semi-rigid wire =<br>1 conductor : 0.2 to 2.5 mm <sup>2</sup> (AWG 25...AWG 14)<br>Rigid wire =<br>1 conductor : 0.2 to 2.5 mm <sup>2</sup> (AWG 25...AWG 14)<br>2 conductors 0.2 to 1.5 mm <sup>2</sup> (AWG 25...AWG 16)<br>Tightening torque =<br>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  | Function blocks / SCF (Grafcet) or Ladder  |
| Program size  | For CB, CD :<br>4 Ko : 64 macros max.<br>256 blocks max. per macro<br>180 typical blocks<br>For XB, XD : |

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|--|--|
|  | 8 Ko : 64 macro max.<br>256 blocks max. per macro<br>350 typical blocks<br>Or for CB, CD, XB, XD : 120 lines in Ladder               |
| Program memory                             | Flash EEPROM   |
| Removable memory                           | EEPROM   |
| Data memory                                | 368 bit/200 words  |
| Back-up time in the event of power failure | Program and settings in the controller : 10 years<br>Program and settings in the plug-in memory : 10 years<br>Data memory : 10 years |
| Cycle time                                 | Function blocks : 6 →90 ms (typically 20 ms)<br>Ladder : typically 20 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)<br>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   | 24 V AC<br>(88970..4)   | 100 →240 V AC<br>(88970..3)  |
| Nominal voltage                                | 24 V AC   | 100 →240 V AC  |
| Operating limits                               | -15 % / +20 %<br>or 20.4 VAC→28.8 VAC   | -15 % / +10 %<br>or 85 VAC→264 VAC   |
| Supply frequency range                         | 50/60 Hz (+4 % / -6 %)<br>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<br>CB20-CD20 : 6 VA<br>XD10-XB10 with extension : 7,5 VA<br>XD26-XB26 : 7.5 VA<br>XD26-XB26 with extension : 10 VA | CB12-CD12-XD10-XB10 : 7 VA<br>CB20-CD20 : 11 VA<br>XD10-XB10 with extension : 12 VA<br>XD26-XB26 : 12 VA<br>XD26-XB26 with extension : 17 VA |
| Isolation voltage                              | 1780 V AC   | 1780 V AC  |
| Inputs   | 24 V AC<br>(88970..4)   | 100 →240 V AC<br>(88970..3)  |
| Input voltage                                  | 24 V AC (-15 % / +20 %)   | 100 →240 V AC (-15 % / +10 %)  |
| Input current                                  | 4,4 mA @ 20,4 V AC<br>5,2 mA @ 24,0 V AC<br>6,3 mA @ 28,8 V AC  | 0,24 mA @ 85 V AC<br>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<br>State 0 →1 (50/60 Hz)  | 50 ms<br>State 0 < 1 (50/60 Hz)  |
| Response time with function blocks programming | Configurable in increments of 10 ms<br>50 ms min. up to 255 ms<br>State 0 →1 (50/60 Hz)   | Configurable in increments of 10 ms<br>50 ms min. up to 255 ms<br>State 0 →1 (50/60 Hz)  |
| Maximum counting frequency                     | In accordance with cycle time (Tc) and input response time (Tr) :<br>$1 / ( (2 \times Tc) + Tr )$   | In accordance with cycle time (Tc) and input response time (Tr) :<br>$1 / ( (2 \times Tc) + Tr )$  |
| 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<br>24 →250 V AC   |
| Breaking current                                   | CB-CD-XB10-XD10-XR06-XR10 : 8 A<br>XD26-XB26 : 8 x 8 A relays, 2 x 5 A relays<br>XE10 : 4 x 5 A relays<br>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<br>Usage category DC-13 : 24 V (L/R = 10 ms), 0.6 A<br>Usage category AC-12 : 230 V, 1.5 A<br>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<br>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  |
| Off-cycle response time                            | Make 10 ms<br>Release 5 ms   |
| Built-in protections                               | Against short-circuits : None<br>Against overvoltages and overloads : None   |
| Status indicator                                   | On LCD screen for CD and XD  |

#### Characteristics of product with DC power supplied

|   |   |  |
|---|---|--|
| Supply  | 12 V DC<br>(88970..5 & 8970814 & 88970840)  | 24 V DC<br>(88970..1 et 88970..2)  |
| Nominal voltage   | 12 V DC   | 24 V DC  |
| Operating limits  | -13 % / +20 %<br>or 10.4 V DC < 14.4 V DC (including ripple)  | -20 % / +25 %<br>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)   |
| Max. absorbed power   | CB12 with solid state outputs : 1.5 W<br>CD12 : 1.5 W<br>CD20 : 2.5 W<br>XD26-XB26 : 3 W<br>XD26-XB26 with extension : 5 W<br>XD26 with solid state outputs : 2.5 W | CB12-CD12-CD20 with solid state outputs - XD10-XB10 with solid state outputs : 3 W<br>XD10-XB10 with relay outputs : 4 W<br>XD26-XB26 with solid state outputs : 5 W<br>CB20-CD20 with relay outputs : 6 W<br>XD26 with relay outputs : 6 W<br>XD10-XB10 with extension : 8 W<br>XD26-XB26 with extension : 10 W |
| Protection against polarity inversions                      | Yes   | Yes  |
| Digital inputs (I1 to IA and IH to IY)                      | 12 V DC<br>(88970..5 & 88970814 & 88970840)   | 24 V DC<br>(88970..1 and 88970..2)   |
| Input voltage   | 12 V DC (-13 % / +20 %)   | 24 V DC (-20 % / +25 %)  |
| Input current   | 3,9 mA @ 10,44 V DC<br>4,4 mA @ 12,0 V DC<br>5,3 mA @ 14,4 VDC  | 2,6 mA @ 19,2 V DC<br>3,2 mA @ 24 V DC<br>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 : FBD (Up to 6 k Hz) & Ladder (1 k Hz)<br>I3 to IA & IH to IY : in accordance with cycle time (Tc) and input response time (Tr) : 1 / ( (2 x Tc) + Tr)      | I1 & I2 : FBD (Up to 6 k Hz) & Ladder (1 k Hz)<br>I3 to IA & IH to IY : 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  |
| 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)                       | 12 V DC<br>(88970..5 & 88970814 & 88970840)   | 24 V DC<br>(88970..1 and 88970..2)   |
| 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 input only in FBD                   |   |  |
| 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)<br>10 kΩ max.  | 2,2 kΩ/0,5 W (recommended)<br>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<br>0,9 mA @ 12,0 VDC<br>1,0 mA @ 14,4VDC   | 1,6 mA @ 19,2 VDC<br>2,0 mA @ 24,0 V DC<br>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 FBD                           | In accordance with cycle time (Tc) and input response time (Tr) :<br>1 / ( (2 x Tc) + Tr)   | In accordance with cycle time (Tc) and input response time (Tr) :<br>1 / ( (2 x 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<br>24 → 250 V AC  |  |
| Max. Output Common Current                                  | 12A (10A UL) for O8,O9,OA   |  |

|  |   |   |
|--|---|---|
| Breaking current                                   | CB-CD-XD10-XB10-XR06-XR10 : 8 A<br>XD26-XB26 : 8 x 8 A relays, 2 x 5 A relays<br>XE10 : 4 x 5 A relays<br>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<br>Usage category DC-13 : 24 V (L/R = 10 ms), 0.6 A<br>Usage category AC-12 : 230 V, 1.5 A<br>Usage category AC-15 : 230 V, 0.9 A  |   |
| Minimum switching capacity                         | 10 mA (at minimum voltage of 12 V)  |   |
| Minimum load                                       | 12 V, 10 mA   |   |
| Maximum rate                                       | Off load : 10 Hz<br>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   |   |
| Off-cycle response time                            | Make 10 ms<br>Release 5 ms  |   |
| Built-in protections                               | Against short-circuits : None<br>Against overvoltages and overloads : None  |   |
| Status indicator                                   | On LCD screen for CD and XD   |   |
| Digital / PWM solid state output                   | 12 V DC<br>(88970814 & 88970840)  | 24 V DC<br>(88970..2)   |
| PWM solid state output*                            | CB12 : O4<br>XD26 : O4 →O7  | CD12-XD10-XB10 : O4<br>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<br>Release ≤ 1 ms   | Make ≤ 1 ms<br>Release ≤ 1 ms   |
| Operating frequency                                | 1 Maximum on inductive load   | 1 Maximum on inductive load   |
| Built-in protections                               | Against overloads and short-circuits : Yes<br>Against overvoltages (*) : Yes<br>Against inversions of power supply : Yes<br>(*) In the absence of a volt-free contact between the output of the logic controller and the load | Against overloads and short-circuits : Yes<br>Against overvoltages (*) : Yes<br>Against inversions of power supply : Yes<br>(*) 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<br>0,1 A / 24 V DC  | 0,1 A / 24 V DC   |
| Galvanic isolation                                 | No  | No  |
| PWM frequency                                      | 14.11 Hz<br>56.45 Hz<br>112.90 Hz<br>225.80 Hz<br>451.59 Hz<br>1806.37 Hz   | 14.11 Hz<br>56.45 Hz<br>112.90 Hz<br>225.80 Hz<br>451.59 Hz<br>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  |
| Max. Breaking current PWM                          | 50 mA   | 50 mA   |
| Max. cable length PWM                              | 20 m  | 20 m  |
| 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   |

## Accessories

| Type    | Description  | Code     |
|---------|--|----------|
| M3 Soft | Multilingual programming software containing specific library functions (CD-ROM) | 88970111 |
| PA      | EEPROM memory cartridge  | 88970108 |
| PA      | 3 m serial link cable : PC →Millenium 3  | 88970102 |
| PA      | USB cable 3 m : PC →Millenium 3  | 88970109 |
| PA      | Millenium 3 interface →Bluetooth® (class A 10 m)                                 | 88970104 |

## Comments

\* to be marketed 1<sup>st</sup> quarter 2006

## Dimensions (mm)

CB12

