Bare board version NB12 Part number 88970005

- Easy and discreet integration into your applications
- Mass-production applications
- Memory: up to 350 "typical" blocks in FBD language and 120 lines in LADDER language
- Compact dimensions
- Range of controllers for use with application specific functions

### Part numbers

<table>
<thead>
<tr>
<th>Type</th>
<th>Inputs</th>
<th>Outputs</th>
<th>Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>88970005</td>
<td>NB12</td>
<td>4 relays</td>
<td>12 V DC</td>
</tr>
</tbody>
</table>

### Specifications

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

**Conformity to standards (with the low voltage directive and EMC directive)**
- CE, UL, CSA, GL
- IEC/EN 61131-2 (Open equipment)
- IEC/EN 61131-2 (Zone B)
- IEC/EN 61000-6-2
- IEC/EN 61000-6-3 (*)
- IEC/EN 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 in a metal enclosure)

**Earting**
- Not included

**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**
- Degree : 2 in accordance with IEC/EN 61131-2

**Max operating Altitude**
- Operation : 2000 m
  - Transport : 3048 m

**Mechanical resistance**
- Immunity to vibrations IEC/EN 60068-2-6, test Fc
- Immunity to shock IEC/EN 60068-2-27, test Ea

**Resistance to electrostatic discharge**
- Immunity to ESD IEC/EN 61000-4-4, 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, EN 55011 (CISPR22, CISPR11) 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 a metal enclosure)

**Operating temperature**
- -20 →+70 °C
- except CB and XB versions in VDC : -30 →+70 °C (+40 °C in a non-ventilated enclosure)
- in accordance with IEC/EN 60068-2-1 and IEC/EN 60068-22

**Storage temperature**
- -40 →+60 °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 rail, 35 x 7.5 mm and 35 x 15 mm, or on panel (2 x Ø 4 mm)

**Screw terminals connection capacity**
- Flexible wire with ferrule =
  - 1 conductor : 0.25 to 2.5 mm² (AWG 24...AWG 14)
  - 2 conductors 0.25 to 0.75 mm² (AWG 24...AWG 18)
- Semi-rigid wire =
  - 1 conductor : 0.2 to 2.5 mm² (AWG 25...AWG 14)
  - 2 conductors 0.2 to 1.5 mm² (AWG 25...AWG 16)
- Rigid wire =
  - 1 conductor : 0.2 to 2.5 mm² (AWG 25...AWG 14)
  - 2 conductors 0.2 to 1.5 mm² (AWG 25...AWG 16)
- Tightening torque =
  - 0.5 N.m (4.5 lb-in) (tighten using screwdriver diam. 3.5 mm)
- Also valid for spring cage connectors (ref 88 970 313 and 88 970 317 for the RBT range)

Unless otherwise specified, the characteristics given are applicable to all or part of the product range selected
General characteristics

Protection rating

IP00

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

8 Kb : 350 typical blocks, 64 macro maximum, 256 blocks maximum per macro or 120 lines in Ladder

Program memory

Flash EEPROM

Data memory

368 bit/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

FBD : 6 → 90 ms (typically 20 ms)
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)
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 %
-15 % / ±10 %

or 20.4 V AC → 28.8 V AC
or 85 V AC → 264 V AC

Supply frequency range

50/60 Hz (+4 % / -6 %)
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-CDD12-XD10-XB10 : 4 VA
CB20-CD20 : 6 VA
 XD10-XB10 with extension : 7.5 VA
 XD26-XB26 : 7.5 VA
 XD26-XB26 with extension : 10 VA

Isolation voltage

1780 V AC
1780 V AC

Inputs

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
50 ms
State 0 → 1 (50/60 Hz)
State 0 → 1 (50/60 Hz)

Response time with function blocks programming

Configurable in increments of 10 ms
Configurable in increments of 10 ms
50 ms min. up to 255 ms
50 ms min. up to 255 ms
State 0 → 1 (50/60 Hz)
State 0 → 1 (50/60 Hz)

Maximum counting frequency

In accordance with cycle time (Tc) and input response time (Ty) :
1/(2 x (Tc + Ty))
In accordance with cycle time (Tc) and input response time (Ty) :
1/(2 x (Tc + Ty))

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

Max. breaking voltage

5 → 30 V DC
24 → 250 V AC

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
RBT (Removable Terminal Blocks) versions : verify the maximum current according to the type of connection used

Electrical durability for 500 000 operating cycles

Utilization category DC-12 : 24 V, 1.5 A
Utilization category DC-13 : 24 V (L/R = 10 ms), 0.6 A
Utilization category AC-12 : 230 V, 1.5 A
Utilization category AC-15 : 230 V, 0.8 A

Max. Output Common Current

12 A 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)

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
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

<table>
<thead>
<tr>
<th>Nominal voltage</th>
<th>12 V DC</th>
<th>24 V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating limits</td>
<td>-13 % / +20 %</td>
<td>-20 % / +25 %</td>
</tr>
<tr>
<td>or 10.4 V DC–14.4 V DC (including ripple)</td>
<td>or 19.2 V DC–30 V DC (including ripple)</td>
<td></td>
</tr>
<tr>
<td>Immunity from micro power cuts</td>
<td>≤ 1 ms (repetition 20 times)</td>
<td>≤ 1 ms (repetition 20 times)</td>
</tr>
</tbody>
</table>

#### Max. absorbed power

<table>
<thead>
<tr>
<th>Device</th>
<th>CB12 with solid state outputs</th>
<th>CD12</th>
<th>CD20</th>
<th>XD26-XB26</th>
<th>XD26 with extension</th>
<th>XD26 with solid state outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>1.5 W</td>
<td>1.5 W</td>
<td>2.5 W</td>
<td>3 W</td>
<td>5 W</td>
<td>2.5 W</td>
</tr>
<tr>
<td>Supply</td>
<td>(0 → 10 V) or (0 → V power supply)</td>
<td>(0 → 10 V) or (0 → V power supply)</td>
<td>(0 → 10 V) or (0 → V power supply)</td>
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</tr>
</tbody>
</table>

#### Protection against polarity inversions
- Yes

### Digital inputs (I1 to IA and IH to IY)

<table>
<thead>
<tr>
<th>Input voltage</th>
<th>12 V DC (-13 % / +20 %)</th>
<th>24 V DC (-20 % / +25 %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input current</td>
<td>3.9 mA @ 10.4 V DC</td>
<td>2.6 mA @ 19.2 V DC</td>
</tr>
<tr>
<td></td>
<td>4.4 mA @ 12.0 V DC</td>
<td>3.2 mA @ 24 V DC</td>
</tr>
<tr>
<td></td>
<td>5.3 mA @ 14.4 VDC</td>
<td>4.0 mA @ 30.0 VDC</td>
</tr>
<tr>
<td>Input impedance</td>
<td>2.7 kΩ</td>
<td>7.4 kΩ</td>
</tr>
<tr>
<td>Logic 1 voltage threshold</td>
<td>≥ 7 V DC</td>
<td>≥ 15 V DC</td>
</tr>
<tr>
<td>Making current at logic state 1</td>
<td>≥ 2 mA</td>
<td>≥ 2.2 mA</td>
</tr>
<tr>
<td>Logic 0 voltage threshold</td>
<td>≤ 3 V DC</td>
<td>≤ 5 V DC</td>
</tr>
<tr>
<td>Release current at logic state 0</td>
<td>&lt; 0.9 mA</td>
<td>&lt; 0.75 mA</td>
</tr>
<tr>
<td>Response time</td>
<td>1 – 2 cycle times + 6 ms</td>
<td>1 – 2 cycle times + 6 ms</td>
</tr>
</tbody>
</table>

#### Maximum counting frequency

Inputs I1 & I2: FBD (up to 6 kHz) & Ladder (1 kHz)
Inputs 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

#### Analogues or digital inputs (IB to IG)

| CB12-CD12-XD10-XB10 | 4 inputs IB → IE |
| CB20-CD20-XB26-XD26 | 6 inputs IB → IG |

#### Inputs used as analogue inputs only in FBD

<table>
<thead>
<tr>
<th>Measurement range</th>
<th>(0 → 10 V) or (0 → V power supply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input impedance</td>
<td>14 kΩ</td>
</tr>
<tr>
<td>Input voltage</td>
<td>14.4 V DC max.</td>
</tr>
<tr>
<td>Value of LSB</td>
<td>14 mV</td>
</tr>
<tr>
<td>Resolution</td>
<td>10 bit at max. input voltage</td>
</tr>
<tr>
<td>Conversion time</td>
<td>Controller cycle time</td>
</tr>
<tr>
<td>Accuracy at 25 °C</td>
<td>± 5 %</td>
</tr>
<tr>
<td>Accuracy at 55 °C</td>
<td>± 6.2 %</td>
</tr>
<tr>
<td>Repeat accuracy at 55 °C</td>
<td>± 2 %</td>
</tr>
<tr>
<td>Isolation between analogue channel and power supply</td>
<td>None</td>
</tr>
<tr>
<td>Cable length</td>
<td>10 m maximum, with shielded cable (sensor not isolated)</td>
</tr>
</tbody>
</table>

#### Inputs used as digital inputs

<table>
<thead>
<tr>
<th>Input voltage</th>
<th>12 V DC (-13 % / +20 %)</th>
<th>24 V DC (-20 % / +25 %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input current</td>
<td>0.7 mA @ 10.4 V DC</td>
<td>1.6 mA @ 19.2 V DC</td>
</tr>
<tr>
<td></td>
<td>0.9 mA @ 12.0 V DC</td>
<td>2.0 mA @ 24.0 V DC</td>
</tr>
<tr>
<td></td>
<td>1.0 mA @ 14.4 VDC</td>
<td>2.5 mA @ 30.0 VDC</td>
</tr>
<tr>
<td>Input impedance</td>
<td>14 kΩ</td>
<td>12 kΩ</td>
</tr>
<tr>
<td>Logic 1 voltage threshold</td>
<td>≥ 7 V DC</td>
<td>≥ 15 VDC</td>
</tr>
<tr>
<td>Making current at logic state 1</td>
<td>≥ 0.5 mA</td>
<td>≥ 1.2 mA</td>
</tr>
<tr>
<td>Logic 0 voltage threshold</td>
<td>≤ 5 V DC</td>
<td>≤ 5 VDC</td>
</tr>
<tr>
<td>Release current at logic state 0</td>
<td>≤ 0.2 mA</td>
<td>≤ 0.5 mA</td>
</tr>
<tr>
<td>Response time</td>
<td>1 – 2 cycle times</td>
<td>1 – 2 cycle times</td>
</tr>
<tr>
<td>Maximum counting frequency in FBD</td>
<td>In accordance with cycle time (Tc) and input response time (Tr): 1 / (2 x Tc + Tr)</td>
<td>In accordance with cycle time (Tc) and input response time (Tr): 1 / (2 x Tc + Tr)</td>
</tr>
</tbody>
</table>

#### Sensor type
- Contact or 3-wire PNP
- Contact or 3-wire PNP

#### Conforming to IEC/EN 61131-2
- Type 1
- Type 1

#### Analogues or digital inputs (IB to IG)

| CB12-CD12-XD10-XB10 | 4 inputs IB → IE |
| CB20-CD20-XB26-XD26 | 6 inputs IB → IG |

### Characteristics of relay outputs common to the entire range

- On LCD screen for CD and XD
- On LCD screen for CD and XD

Unless otherwise specified, the characteristics given are applicable to all or part of the product range selected.
### Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3 Soft Multilingual programming software containing specific library functions (CD-ROM)</td>
<td>88970111</td>
</tr>
<tr>
<td>EEPROM memory cartridge</td>
<td>88970108</td>
</tr>
<tr>
<td>3 m serial link cable : PC → Millenium 3</td>
<td>88970102</td>
</tr>
<tr>
<td>USB cable 3 m : PC → Millenium 3</td>
<td>88970109</td>
</tr>
<tr>
<td>Millenium 3 interface → Bluetooth® (class A 10 m)</td>
<td>88970104</td>
</tr>
</tbody>
</table>

**Dimensions (mm)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NB12</td>
<td></td>
</tr>
</tbody>
</table>
Product adaptations

- Tropicalisation
- Spring connectors or removable connectors
- Changing the number of I/O
- Updating power supply

Unless otherwise specified, the characteristics given are applicable to all or part of the product range selected.