# DATASHEET - MFD-TP12-NI-A

**I/O module with temperature measuring, range A, 6DI(2AI), 4DO-Trans**

| | |
|---|---|
| **Part no.** | **MFD-TP12-NI-A** |
| **Catalog No.** | **106044** |
| **EL-Nummer (Norway)** | **4560800** |

## Delivery program

| | | |
|---|---|---|
| Description | | Configurable temperature range |
| Supply voltage | | 24 V DC |
| **Inputs** | | |
| Digital | | 6 |
| of which can be used as analog | | 2 |
| **Outputs** | | |
| Transistor | | 4 |
| **Temperature range** | | |
| Temperature detector | | -40…+90 °C<br>0…+250 °C |
| For use with | | MFD-CP8… from device version 08<br>MFD-CP10.. |
| Connection type | | screw terminal |

## Technical data

### General

| | | |
|---|---|---|
| Standards | | EN 61000-6-1/-2/-3/-4, IEC 60068-2-6, IEC 60068-2-27 |
| Dimensions (W x H x D) | mm | 89 x 90 x 25 (installed) |
| Weight | kg | 0.14 |
| Mounting | | Fitted into the power supply unit. |

### Terminal capacities

| | | |
|---|---|---|
| Solid | mm$^2$ | 0.2/4 (AWG 24 - 12) |
| Flexible with ferrule | mm$^2$ | 0.2/2.5 (AWG 24 - 12) |
| Standard screwdriver | mm | 3.5 x 0.6 |

### Climatic environmental conditions

| | | |
|---|---|---|
| Operating ambient temperature | °C | -25 to 55, cold as per IEC 60068-2-1, heat as per IEC 60068-2-2 |
| Condensation | | Take appropriate measures to prevent condensation |
| Storage | °C | - 40 - 70 |
| Relative humidity, non-condensing (IEC/EN 60068-2-30) | % | 5 - 95 |
| Air pressure (operation) | hPa | 795 - 1080 |

### Ambient conditions, mechanical

| | | | |
|---|---|---|---|
| Pollution degree | | | 2 |
| Protection type (IEC/EN 60529, EN50178, VBG 4) | | | IP20 |
| Vibrations (IEC/EN 60068-2-6) | | Hz | |
| Constant amplitude 0.15 mm | | Hz | 10 - 57 |
| Constant acceleration 2 g | | Hz | 57 - 150 |
| Mechanical shock resistance (IEC/EN 60068-2-27) semi-sinusoidal 15 g/11 ms | | Impacts | 18 |
| Drop to IEC/EN 60068-2-31 | Drop height | mm | 50 |
| Free fall, packaged (IEC/EN 60068-2-32) | | m | 1 |
| Mounting position | | | Vertical or horizontal |

### Electromagnetic compatibility (EMC)

| | | |
|---|---|---|
| Electrostatic discharge (IEC/EN 61000-4-2, Level 3, ESD) | kV | |
| Air discharge | kV | 8 |
| Contact discharge | kV | 6 |
| Electromagnetic fields (RFI) to IEC EN 61000-4-3 | V/m | 10 |
| Radio interference suppression | | EN 55011 Class B, EN 55022 Class B |
| Burst Impulse (IEC/EN 61000-4-4, Level 3) | | |

| | | | |
|---|---|---|---|
| Supply cable | | kV | 2 |
| Signal lines | | kV | 2 |
| Power pulses (surge) (IEC/EN 61000-4-5) | | kV | 2 (supply cables, symmetrical) |
| power pulses (surge) (IEC/EN 61000-4-5, level 2) | | kV | 0.5 (supply cables, symmetrical) |
| Immunity to line-conducted interference to (IEC/EN 61000-4-6) | | V | 10 |

## Insulation resistance

| | | | |
|---|---|---|---|
| Clearance in air and creepage distances | | | EN 50178, UL 508, CSA C22.2, No. 142 |
| Insulation resistance | | | EN 50178 |

## Power supply

| | | | |
|---|---|---|---|
| Heat dissipation | | W | 2 |

## Digital inputs 24 V DC

| | | | |
|---|---|---|---|
| Number | | | 6 |
| Inputs can be used as analog inputs | | | 2 (I11, I12) |
| Potential isolation | | | |
| From power supply | | | No |
| Between digital inputs | | | No |
| From the outputs | | | Yes |
| to PC interface, memory card, easyNet, easyLink | | | Yes |
| Rated operational voltage | $U_e$ | V DC | 24 |
| On 0 signal | $U_e$ | V DC | < 5.0 (I1 - I4) < 8.0 (I11, I12) |
| On 1 signal | $U_e$ | V DC | >15.0 (I1 - I4) > 8.0 (I11, I12) |
| Input current on 1 signal | | | |
| I11, I12 | | mA | 2.2 (at 24 V DC) |
| Delay time from 0 to 1 | | ms | |
| Debounce ON | | ms | 20 |
| Debounce OFF | | ms | Normally 0.1 (I1 - I4), Normally 0.25 (I11 - I12) |
| Delay time from 1 to 0 | | ms | |
| Debounce ON | | ms | 20 |
| Debounce OFF | | ms | Normally 0.1 (I1 - I4), normally 0.2 (I11, I12) |
| Cable length (unscreened) | | m | 100 |
| Frequency counter | | | |
| Quantity | | | 4 (I1, I2, I3, I4) |
| Counter frequency | | kHz | < 3 |
| Pulse shape | | | Square |
| Incremental counter | | | |
| Quantity | | | 2 (I1 + I2, I3 + I4) |
| Counter frequency | | kHz | ≦ 3 |
| Pulse shape | | | Square |
| Signal offset | | | 90° |
| Rapid counter inputs | | | |
| Number | | | 4 (I1, I2, I3, I4) |
| Counter frequency | | kHz | < 3 |
| Pulse shape | | | Square |
| Cable length, screened | | m | < 20 |

## Analog inputs

| | | | |
|---|---|---|---|
| Potential isolation | | | |
| From power supply | | | No |
| From the digital inputs | | | No |
| From the outputs | | | Yes |
| From the PC interface, memory card NET network, EASY-Link | | | Yes |
| Input type | | | DC voltage |
| Signal range | | V DC | 0 - 10 |
| Resolution, analog | | V | 0.01 |
| Resolution, digital | | V | 0.01 |
| Resolution | | Bit | 10 (value 0 - 1023) |
| Input impedance | | kΩ | 11.2 |

| | | | |
|---|---|---|---|
| Accuracy of actual value | | | |
| two MFD devices | | % | ± 3 |
| Within a single device | | % | ± 2 |
| Conversion time, analog/digital | | ms | Each CPU cycle |
| Input current | | mA | < 1 |
| Cable length screened | | m | < 30 |

## Analog inputs temperature resistance Pt100 or Ni1000 sensors

| | | | |
|---|---|---|---|
| Number | | | 2 x Pt 100 or 2 x Ni1000 (according to part no.) |
| Input type resistance sensor | | | Platinum sensor Pt100 according to DIN EN 60751, IEC 751: MFD-TP12-PT…<br>Nickel sensor Ni1000 according to DIN 43760: MFD-TP12-NI… |
| Temperature range | | °C, (°F) | Pt100, area A, selectable:-40 — +90, (-40 — +194); 0 — +250 (+32 — +482); 0 — +400, (+32 — +752)<br>Ni1000, area A, selectable: -40 — +90, (-40 — +194); 0 — +250 (+32 — +482)<br>Pt100, area B: -0 — +850, (+32 — +1562); -200 — +200 (-328 — +392) |
| Potential isolation | | | |
| From power supply | | | No |
| From the digital inputs | | | No |
| From the outputs | | | Yes |
| to PC interface, memory card, easyNet, easyLink | | | Yes |
| Resolution digital, scaling per sensor | | | With operands "IA" and "MD", selectable under scaling: 12 (0- 4095) Bit<br>With operand "MD", selectable under scaling: 1, 0.1 °C (1, 0.1 °F) |
| Measurement value resolution analog/digital | | Bit | Depending upon the scaling |
| Measuring current | | mA | < 1.6 |
| Damage limit (in the case of a wiring error) | | | Apply external voltage |
| Measuring principle | | | Two or three wire per sensor, selectable by connection of sensor |
| Accuracy (without electromagnetic compatibility interference) | | % | Two MFD devices between each other: Typically 1; max. 1.6 (Pt), 1.2 (Ni)<br>Pt100 sensor (offset error, linearity error, repetition accuracy, temperature error of device included): ± 0.8 of measuring range<br>Ni1000 sensor (offset error, linearity error, repetition accuracy, temperature error of device included): ± 0.8 of measuring range |
| Conversion time, analog/digital | | ms | without sampling time setting, selectable per sensor: 200<br>with sampling time (adjustable), selectable per sensor: 200 - 65535 |
| additional measurement aids | | | Filtering (software), smoothing of analog input signal (PT1 behavior), only with set sampling time, selectable per sensor: yes<br>Filter for the suppression of certain frequencies and their multiples: 50, 60, 250, 500 Hz |
| Diagnostics | | | Card diagnostic: yes<br>Wire break diagnostic per sensor: yes<br>Wire break diagnostic per sensor: yes<br>below lower measurement range: yes<br>Upper sensor measuring range exceeded: yes |
| Cable length screened | | m | < 10 |

## Relay outputs

| | | | |
|---|---|---|---|
| Potential isolation | | | |
| From power supply | | | Yes |

## Transistor outputs

| | | | |
|---|---|---|---|
| Number | | | 4 |
| Rated operational voltage | U$_e$ | V DC | 24 |
| Admissible range | U$_e$ | V DC | 20.4 - 28.8 |
| Supply current | | | |
| On 0 signal | Normally/max. | mA | 18/32 |
| On 1 signal | Normally/max. | mA | 24 /44 |
| Protection against polarity reversal | | | yes (Caution: A short circuit will result if 0 V or earth is applied to the outputs in the event that the supply voltage is connected to the wrong poles.) |
| Potential isolation | | | |
| Potential isolation of the power supply, inputs | | | Yes |
| From the inputs | | | Yes |
| to PC interface, memory card, easyNet, easyLink | | | Yes |
| Rated operational current at signal „1" DC per channel | I$_e$ | A | max. 0.5 |
| Lamp load without R$_V$ per channel | | W | 5 (Q1 - Q4) |
| Residual current on 0 signal per channel | | mA | < 0.1 |
| Max. output voltage | | | |
| On 0 signal with external load < 10 MΩ | | V | 2.5 |

| | | | |
|---|---|---|---|
| On 1 signal with $I_e$ = 0.5 A | | V | U = $U_e$ -1 V |
| Short-circuit protection | | | Thermal (Q1 - Q4), (evaluation with diagnostics input I16) |
| Short-circuit tripping current for $R_a \leqq 10$ mΩ | | A | $0.7 \leqq I_e \leqq 2$ per output |
| Total short-circuit current | | A | 8 |
| Peak short-circuit current | | A | 16 |
| Thermal cutout | | | Yes |
| Max. operating frequency with constant resistive load | | Operations/h | 40000 |
| Parallel connection of outputs | | | |
| With resistive load, inductive load with external suppressor circuit, combination within a group | | | Group 1: Q1 to Q4 |
| Number of outputs | max. | | 4 |
| Total max. current | | A | 2 (Caution! Outputs must be switched simultaneously and for the same period.) |
| Inductive load to EN 60947-5-1 | | | |
| Without external suppressor circuit | | | |
| $T_{0.95}$ = 1 ms, R = 48 Ω, L = 16 mH | | | |
| Utilization factor | | g | 0.25 |
| Duty factor | | % DF | 100 |
| Max. switching frequency f = 0.5 Hz (max. DF = 50 %) | | Operations | 1500 |
| DC-13, $T_{0.95}$ = 72 ms, R = 48 Ω, L = 1.15 H | | | |
| Utilization factor | | g | 0.25 |
| Duty factor | | % DF | 100 |
| Max. switching frequency f = 0.5 Hz (max. DF = 50 %) | | Operations | 1500 |
| $T_{0.95}$ = 15 ms, R = 48 Ω, L = 0.24 H | | | |
| Utilization factor | | g | 0.25 |
| Duty factor | | % DF | 100 |
| Max. switching frequency f = 0.5 Hz (max. DF = 50 %) | | Operations | 1500 |
| With external suppressor circuit | | | |
| Utilization factor | | g | 1 |
| Duty factor | | % DF | 100 |
| Max. switching frequency, max. duty factor | | Operations | Depending on the suppressor circuit |

## Analog outputs

| | | | |
|---|---|---|---|
| Potential isolation | | | |
| From power supply | | | No |
| From the digital inputs | | | No |

## Point-to-point connection

| | | | |
|---|---|---|---|
| Potential isolation | | | |
| From power supply | | | Yes |

# Design verification as per IEC/EN 61439
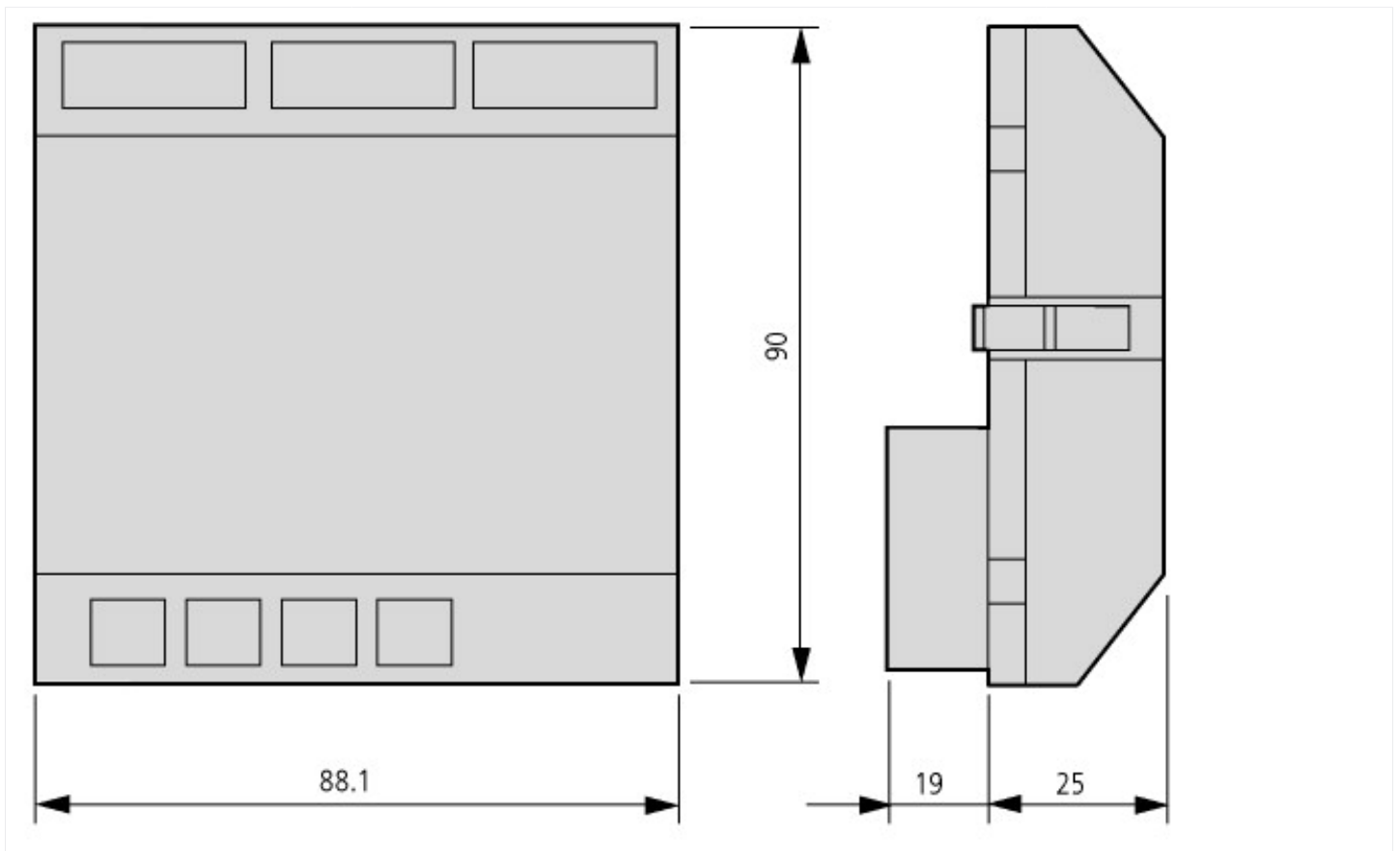
| | | | |
|---|---|---|---|
| Technical data for design verification | | | |
| Rated operational current for specified heat dissipation | $I_n$ | A | 0 |
| Heat dissipation per pole, current-dependent | $P_{vid}$ | W | 0 |
| Equipment heat dissipation, current-dependent | $P_{vid}$ | W | 0 |
| Static heat dissipation, non-current-dependent | $P_{vs}$ | W | 2 |
| Heat dissipation capacity | $P_{diss}$ | W | 0 |
| Operating ambient temperature min. | | °C | -25 |
| Operating ambient temperature max. | | °C | 55 |
| IEC/EN 61439 design verification | | | |
| 10.2 Strength of materials and parts | | | |
| 10.2.2 Corrosion resistance | | | Meets the product standard's requirements. |
| 10.2.3.1 Verification of thermal stability of enclosures | | | Meets the product standard's requirements. |
| 10.2.3.2 Verification of resistance of insulating materials to normal heat | | | Meets the product standard's requirements. |
| 10.2.3.3 Verification of resistance of insulating materials to abnormal heat and fire due to internal electric effects | | | Meets the product standard's requirements. |
| 10.2.4 Resistance to ultra-violet (UV) radiation | | | Meets the product standard's requirements. |

| 10.2.5 Lifting | | Does not apply, since the entire switchgear needs to be evaluated. |
|---|---|---|
| 10.2.6 Mechanical impact | | Does not apply, since the entire switchgear needs to be evaluated. |
| 10.2.7 Inscriptions | | Meets the product standard's requirements. |
| 10.3 Degree of protection of ASSEMBLIES | | Meets the product standard's requirements. |
| 10.4 Clearances and creepage distances | | Meets the product standard's requirements. |
| 10.5 Protection against electric shock | | Does not apply, since the entire switchgear needs to be evaluated. |
| 10.6 Incorporation of switching devices and components | | Does not apply, since the entire switchgear needs to be evaluated. |
| 10.7 Internal electrical circuits and connections | | Is the panel builder's responsibility. |
| 10.8 Connections for external conductors | | Is the panel builder's responsibility. |
| 10.9 Insulation properties | | |
| 10.9.2 Power-frequency electric strength | | Is the panel builder's responsibility. |
| 10.9.3 Impulse withstand voltage | | Is the panel builder's responsibility. |
| 10.9.4 Testing of enclosures made of insulating material | | Is the panel builder's responsibility. |
| 10.10 Temperature rise | | The panel builder is responsible for the temperature rise calculation. Eaton will provide heat dissipation data for the devices. |
| 10.11 Short-circuit rating | | Is the panel builder's responsibility. |
| 10.12 Electromagnetic compatibility | | Is the panel builder's responsibility. |
| 10.13 Mechanical function | | The device meets the requirements, provided the information in the instruction leaflet (IL) is observed. |

## Approvals

| Product Standards | IEC/EN see Technical Data; UL 508; CSA C22.2 No. 142-M1987; CSA C22.2 No. 213-M1987; CE marking |
|---|---|
| UL File No. | E135462 |
| UL Category Control No. | NRAQ |
| CSA File No. | 012528 |
| CSA Class No. | 2252-01 + 2258-02 |
| North America Certification | UL listed, CSA certified |
| Degree of Protection | IEC: IP20, UL/CSA Type: - |

## Dimensions

## Additional product information (links)

**Manual "MFD-Titan multi-function display" MN05002001Z (AWB2528-1480)**

| | |
|---|---|
| Handbuch „Multifunktions-Display MFD-Titan" MN05002001Z (AWB2528-1480) - Deutsch | https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN05002001Z_DE.pdf |
| Manual "MFD-Titan multi-function display" MN05002001Z (AWB2528-1480) - English | https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN05002001Z_EN.pdf |
| f1=1454&f2=1179;Labeleditor | http://applications.eaton.eu/sdlc?LX=11&amp |

## Additional product information (links)

**Manual "MFD-Titan multi-function display" MN05002001Z (AWB2528-1480)**

| | |
|---|---|
| Handbuch „Multifunktions-Display MFD-Titan" MN05002001Z (AWB2528-1480) - Deutsch | https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN05002001Z_DE.pdf |
| Manual "MFD-Titan multi-function display" MN05002001Z (AWB2528-1480) - English | https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN05002001Z_EN.pdf |
| f1=1454&f2=1179;Labeleditor | http://applications.eaton.eu/sdlc?LX=11&amp |

08/10/2020

Eaton Industries GmbH
http://www.eaton.eu
© 08/2020 by Eaton Industries GmbH
Eaton 106044 ED2020 V71.0 EN

6 / 6