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Family Overview

Module Data Sheets

Analog Input Modules
- NT-8101-HI-TX 8-channel AI, 4-20 mA with HART for 2- or 4-wire
- NT-8103-AI-TX 8-channel AI, 4-20 mA for 2- or 4-wire
- NT-8119-VI-05 8-channel Voltage Input, 1-5Vdc
- NT-8132-AI-UN 8-channel isolated AI, 4-20 mA, Thermocouple, RTD, Voltage
- NT-8105-TI-TC 4-channel THC/mV input
- NT-8106-TI-RT 4-channel RTD input

Analog Output Modules
- NT-8102-HO-IP 8-channel AO, with HART for 4-20 mA
- NT-8104-AO-IP 8-channel AO, 4-20 mA

Digital Inputs
- NT-8109-DI-DC 8-channel DI, 24 V dc isolated, sinking
- NT-8110-DI-DC 8-channel DI, 24 V dc non-isolated, module powered
- NT-8121-DI-DC 16-channel DI, 24 V dc non-isolated, module powered
- NT-8122-DI-DC 16-channel DI, 24 V dc isolated, sinking
- NT-8111-DI-AC 8-channel DI, 115 V ac isolated, sinking
- NT-8112-DI-AC 8-channel DI, 115 V ac non-isolated, module powered
- NT-8113-DI-AC 8-channel DI, 230 V ac isolated, sinking
- NT-8114-DI-AC 8-channel DI, 230 V ac non-isolated, module powered
- NT-8140-DI-AC 16-channel DI, 115 V ac isolated, sinking

Digital Outputs
- NT-8115-DO-DC 8-channel DO, 2-60 V dc non-isolated, module powered
- NT-8117-DO-DC 8-channel DO, 2-60 V dc isolated, unpowered
- NT-8116-DO-AC 8-channel DO, 20-250 V ac non-isolated, module powered
- NT-8118-DO-AC 8-channel DO, 20-250 V ac isolated, unpowered
- NT-8142-DO-DC 16-channel DO, 12-42Vdc non-isolated, module powered

Combination Digital Input/Output Module
- NT-8129-IO-DC 8-channel Combination /Frequency, Vdc, Current, Namur, Dry Contact

Pulse Input
- NT-8123-PI-QU 2-channel Pulse/Frequency Input, Vdc, Current, Namur, Dry Contact

Intrinsically Safe Modules

Analog Input Modules
- NT-8201-HI-IS 8-channel IS AI, 4-20mA with HART for 2 wire
- NT-8230-AI-IS 8-channel IS AI, 0-10V/Potentiometer
- NT-8205-TI-IS 8-channel IS AI, Thermocouple & mV
- NT-8206-TI-IS 8-channel IS AI, RTD and Resistance

Analog Output Modules
- NT-8202-HO-IS 8-channel IS AO, 4-20mA Output with HART
- NT-8204-AO-IS 8-channel IS AO, 4-20mA

Digital Input Module
- NT-8220-DI-IS 16-channel IS Digital Input, Switch / Namur Proximity Detector

Digital Output Module
- NT-8215-DO-IS 4-channel IS DO

Pulse Input Module
- NT-8223-PI-IS 2-channel IS Pulse/Frequency Input, Vdc, Current, Namur, Dry Contact
Overview

The NovaTech 8000 Series I/O is the newest remote I/O family native to the D/3® Distributed Control System (DCS). It is the preferred I/O for new installations and it can replace the older NovaTech 16000 series I/O in existing PCM cabinets, using existing field wiring connected to new termination panels with existing connectors.

With its -40 to +70°C temperature range and G3 corrosive coating, the NovaTech 8000 Series I/O is an I/O system designed for field mounting. It connects to conventional and smart field devices through multi-channel I/O modules. The modules communicate, via a fast internal bus, with redundant Ethernet Bus Interface Modules (EBIMs) which provide dual-redundant high speed Ethernet data connections to the D/3®.

Up to 64 I/O modules can be supported within a single 8000 Series node, and each module has between 4 and 16 channels. A PCM EthernetMPC card can support up to 50 nodes. With the availability of intrinsically safe modules, 8000 Series I/O provides a solution for both general purpose and hazardous area applications - even within the same node.

Designed for use with PCM 4100 or PCM 4200 PCI-based PCMs, it requires an Ethernet Multi Protocol Controller (EthernetMPC) card and D/3® version 12.2-2 or higher.

Key Features

- Wide range of input and output types, in any mix
- Up to 64 I/O modules per node
- Up to 50 nodes per EthernetMPC card
- Wide operating temperature range, -40 to +70°C
- General-purpose and intrinsically-safe I/O within a single node
- Redundant Local Area Networks (LAN) and power supplies supported
- High channel density
- Zone 2 and Division 2 hazardous area mounting as standard
- I/O module hot-swapping even in Zone 2 and Division 2
- HART® pass-through supported
- Rugged construction, optimized for true field mounting
- Integrated (per-channel) fusing and loop-disconnect facility
- Bussed field power on carriers eliminates daisy-chain wiring at field terminals
- Sophisticated mechanical keying system eliminates risk to plant and personnel

8000 Series I/O connects to both conventional (such as 4-20 mA) and smart field devices. It allows the cost benefits of fieldbus to be enjoyed with existing field instruments—ideal for plant upgrades and expansions. Pass-through of HART® information between HART® instruments and the D/3® network is possible.

8000 Series nodes can be located within, and connected into, a hazardous area where there is a risk of explosion from flammable gases. The standard, general purpose system is approved for operation in a Zone 2 or Class I, Division 2 hazardous area, with field devices in a similarly classified area. I/O modules with intrinsically safe field circuits can be connected to certified devices in Zone 0 and Class I, II, III, Division 1 hazardous areas.

Enclosures are also available for application where the Series 8000 node must be located in a Zone 1 or Division 1 area—consult NovaTech for availability.
Node Architecture
An 8000 Series node comprises single or redundant Ethernet Bus Inter-face Modules, up to 64 I/O modules, field terminals, and associated power supplies.

A schematic node architecture is shown below. Information from the I/O modules is transferred to and from the communication module (EBIM) via the Railbus. The Railbus is a fast, serial data bus with parallel module addressing and extends over the full length of the node. The parallel address architecture means that each I/O module position has a unique address which eliminates the need to ‘train’ modules during installation.

Power for the node is provided by integrated power supply modules; these convert the locally available power source into a regulated internal supply rail. This rail energizes the EBIM and all Railbus communication between the EBIM and I/O modules.

For some I/O module types—such as those with low-power and intrinsically safe field circuits—it also provides power for the field wiring. Where additional power is required for field devices (such as high current AC circuits), power can be provided by means of cabled connections from each module to external relays. This Bussed Field Power facility reduces installation time by removing the need to make daisy chain wiring connections at the field terminals of each I/O module.

Node Operation
A typical request for data from the field might happen as follows:

The D/3 DCS requires the temperature from a particular thermocouple input at a particular node and transmits a signal on the I/O LAN. There are several Series 8000 nodes on the I/O LAN, but the EBIM at the chosen node recognizes its own node address, and acknowledges the request.

At each node, the input modules constantly monitor, linearize and digitize their respective field signals, and make them available to scanning on the node’s internal bus (Railbus).

The EBIM continually scans the I/O modules via the Railbus, and builds up a map of the values of the input variables, ready for the PCM to read. These are converted into the LAN protocol and placed on the LAN by the EBIM, together with acknowledgement signals. The D/3 then interprets the signal and reconstructs the temperature reading.
NovaTech 8000 Series I/O Components

Modules
I/O modules transfer signals to and from field instruments. Input modules receive signals from transmitters and sensors and convert them into a digital form for presentation to the EBIM. Output modules receive commands from the EBIM and transfer them to actuators. A wide range of modules is available, including types for low-level instrumentation, AC circuits, and intrinsically safe signals. I/O modules typically have 4, 8, or 16 field channels.

Carriers
Carriers allow the 8000 Series I/O to mount onto a flat panel or T- or G-section DIN rail. They support and interconnect the EBIM, power supplies, I/O modules and field terminals, and carry the address, data and power lines of the internal Railbus. They provide termination points for the LAN and field wiring cable screens and can also distribute bussed field power to the I/O modules. I/O module carriers support eight I/O modules.

Field Terminals
Field terminals provide the interface between the I/O modules and the field wiring. They include fusing and loop disconnect as options. A mechanical keying system prevents an I/O module from being connected to the wrong type of field terminal. Field terminals mount onto the module carrier, one to each I/O module. They are clamped firmly by the I/O module to form an electrical and mechanical assembly of high integrity. They may be replaced in service without removing carriers or disturbing the operation of other modules.

Power Supplies
8000 Series I/O power supplies accept locally available unregulated power and provide a regulated supply for the EBIM and I/O modules. Supply redundancy is supported. The system power supply at an 8000 Series node converts the local DC supply to power the node, and can also provide field power for I/O modules with low-level field circuits. Where heavy-current or AC mains circuits are handled by the I/O modules, the 8000 Series method for distributing field power avoids complex wiring at the field terminal and minimizes the backplane/carerrier wiring.
Ethernet Bus Interface Module (EBIM)

NovaTech 8000 Series I/O uses the Ethernet Bus Interface Module (EBIM) to provide a high speed Ethernet data connection to the D/3®. The EBIMs communicate using a proprietary protocol over Ethernet at speeds of 10/100MB to the D/3® PCMs.

NovaTech 8000 Series I/O Support

8000 Series I/O offers a variety of I/O boards and signal conditioning termination panels suitable for virtually every standard process sensor and actuator. Details on signal conditioning termination panels, as well as their associated I/O function boards, can be obtained in individual specification sheets. The standard D/3® configuration supports such I/O signals as:

- Analog Inputs: 4-20 mA, 10-50 mA, 0-10V (programmable ranges of 0-50mV, 0-100mV, 0-1V and 0-10V), 100 ohm platinum RTDs, thermocouples
- Analog Outputs: 4-20 mA, 10-50 mA, 0-10V
- Digital and Pulse Inputs:
  - Contact Closures +5, +12, +24 and +10 to +32 V dc
  - Contact Closures 95 to 130 V ac
  - Pulse Train Inputs up to 100 KHz @ +5, +12, +24 V dc
- Digital and Pulse Outputs:
  - DC Output +5, +12, +24, and +5 to +60 V dc
  - AC Output 12 to 140 V ac
  - Pulse Output 2 msec. to 3.3 sec. @ +5, +12, +24, and +5 to +60 V dc
  - Pulse Output 10 msec. to 11 min. @ +5, +12, +24, and +5 to +60 V dc
  - Pulse Output 2 msec. to 3.3 sec. @ 12 to 140 V ac
  - Pulse Output 10 msec. to 11 min. @ 12 to 140 V ac
  - Pulse Train Inputs up to 50 Hz @ +10 to +32 V dc and 95 to 130 V ac
NT-8101-HI-TX

- 8 single-ended 4-20 mA input channels
- Non-incendive field circuits
- HART pass-through
- HART variable and status reporting
- 2- or 4-wire transmitters
- open and short circuit detection
- 24 V dc bussed field power required

Module Specifications

Inputs
Number of channels ...............................................8, single-ended
Nominal signal range (span) ...........................................4 to 20 mA
Full signal range .............................................................1 to 23 mA
Line fault detection
  Short circuit current ......................................................> 23.5 mA
  Open circuit current .....................................................< 0.5 mA
Output voltage (@ 20mA) ..............................................13.5 V (min.)
Output current ..............................................................32 mA (max.)
Accuracy (over temp range) ...........................................± 0.1% of span
Resolution ...............................................................................16 bits
Repeatability ........................................................................0.05% of span
Isolation
  (any channel to Railbus) ..............................................100 V ac
  (between channels) ........................................................none

Configurable Parameters
Input filter time constant ............................................user defined value
Input dead zone ..............................................................user defined value

Drive on failsafe ..............................................................disabled /upscale /downscale
Channel status .............................................................active /inactive
HART variable and status reporting ..............................enable /disable

Response Time
Signal change to availability on Railbus
  4–20 mA mode .........................................................27 ms (max.)
  HART mode ...............................................................0.75 s per channel

Safety
FM non-incendive field wiring parameters (each channel)
Voc = 28.7 V; Isc = 33 mA; Ca = 0.17 µF; La = 11.0 mH

Power Supplies
Railbus (12V) current ..............................................100 mA (typ.), 150 mA (max.)
Bussed Field Power 2-wire Tx ......................................300 mA (max.)
  (@ 24 V dc ±10%) 4-wire Tx ......................................60 mA (max.)

Mechanical
Module Key Code .................................................................A1
Module width .................................................................42 mm
Weight .................................................................200 g

Field Terminals (2-WIRE TX)

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td>NT-8602-FT-ST Standard</td>
<td>NT-8604-FT-FU Fused</td>
</tr>
<tr>
<td>Class 1, Div 2 or Zone 2 hazardous area</td>
<td>NT-8601-FT-NI Non-incendive</td>
<td>NT-8603-FT-FU Non-incendive</td>
</tr>
</tbody>
</table>

Field Terminals (4-WIRE TX)

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<th>Compatible Field Terminal</th>
</tr>
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<tbody>
<tr>
<td>General Purpose</td>
<td>NT-8615-FT-4W</td>
<td>--</td>
</tr>
<tr>
<td>Class 1, Div 2 or Zone 2 hazardous area</td>
<td>NT-8615-FT-FU</td>
<td>--</td>
</tr>
</tbody>
</table>
NT-8103-AI-TX

- 8 single-ended 4-20mA input channels
- Non-incentive field circuits
- 4-20mA
- 2- or 4-wire transmitters
- Open and short circuit detection
- 24Vdc bussed field power required

Module Specifications

Inputs
Number of channels ...............................................8, single-ended
Nominal signal range (span) ........................................4 to 20 mA
Full signal range .........................................................1 to 23 mA
Out of range alarm
  Lower threshold ......................................................> 23.5 mA
  Upper threshold ......................................................< 0.5 mA
Output voltage (@ 20 mA) .........................................13.5 V (min.)
Output current ........................................................32 mA (max.)
Accuracy (over temp range) ..................................± 0.1% of span
Resolution .......................................................................16 bits
Repeatability .............................................................0.05% of span
Isolation
  (any channel to Railbus) .................................................100 V ac
  (between channels) ........................................................none

Response Time
Signal change to availability on Railbus ...............27 ms (max.)

Safety
FM non-incendive field wiring parameters (each channel)
  $V_{oc} = 28.7$ V; $I_{sc} = 33$ mA; $C_a = 0.17$ µF; $L_a = 11.0$ mH

Power Supplies
Railbus (12V) current .............................................100 mA (typ.)/150 mA (max.)
Bussed Field Power ...........................................2-wire Tx 300 mA (max.)
(@ 24 Vdc ± 10%) 4-wire Tx 60 mA (max.)

Mechanical
Module Key Code .............................................................A1
Module width ..............................................................42 mm
Weight ...........................................................................200 g

Field Terminals (2-wire TX)

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<td>NT-8603-FT-FU Non-incendive Fused</td>
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</table>

Field Terminals (4-wire TX)

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<td>--</td>
</tr>
<tr>
<td>Class 1, Div 2 or Zone 2 hazardous area</td>
<td>NT-8615-FT-4W</td>
<td>--</td>
</tr>
</tbody>
</table>

Contact:
NovaTech, LLC
D/3 Process Control
11500 Cronridge Drive, Ste. 110
Owings Mills, MD 21117
T: 410.753.8300
F: 410.753.8395
E: d3@novatechweb.com
www.novatechweb.com

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DS_NT_8103_AI_TX_122210
NT-8119-VI-05

- 8 single-ended input channels
- Non-incendive field circuits
- 1–5 V inputs open circuit and short circuit detection
- 24 V dc bussed field power required

Module Specifications

Inputs
Number of channels ...............................................8, single-ended
Nominal signal range (span) ........................................1 to 5 V
Full signal range ......................................................0.19 to 5.64 V
Input impedance .......................................................2 MΩ
Out of range alarm
   Lower threshold .....................................................< 0.19 V
   Upper threshold .....................................................> 5.64 V
Accuracy (over temp range) ......................................± 0.1% of span
Resolution ...............................................................16 bits
Repeatability .............................................................0.05% of span
Isolation (any channel to Railbus) ..............................100 V ac
   (between channels) ..................................................none

Configurable Parameters
Input filter time constant .....................................user defined value
Input dead zone ......................................................user defined value
Drive on failsafe .....................................................disabled / upscale / downscale
Channel status ......................................................active / inactive

Response Time
Signal change to availability on Railbus .....................27 ms (max.)

Safety
FM non-incendive field wiring parameters (each channel)
...............................................\( V_{oc} = 28.7 \text{ V} \);
\( I_{sc} = 33 \text{ mA} \);
\( C_a = 0.17 \mu F \);
\( L_a = 11.0 \text{ mH} \)

Power Supplies
Railbus (12V) current ..............................................100 mA (typ.)/150 mA (max.)
Bussed Field Power .................................................60 mA (max.) at 24 Vdc ± 10%

Mechanical
Module Key Code ..................................................A1
Module width .........................................................42 mm
Weight .................................................................200 g

Field Terminals

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<tr>
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<td>NT-8615-FT-4W</td>
<td>--</td>
</tr>
<tr>
<td>or Zone 2 hazardous</td>
<td>or Zone 2 hazardous area</td>
<td></td>
</tr>
<tr>
<td>area</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Field Wiring Diagram

Safe area
or Zone 2/Div 2 hazardous area

Contact:
NovaTech, LLC
D/3 Process Control
11500 Cronridge Drive, Ste. 110
Owings Mills, MD 21117
www.novatechweb.com
NT-8132-AI-UN

- 8 isolated, universal, input channels
- Configurable on a channel by channel basis:
  - 4-20mA, THC, RTD, resistance & voltage
- 250V ac rms channel to channel isolation
- Thermocouple types B, E, J, K, N, R, S, and T
- RTD types Pt100, jPt100, Pt200, Pt500, Ni120, Cu10
- Volt input types ±120mV, 0-1V, 0-5V, 1-5V, 0-10V, ±10V
- 2 or 3-wire RTDs
- 2 or 4-wire transmitters
- Non-incendive field circuits
- 24 V dc bussed field power required

Module Specifications

Inputs
Number of configurable channels .........................8 isolated

4-20mA Inputs
Nominal signal range (span) ........................................4 to 20mA
Full signal range (FSR) ................................................0 to 25mA
Output voltage (@ 20mA) ..........................................13.5 V (min.)
Output current (linear operation) ............................25 mA (max.)
Short circuit current (max.) .................................75 mA for 100ms
(Open circuit turns off after ~100ms at more than 25mA)
Calibration accuracy
  - 10°C to 40°C .........................................................± 0.1% of FSR
  - -40°C to 70°C ......................................................± 0.3% of FSR
Resolution ...............................................................15 bits (typ.)
Repeatability ............................................................0.05% of span

Thermocouple Inputs
THC Types ...B, E, J, K, N, R, S, and T
Calibration Accuracy
  - 10°C to 40°C .........................................................± 0.1% of span (typ.)
  - -40°C to 70°C ......................................................± 0.2% of span (typ.)
Cold junction compensation error †< ±1°C (~40°C to +70°C)
Resolution ...............................................................14 bits (typ.)
Optional open circuit bleed current ...............± 1.2uA (nom.)

RTD Input (2 or 3 Wire)
RTD types ................Pt100, Pt200, Pt500, Cu10, Ni120, jPt100
Maximum wire resistance ........................................40 ohms
Calibration accuracy 3-wire
  - 10°C to 40°C .........................................................± 0.1% of span
  - -40°C to 70°C ......................................................± 0.2% of span
RTD excitation current ..................................selected for ~0.2 mW at 0°C
Resolution ...............................................................14 bits (typ.)
Open circuit detection time ..............................1 sec
(with < 0.5 µF cable capacitance)

Resistance Input (2 or 3 Wire)
Input resistance range (span) .........................0 to 110, 280,
........................................................................470 and 1000 ohms
Calibration accuracy 3-wire
  - 10°C to 40°C .........................................................± 0.2% of span
  - -40°C to 70°C ......................................................± 0.4% of span
Maximum wire resistance ..................................40 ohms
Resistive excitation current ....................selected for ~1.0 mW at max R
Resolution ...............................................................14 bits (typ.)

† C J compensation located in recommended field terminal
Voltage Input
Nominal signal range 1 (span) ......................................±120 mV, 0-1 V, ...............................................0-5V, 1-5V, 0-10V, ±10V
Resolution .................................................................14 bits (typ.)

Configurable Parameters
Sensor type .................................................................user selectable
Input dead zone .............................................................user defined value
Channel status .............................................................active/inactive
Filter/sample rates .......................................................user selectable

General Specifications
Common mode rejection (using 50/60Hz filter) ...............> 120 dB @ 50/60 Hz
Series mode rejection (using 50/60Hz filter) ....................> 65 dB @ 50/60 Hz
Maximum input voltage (except current I/P) ....................± 25V
Common mode voltage between channels ..............250 V ac rms
Isolation
(channel to channel) .....................................................250 V ac rms
(any channel to Railbus) ..............................................250 V ac rms
(any channel to Bussed Field Power) .........................250 V ac rms
(Railbus to Bussed Field Power) ...............................150 V ac rms
Input filter frequency response .................................time constant 4 ms
Input impedance ...........................................................> 1 M ohm
Data Format ...............0 to 66535 corresponds to selected span
Open circuit detection ..................................................< 1 sec
........................................................................(with < 0.5 µF cable capacitance)

Safety
FM non-incendive field wiring parameters (each channel)
.........................................................Voc=20 V; Isc = 75mA; Ca = 0.61 µF; La = 11.3mH

Power Supplies
Railbus (12V) current ......................................................60 mA (typ.)
................................................................................125 mA (max.)
Bussed Field Power @ 24 V dc ± 10%
All configurations - except 4/20mA with excitation ..125 mA (max.)
4/20mA with excitation .............................................300 mA (max.)

Mechanical
Module Key Code ..........................................................A1*
Module width ...............................................................42mm
Weight .................................................................185g

* WARNING If this module is being used in an application that requires 250V ac rms channel-to-channel isolation, it must be replaced only with an A1 key code module that has equivalent, or better, channel-to-channel isolation rating.

Field Terminals

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Purpose</td>
<td>NT-8608-FT-NI (no internal CJ)</td>
<td>8607-FT-TC (see note) (internal CJ)</td>
</tr>
<tr>
<td>THC</td>
<td>NT-8607-FT-TC (internal CJ)</td>
<td>8608-FT-NI (see note) (no internal CJ)</td>
</tr>
</tbody>
</table>

NOTE: For further advice on field terminals for this module and for operations with more than one type of sensor, see NovaTech 8000 I/O Hardware User’s Guide.
NT-8105-TI-TC

- 4 thermocouple or mV* input channels
- Cold junction compensation

Module Specifications

Inputs
Number of channels ..................................................4
THCs types .................................................B,E,J,K,N,R,S, or T to EN 60584-2, IEC584-2, BS4937

Input Ranges

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>mV</td>
<td>0 to 120 mV</td>
</tr>
<tr>
<td>Thermocouples: B</td>
<td>0 to 1820 °C</td>
</tr>
<tr>
<td>J</td>
<td>– 270 to + 1000 °C</td>
</tr>
<tr>
<td>K &amp; N</td>
<td>– 270 to + 1372 °C</td>
</tr>
<tr>
<td>R &amp; S</td>
<td>– 50 to + 1768 °C</td>
</tr>
<tr>
<td>T</td>
<td>– 270 to + 400 °C</td>
</tr>
</tbody>
</table>

Calibration Accuracy

- mV input ............................................± 0.2% of span (– 40 to + 70 °C)
- THCs input .............................................± 0.1% of span (+10 to + 40 °C)

- Cold junction compensation error†........<± 1°C (–40 to + 70 °C)
- Resolution ..........................................................15 bits plus sign bit
- Common mode rejection ................................> 80 dB @ 50/60 Hz
- Series mode rejection ........................................> 40 dB @ 50/60 Hz
- Maximum input voltage ........................................± 4.0 V
- Common mode voltage between channels ..........± 4.5 V (max.)
- Isolation (any channel to Railbus) ...............250 V ac rms
- Open circuit bleed current ............................± 0.5 µA (nom.)

Configurable Parameters

- Sensor type .................................................user selectable
- Input dead zone (hysteresis)........................user defined value
- Selectable input filtering ...off /2 reading avge./running avge.
- Drive on open circuit fault.............disabled /upscale /downscale
- Channel status..................................................active/ inactive

Response Times

- Signal change to availability on Railbus ..........................................................120 ms (min.)
- O/C sensor detection ........................................................................≤ 10 s

Safety

- FM non-incendive field wiring parameters (each channel) ........Voc = 10.5 V; Isc = 3.6 mA; Ca = 14.9 µF; La = 1000 mH

Power Supplies

- Railbus (12V) current .........................................150 mA (typ.)
- Bussed Field Power ..............................................not required

Mechanical

- Module Key Code .......................................................C1
- Module width ..........................................................42 mm
- Weight .................................................................200 g

Field Terminals

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td>NT-8605-FT-TC THC</td>
<td></td>
</tr>
<tr>
<td>Class 1, Div 2 or Zone 2 hazardous area</td>
<td>NT-8605-FT-TC THC</td>
<td>-</td>
</tr>
</tbody>
</table>

Contact:

NovaTech, LLC
D/3 Process Control
11500 Cronridge Drive, Ste. 110
Owings Mills, MD  21117
T: 410.753.8300
F: 410.753.8395
E: d3@novatechweb.com
www.novatechweb.com

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DS_NT_8105_TI_TC_122210
NT-8106-TI-RT

- 4 RTD or resistance* source inputs
- Function defined by configuration
- 2-, 3- or 4-wire RTD types accommodated

Module Specifications

Inputs
Number of channels .........................................................4
RTD input (2, 3, or 4 wire)
..........................................................Pt100 to BS1904/DIN43760/IEC 75
..........................................................Ni120; jPt100 to JIS C1604: 1989

Input Ranges

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance</td>
<td>Consult NovaTech for availability</td>
</tr>
<tr>
<td>RTDs: Pt100</td>
<td>- 200 to + 850 °C</td>
</tr>
<tr>
<td>jPt100</td>
<td>- 200 to + 510 °C</td>
</tr>
<tr>
<td>Ni120</td>
<td>- 60 to + 320 °C</td>
</tr>
</tbody>
</table>

Input resistance range (span)..................................................0 to 500 Ω

Accuracy (% of span)

<table>
<thead>
<tr>
<th>Tamb</th>
<th>(RTD &amp; Ω inputs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25°C</td>
<td>± 0.05%</td>
</tr>
<tr>
<td>+10 to + 40°C</td>
<td>± 0.1%</td>
</tr>
<tr>
<td>- 40 to + 70°C</td>
<td>± 0.2%</td>
</tr>
</tbody>
</table>

RTD excitation current ...............................................200 μA (nom.)
Resolution ......................................................15 bits plus sign bit
Common mode rejection.......................................> 80 dB @ 50/60 Hz
Series mode rejection......................................> 40 dB @ 50/60 Hz
Isolation (any channel to Railbus) .......................250 V ac rms
Open circuit bleed current......................................0.5 μA (nom.)

Configurable Parameters

Sensor type.................................................................user selection
Input deadzone ..........................................................user defined value
Selectable input filtering..............................................off / 2-reading avg / running avg.
Drive on open circuit fault .............................................disabled / upscale
Channel status ..........................................................active / inactive
Offset (2-wire RTD mode) .............................................user defined value

Response Times
Signal change to availability on Railbus............................180 ms (min.)
..................................................................................840 ms (max.)
O/C sensor detection ....................................................≤ 10 s

Safety
FM non-incendive field wiring parameters (each channel)
...............................................................................Voc = 10.5 V; Isc = 3.6 mA; Ca = 14.9 μF; La = 1000 mH

Power Supplies
Railbus (12V) current ..................................................150 mA (typ.)
..................................................................................200 mA (max.)
Bussed Field Power ........................................................not required

Mechanical
Module Key Code ..........................................................C1
Module width ...............................................................42 mm
Weight .................................................................200 g

Field Terminals

Field Wiring | Recommended Field Terminal | Compatible Field Terminal
-------------|-----------------------------|-----------------------------
General Purpose | NT-8606-FT-RT RTD | -
Class 1, Div 2 or Zone 2 hazardous area | NT-8606-FT-RT RTD | -

*Consult NovaTech for availability.

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DS_N8106_TI_RT_122210

Contact:
NovaTech, LLC                        T: 410.753.8300
D/3 Process Control                  F: 410.753.8395
11500 Cronridge Drive, Ste. 110    E: d3@novatechweb.com
Owings Mills, MD 21117             www.novatechweb.com
NT-8102-HO-IP

- 8 single-ended 4–20 mA output channels
- Non-incendive field circuits
- HART pass-through
- HART variable and status reporting
- Valve positioners and remote indicators, etc.
- Open circuit detection on each channel
- 24 V dc bussed field power required

Module Specifications

Inputs
- Number of channels: 8, single-ended
- Nominal signal range (span): 4 to 20 mA
- Full signal range: 1 to 23 mA
- Open loop detection threshold: 0.7 ± 0.25 mA
- Output compliance: 20 mA at 21.6 V dc supply
- Accuracy (over temp range): ±0.25% of span
- Resolution: 12 bits
- Isolation
  - (any channel to Railbus): 100 V ac
  - (between channels): none

Configurable Parameters

- Initialization state: predefined value
- Drive on fail-safe: predefined value/last value
- Channel status: active/inactive
- HART variable and status reporting: enable/disable

Response Time

- Signal change to availability on Railbus
  - 4–20 mA mode: 25 ms (max.)
  - HART mode: 0.75 s per channel

Safety

- FM non-incendive field wiring parameters (each channel)
  - $V_{oc} = 28.7$ V; $I_{sc} = 33$ mA; $C_s = 0.17$ µF; $L_a = 11.0$ mH

Power Supplies

- Railbus (12V) current: 100 mA (typ.)
- Bussed Field Power: 300 mA (max.) at 24 Vdc ± 10%

Mechanical

- Module Key Code: A4
- Module width: 42mm
- Weight: 200 g

Field Terminals

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td>NT-8602-FT-ST Standard</td>
<td>NT-8604-FT-FU Fused</td>
</tr>
<tr>
<td>Class 1, Div 2 or Zone 2 hazardous area</td>
<td>NT-8601-FT-NI Non-incendive</td>
<td>NT-8603-FT-FU Non-incendive</td>
</tr>
</tbody>
</table>

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NT-8104-AO-IP

- 8 single-ended outputs
- 4–20 mA
- For I/P converters and remote indicators, etc
- Open circuit detection is provided on each channel
- 24 V dc bussed field power required

Module Specifications

Outputs
Number of channels ...............................................8, single-ended
Nominal signal range (span) ......................................4 to 20 mA
Full signal output range .............................................1 to 23 mA
Open loop output threshold ......................................0.7 ± 0.25 mA
Output compliance ...................................................20 mA at 21.6 V dc supply (into 700 Ω load)
Accuracy (over temp range) .......................................± 0.25% of span
Output ripple ...........................................................< 0.02% of span
Resolution .................................................................12 bits
Isolation any channel to Railbus ...............................100 V ac

Configurable Parameters
Initialization state ......................................................predefined value
Drive on fail-safe .....................................................predefined value / last value
Channel status ..........................................................active / inactive

Response time
From Railbus command to output change ............25 ms (max.)

Safety
FM non-incendive field wiring parameters (each channel)
........................................................................V_{oc} = 28.7 V; I_{sc} = 33 mA; C_a = 0.17 μF; L_a = 11.0 mH

Power Supplies
Railbus (12V) current ..................................................100 mA (typ.)
..............................................................................150 mA (max.)
Bussed Field Power ..............................................300 mA (max.) @ 24 V dc ±10%
Quiescent current .....................................................60 mA

Mechanical
Module Key Code .....................................................A4
Module width ...........................................................42 mm
Weight .................................................................200 g

Field Terminals

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<tr>
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<td>NT-8601-FT-NI Non-incendive</td>
<td>NT-8603-FT-FU Non-incendive Fused</td>
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NT-8109-DI-DC

- 8 discrete isolated inputs
- 24 V dc field voltage sources
- User definable input threshold
- Pulse counting option

**Module Specifications**

**Inputs**
- Number of channels: 8
- OFF voltage: < 3.2 V dc
- ON voltage: > 11 V dc
- Wetting current: 6.3 mA (nom.) @ 24 V dc
- Minimum pulse width detected: 3 ms
- Maximum switching frequency (no-filtering): 200 Hz
- Maximum voltage
  - Input: 30 V dc
  - Reverse input: ~ 25 V dc

**Configurable Parameters**
- Selectable input filter: fast, slow or user defined (User defined permits 0 to 512 ms values in 2ms steps)
- Latch inputs: enable / disable
- Latch polarity: latch on high / latch on low
- Pulse counting: enable / disable

**Response Time**
- I/O response time: Field event to new data available on Railbus: 3 ms (max.)

**Safety**
- FM non-incendive field wiring parameters (each channel)
  - \( V_{\text{max}} = 30 \text{ V} \)
  - \( I_{\text{max}} = 100 \text{ mA} \)
  - \( C = 0 \mu F \)
  - \( L = 0 \text{ mH} \)

**Power Supplies**
- Railbus (12V) current: 35 mA (typ.)
- Bussed Field Power: not required

**Mechanical**
- Module Key Code: B2
- Module width: 42 mm
- Weight: 170 g

**Field Terminals**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td>NT-8602-FT-ST Standard †</td>
<td>NT-8604-FT-FU Fused</td>
</tr>
<tr>
<td>Class 1, Div 2 or Zone 2 hazardous area</td>
<td>NT-8610-FT-NA Non-arcing †</td>
<td>NT-8611-FT-FU Non-arcing, Fused</td>
</tr>
</tbody>
</table>

† External fusing of the Field Power supply is recommended in order to protect the field wiring.
NT-8110-DI-DC

- 8 discrete inputs for dry contact switches
- 24 V dc provided on input high side
- Returns commoned internally
- Pulse counting option
- 24 V dc bussed field power required

Module Specifications

Inputs
Number of channels ................................................................. 8
OFF current ............................................................................ < 0.69 mA
ON current ............................................................................. > 2.24 mA
Wetting current ....................................................................... 5 mA (typ.)
Minimum pulse width detected ...................................... 3 ms
Maximum switching frequency (no-filtering) ................. 200 Hz
Isolation (any channel to Railbus) .............................. 250 V ac

Configurable Parameters
Selectable input filter ........................................... fast, slow or user defined
(User defined permits 0 to 512 ms values in 2 ms steps)
Latch inputs ............................................................... enable / disable
Latch polarity ............................................................ latch on high / latch on low
Pulse counting .......................................................... enable / disable

Response Time
I/O response time
Field event to new data available on Railbus .......... 3 ms (max.)

Safety
FM non-incendive field wiring parameters (each channel)
.......................... $V_{oc} = 30 \text{ V}$; $I_{oc} = 15.2 \text{ mA}$; $C_a = 0.12 \mu \text{F}$; $L_a = 151 \text{ mH}$

Power Supplies
Railbus (12V) current ............................................................ 35 mA (typ.)
............................................................... 55 mA (max.)
Bussed Field Power .................................................. 40 mA, @ 18—36 V dc

Mechanical
Module Key Code ............................................................... B1
Module width ....................................................................... 42 mm
Weight ................................................................................... 170 g

Field Terminals

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td>NT-8602-FT-ST Standard †</td>
<td>NT-8604-FT-FU</td>
</tr>
<tr>
<td>Class 1, Div 2</td>
<td>NT-8601-FT-NI Non-incendive †</td>
<td>NT-8603-FT-FU Non-incendive, fused</td>
</tr>
<tr>
<td>or Zone 2 hazard-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ous area</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

† External fusing of the field power supply is recommended in order to protect the field wiring.

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DS_NT_8110_DI_DC_122210
**NT-8121-DI-DC**

- 16 input channels for dry contact switches
- 24 V dc provided on input high side
- Returns commoned internally
- Pulse counting option
- 24 V dc bussed field power required

**Module Specifications**

**Inputs**
- Number of channels: 16
- OFF current: < 0.3 mA
- ON current: > 1.2 mA
- Wetting current: 2.8 mA (typ.)
- Minimum pulse width detected: 5 ms
- Max input freq in pulse counting mode (no-debounce): 100 Hz
- Isolation (any channel to Railbus): 250 V ac

**Configurable Parameters**
- Selectable input filter: fast, slow or user defined
  (User defined permits 0 to 512 ms values in 2ms steps)
- Latch inputs: enable/disable
- Latch polarity: latch on high / latch on low
- Pulse counting: enable/disable

**Response Time**
- I/O response time: 5 ms (max.)
- Field event to new data available on Railbus: 5 ms (max.)

**Safety**
- FM non-incendive field wiring parameters (each channel)
  \[ V_{cc} = 30 \text{ V}; I_{cc} = 3.5 \text{ mA}; C_a = 0.12 \text{ μF}; L_a = 1000 \text{ mH} \]

---

**Power Supplies**
- Railbus (12V) current: 90 mA (typ.)
- Railbus (12V) current: 135 mA (max.)
- Bussed Field Power: 60 mA, @ 18–30 V dc

**Mechanical**
- Module Key Code: E1
- Module width: 42 mm
- Weight: 210 g

**Field Terminals**

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td>NT-8617-FT-NI 16 channel DI</td>
<td>-</td>
</tr>
<tr>
<td>Class 1, Div 2 or Zone 2 hazardous area</td>
<td>NT-8617-FT-NI 16 channel DI</td>
<td>-</td>
</tr>
</tbody>
</table>

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DS_NT_8121_Di_DC_122210
NT-8122-DI-DC

- 16 input channels
- 24 V dc field voltage sources
- Individually isolated channels
- User definable input threshold
- Pulse counting option

Module Specifications

Inputs
Number of channels ................................................................. 16
OFF voltage ........................................................................... < 3.4 V dc
ON voltage .............................................................................. > 11 V dc
Wetting current ................................................................. 2.8 mA (nom.) @ 24 V dc
Minimum pulse width detected ............................................. 5 ms
Max input freq in pulse counting mode (no-debounce) 100 Hz

Maximum voltage
Input .......................................................................................... 30 V dc
Reverse input ............................................................................. – 25 V dc
Isolation (Any Channel to railbus) ........................................... 250 V ac
Isolation (channel to channel) .................................................. 150 V peak

Configurable Parameters
Selectable input filter .......................................................... fast, slow or user defined
(User defined permits 0 to 512 ms values in 2 ms steps)
Pulse counting ................................................................. enable / disable

Response Time
I/O response time ............................................................... 5 ms (max.)
(Field event to new data available on Railbus)

Safety
FM non-incendive field wiring parameters (each channel)
................................................................. $V_{\text{max}} = 30 \text{ V}; I_{\text{max}} = 100 \text{ mA}; C = 0 \mu\text{F}; L = 0 \text{ mH}$

Power Supplies
Railbus (12V) current ........................................................... 90 mA (typ.)
......................................................................................... 135 mA (max.)
Bussed Field Power .............................................................. not required

Mechanical
Module Key Code ................................................................. E2
Module width ........................................................................ 42 mm
Weight .................................................................................. 210 g

Field Terminals

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td>NT-8617-FT-Ni †</td>
<td>-</td>
</tr>
<tr>
<td>Class 1, Div 2 or Zone 2 hazardous area</td>
<td>NT-8617-FT-Ni †</td>
<td>-</td>
</tr>
</tbody>
</table>

† External fusing of the Field Power supply is recommended in order to protect the field wiring.
NT-8111-DI-AC

- 16 discrete inputs
- 115 V ac field voltage sources
- User definable input threshold
- Pulse counting option

Module Specifications

Inputs
Number of channels ........................................... 8
OFF voltage ................................................. < 34 V ac
ON voltage ....................................................... > 84 V ac
Wetting current .............................................. 2 mA (nom.) @ 115 V ac
Max. input voltage ............................................ 130 V ac
Frequency ...................................................... 50 / 60 Hz

Configurable Parameters
Selectable input filter .............................. fast, slow or user defined
(User defined permits 0 to 512 ms values in 2 ms steps)
Latch inputs .................................................. enable / disable
Latch polarity ............................................. latch on high / latch on low
Pulse counting ............................................. enable / disable

Response Time
I/O response time
Field event to new data available on Railbus...33 ms (max.)

Power Supplies
Railbus (12V) current .................................. 40 mA (typ.)
................................................................. 60 mA (max.)
Bussed Field Power ..................................... not required

Field Wiring | Recommended Field Terminal | Compatible Field Terminal
-------------|-----------------------------|-----------------------------
General Purpose | NT-8602-FT-ST Standard † | NT-8604-FT-FU Fused
Class 1, Div 2 or Zone 2 hazardous area | NT-8610-FT-NA Non-arcing † | NT-8611-FT-FU Non-arcing, fused

† External fusing of the Field Power supply is recommended in order to protect the field wiring.
NT-8112-DI-AC

- 8 discrete inputs for dry contact switches
- 115 V ac provided on input high side
- Returns commoned internally
- Pulse counting option
- 115 V ac Bussed Field Power required

Module Specifications

Inputs
Number of channels .........................................................8
OFF current .................................................................< 0.56 mA
ON current .................................................................> 1.4 mA
Wetting current ........................................2 mA (nom.) @ 115 V ac

Configurable Parameters
Selectable input filter ......................fast, slow or user defined
(User defined permits 0 to 512 ms values in 2ms steps)
Latch inputs ........................................enable /disable
Latch polarity ........................................latch on high / latch on low
Pulse counting ........................................enable /disable

Response Time
I/O response time
Field event to new data available on Railbus...33 ms (max.)

Power Supplies
Railbus (12V) current ....................................................40 mA (typ.)
.................................................................60 mA (max.)
Bussed Field Power ........................................115 V ac ±10%
Frequency ...............................................................50 / 60 Hz

Mechanical
Module Key Code .........................................................E1
Module width ...............................................................42 mm
Weight .................................................................170 g

Field Terminals

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td>NT-8604-FT-FU Fused</td>
<td>NT-8602-FT-ST Standard †</td>
</tr>
<tr>
<td>Class 1, Div 2 or Zone 2 hazardous area</td>
<td>NT-8611-FT-FU Non-arcing, Fused</td>
<td>NT-8610-FT-NA Non-arcing †</td>
</tr>
</tbody>
</table>

† Alternative fusing in the field wiring is recommended if it is not provided in the field terminal.
NT-8113-DI-AC

- 8 discrete isolated inputs
- 230 V ac field voltage sources
- User definable input threshold
- Pulse counting option

Module Specifications

Inputs
Number of channels ......................................................... 8
OFF voltage .............................................................. < 68 V ac
ON voltage ................................................................. > 168 V ac
Wetting current .............................................. 1 mA (nom.) @ 230 V ac
Max. input voltage .................................................. 265 V ac
Frequency ................................................................. 50 / 60 Hz

Configurable Parameters
Selectable input filter ........................................ fast, slow or user defined
(User defined permits 0 to 512 ms values in 2 ms steps)
Latch inputs ............................................................ enable / disable
Latch polarity ...................................................... latch on high / latch on low
Pulse counting ................................................ enable / disable

Response Time
I/O response time
Field event to new data available on Railbus . . . . . . . 33 ms (max.)

Power Supplies
Railbus (12 V) current ........................................ 40 mA (typ.)
Bussed Field Power ........................................ not required

Mechanical
Module Key Code .................................................... E5
Module width .......................................................... 42 mm
Weight ................................................................. 170 g

Field Terminals

<table>
<thead>
<tr>
<th>Field Wiring</th>
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<th>Compatible Field Terminal</th>
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<td>NT-8604-FT-FU Fused</td>
</tr>
<tr>
<td>Class 1, Div 2</td>
<td>NT-8610-FT-NI Non-arcing †</td>
<td>NT-8611-FT-FU Non-arcing, fused</td>
</tr>
<tr>
<td>or Zone 2 hazard-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ous area</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

† External fusing of the Field Power supply is recommended in order to protect the field wiring.
NT-8114-DI-AC

- 8 discrete inputs for dry contact switches
- 230 V ac provided on input high side
- Returns commoned internally
- Pulse counting option
- 230 V ac Bussed Field Power required

Module Specifications (See also System Specification)

Inputs
Number of channels .......................................................8
OFF current .................................................................< 0.28 mA
ON current .................................................................> 0.71 mA
Wetting current .......................................................1 mA (nom.) @ 230 V ac

Configurable Parameters
Selectable input filter ...............................................fast, slow or user defined
(Last defined permits 0 to 512 ms values in 2ms steps)
Latch inputs ..............................................................enable /disable
Latch polarity ......................................................latch on high / latch on low
Pulse counting ..............................................................enable /disable

Response Time
I/O response time
Field event to new data available on Railbus....33 ms (max.)

Power Supplies
Railbus (12V) current ......................................................40 mA (typ.)
.................................................................60 mA (max.)
Bussed Field Power ..................................................207 to 265 V ac
Frequency .................................................................50 / 60 Hz

Mechanical
Module Key Code ..............................................................................E2
Module width .................................................................42 mm
Weight .................................................................170 g

Field Terminals

<table>
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<td>NT-8602-FT-ST Standard †</td>
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<td>NT-8611-FT-FU Non-arcing, Fused</td>
<td>NT-8610-FT-NA Non-arcing †</td>
</tr>
</tbody>
</table>

† Alternative fusing in the field wiring is recommended if it is not provided in the field terminal.
NT-8140-DI-AC

- 16 input channels
- 115 V ac field voltage sources
- Hi-res time stamp for accurate event sequencing
- User definable input threshold
- Pulse counting option
- Channels isolated in four blocks of four channels

Module Specifications

Inputs
Number of channels ................................................................. 16
Number of isolated IO blocks......................... 4 blocks of 4 channels
ON voltage ................................................................. > 84 V ac
OFF voltage ................................................................. <34 V ac
Input impedance ................................................................. 60KΩ (nom.)
Wetting current ................................................................. 1.9 mA (nom.)
Frequency ................................................................. 50 / 60 Hz

Configurable Parameters
Latch inputs ................................................................. enable / disable
Latch polarity ................................................................. latch on high / latch on low
Pulse counting ................................................................. enable / disable
SOE logging ................................................................. configurable per channel

Response Time
I/O response time
Field event to new data available on Railbus... 33 ms (max.)

Electrical Isolation
Channel to railbus ................................................................. 275 V ac (max.)
Between blocks (1-4, 5-8, 9-12, 13-16) .......... 275 V ac (max.)
Channel to Channel and Ch+ to Ch-........ 130 V ac (max.)
Within one block Ch. 1-4, 5-8, 9-12, 13-16....... 130 V ac (max.)

Field Terminals

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td>NT-8612-FT-NA non-arcing</td>
<td>--</td>
</tr>
<tr>
<td>Class 1, Div 2 or Zone 2 hazardous area</td>
<td>NT-8612-FT-NA non-arcing</td>
<td>--</td>
</tr>
</tbody>
</table>

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NT-8140_DI_AC_122210
NT-8115-DO-DC

- 8 powered outputs
- Controls solenoids and relays
- Common load supply of up to 60 V dc
- Discrete or pulsed outputs
- 1A per channel switched current
- 2–60 V dc bussed field power required

Module Specifications

Outputs
Number of channels .......................................................... 8
Output voltage range ......................................................... 2–60 V dc
ON voltage drop ............................................................ 0.25 V (max.)
OFF leakage current ..................................................... 1.0 mA (max.)
Switched current per channel ††
  Continuous * .................................................................. 1 A
  For < 100 ms ............................................................... 4 A
  For < 20 ms ................................................................. 6 A

Configurable Parameters
Output initialization state .................................................. predefined value
Fail-safe ........................................................................... predefined value/last value
Output ................................................................. discrete or momentary pulse
Pulse width ................................................................. 2 ms to 130 s

Response Time
Response time
  From Railbus command to output change .......... 1 ms (max.)

Power Supplies
Railbus (12V) current ...................................................... 45 mA (typ.)
............................................................................ 70 mA (max.)
Bussed Field Power ....................................................... 2 to 60 V dc

Mechanical
Module Key Code ................................................................. B6
Module width ................................................................. 42 mm
Weight ................................................................. 200 g

Field Terminals

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td>NT-8604-FT-FU Fused</td>
<td>NT-8602-FT-ST Standard †</td>
</tr>
<tr>
<td>Class 1, Div 2 or Zone 2 hazardous area</td>
<td>NT-8611-FT-FU Non-arcing, Fused</td>
<td>NT-8610-FT-NA Non-arcing †</td>
</tr>
</tbody>
</table>

† Alternative fusing in the field wiring is recommended if it is not provided in the field terminal.
†† The total instantaneous switched current should not exceed the following:
  10 A for < 100 ms
  18 A for < 20 ms
*Limited to 6 A per module

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www.novatechweb.com
NT-8117-DO-DC

- 8 fully isolated semiconductor switched outputs
- Controls solenoids and relays
- For load supplies of up to 60 V dc
- Discrete or pulsed outputs
- 1A per channel switched

Module Specifications

Outputs
Number of channels .................................................. 8
Output voltage range .............................................. 2–60 V dc
ON voltage drop ........................................................ 0.25 V (max.)
OFF leakage current ................................................ 1.0 mA (max.)
Switched current per channel
Continuous ..................................................................... 1 A
For < 100ms ............................................................. 4 A
For < 20ms ............................................................ 6 A

Configurable Parameters
Output initialization state ..................................................... predefined value
Fail-safe ................................................................. predefined value/last value
Output ................................................................. discrete or momentary pulse
Pulse width ............................................................. 2 ms to 130 s

Response Time
Response time
From Railbus command to output change ........ 3 ms (max.)

Power Supplies
Railbus (12V) current ............................................... 45 mA (typ.)
................................................................. 70 mA (max.)
Bussed Field Power ........................................ not required

Mechanical
Module Key Code .......................................................... B5
Module width .......................................................... 42 mm
Weight ................................................................. 200 g

Field Terminals

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td>NT-8604-FT-FU Fused</td>
<td>NT-8602-FT-ST Standard</td>
</tr>
<tr>
<td>Class 1, Div 2 or Zone 2 hazardous area</td>
<td>NT-8611-FT-FU Non-arcing, Fused</td>
<td>NT-8610-FT-NA Non-arcing</td>
</tr>
</tbody>
</table>

Note: External fusing to protect field wiring is recommended.
**NT-8116-DO-AC**

- 8 powered outputs
- Controls solenoids and relays
- Common load supply of up to 265 V ac
- Discrete or pulsed outputs
- 1A per channel maximum
- 20–265 V ac bussed field power required

**Module Specifications**

**Outputs**
- Number of channels ............................................... 8
- Output voltage range ...................................................... 20–265 V ac
- Frequency ................................................................. 50 / 60 Hz
- ON voltage drop .............................................................. < 1.2 V
- OFF leakage current ........................................................... < 4mA

**Switched current per channel ††**
- Continuous ........................................................................ 1 A*
- For < 100 ms ................................................................. 5 A
- For < 20 ms ........................................................................ 20 A

**Minimum load current, per channel**
- @ 115 V ac ......................................................................... 11 mA
- @ 230 V ac .......................................................................... 5 mA

**Configurable Parameters**
- Output initialization state .............................................. predefined value
- Fail-safe ............................................................................. predefined value/last value
- Output ................................................................................ discrete or momentary pulse
- Pulse width .......................................................................... 2 ms to 130 s

**Response Time**
- Response time (max.) ........................................ 2 ms + 1/2 cycle of mains frequency
  (From Railbus command to output change)

**Power Supplies**
- Railbus (12V) current .................................................... 75 mA (typ.)
- ......................................................................................... 125 mA (max.)
- Bussed Field Power (voltage) ........................................ 20 to 265 V ac

**Mechanical**
- Module Key Code .............................................................. F1
- Module width ........................................................................ 42 mm
- Weight .................................................................................. 220 g

**Field Terminals**

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td>NT-8604-FT-FU Fused</td>
<td>NT-8602-FT-ST Standard †</td>
</tr>
<tr>
<td>Class 1, Div 2 or Zone 2 hazardous area</td>
<td>NT-8611-FT-FU Non-arcing, Fused</td>
<td>NT-8610-FT-NA Non-arcing †</td>
</tr>
</tbody>
</table>

† Alternative fusing in the field wiring is recommended if it is not provided in the field terminal.

†† Stated figures are for operation with unfused field terminal. When operating with 2 A fused field terminal part no. NT-8604-FT-FU, maximum switched current is 5 A inrush for <10 ms pulse width at 0.1% duty cycle and <108 operations

*Limited to 3 A per module.
NT-8118-DO-AC

- 8 fully isolated semiconductor switched outputs
- Controls solenoids and relays
- For load supplies of up to 250 V ac
- Discrete or pulsed outputs
- 1A per channel switched

Module Specifications

Outputs
Number of channels ................................................. 8
Output voltage range .............................................. 20–265 V ac
Frequency ............................................................... 50 / 60 Hz
ON voltage drop ...................................................... < 1.2 V
OFF leakage current ................................................... < 4 mA
Switched current per channel †
  Continuous .................................................................. 1 A*
  For < 100ms ............................................................. 5 A
  For < 20ms ............................................................. 20 A
Minimum load current, per channel
  @ 115 V ac ............................................................... 11 mA
  @ 230 V ac ............................................................... 5 mA

Configurable Parameters
Output initialization state .............................................. predefined value
Fail-safe ................................................................. predefined value/last value
Output ................................................................. discrete or momentary pulse
Pulse width .............................................................. 2 ms to 130 s

Response Time
Response time (max.) .2 ms + 11/42 cycle of mains frequency
(From Railbus command to output change)

Power Supplies
Railbus (12V) current .................................................. 75 mA (typ.)
............................................................................... 125 mA (max.)

Bussed Field Power ....................................................... not required

Mechanical
Module Key Code ......................................................... F4
Module width ............................................................. 42 mm
Weight ................................................................. 220 g

Field Terminals

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td>NT-8604-FT-FU Fused</td>
<td>NT-8602-FT-ST Standard</td>
</tr>
<tr>
<td>Class 1, Div 2 or Zone 2 hazardous area</td>
<td>NT-8611-FT-FU Non-arcing, Fused</td>
<td>NT-8610-FT-NA Non-arcing</td>
</tr>
</tbody>
</table>

† Stated figures are for operation with unfused field terminal. When operating with 2 A fused field terminal part no. NT-8604-FT-FU, maximum switched current is 5 A inrush for <10 ms pulse width at 0.1% duty cycle and <10⁸ operations.
* Limited to 3 A per module.
NT-8142-DO-DC

- 16 output channels
- Controls solenoids and relays
- Common load supply for up to 42 V dc
- Discrete or pulsed outputs
- 0.5 A per channel switched current
- 12 - 42 V dc bussed field power required

Module Specifications

Outputs
Number of channels .................................................16
Output voltage range ...........................................12 - 42 V dc
ON voltage drop ..................................................<0.2 V @ 0.5 A
OFF leakage current .............................................<1 mA
Output current Per channel..............................................0.5 A (max.)
Per module ..........................................................6 A (max.)

Configurable Parameters
Output initialization state....................................predefined value
Fail-safe ..........................................................predefined value/last value
Output..........................................................discrete, momentary or continuous pulse
Pulse width ..................................................2 ms to 130 s

Response Time
From Railbus command to output change ..........1 ms (max.)

Electrical Isolation
Channel to railbus ..................................................275 V ac (max.)
Channel to Channel and Ch+ to Ch- .........................<50 V

Safety
FM field wiring protection ........................................non-arcing

Power Supplies
Railbus (12V) current ...........................................110 mA
Bussed Field Power ...........................................12 to 42 V dc, 6 A (max.)

Mechanical
Module Key Code ..................................................B4, non-arcing
Module width ....................................................42 mm
Weight ..........................................................170 g

Field Terminals

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td>NT-8612-FT-NA non-arcing</td>
<td>--</td>
</tr>
<tr>
<td>Class 1, Div 2 or Zone 2 hazardous area</td>
<td>NT-8612-FT-NA non-arcing</td>
<td>--</td>
</tr>
</tbody>
</table>

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DS_NT_8142_DO-DC_122210
NT-8129-IO-DC

- 8 Channels any combination of inputs and outputs
- Non-arcing inputs and outputs
- Output channels rated up to 2A continuous
- Inputs for dry contact switches
- 24 Vdc bussed field power required from 8914-PS-AC

Module Specifications

Inputs
ON/OFF threshold current ...........................................0.9mA (typ.)
O/C Voltage ..........................24V dc (typ.) - depends on BFP Supply
Wetting current ................................................................1.2mA (typ.)
Minimum pulse width detected............................................5ms
Max input frequency in pulse counting mode (no debounce) 30Hz
Isolation (any channel to Railbus)..............................250V ac

Outputs
Maximum Output Current per Channel .........................2A
Maximum Output Current per Module
Continuous ........................................................................6A
Non-continuous (<10 seconds) .........................................8A

Configurable Parameters
Input
Filter time interval ..............................................0 to 8s (in 1ms steps)
Earth Leakage Detection Channel ................................ON/OFF
Latch inputs ..........................................................enable/disable
Latch polarity ..........................................................latch on high/latch on low
Pulse counting ................................................up transition/down transition/disable
Line fault detection...... none/open circuit/open & short circuit
Output
Output type ................................................pulse/discrete/pattern
Pulse width .........................................................1ms to 60s
Line fault detection* ......open line & short circuit detect /disable
* Normally de-energized channels only

Response Time
Input Signal change to availability on Railbus ............5ms (max.)
Railbus command to output change .........................1ms (max.)

Safety
FM field wiring protection............................................non-arcing

Resistance Measurement Accuracy
For normally de-energized output open and short-circuit detection.
With forward biased test current
.................................................................±(3.4%+5.3Ω) for line resistance ≤ 220Ω
...greater of: ±7% or ±(3.1%+27Ω) for line resistance >220Ω, <1kΩ
With reverse biased test current
.................................................................greater of: ±7% or ±(3.1%+430Ω)

Mechanical
Module Key Code..............................................................B6
Module width ..........................................................42 mm
Weight ...........................................................................210 g

Field Terminals

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td>NT-8604-FT-FU</td>
<td>NT-8602-FT-ST Standard †</td>
</tr>
<tr>
<td>Class 1, Div 2 or Zone 2</td>
<td>NT-8611-FT-FU</td>
<td>NT-8610-FT-NA Non-arcing †</td>
</tr>
<tr>
<td>Hazardous Area</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

† Alternative fusing in the field wiring is recommended if it is not provided in the field terminal.
† † The total instantaneous switched current should not exceed the following:
10 A for < 100 ms
18 A for < 20 ms
* Limited to 6 A per module
† Consult NovaTech for availability

Power Supplies
System Power Supply ..............................50mA (typ.), 70mA (max.)
Bussed Field Power Supply
All channels configured as inputs...............................50mA (max)
Any channels configured as output...50mA + output load currents

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www.novatechweb.com
NT-8123-PI-QU

Safe Area or
Zone 2 / Div 2 Hazardous Area

<table>
<thead>
<tr>
<th>Channel</th>
<th>Control</th>
<th>*For switch-type sensors, resistors are required for line fault detection.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 1</td>
<td>11</td>
<td>N/A</td>
</tr>
<tr>
<td>Ch 2</td>
<td>12</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Key Features
• 2 input channels with power supplies
• 1 Hz to 50 kHz signal capability
• Frequency measurement
• 2- and 3-wire pulse transmitter format
• Pulse counting (with gate control)
• Channels independently configurable
• Open and short circuit detection

Module Specification

Frequency Inputs
Number of channels........................................2 (pulse input)
..............................................................1 auxiliary for start/stop counter on channel 1
Frequency range........................................1 Hz to 50 kHz
Accuracy (25°C)...........................................± 0.05% of span
Temperature Stability.......................................0.005% / °C

Sensor Input Characteristic
NAMUR 1
Switching thresholds....................................1.2 mA / 2.1 mA
Input impedance..........................................1 kΩ
Supply voltage.............................................8.1 V (nom.) at 8 mA

Current
Input Signal.............................................20 mA (max.)
Threshold...........................................configurable in 8 levels
Input impedance..........................................25 Ω
Open circuit current......................................< 0.5 mA
Short circuit current....................................> 21.5 mA

Voltage
Input signal.............................................0 - 24 V dc (50 V max.)
Threshold...........................................configurable in 8 levels
Input impedance..........................................> 10 kΩ
Switching hysteresis....................................100 mV

Switch
Input voltage range.....................................0 - 10 V dc

NAMUR Gate Control

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse</td>
<td>Pulse</td>
</tr>
<tr>
<td>Voltage</td>
<td>Voltage</td>
</tr>
<tr>
<td>2-wire</td>
<td>3-wire</td>
</tr>
<tr>
<td>Current</td>
<td>Current</td>
</tr>
<tr>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td>2-wire</td>
<td>3-wire</td>
</tr>
<tr>
<td>Pulse</td>
<td>Pulse</td>
</tr>
</tbody>
</table>

Field Wiring | Recommended Field Terminal
---|---
General Purpose | NT-8602-FT-ST Standard
Class 1, Div 2 or Zone 2 Hazardous Area | NT-8601-FT-NI Non-incendive

Configurable Parameters
Inputs
Channel..................................................enable / disable
Sensor type...........................................NAMUR prox. type (select low / high speed)
..........................................................current pulse input
..........................................................voltage pulse input
..........................................................switch input
Frequency range.................................0.1, 0.3, 0.5, 1, 3, 5, 10, 30, 50, 100* kHz
Sample period........................................20 ms to 200 s
Threshold level........................................user defined values
Triggering..............................................rising edge / falling edge
Line fault detect......................................enable / disable
Channel status........................................active / inactive
Counter................................................enable / disable

Dynamic Data (Read Only)
Process Values
Frequency.............................................16 bit unsigned
Count..................................................2 bit signed
Status Values
Line fault detect......................................open / short circuit

*Maximum frequency 50kHz. Frequencies > 50kHz are “out of range”
**Isolation**
Any channel to Railbus ................................................................. 100 V ac
Between input channels .............................................. none (common 0 V connection)
Between output channels ......................................................... 30 V ac

**Power Supplies**
Railbus current (both channels @ 22 mA) ......................... 300 mA (max.)
Bussed field power .................................... 20 mA @ 24 ± 10% V dc
Power dissipation (both channels @ 22 mA) ...................... 2.8 W (max.)
(no load) ......................................................... 2.0 W (max.)

**Mechanical**
Module key code ................................................................. F2
Module width ................................................................. 42 mm
Weight ................................................................. 260 g

**Terminal Assignments**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Current input Channel #1</td>
</tr>
<tr>
<td>2</td>
<td>Voltage input</td>
</tr>
<tr>
<td>3</td>
<td>NAMUR input</td>
</tr>
<tr>
<td>4</td>
<td>Common</td>
</tr>
<tr>
<td>5</td>
<td>Power supply +ve</td>
</tr>
<tr>
<td>6</td>
<td>Power supply +ve Channel #2</td>
</tr>
<tr>
<td>7</td>
<td>Current input</td>
</tr>
<tr>
<td>8</td>
<td>Voltage input</td>
</tr>
<tr>
<td>9</td>
<td>NAMUR input</td>
</tr>
<tr>
<td>10</td>
<td>Common</td>
</tr>
<tr>
<td>11</td>
<td>NAMUR gate / control input</td>
</tr>
<tr>
<td>12</td>
<td>Common Channel #1</td>
</tr>
<tr>
<td>13</td>
<td>Output +ve</td>
</tr>
<tr>
<td>14</td>
<td>Output -ve</td>
</tr>
<tr>
<td>15</td>
<td>Output +ve Channel #2</td>
</tr>
<tr>
<td>16</td>
<td>Output -ve</td>
</tr>
</tbody>
</table>

**LED Indicators**

**Power - Green LED**

<table>
<thead>
<tr>
<th>OFF</th>
<th>ON</th>
<th>FLASHING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Failure</td>
<td>Power OK</td>
<td>----</td>
</tr>
</tbody>
</table>

**Fault - Red LED**

<table>
<thead>
<tr>
<th>OFF</th>
<th>ON</th>
<th>FLASHING</th>
</tr>
</thead>
<tbody>
<tr>
<td>In running state</td>
<td>Fault</td>
<td>Awaiting module training</td>
</tr>
</tbody>
</table>

**Pulse Input Channel - Yellow LED**

<table>
<thead>
<tr>
<th>OFF</th>
<th>ON</th>
<th>FLASHING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel Inactive</td>
<td>Channel Active and Operating Normally</td>
<td>Channel Active but in Alarm Condition</td>
</tr>
</tbody>
</table>

**Digital Output Channel - Yellow LED**

<table>
<thead>
<tr>
<th>OFF</th>
<th>ON</th>
<th>FLASHING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel Inactive</td>
<td>Channel Active and Operating Normally</td>
<td>----</td>
</tr>
</tbody>
</table>

**Safety**
Field wiring protection ................................................................. non-incendive
FM and ATEX Cat 3 non-incendive field wiring parameters
The following figures are for Gas Groups A/b (IIC) unless otherwise stated.

Current inputs (Ch1 & Ch2)
............................................................... Uo ≤ 0.6 V, Io ≤ 0.5 mA, Po ≤ 75 µW
..................................................................... Ca = 1000 µF, La = 1000 mH

3-wire current inputs (Ch1 & Ch2)
....................................................... Uo 30 V, Io ≤ 102.5 mA, Po ≤ 765.7 mW
....................................................... Ca = 0.165 µF, La = 6 mH, La/Ra = 82 µH / Ω

Voltage inputs (Ch1 & Ch2)
............................................................... Uo ≤ 5.5 V, Io ≤ .58 mA, Po ≤ 0.8 mW
..................................................................... Ca = 535 µF, La = 1000 mH

3-wire voltage inputs (Ch1 & Ch2)
.................................................. Uo ≤ 30 V, Io ≤ 102.6 mA, Po ≤ 765.8 mW
.................................................. Ca = 0.165 µF, La = 6 mH, La/Ra = 82.1 µH / Ω

NAMUR inputs (Ch1 & Ch2)
......................................................... Uo ≤ 9.1 V, Io ≤ 10.6 mA, Po ≤ 24 mW
................................................................................... Ca = 20 µF, La = 490 mH

NAMUR gate input (Ch1)
......................................................... Uo ≤ 9.1 V, Io ≤ 10.6 mA, Po ≤ 24 mW
................................................................................... Ca = 20 µF, La = 490 mH

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DS_NT_8123_PI_QU_122210
NT-8201-HI-IS  (Intrinsically Safe)

- 8 single-ended 4 - 20 mA input channels
- Intrinsically safe field circuits
- HART pass-through
- HART variable and status reporting
- For 2-wire transmitters
- Built-in IS power supply

Module Specifications

Inputs
- Number of channels ... 8, single-ended
- Nominal signal range (span) ... 4 to 20 mA
- Full signal range ... 0.5 to 22 mA
- Line fault detection
- Short circuit current ... > 21.5 mA
- Voltage to transmitter @ 20 mA ... 15 V (min.)
- Accuracy (@ 25 °C) ... ± 20 µA
- Resolution ... 16 bits
- Temperature Stability
  (-40 to + 70°C) ... ± 0.006% of span per °C
- Isolation
  (any channel to Railbus) ... 60 V ac
  (between channels in same module) ... none

Configurable Parameters
- Input filter time constant ... user defined value
- Input dead zone ... user defined value
- Drive on failsafe ... disable / upscale / downscale
- Channel status ... active / inactive
- HART variable and status reporting ... enable / disable
- Alarms ... high, high-high, low, low-low
- Alarm deadband (hysteresis) ... user defined value

Response Time
- Signal change to availability on Railbus
  4–20 mA mode ... 33 ms (max.)
  HART mode ... 0.75 s per channel

Safety
- Field wiring protection ... [EEx ia] IIC
- Safety description (each channel)
  Uo = 28 V, Io = 93 mA, Po = 0.65 W
- FM entity parameters
  Voc ≤ 28 V dc, Isc ≤ 93 mA
  Ca ≤ 0.14 µF, La ≤ 4.38 mH

Power Supplies
- IS Railbus (12V) current (all channels @ 22 mA) ... 600 mA (typ.)
- Power dissipation within module ... 4.2 W (max.)

Mechanical
- Module Key Code ... A1
- Module width ... 42 mm
- Weight ... 260 g

Field Wiring

<table>
<thead>
<tr>
<th>Intrinsicly Safe Standard</th>
<th>Recommended Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsically Safe</td>
<td>NT-8621-FT-IS</td>
</tr>
<tr>
<td>Standard</td>
<td></td>
</tr>
<tr>
<td>Intrinsicly Safe Loop</td>
<td>NT-8622-FT-IS</td>
</tr>
<tr>
<td>Disconnect</td>
<td></td>
</tr>
</tbody>
</table>

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www.novatechweb.com
NT-8230-AI-IS (Intrinsically Safe)

- 8 single-ended input channels
- Intrinsically safe field circuits
- 0–10V/100Ω–10kΩ potentiometer
- 0/4–20mA current input with additional burden resistor
- True zero on voltage input
- Open circuit field wiring detection

**Module Specifications**

**Inputs**
- Number of channels: 8, single-ended
- 0–10V input characteristics
- Nominal signal range (span): 0 to 10 V
- Full signal range: 0 to +11 V
- Resolution: 16 bits
- Input impedance: > 100 kΩ

**Potentiometer input characteristics**
- Nominal signal range (span): 0 to 100% of travel
- Potentiometer resistance: 100Ω to 10 kΩ
- Excitation voltage (nom.): 10 V (from 2.2 kΩ source)
- Resolution (≥1kΩ potentiometer): 14 bits
- Resolution (100Ω potentiometer): 11 bits
- Accuracy (at 25°C): ± 0.1% of span

**Isolation**
- (any channel to Railbus): 100 V ac
- (between channels): none

**Configurable Parameters**
- Input type (per channel): voltage/potentiometer
- Alarms: high and low
- Alarm deadband (hysteresis): user defined value
- Input filter time constant: user defined value
- Input dead zone: user defined value
- Drive on open circuit: disabled / upscale / downscale
- Channel status: active/inactive
- Lead compensation: user defined value

**Response Time**
- Signal change to availability on Railbus: 33 ms (max.)
- Open circuit line fault detection time: ≤ 5 s

**Safety**
- Field wiring protection: [EExia] IIC
- Safety description (each channel - non linear output):
  - Uo ≤ 15.75 V, Io ≤ 20 mA, Po ≤ 0.315 W
  - FM entity parameters: Voc = 15.75 V, Isc = 20 mA
  - Cca = 0.22 μF, La = 5 mH

**Power Supplies**
- IS Railbus (12V) current
  - Typical: 200 mA
  - Max with voltage/current inputs: 250 mA
  - Max. with 100Ω potentiometer inputs: 350 mA
  - Power dissipation within module: 3 W
  - Max. with 100Ω potentiometer inputs: 4.2 W

**Mechanical**
- Module Key Code: C4
- Module width: 42 mm
- Weight: 200 g

**Field Wiring**

<table>
<thead>
<tr>
<th>Intrinsically Safe Standard</th>
<th>Recommended Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>NT-8623-FT-IS</td>
<td></td>
</tr>
</tbody>
</table>

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www.novatechweb.com
NT-8205-TI-IS (Intrinsically Safe)

- 8 input channels
- Intrinsically safe field circuits
- Thermocouple and mV
- Cold junction compensation (internal or remote)
- Built-in thermocouple linearisation
- Channels independently configurable
- Open-circuit field wiring detection

Module Specifications

Inputs
Number of channels .........................................................8
THCs types .........................B,E,J,K,N,R,S, or T to EN 60584-1: 1995
........................................user definable linearisation table, note 1

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>mV</td>
<td>-8 to +24 mV</td>
</tr>
<tr>
<td></td>
<td>-20 to +60 mV</td>
</tr>
<tr>
<td></td>
<td>-33.333 to +100 mV</td>
</tr>
<tr>
<td></td>
<td>-100 to +100 mV</td>
</tr>
<tr>
<td>Thermocouples: B</td>
<td>0 to 1820 °C</td>
</tr>
<tr>
<td>E</td>
<td>-270 to +1000 °C</td>
</tr>
<tr>
<td>J</td>
<td>-210 to +1200 °C</td>
</tr>
<tr>
<td>K</td>
<td>-270 to +1372 °C</td>
</tr>
<tr>
<td>N</td>
<td>-270 to +1300 °C</td>
</tr>
<tr>
<td>R &amp; S</td>
<td>-50 to +1768.1 °C</td>
</tr>
<tr>
<td>T</td>
<td>-270 to +400 °C</td>
</tr>
</tbody>
</table>

Accuracy

<table>
<thead>
<tr>
<th>Tamb</th>
<th>mV Inputs</th>
<th>THC Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 °C</td>
<td>± 0.05%</td>
<td>± 0.05%</td>
</tr>
<tr>
<td>+10 to + 40 °C</td>
<td>± 0.08%</td>
<td>± 0.1%</td>
</tr>
<tr>
<td>-40 to + 70 °C</td>
<td>± 0.18%</td>
<td>± 0.3%</td>
</tr>
</tbody>
</table>

Temperature drift...............................................< ± 0.003% of span / °C
Cold junction compensation error........................<± 1°C (~40 to + 70 °C)
Resolution ................................................................16 bits
Common mode rejection..............................................> 87 dB @ 50/60 Hz
Hz Series mode rejection...........................................> 50 dB @ 50/60 Hz
Common mode voltage between channels......................± 5 V (max.)
Absolute maximum input voltage................................± 30 V
Isolation (any channel to Railbus).............................60 V peak

Response Time
Signal change to availability on Railbus.....................600 ms (max.)
O/C sensor detection----------------------------------------≤ 10 s

Safety
Channels 1, 2, 3, 4, 7 and 8, wired as separate IS circuits
.................................................................Uo = 16.4 V; Io = 79 mA; Po = 0.33 W
Channels 5 and 6, wired as separate IS circuits
.................................................................Uo = 1 V, Io + 1.1 mA, Po = 0.3 mW
(Input terminals are equivalent to non-energy storing apparatus)
FM entity parameters
Channels 1, 2, 3, 4, 7 and 8, wired as separate IS circuits
.................................................................Voc = 16.4 V; Isc= 63.7 mA; Po = 131 m W
Channels 5 and 6, wired as separate IS circuits
.................................................................Uo = 1 V, Io + 1 mA, Po = 0.25 mW

Power Supplies
IS Railbus (12V) current..............................................120 mA (max.)
Power Dissipation within module...............................1.5 W (max.)

Mechanical
Module Key Code..........................................................C1
Module width ...............................................................42 mm
Weight.....................................................................245 g
* cold junction compensation located in recommended field terminal

Field Terminals

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsically Safe THC</td>
<td>NT-8625-FT-IS</td>
<td>--</td>
</tr>
</tbody>
</table>

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www.novatechweb.com
NT-8206-TI-IS (Intrinsically Safe)

- 8 input channels
- Intrinsically safe field circuits
- RTD and Ω
- 2-, 3- and 4-wire RTD format
- Channels independently configurable
- Channels are o/c failure independent

Module Specifications

Inputs
Number of channels ........................................8
RTD inputs ...............................................(2-, 3- or 4-wire)
...............................................Pt100, Pt500 to BS EN60751: 1996
...............................................Ni120 to DIN 43 760: 1985
...............................................jPt100 to JIS C1604: 1981
...............................................user definable linearisation table, note 1

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTDs: Pt100, Pt500</td>
<td>−200 to + 850°C</td>
</tr>
<tr>
<td>jPt100</td>
<td>−200 to + 650°C</td>
</tr>
<tr>
<td>Ni120</td>
<td>−60 to + 250°C</td>
</tr>
</tbody>
</table>

Resistance input

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>211 μA</td>
<td>0 to 110 Ω</td>
</tr>
<tr>
<td>211 μA</td>
<td>0 to 280 Ω</td>
</tr>
<tr>
<td>211 μA</td>
<td>0 to 470 Ω</td>
</tr>
<tr>
<td>48 μA</td>
<td>0 to 2000 Ω</td>
</tr>
</tbody>
</table>

Accuracy (% of span), see note 2

<table>
<thead>
<tr>
<th>Tamb</th>
<th>mV Inputs</th>
<th>THC Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>25°C</td>
<td>± 0.05%</td>
<td>± 0.05%</td>
</tr>
<tr>
<td>+10 to + 40°C</td>
<td>± 0.08%</td>
<td>± 0.1%</td>
</tr>
<tr>
<td>−40 to + 70°C</td>
<td>± 0.18%</td>
<td>± 0.3%</td>
</tr>
</tbody>
</table>

Note 1: Consult NovaTech for support in BIM/configurator.
Note 2: For Pt500 and 0 to 2000 Ω ranges a deviation of 0 to + 0.1% of reading is to be added for channel 1 or any channel preceded by a lower resistance range.

Cable resistance per loop ........................................50 W (max)
RTD excitation current ........................................211 μA (nom.)
Compliance voltage of current source .......................6.8 V
Resolution ........................................................................16 bits
Series mode rejection ........................................> 50 dB @ 50/60 Hz
Isolation (any channel to Railbus) .........................60 V peak

Configurable Parameters

Sensor type .............................................user selectable
Alarms .............................................high and low
Input dead zone ........................................user defined value
Selectable input filtering .........off / 2 reading avg. / running avg.
Drive on open circuit fault .........disabled / upscale / downscale
Channel status ....................................active / inactive
Offset (2-wire RTD mode) ..........user defined value

Response Time

Signal change to availability on Railbus .................600 ms (max.)

Safety

Field wiring protection ..............................................[EEx ia] IIC
Safety Description (all channels combined)
........................................Uo = 16.4 V, Io = 217 mA, Po = 0.9 W
FM entity parameters
........................................Voc = 16.4 V dc, Isc = 350 mA, Po = 718 mW

Power Supplies

IS Railbus (12V) current .....................120 mA (max.)
Power dissipation within module ..............1.5 W (max.)

Mechanical

Module Key Code .............................................C3
Module width .............................................42 mm
Weight ......................................................45 g

Field Wiring | Recommended Field Terminal
--- | ---
Intrinsically Safe RTD | NT-8626-FT-IS

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NT-8202-HO-IS (Intrinsically Safe)

- 8 single ended output channels
- Intrinsically safe field circuits
- 4 - 20 mA for I/P converters
- Open-circuit field wiring detection
- HART pass-through
- HART variable and status reporting

Module Specifications

Outputs
Number of channels ..............................................8
Nominal signal range (span) ...................................4 to 20 mA
Full signal range ..................................................1 to 22 mA
Voltage to load ..................................................13 V min. @ 20 mA
Load resistance ..................................................0 to 650 Ω max.
Accuracy (@ 25°C) ..................................................± 20 μA
Temperature stability
(-40°C to +70°C) ..............................................± 0.006% of span per °C
Resolution .........................................................12 bits
Open circuit detection threshold .........................685 Ω (typ.)
(also detects loads greater than driveable range)
Isolation
(any channel to Railbus) ........................................60 V ac
(between channels) ..............................................none

Configurable Parameters
Output Initialization state ......................................predefined value
Drive on fail-safe ...............................................upscale / downscale / last value
Channel status ....................................................active / inactive
HART variable and status reporting .......................enable / disable

Response Time
Railbus command to output change
4-20 mA mode .................................................20 ms (max.)
.................................................................80 ms (max.)
HART mode........................................................1 s per channel

Safety
Location of module
Field wiring protection .........................................[Ex ia] IIC
Safety description
(each channel) ..............................................V_o = 24.6 V; I_o = 93 mA; P_o = 0.57 W
FM entity parameters ........................................V_o ≤ 24.6 V dc; I_o ≤ 93 mA
.................................................................C_a ≤ 0.42 µF; L_a ≤ 4.2 mH

Power Supplies
IS Railbus (12V) current
(all channels @ 22 mA into 650 Ω load) ...............630 mA
Power dissipation within module .........................4.1 W (max.)

Mechanical
Module Key Code ..............................................A4
Module width ....................................................42 mm
Weight ..............................................................265 g

Field Terminals

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsically safe standard</td>
<td>NT-8621-FT-IS</td>
<td>--</td>
</tr>
<tr>
<td>Intrinsically safe loop disconnect</td>
<td>NT-8622-FT-IS</td>
<td>--</td>
</tr>
</tbody>
</table>

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www.novatech.com
NT-8204-AO-IS (Intrinsically Safe)

- 8 single ended output channels
- Intrinsically safe
- Conventional 4 - 20 mA
- Open-circuit field wiring detection
- For I/P converters

Module Specifications

Outputs
Number of channels ..................................................8
Nominal signal range (span) ........................................4 to 20 mA
Full signal range ...................................................1 to 22 mA
Voltage to load .........................................................13 V min. @ 20 mA
Load resistance .......................................................450 Ω max.
Accuracy (@ 25°C) ..................................................± 20 μA
Temperature stability
(-40°C to +70°C) ..................................................± 0.006% of span per °C
Resolution ...............................................................12 bits
Open circuit detection threshold..............................0.7 ± 0.2 mA
Isolation
(any channel to Railbus) ..........................................60 V ac
(between channels) ..................................................none

Configureable Parameters
Output Initialization state .........................................predefined value
Drive on fail-safe ..................................................upscale / downscale / last value
Channel status .......................................................active / inactive

Response Time
Railbus command to output change
4–20 mA mode ..................................................25 ms (max.)
..........................................................80 ms (max.)

Safety
Location of module
Field wiring protection ...........................................[EEx ia] IIC
Safety description
(each channel) ...........................................V_o = 24.6 V; I_o = 93 mA; P_o = 0.57 W
FM entity parameters ......................................V_{ac} ≤ 24.6 V dc; I_{sc} ≤ 93 mA
..........................................................C_a ≤ 0.42 µF; L_a = 4.2 mH

Power Supplies
IS Railbus (12V) current
(all channels @ 22 MA into 650 Ω load) .................530 mA
Power dissipation within module .........................3.8 W (max.)

Mechanical
Module Key Code ..................................................A4
Module width .......................................................42 mm
Weight ..............................................................245 g

Field Terminals

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsically safe standard</td>
<td>NT-8621-FT-IS</td>
<td>--</td>
</tr>
<tr>
<td>Intrinsically safe loop disconnect</td>
<td>NT-8622-FT-IS</td>
<td>--</td>
</tr>
</tbody>
</table>

NovaTech 8000 Series I/O Family

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39
NT-8220-DI-IS  *(Intrinsically Safe)*

- 16 single-ended input channels
- Intrinsically safe field circuits
- Simple apparatus, dry contacts or IS proximity detectors
- Open and short-circuit field wiring detection

**Module Specifications**

**Inputs**

- Number of channels ............................................................. 16
- OFF current ........................................................................... < 1.2 mA
- ON current ............................................................................. > 2.1 mA
- Switching hysteresis ............................................................ 200 μA (nom.)
- Applicable specifications ...................................................... NAMUR, DIN19234
- Voltage applied to sensor .................................................... 7.0 to 9.0 V from 1 kΩ ±10%
- Output (wetting) current @ 100Ω line impedance ................. > 6 mA
- Line fault detection ............................................................... > 90 kΩ
- Maximum input frequency in pulse counting mode .............. 20 Hz
- Minimum pulse width detected ........................................... 45 ms

**Configurable Parameters**

- Selectable input filter ......................................................... fast, slow or user defined
  (User defined permits 0 to 512 ms values in 3ms steps)
- Latch inputs ........................................................................ enable / disable
- Latch polarity ...................................................................... latch on high / latch on low
- Pulse counting ..................................................................... enable / disable
- Line fault detection ............................................................. enable / disable

**Response Time**

Field event to availability on Railbus ........................................ 6 ms (max.)

**Safety**

- Field wiring protection ........................................................... [EEx ia] IIC
- Safety Description (each channel)
  (each channel) .................................................................. Uo = 10.5 V, Io = 14 mA, Po = 0.04 W
- FM Entity parameters ......................................................... Voc ≤ 10.5 V dc, Isc ≤ 14 mA
- Safety Description (each channel) ....................................... Ca ≤ 2.67 μF, La ≤ 176 mH
- Isolation (any channel to Railbus) ....................................... 60 V ac
- (channels arranged in two groups of eight, with returns com-
  moned within each group)

**Power Supplies**

- IIS Railbus (12V) current
  (16-channel mode) ............................................................ 350 mA (max.)
  (8-channel mode) ............................................................. 285 mA (max.)

**Mechanical**

- Module Key Code .............................................................. B1
- Module width ...................................................................... 42 mm
- Weight ............................................................................... 170 g

**Field Terminals**

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsically safe,</td>
<td>NT-8623-FT-IS</td>
<td>--</td>
</tr>
<tr>
<td>16-channel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrinsically safe,</td>
<td>NT-8624-FT-IS</td>
<td>--</td>
</tr>
<tr>
<td>8-channel loop disconnect</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure**: Diagram showing hazardous and safe areas.

---

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**NT-8215-DO-IS (Intrinsically Safe)**

- 4 single-ended output channels
- Intrinsically safe field circuits
- Solenoid valves and alarms or LED indicators
- Line-fault detection

**Module Specifications**

**Outputs**

- Number of channels: 4
- Minimum output voltage: 22 V
- Open circuit: 22 V
- 45 mA load: 11 V
- Maximum output voltage: 25 V
- Current limit per channel: 45 mA (min.)
- Output supply ripple: <0.5% of output (pk. to pk.)
- Line fault detection
- Short circuit: < 15 Ω
- Open circuit: > 13 kΩ
- Isolation
  - (any channel to Railbus): 60 V ac
  - (between channels): none

**Configurable Parameters**

- Output initialisation state: high / low
- Output state on “fail-safe”: high / low / last value
- Channel status: active / inactive
- Operation mode: static / dynamic
- Output: discrete / momentary pulse / continuous pulse
- Pulse width: 2 ms to 130 s
- Duty cycle: 2 ms to 130 s (0.01% to 99.99%)
- Line fault detection: enable / disable

**Response Time**

- Signal change to availability on Railbus: 600 ms (max.)

**Safety**

- Field wiring protection: [EEx ia] IIC
- Field wiring description (each channel): Vo = 25 V, Io = 110 mA, Po = 0.69 W
- FM Entity parameters: Voc ≤ 25 V dc, Isc ≤ 110 mA, Ca ≤ 0.19 μF, La ≤ 3.15 mH

**Power Supplies**

- IS Railbus (12V) current: 560 mA (max.)
- Power Dissipation within module: 3.7W (max.)

**Mechanical**

- Module Key Code: B5
- Module width: 42 mm
- Weight: 220 g
- * cold junction compensation located in recommended field terminal

**Field Terminals**

<table>
<thead>
<tr>
<th>Field Wiring</th>
<th>Recommended Field Terminal</th>
<th>Compatible Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsically Safe THC</td>
<td>NT-8621-FT-IS</td>
<td>--</td>
</tr>
<tr>
<td>Intrinsically Safe, Loop Disconnect</td>
<td>NT-8622-FT-IS</td>
<td>--</td>
</tr>
</tbody>
</table>

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DS_NT_8215_DO-IS_122210
## NT-8223-PI-IS (Intrinsically Safe)

### Hazardous Area

<table>
<thead>
<tr>
<th>Zone 0 / Div 1</th>
<th>Safe Area or Zone 2 / Div 2 Hazardous Area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outputs</strong></td>
<td><strong>Solenoid or Other IS Device</strong></td>
</tr>
<tr>
<td>Counter, Display, Rate Meter</td>
<td>Ch 1 Ch 2</td>
</tr>
<tr>
<td>IS Power</td>
<td>14 16</td>
</tr>
<tr>
<td>NAMUR Gate Control</td>
<td>*For switch-type sensors, resistors are required for line fault detection.</td>
</tr>
<tr>
<td>3-wire voltage pulse</td>
<td>11 N/A</td>
</tr>
<tr>
<td>External voltage pulse</td>
<td>12 N/A</td>
</tr>
<tr>
<td>2-wire current pulse</td>
<td>5 6</td>
</tr>
<tr>
<td>3-wire current pulse</td>
<td>1 7</td>
</tr>
<tr>
<td>External current pulse</td>
<td>2 8</td>
</tr>
<tr>
<td>Switch</td>
<td>3 9</td>
</tr>
<tr>
<td>Proximity detector</td>
<td>4 10</td>
</tr>
</tbody>
</table>

### Inputs

<table>
<thead>
<tr>
<th>4-20mA</th>
<th>V</th>
<th>4-20mA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Key Features
- 2 input channels with power supplies
- 1 Hz to 50 kHz signal capability
- Frequency measurement and acceleration measurement
- 2 alarm / repeater transmitted output channels
- 2- and 3-wire pulse transmitter format
- Pulse counting (with gate control)
- Channels independently configurable
- Open circuit, short circuit and missing pulse detection

### Module Specification

#### Frequency Inputs
- Number of channels: 2 (pulse input)
- Frequency range: 1 Hz to 50 kHz
- Accuracy (25°C): ± 0.05% of span
- Temperature stability: ± 0.005% / °C

#### Response Time
- Response Time: 25 ms (max.)
- (Signal change to availability on Railbus)

#### Sensor Input Characteristic
- NAMUR 1
- Switching thresholds: 1.2 mA / 2.1 mA
- Input impedance: 1 kΩ
- Supply voltage: 8.1 V (nom.) at 8 mA

#### Current
- Input Signal: 20 mA (max.)
- Threshold: configurable in 8 levels
- Input impedance: 25 Ω
- Open circuit current: < 0.5 mA
- Short circuit current: > 21.5 mA

#### Voltage
- Input signal: 0 - 24 V dc (50 V max.)
- Threshold: configurable in 8 levels

### Field Wiring

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Recommended Field Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN1</td>
<td>Intrinsically Safe Standard</td>
</tr>
<tr>
<td>OUT1</td>
<td>NT-8621-FT-IS Standard</td>
</tr>
</tbody>
</table>

### Outputs
- Input impedance: > 10 kΩ
- Switching hysteresis: 100 mV

### Switch
- Input voltage range: 0 - 10 V dc

### Outputs
- The outputs are open-collector type for separately powered IS devices such as LED clusters, annunciators or solenoids.
  - Number of channels: 2
  - OFF state voltage: 30 V (max.)
  - OFF state leakage current: 10 µA (max.)
  - ON state voltage drop: < 1.0 V @ 50 mA
  - ON state current: 100 mA
  - Retransmission bandwidth: 1 - 2000 Hz

### Configurable Parameters

#### Inputs
- Channel: enable / disable
- Sensor type: NAMUR prox. type (select low / high speed)
- Current: switch pulse input
- Supply voltage: switch pulse input
- Frequency ranges: 0.1, 0.3, 0.5, 1, 3, 5, 10, 30, 50, 100 kHz
- Sample period: 20 ms to 200 s
- Threshold level: user defined values
- Triggering: rising edge / falling edge
- Filtering: off, 1, 5, 20, 100 kHz
- Line fault detect: enable / disable
- Counter: enable / disable
- Alarms: frequency / acceleration
- Alarm limits: high / low
- Alarm deadband (hysteresis): user defined value

---

**Notes:**
- The outputs are open-collector type for separately powered IS devices such as LED clusters, annunciators or solenoids.
- The outputs are open-collector type for separately powered IS devices such as LED clusters, annunciators or solenoids.
- Input impedance: > 10 kΩ
- Switching hysteresis: 100 mV

---

**Wiring Diagram:**
- Railbus
- Channel 1 of 2
- 11500 Cronridge Drive, Ste. 110
- Owings Mills, MD  21117
- Ch 1
- Ch 2
- Railbus
- 123.4
- IS Power
- N/A
- N/A
- N/A
- N/A

---

**Contact:**
- 3 2 1 5 12
- www.novatechweb.com
- F: 410.753.8395
- E: d3@novatechweb.com
- T: 410.753.8300

---

**Railbus**
- 42
- Btronics D/3 Orion
- Btronics D/3 Orion
- Btronics D/3 Orion
Dynamic Data (Read Only)

Process Values
Frequency..............................................................16 bit unsigned
Count..............................................................................32 bits signed

Status Values
Line fault detect........................................open / short circuit
*Maximum frequency 50 kHz. Frequencies > 50kHz are “out of range”

Isolation
Any channel to Railbus..............................................60 V ac
Between input channels.................none (common 0 V connection)
Between output channels..............................30 V ac

Power Supplies
Railbus current (both channels @ 22 mA)..................300 mA (max.)
Power dissipation (both channels @ 22 mA)..............2.8 W (max.)
(no load) .................................................................2.0 W (max.)

Mechanical
Module key code..........................................................F2
Module width..............................................................42 mm
Weight.............................................................................260 g

Terminal Assignments

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Current input</td>
</tr>
<tr>
<td>2</td>
<td>Voltage input</td>
</tr>
<tr>
<td>3</td>
<td>NAMUR input</td>
</tr>
<tr>
<td>4</td>
<td>Common</td>
</tr>
<tr>
<td>5</td>
<td>Power supply +ve</td>
</tr>
<tr>
<td>6</td>
<td>Power supply +ve</td>
</tr>
<tr>
<td>7</td>
<td>Current input</td>
</tr>
<tr>
<td>8</td>
<td>Voltage input</td>
</tr>
<tr>
<td>9</td>
<td>NAMUR input</td>
</tr>
<tr>
<td>10</td>
<td>Common</td>
</tr>
<tr>
<td>11</td>
<td>NAMUR gate / control input</td>
</tr>
<tr>
<td>12</td>
<td>Common</td>
</tr>
<tr>
<td>13</td>
<td>Output +ve</td>
</tr>
<tr>
<td>14</td>
<td>Output -ve</td>
</tr>
<tr>
<td>15</td>
<td>Output +ve</td>
</tr>
<tr>
<td>16</td>
<td>Output -ve</td>
</tr>
</tbody>
</table>

LED Indicators

Power - Green LED

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Power Failure</td>
</tr>
<tr>
<td>ON</td>
<td>Power OK</td>
</tr>
<tr>
<td>FLASHING</td>
<td>----</td>
</tr>
</tbody>
</table>

Fault - Red LED

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>In running state</td>
</tr>
<tr>
<td>ON</td>
<td>Fault</td>
</tr>
<tr>
<td>FLASHING</td>
<td>Awaiting module training</td>
</tr>
</tbody>
</table>

Pulse Input Channel - Yellow LED

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Channel Inactive</td>
</tr>
<tr>
<td>ON</td>
<td>Channel Active and Operating Normally</td>
</tr>
<tr>
<td>FLASHING</td>
<td>Channel Active but in Alarm Condition</td>
</tr>
</tbody>
</table>

Safety

Field wiring protection..............................................[EEx ia] 1IC
The following figures are for Gas Groups A/B (1IC) unless otherwise stated.

24V TX supplies (Ch1 & Ch2)
.............................................................................Uo = 27.4V, Io = 93.2mA, Po = 639mW
.............................................................................Co = 0.087μF, Lo = 4.2mH
Current inputs (Ch1 & Ch2)
.............................................................................Ui = ± 1.1V, Io = 53mA, Po = 15mW
.............................................................................Ui = 1.1V, Io = 50mA
.............................................................................Co = 1000μF, Lo = 13.1mH
Voltage inputs (Ch1 & Ch2)
NAMUR inputs (Ch1 & Ch2)
NAMUR gate input (Ch1)
.............................................................................Uo = 9.6V, Io = 25mA, Po = 57mW
.............................................................................Ui = 18.2V, Pi = 333mW
.............................................................................Co = 3.6μF, Lo = 56.6mH
Discrete outputs (Ch1 & Ch2)
All circuits combined within one channel
.............................................................................Uo = 28.5V, Io = 93.2mA (or 169mA at 13.4V), Po = 639mW
.............................................................................Co = 0.078μF, Lo = 1.28mH

FM ENTITY PARAMETERS

24V TX supplies (Ch1 & Ch2)
.............................................................................Uo = 27.4V, Io = 93.2mA, Po = 639mW
.............................................................................Ca = 0.08μF, La = 4.1mH
24V TX supplies (Ch1 & Ch2 connected together)
Gas Groups C,E (IIIB)
.............................................................................Uo = 27.4V, Io = 186.4mA, Po = 1.28W
.............................................................................Ca = 0.67μF, Lo = 4.3mH
Current inputs (Ch1 & Ch2)
.............................................................................Uo = 1.2V, Io = 57.4mA, Po = 17.2mW
.............................................................................Ca = 100μF, La = 10.6mH
3-wire current inputs (Ch1 & Ch2)
Gas Groups C,E (IIIB)
.............................................................................Uo = 27.4V, Io = 150.6mA, Po = 656mW
.............................................................................Ca = 0.67μF, Lo = 6.4mH
Voltage inputs (Ch1 & Ch2)
.............................................................................Uo = 9.56V, Io = 1.0mA, Po = 2.39mW
.............................................................................Ca = 3.7μF, Lo = 1000mH
3-wire voltage inputs (Ch1 & Ch2)
.............................................................................Uo = 27.4V, Io = 93.2mA, Po = 642mW
.............................................................................Ca = 0.08μF, Lo = 4.0mH
NAMUR inputs (Ch1 & Ch2)
NAMUR gate input (Ch1)
.............................................................................Uo = 9.56V, Io = 11.1mA, Po = 26.4mW
.............................................................................Ca = 3.7μF, Lo = 263mH
Discrete outputs (Ch1 & Ch2)
.............................................................................Ui = 30V, Io = 100mA
.............................................................................Ci = 0μF, Lo = 0mH

Digital Output Channel - Yellow LED

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Channel Inactive</td>
</tr>
<tr>
<td>ON</td>
<td>Channel Active and Operating Normally</td>
</tr>
<tr>
<td>FLASHING</td>
<td>----</td>
</tr>
</tbody>
</table>

Contact:
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COMPLETE: BR_8000IO_122210