8000 Series I/O

Remote I/O Catalog

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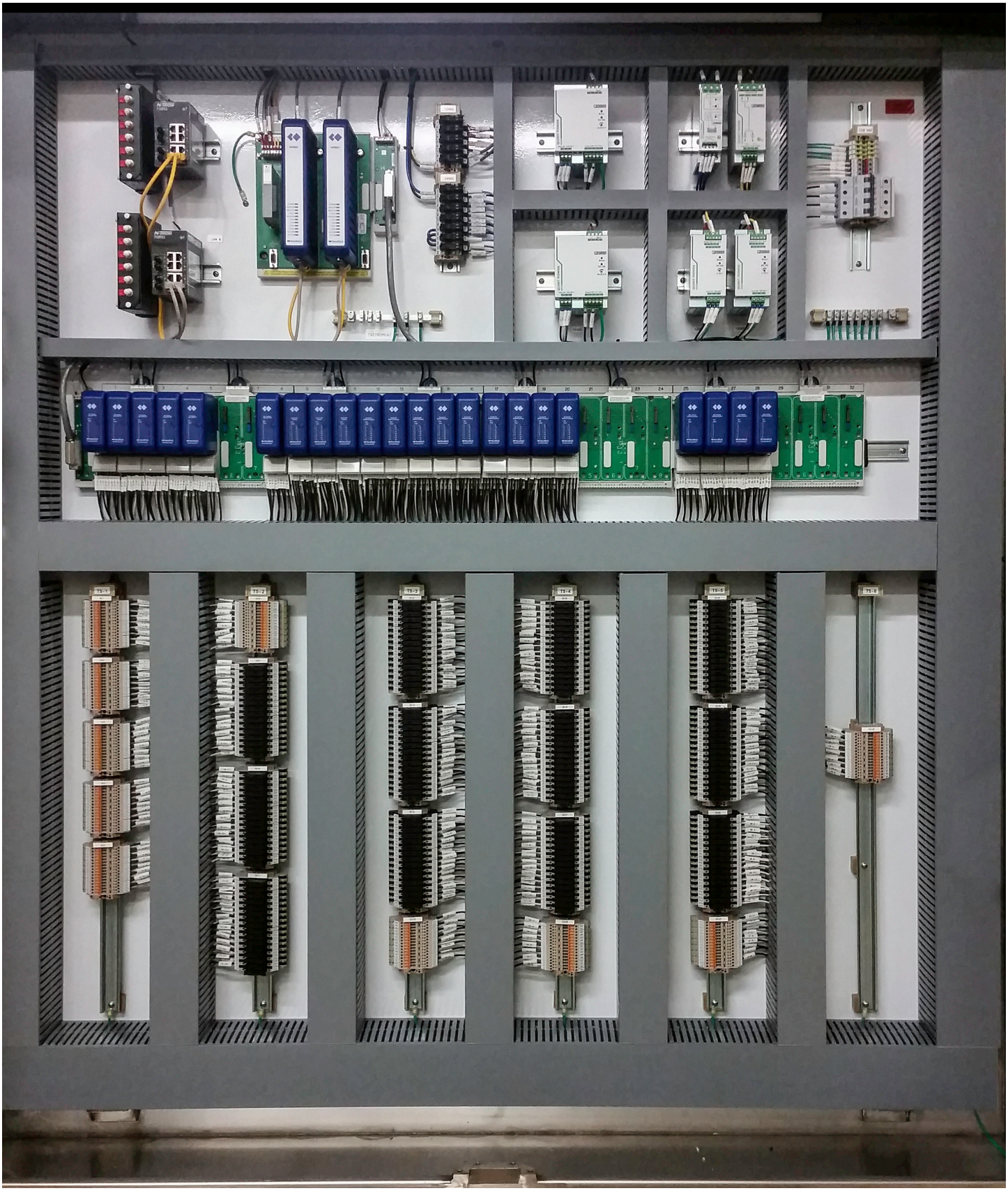


One of many cabinets designed and fabricated by NovaTech in Owings Mills, MD USA.

NovaTech 8000 Series I/O Overview

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. It also replaces Quantum I/O.

With its -40°C 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 32 channels. A PCM EthernetMPC2 card can support up to 50 nodes. With the availability of intrinsically safe (IS) modules, 8000 Series I/O provides a solution for both general purpose and hazardous area applications—even within the same node.

When used with PCM 4100, PCM 4200, or PCI based PCMs, 8000 Series I/O requires an Ethernet Multi Protocol Controller 2 (EthernetMPC2) card and D/3 version 12.2 or higher. When used with PCM 5 and D/3 version 16.0 or higher the EthernetMPC2 card is not required.

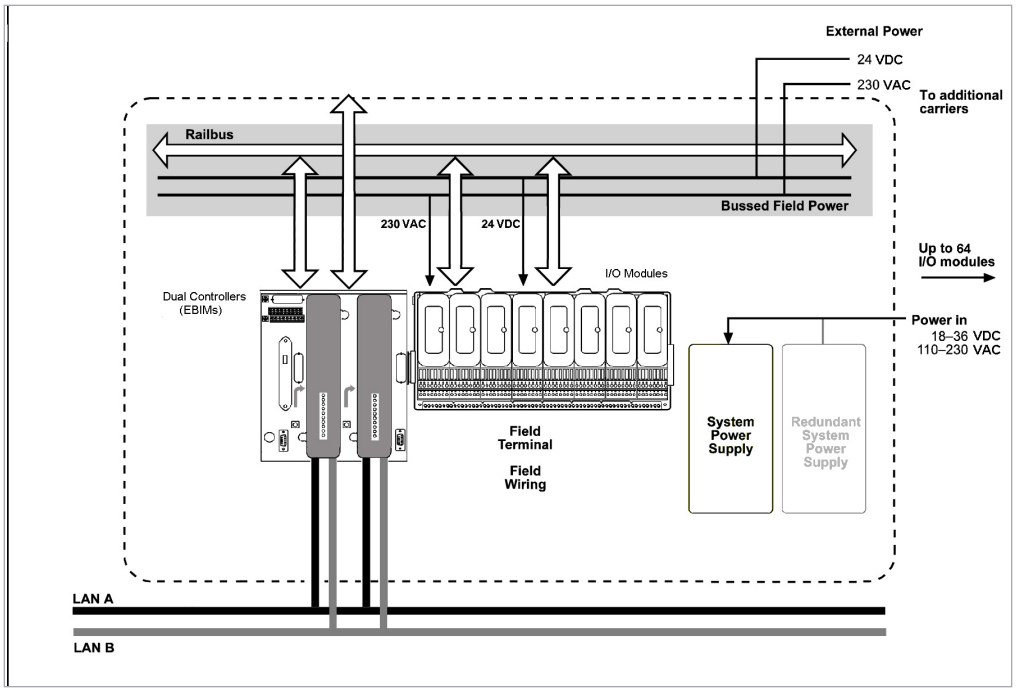
Key Features

- Wide range of input and output types, in any mix
- Up to 64 I/O modules per node
- Up to 50 nodes per EthernetMPC2 card
- Wide operating temperature range -40°C to +70°C
- General-purpose and IS 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 connects to both conventional I/O (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. 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 IS 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 Interface Modules, up to 64 I/O modules, field terminals, and associated power supplies.

A schematic node architecture is shown above. 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 IS 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

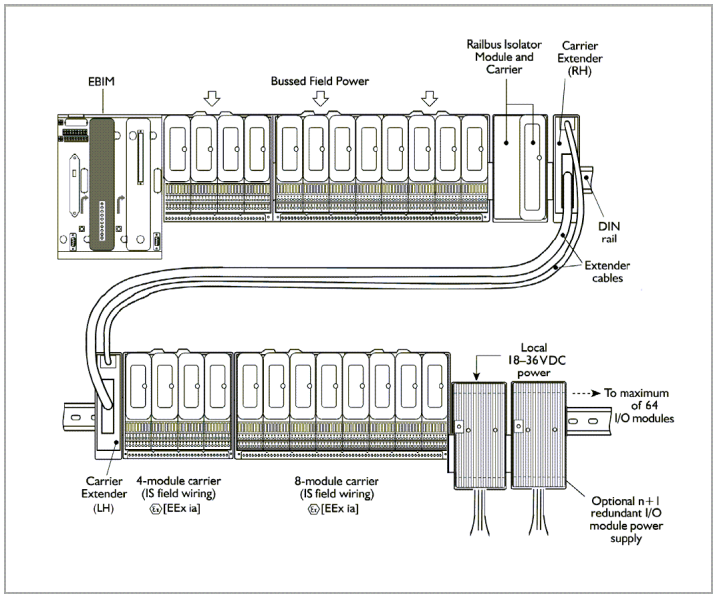
A typical request for data from the field might happen as follows:

The D/3® DCS requires the temperature from a particular RTD 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 acknowledgment 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 (IS) signals. I/O modules typically have 4, 8, 16, or 32 field channels.

Carriers

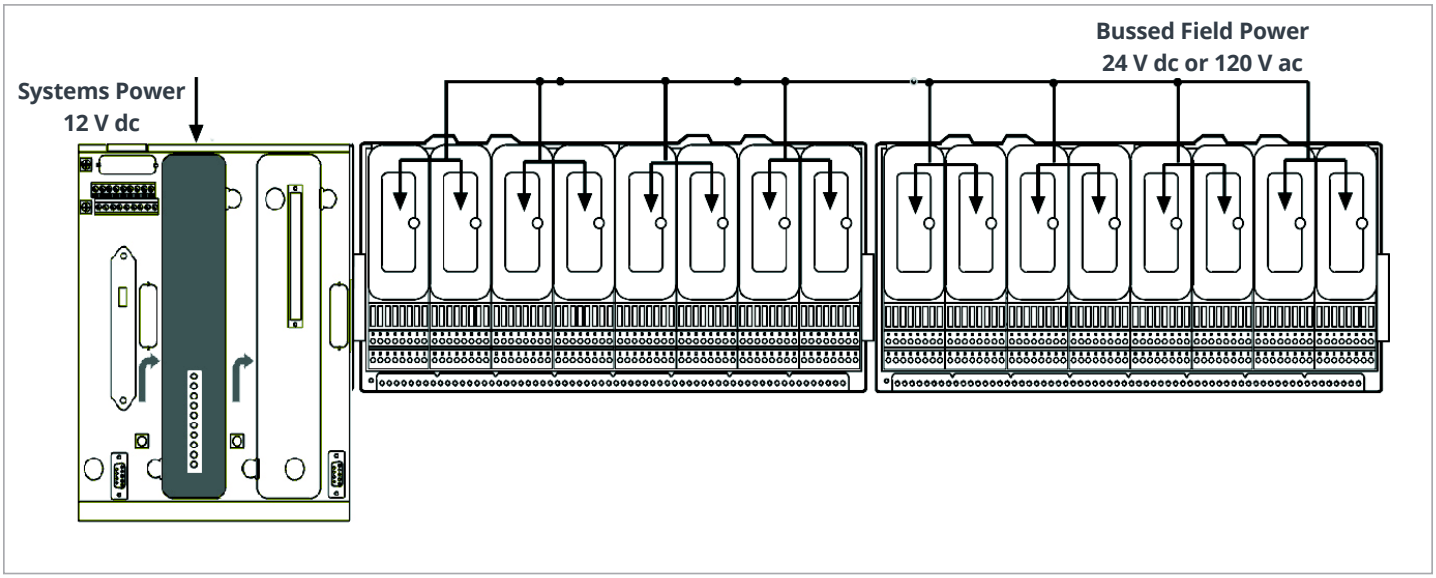
Carriers allow the 8000 Series I/O to mount onto a flat panel or T- or G-section DIN rail. They support and interconnect the EBIM, power supplies, I/O modules and field terminals, and carry the address, data and power lines of the internal Railbus. They provide termination points for the LAN and field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

Field Terminal Assemblies

Field terminal assemblies 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 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/carrier wiring.



Ethernet Bus Interface Module

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, 0-1 V, 0-5 V, 0-10 V, 1-5 V, ±10 V, RTDs, thermocouples
- Analog Outputs: 4-20 mA
- Digital and Pulse Inputs:
  - Contact Closures +24 V dc
  - Contact Closures 115 V ac
  - Pulse Counting up to 500 Hz @ +24 V dc
- Digital and Pulse Outputs:
  - DC Output 2 to 60 V dc
  - AC Output 20 to 265 V ac
  - Pulse Output 2 msec. to 130 sec @ 2 to 60 V dc
  - Pulse Output 2 msec. to 130 sec. @ 20 to 265 V ac

NovaTech 8000 Series System Specifications

Mechanical

Mounting Method .....Flat panel or DIN-rail
DIN-rail types .....'Top hat', 35 x 7.5 mm to EN 50022
.....or 35 x 15 mm to EN 50022
.....or G-section, to EN 50035

Railbus (Backplane)

Maximum physical length* of node.....6.8 m (22 ft)
Maximum number of extender cables 3
*overall, including backplanes and extender cables

Node Size

BIM/Controller type	Module limit
8521-EB-NT	64 max.

Note: I/O module carriers used with these must conform to the same module address limits. See I/O module carrier datasheets for details.

Electrical

EMC compliance .....To BS EN 61326:1998
Electrical safety .....EN 61010-1

Isolation

I/O Modules - 2/2
Between isolated channels .....250 V ac rms (to EN 61010-1)
.....(tested at 2.3 kV ac rms)
Channel (any) to Railbus .....250 V ac rms
(Except where stated on individual module specifications)

I/O Modules - 2/1
Between hazardous area terminals and Railbus .....60 V ac rms
Between IS field circuits of separate I/O modules† .....500 V ac rms
Between any IS field circuit & non-IS field circuit .....250 V ac rms
.....refer to individual module specifications
† 60 second test

Environmental

Ambient temp
Operating, optimum orientation* .....-40°C to +70°C
(except where stated in individual module specifications)
Operating, non-optimum orientation* .....-40°C to +50°C
(except where stated in individual module specifications)
Storage .....-40°C to +85°C
*Optimum orientation is when the carrier is mounted in a vertical plane with field terminals located below the modules

Relative humidity .....5 to 95% RH (non-condensing)

Ingress Protection .....IP20 to BS EN60529:1992
(Additional protection by means of enclosure)

Corrosive atmospheres: Designed to meet ten year service in Class G3 corrosive environment, as defined by ISA Standard SP71.04.

Vibration - Storage & Transport	
EN 60068-2-6 (Sinusoidal Vibration)	10-500 Hz 5 g for surface mounting, 1 g for DIN-rail mounting
BS2011:Part 2.1 (Random Vibration)	20-500 Hz 5 g for surface mounting 1 g for DIN-rail mounting

Vibration - Operating	
EN 60068-2-6 (Sinusoidal Vibration)	10-500 Hz 5 g for surface mounting, 1 g for DIN-rail mounting
BS2011:Part 2.1 (Random Vibration)	20-500 Hz 5 g for surface mounting 1 g for DIN-rail mounting

Shock - Storage & Transport	
EN 60068-2-6	1 m drop onto flat concrete

Shock - Operating	
EN 60068-2-6	30 g peak acceleration with 11 ms pulse width

Hazardous Area Approvals - 2/2 Node

8000 node equipment location* .....Safe area or
..... Zone 2, IIC T4 hazardous area or
..... Class 1, Div 2, Groups A-D, T4 hazardous location
*except for 8101-HI-TX, 8103-AI-TX, and 8119-VI-05
..... Safe area or
Zone 2, IICT4 (T_{amb} = 60° C), T3 (T_{amb} = 70°C) hazardous area or
..... Class 1, Div 2, Groups A-D, (T_{amb} = 60° C)
..... (T_{amb} = 60° C) hazardous location

Field equipment and wiring location
..... Safe area or
..... Zone 2, IIC T4 hazardous area or
..... Class 1, Div 2, Groups A-D hazardous location
(Temperature classification will be determined by the
field apparatus)

Hazardous Area Approvals - 2/1 Node

8000 node equipment location* .....Safe area or
..... Zone 2, IIC T4 hazardous area or
..... Class 1, Div 2, Groups A-D, T4 hazardous location

Field equipment and wiring location
..... Zone 0, IIC hazardous area or
..... Class 1, Div 2, Groups A-D hazardous location
(Temperature classification will be determined by the
field apparatus)

Application standards:

- Factory Mutual Research Co., Class No. 3611 for Class I, Division 2, Groups A, B, C, D hazardous locations
- Factory Mutual Research Co., Class No. 3610 for Class I, II, III, Division 1, 2 Groups A-G hazardous locations
- EN 50014:1992 Electrical apparatus for potentially explosive atmospheres, general requirements
- EN 50020:1995 Electrical apparatus for potentially explosive atmospheres, intrinsically safe “i”
- EN 50021:1999 Electrical apparatus for potentially explosive atmospheres, type of protection “n”
- EC Directive 94/9/EC (ATEX 100A)

Local Area Network

Fieldbus protocols supported .....Modbus (RTU mode)
..... Profibus - DP

Note:
1. Protocols are selected by choice of Bus Interface Module
2. For other protocols consult NovaTech

Configuration:
1) via host LAN (if supported by LAN)
2) via PC connected locally at configuration port

Node address setting .....Software settable in the BIM
LAN physical medium (configurable on carrier) .....
LAN A .....RS485 or RS422, 5-wire
LAN B (where available) .....RS485 or RS422, 5-wire
LAN isolation
LAN A to B (if applicable) .....250 V ac
LAN A or B to system ground .....250 V ac (to EN 61010)

Local Area Network

System Supply
Local supply input .....18.5-36 V dc input
Supply redundancy .....supported
Railbus supply voltage .....12 V dc ± 5%

NovaTech 8000 Series EBIM NT-8521-EB-NV and NT-8522-EB-NV

The 8000 Series EBIMs, NT-8521-EB-NV and NT-8522-EB-NV, are rugged, field-mountable, D/3® 8000 I/O communications controllers. The EBIM supports full redundant operation, with provisions for redundant communications and automatic switchover to the standby EBIM if required. The EBIM supports HART pass-through, which can be used for remote maintenance of HART field devices.

The new, compact EBIM 8522-EB-NV is a replacement to the existing EBIM 8521-EB-NV (not backwards compatible). The 8522-EB-NV is supported by D/3 Version 16.1 Update 4, or by V16.1-1 or newer.

Key Features

- Redundancy with bumpless transfer
- Dual-redundant high-speed Ethernet connections
- Field mountable in harsh process environments
- Online configuration and reconfiguration
- HART® pass-through of process and status variables
- Supports both zone 2/2 (81xx) and zone 2/1 (82xx) IO modules

Online Changes

EBIMs allow online configuration changes. You can add or remove EBIMs, add or remove modules, activate or deactivate points, activate or deactivate HART, and change module and point parameters all online.

Built-in Diagnostics

Extended diagnostics are available to provide module and channel status information, including high and low alarm, open circuit detection, and line fault detection at the device level and “fail-safe” perform level.

High System Availability - Easy Maintenance

Maximize up-time through use of redundant EBIM controllers, power supplies, and network connections. “Hot swap” modules without affecting system operation or re-configuring even in hazardous areas.

EBIM Redundancy

Redundant EBIMs can be used for critical control applications. The redundant EBIM pair operates in parallel, checking status multiple times through the processing loop enabling the backup EBIM to continuously monitor the health of the master EBIM, assuring a rapid and bumpless transfer to the standby EBIM.

Network Redundancy

In addition to EBIM redundancy, the EBIM has two high-speed Ethernet ports to provide security of communication. Each port can be connected to an independent LAN which is continuously monitored for its integrity. The fault tolerant network protocol provides network diagnostics and manages network connectivity. If the primary port detects a network failure, traffic is immediately switched to the other LAN to maintain full communication.

Failsafe and Automatic Cold Start

In the event of complete loss of communication the EBIM will adopt a user-defined failsafe mode and similarly instruct the I/O to take up user-defined failsafe values. In the event of power loss the EBIM will perform a cold restart.

I/O Module Configuration

The EBIM receives full details of all the I/O modules under its control and stores the information in non-volatile memory. At start-up the controller downloads to the modules their configuration details, which also include the failsafe states they should adopt in the event of communication failure.

Firmware Updates

In keeping with its ability to maintain operations on a continuous basis, redundant EBIMs are also capable of receiving a firmware upgrade. An EBIM can receive an update to its firmware while still in the field. When the upgrade has been confirmed as successful, the EBIM can be returned to full operation as a master or as a protective standby and the redundant EBIM’s firmware can then be upgraded.

HART Pass-through
The EBIM has the ability to pass smart HART® information from field devices to the D/3® PCM and to a separate PC workstation. The D/3 PCM can read the additional four HART process variables associated with each 4-20 mA signal and also the instrument alarm and warning statuses. Connecting the I/O switch to a PC workstation allows you to readily interface to asset management software applications, to remotely manage the HART information contained in your HART-based field instruments. The EBIM works with a variety of asset management packages, including Endress+Hauser's FieldCare.

Hazardous Area Operation
The EBIM is designed also to operate in Class 1, Division 2, and Zone 2 hazardous areas and can control I/O modules that have field wiring extending into the more hazardous Division 1, Zone 1, and Zone 0 areas.

Grows As Your Needs Grow
The system is scalable to your needs. You can add modular I/O to your system as your needs increase. Redundant EBIMs can be added without the need to power off your system - the backup EBIM powers up automatically and is seamlessly brought online.

Environmental Stability
Like all of the 8000 Series equipment, the EBIM is designed for use in harsh environments. It operates over a temperature range of -40°C to +70°C and is resistant to shock, vibration, and corrosive environments.

Power Supplies
Each EBIM can be powered individually. NovaTech's recommends using redundant or load sharing supplies to power the EBIMs. The EBIM carrier can also accommodate a Power Supply Monitor module (NT-8410-NS-PS), which monitors the health signals available from up to seven power supplies and reports problems to the D/3.

8000 with Intrinsically Safe Field Wiring
The 8000 Series I/O System is also capable of supporting I/O modules with intrinsically safe (IS) field wiring, for connection to certified or 'simple apparatus' field devices in Division 1 or Zone 0 hazardous areas. A range of I/O module types with IS field circuits for industry-standard DI, DO, AI, AO, and pulse applications is supported.

Integrated Intrinsically Safe Power Supplies
Power for IS I/O modules is derived from integrated, modular power supply units. Each power unit is capable of supplying between eight and twenty I/O modules, depending on the I/O type and mix. Optional power supply redundancy is supported by means of an additional, redundant supply unit connected in an 'n+1' arrangement. In applications with mixed IS and non-IS safe field wiring, the full facilities of the 'Bussed Field Power' regime are retained for the non-IS part of the system. In nodes populated only with IS I/O modules, a separate system power supply module provides power for the Bus Interface Module and 'node services'. Redundancy of this supply is also supported.

LAN Interface
Transmission medium .....100BaseTX or 10BaseT Ethernet
Transmission protocol .....Modbus over High Speed Ethernet
Transmission rates ..... 10-100 Mbits/s
LAN connector type (x2) RJ45 (8-pin)
LAN Insulation (Dielectric withstand) .....1500 V
Action on software malfunction .....Halt CPU/Reset CPU
Max. nodes per EMPC2 50

Hazardous Area Approvals
Location of controller .....Zone 2, IIC T5 hazardous area
.....or Class 1, Div 2, Groups A, B, C, D T5 hazardous location

Applicable standards:

- Factory Mutual Research Co., Class No. 3611 for Class I, Division 2, Groups A, B, C, D hazardous locations
- CSA Std C22.2 No. 213 for Class 1, Division 2, Groups A, B, C, D hazardous locations
- ATEX Category 3 (for Zone 2 installation) to EN50021:1999 protection type 'n'
- UL 61010-1 "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use; Part 1: General Requirements, 2nd Edition

Environmental
Refer to System Specifications

Mechanical
NT-8522-EB-NV
Module dimensions .....40 (w) x 160 (d) x 120 (h) mm
Weight (approx.) .....800 g

NT-8521-EB-NV
Module dimensions .....69 (w) x 232 (d) x 138 (h) mm
Weight (approx.) .....1.35 kg

Compatible Mounting Backplane
NT-8522-EB-NV
NT-8755-CA-NS Redundant EBIM Carrier
Carrier dimensions:.....~170 (w) x 170 (d) x 40 (h) mm
Carrier weight:.....500g

NT-8521-EB-NV
NT-8750-CA-NS Redundant EBIM Carrier
Carrier dimensions:.....~200 (w) x 253 (d) x 55 (h) mm
Carrier weight:.....1.43 kg

NT-8753-CA-NS Simplex EBIM Carrier
Carrier dimensions:.....~110 (w) x 253 (d) x 55 (h) mm
Carrier weight:.....1.0 kg

8-channel Analog Input 4-20 mA with HART®

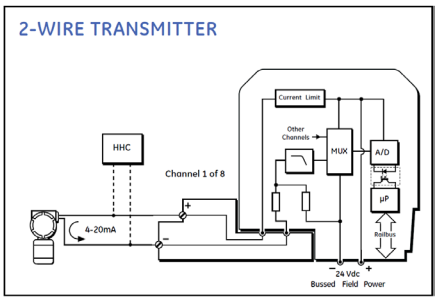
NT-8101-HI-TX

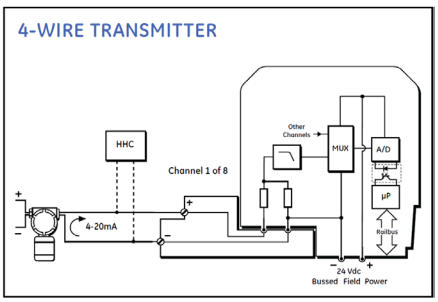
- 8 single-ended 4-20 mA input channels
- Non-incendive field circuits
- HART pass-through
- HART variable and status reporting
- 2 or 4-wire transmitters
- Open and short circuit detection
- 24 V dc bussed field power required

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 (@ 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





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 (12 V) 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)

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8602-FT-ST Standard	NT-8604-FT-FU Fused
Mass Termination	-	NT-8618-FT-MT
Class 1, Div 2 or Zone 2 Hazardous area	NT-8601-FT-NI Non-incendive	NT-8603-FT-FU Non-incendive

Field Terminals (4-WIRE TX)

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8615-FT-4W	-
Class 1, Div 2 or Zone 2 Hazardous area	NT-8615-FT-4W	-

8-channel Analog Input 4-20 mA

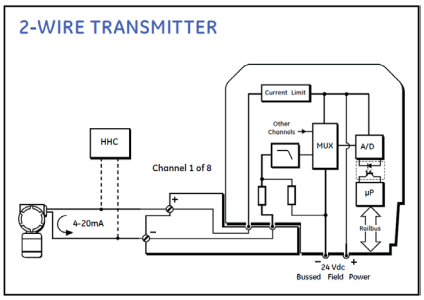
NT-8103-AI-TX

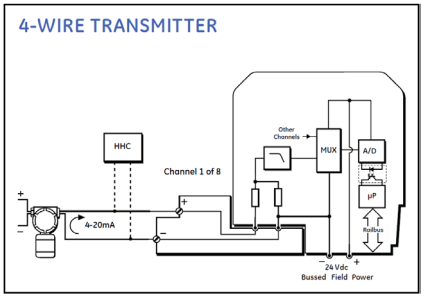
- 8 single-ended 4-20 mA input channels
- Non-incentive field circuits
- 4-20 mA
- 2 or 4-wire transmitters
- Open and short circuit detection
- 24 V dc bussed field power required

Module Specifications

Inputs

Number of channels .....8, single-ended
Nominal signal range (span) .....4 to 20 mA
Full signal range .....1 to 23 mA
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





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)
.....Voc = 28.7 V; Isc = 33 mA; Ca = 0.17 µF; La = 11.0 mH

Power Supplies

Railbus (12 V) 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)

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8602-FT-ST Standard	NT-8604-FT-FU Fused
Mass Termination	-	NT-8618-FT-MT
Class 1, Div 2 or Zone 2 Hazardous area	NT-8601-FT-NI Non-incendive	NT-8603-FT-FU Non-incendive Fused

Field Terminals (4-wire TX)

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8615-FT-4W	-
Class 1, Div 2 or Zone 2 hazardous area	NT-8615-FT-4W	-

16-channel Analog Input 4-20 mA with HART®

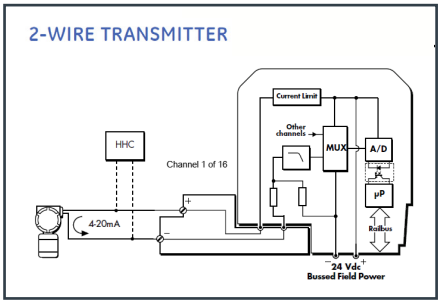
NT-8107-HI-TX

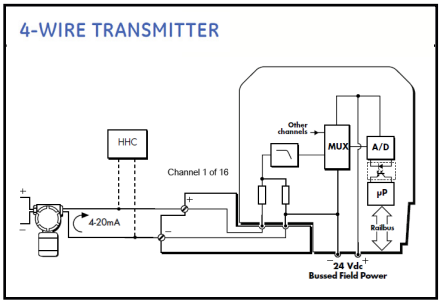
- 16 single-ended 4-20 mA input channels
- Non-incendive field circuits
- HART pass-through
- HART variable and status reporting
- 2 or 4-wire transmitters
- Open and short circuit detection
- 24 V dc bussed field power required

Module Specifications

Inputs

Number of channels .....16, single-ended
Nominal signal range (span) .....4 to 20 mA
Full signal range .....2 to 22 mA
Out of Range Alarm
Upper threshold .....> 22.5 mA
Lower threshold .....< 1.5 mA
Output voltage (@ 20 mA) .....13.5 V (min.)
Output current .....32 mA (max.)
Accuracy (over temp range) .....± 0.2% of span
Resolution .....16 bits
Repeatability .....0.05% of span
Isolation
(any channel to Railbus) .....1000 V dc / 100 V ac
(between channels) .....none





Configurable Parameters

Input filter time constant .....user defined value
Input dead zone .....disabled
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 .....600 to 800 ms per HART enabled 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 (12 V) current .....85 mA (typ.), 150 mA (max.)
Bussed Field Power 2-wire Tx .....600 mA (max.)
(@ 24 V dc ±10%)

Mechanical

Module Key Code A6
Module width .....42 mm
Weight .....200 g

Field Terminals (2-WIRE TX)

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
Mass Termination	-	NT-8629-FT-MT
Class 1, Div 2 or Zone 2 Hazardous area	NT-8627-FT-NI	-

Field Terminals (4-WIRE TX)

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
Mass Termination	-	NT-8629-FT-MT
Class 1, Div 2 or Zone 2 Hazardous area	NT-8628-FT-4W	-

8-channel Isolated Universal Analog Input 4-20 mA with Thermocouple, RTD, Voltage

NT-8132-AI-UN

- 8 isolated, universal, input channels
- Configurable on a channel by channel basis: 4-20 mA, THC, RTD, resistance, and voltage
- 250 V 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 ± 120 mV, 0-1 V, 0-5 V, 1-5 V, 0-10 V, ± 10 V
- 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 20 mA
Full signal range (FSR) .....0 to 25 mA
Output voltage (@ 20mA) .....13.5 V (min.)
Output current (linear operation) .....25 mA (max.)
Short circuit current (max.) .....75 mA for 100 ms
(Output turns off after ~100 ms at more than 25 mA)
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.)
Open circuit detection time .....1 sec
.....(with < 0.5 µF cable capacitance)

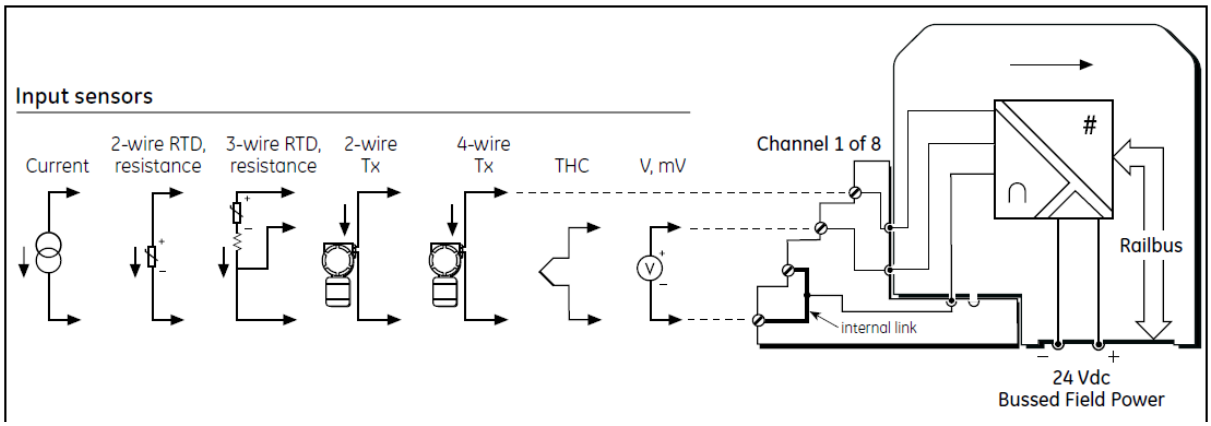
RTD Input (2 or 3 Wire)

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
Resistance 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, ...0-5 V, 1-5 V, 0-10 V, ± 10 V
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 50/60 Hz filter) ....> 120 dB @ 50/60 Hz
Series mode rejection (using 50/60 Hz filter) ....> 65 dB @ 50/60 Hz
Maximum input voltage (except current I/P) .....± 25 V
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 = 75 mA; Ca = 0.61 µF; La = 11.3 mH

Power Supplies

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

Mechanical

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

* WARNING: If this module is being used in an application that requires 250 V 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

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
All Purpose	NT-8608-FT-NI (no internal CJ)	8607-FT-TC (see note) (internal CJ)
4-20 mA, Mass Termination	-	NT-8618-FT-MT
RTD, Voltage Mass Termination	-	NT-8619-FT-MT
THC	NT-8607-FT-TC (internal CJ)	8608-FT-NI (see note) (no internal CJ)

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

4-channel Analog Input Thermocouple and mV

NT-8105-TI-TC

- 4 thermocouple or mV input channels
- Cold junction compensation

Module Specifications

Inputs

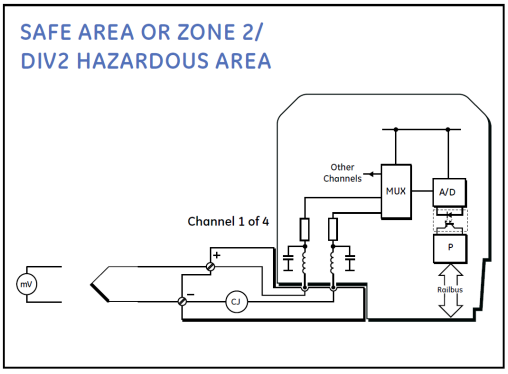
Number of channels 4
THCs types
.....B,E,J,K,N,R,S, or T to EN 60584-2, IEC584-2, BS4937

Input Ranges

Input Type	Range
mV	0 to 120 mV
Thermocouples: B	0°C to 1820°C
E	-270°C to +1000°C
J	-210°C to +1200°C
K & N	-270°C to +1372°C
R & S	-50°C to + 1768°C
T	-270°C to + 400°C

Calibration Accuracy

mV input .....± 0.2% of span (-40°C to +70°C)
.....± 0.1% of span (+10°C to +40°C)
THC input .....dependent on thermocouple type
Cold junction compensation error† .....< ± 1°C (-40°C 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.)
.....420 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 (12 V) 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-8605-FT-TC THC	-
Class 1, Div 2 or Zone 2 Hazardous area	NT-8605-FT-TC THC	-

† C J compensation located in recommended field terminal

4-channel Analog Input RTD and Resistance

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

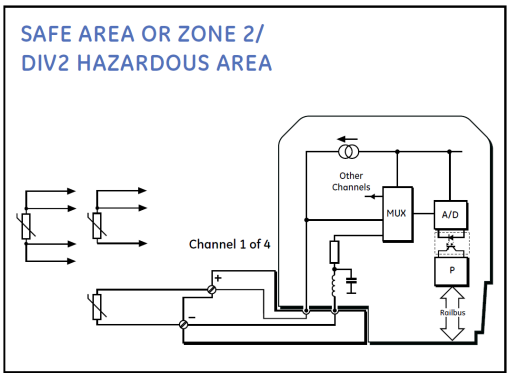
Input Type	Range
Resistance	Consult NovaTech for availability
RTDs: Pt100	-200°C to +850°C
jPt100	-200°C to +510°C
Ni120	-60°C to +320°C

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

Accuracy (% of span)

T_{amb}	(RTD & Ω inputs)
25°C	± 0.05%
+10°C to +40°C	± 0.1%
-40°C to +70°C	± 0.2%

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 avge/running avge.
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 (12 V) 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.

8-channel Analog Output 4-20 mA with HART®

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
.....(into 700 Ω load)
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)
.....Voc = 28.7 V; Isc = 33 mA; Ca = 0.17 µF; La = 11.0 mH

Power Supplies

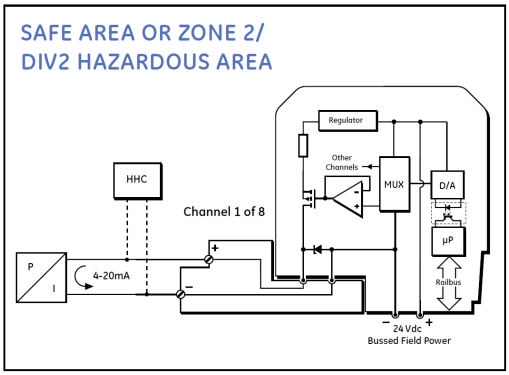
Railbus (12 V) current .....100 mA (typ.)
.....150 mA (max.)
Bussed Field Power ..... 300 mA (max.) at 24 V dc ± 10%

Mechanical

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

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8602-FT-ST Standard	NT-8604-FT-FU Fused
Mass Termination	-	NT-8618-FT-MT
Class 1, Div 2 or Zone 2 Hazardous area	NT-8601-FT-NI Non-incendive	NT-8603-FT-FU Non-incendive



8-channel Analog Output 4-20 mA

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 detection 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

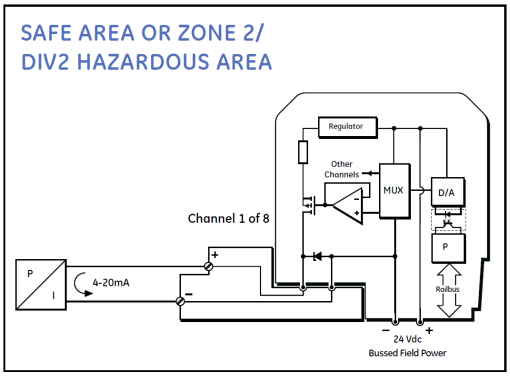
Initialization state.....predefined value
Drive on fail-safe .....predefined value/last value
Channel status .....active/inactive

Response Time

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

Safety

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



Power Supplies

Railbus (12 V) 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

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8602-FT-ST Standard	NT-8604-FT-FU Fused
Mass Termination	-	NT-8618-FT-MT
Class 1, Div 2 or Zone 2 Hazardous area	NT-8601-FT-NI Non-incendive	NT-8603-FT-FU Non-incendive Fused

8-channel Discrete Input 24 V dc, Isolated, Sinking

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

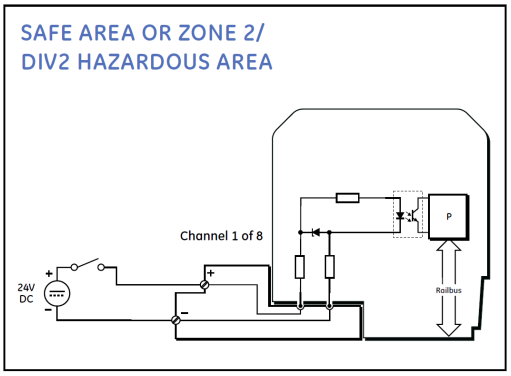
Selectable input filter .....fast, slow or user defined
(User defined permits 0 to 512 ms values in 2 ms steps)
Latch inputs .....enable/disable
Latch polarity .....latch on high/latch on low
Pulse counting .....enable/disable

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)
.....Vmax = 30 V; Imax = 100 mA; Ci = 0 µF; Li = 0 mH



Power Supplies

Railbus (12 V) current .....35 mA (typ.)
.....55 mA (max.)
Bussed Field Power .....not required

Mechanical

Module Key Code B2
Module width .....42 mm
Weight .....170 g

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8602-FT-ST Standard †	NT-8604-FT-FU Fused
Mass Termination	-	NT-8618-FT-MT
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.

8-channel Discrete Input 24 V dc, Non-isolated, Module Powered

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

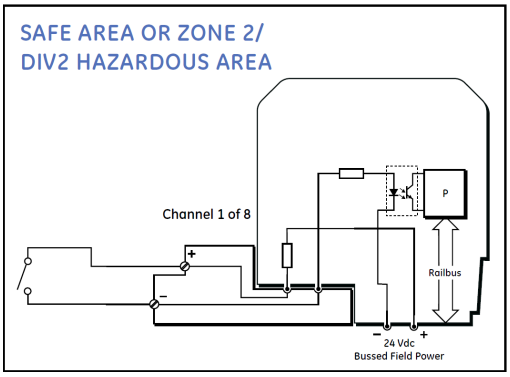
Selectable input filter .....fast, slow, or user defined
(User defined permits 0 to 512 ms values in 2ms steps)
Latch inputs.....enable/disable
Latch polarity.....latch on high/latch on low
Pulse counting .....enable/disable

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)
.....Voc = 30 V; Isc = 15.2 mA; Ca = 0.12 µF; La = 151 mH



Power Supplies

Railbus (12 V) 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

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8602-FT-ST Standard †	NT-8604-FT-FU
Mass Termination	-	NT-8619-FT-MT
Class 1, Div 2 or Zone 2 Hazardous area	NT-8601-FT-NI Non-incendive †	NT-8603-FT-FU Non-incendive, fused

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

16-channel Discrete Input 24 V dc, Non-isolated, Module Powered

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

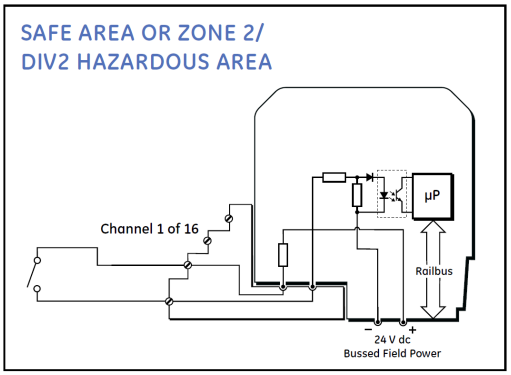
Selectable input filter .....fast, slow or user defined
(User defined permits 0 to 512 ms values in 2ms steps)
Latch inputs.....enable/disable
Latch polarity.....latch on high/latch on low
Pulse counting .....enable/disable

Response Time

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

Safety

FM non-incendive field wiring parameters (each channel)
.....Voc = 30 V; Isc = 3.5 mA; Ca = 0.12 µF; La = 1000 mH



Power Supplies

Railbus (12 V) current .....90 mA (typ.)
.....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

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8617-FT-NI 16 channel DI	-
Mass Termination	-	NT-8619-FT-MT
Class 1, Div 2 or Zone 2 Hazardous area	NT-8617-FT-NI 16 channel DI	-

16-channel Discrete Input 24 V dc, Isolated, Sinking

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)
.....Vmax = 30 V; Imax = 100 mA; Ci = 0 µF; Li = 0 mH

Power Supplies

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

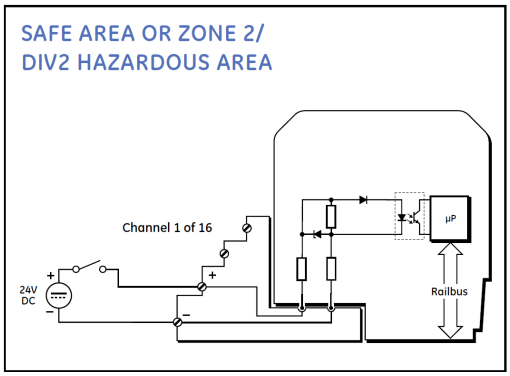
Mechanical

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

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8617-FT-NI † 16 channel DI	-
Class 1, Div 2 or Zone 2 Hazardous area	NT-8617-FT-NI † 16 channel DI	-

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



32-channel Discrete Input, Switch/ Proximity Detector, Module Powered

NT-8125-DI-DC

- 32 NAMUR input channels
- For dry contact switches or proximity detectors
- Pulse counting and latching option
- 24 V dc bussed field power required
- Line fault detection on all inputs (switch inputs need resistors)

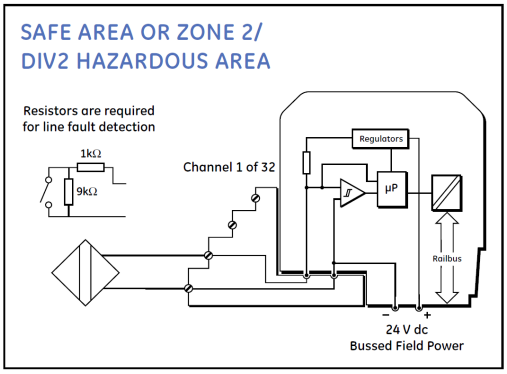
Module Specifications

Inputs

Number of channels 32
OFF voltage .....< 1.2 mA
ON voltage .....> 2.1 mA
Short circuit current .....8.6 mA (typ)
Output resistance .....950 Ω (typ)
Open circuit output voltage .....8.2 V dc (typ)
Line fault detection
  Short circuit .....< 100 Ω
  Open circuit .....50 µA
Input voltage range without damage .....0 to + 12 V dc
Input sampling rate (all 32) .....8 kHz
Input pulse width .....250 µS (min)
DI counting frequency without loss .....500 Hz (max)
Applicable specification .....NAMUR, DIN 19234

Configurable Parameters

Input filter .....0 to 8.192 secs in 250 µS steps
Pulse counting .....on/off
Latching .....on/off



Response Time

Input module scan time .....< 1 ms
(Inputs sampled at 8 kHz and processed every 1 mS)

Safety

FM non-incendive field wiring parameters (each channel)
.....Voc ≤ 8.64 V; Isc ≤ 18.5 mA; Ca ≤ 28 µF; La ≤ 23.6 mH

Power Supplies

Railbus (12 V) current .....< 50 mA
Bussed Field Power .....190 mA (max) at 34 V dc

Mechanical

Module Key Code .....83 non arcing
Module width .....42 mm
Weight .....185 g

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8632-FT-NI 32 channel DI	NT-8619-FT-MT 32 channel DI
Class 1, Div 2 or Zone 2 Hazardous area	NT-8632-FT-NI 32 channel DI	NT-8619-FT-MT 32 channel DI

8-channel Discrete Input 115 V ac, Isolated, Sinking

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

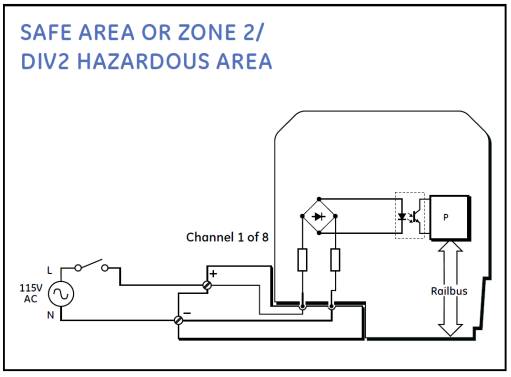
Selectable input filter .....fast, slow, or user defined
(User defined permits 0 to 512 ms values in 2 ms steps)
Latch inputs .....enable/disable
Latch polarity .....latch on high/latch on low
Pulse counting .....enable/disable

Response Time

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

Power Supplies

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



Mechanical

Module Key Code E4
Module width .....42 mm
Weight .....170 g

Field Terminals

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.

8-channel Discrete Input, 115 V ac, Non-isolated, Module Powered

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 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

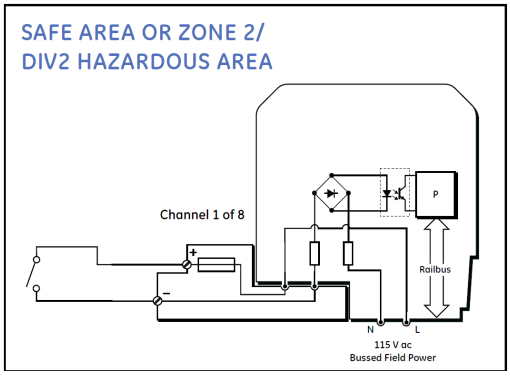
Selectable input filter .....fast, slow, or user defined
(User defined permits 0 to 512 ms values in 2 ms steps)
Latch inputs .....enable/disable
Latch polarity .....latch on high/latch on low
Pulse counting .....enable/disable

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.)
.....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

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

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

16-channel Discrete Input 115 V ac, Block Isolated, Sinking

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 .....60 KΩ (nom.)
Wetting current .....1.9 mA (nom.)
.....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-
Within one block Ch. 1–4, 5–8, 9–12, 13–16 .....130 V ac (max.)

Safety

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

Power Supplies

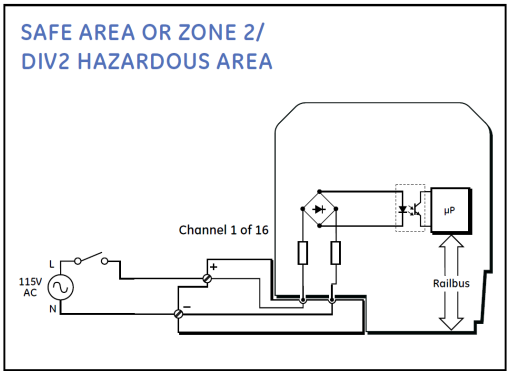
Railbus (12 V) current .....110 mA
Bussed Field Power .....not required

Mechanical

Module Key Code .....E3, non-arcing
Module width .....42 mm
Weight .....170 g

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8612-FT-NA non-arcing	-
Class 1, Div 2 or Zone 2 Hazardous area	NT-8612-FT-NA non-arcing	-



8-channel Discrete Output, 2-60 V dc, Non-isolated, Module Powered

NT-8115-DO-DC

- 8 powered outputs
- Controls solenoids and relays
- Common load supply of up to 60 V dc
- Discrete or pulsed outputs
- 1 A 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 (12 V) 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

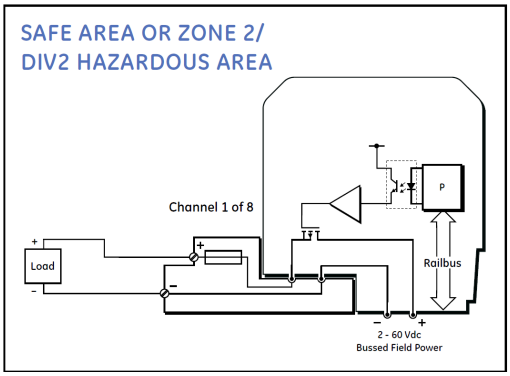
Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8604-FT-FU Fused	NT-8602-FT-ST Standard †
Mass Termination	-	NT-8618-FT-MT
Class 1, Div 2 or Zone 2 Hazardous area	NT-8611-FT-FU Non-arcing, Fused	NT-8610-FT-NA Non-arcing †

† 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



8-channel Discrete Output 2-60-V dc, Isolated, Unpowered

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
- 1 A 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 < 100 ms .....4 A
  For < 20 ms .....6 A

Configurable Parameters

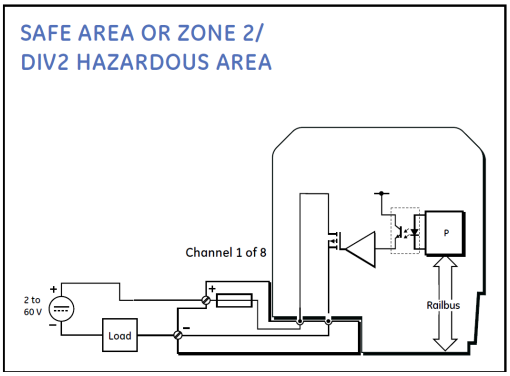
Output initialization state .....predefined value
Fail-safe .....predefined value/last value
Output .....discrete or momentary pulse
Pulse width .....2 ms to 130 s

Response Time

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

Power Supplies

Railbus (12 V) 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

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

Note: External fusing to protect field wiring is recommended.

16-channel Discrete Output 24 V dc, Non-isolated, Module Powered

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
Ouput 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 .....500 ms to 60 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

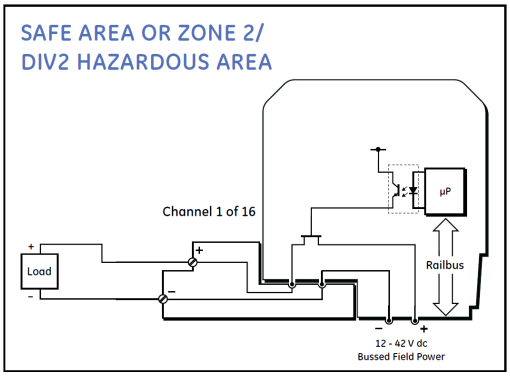
Railbus (12 V) current .....110 mA
Bussed Field Power .....12 to 42 V dc, 6 A (max.)

Mechanical

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

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8612-FT-NA non-arcing	-
Mass Termination	-	NT-8620-FT-MT
Class 1, Div 2 or Zone 2 Hazardous area	NT-8612-FT-NA non-arcing	-



8-channel Discrete Output, 20-265 V ac, Non-isolated, Module Powered

NT-8116-DO-AC

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

Module Specifications

Outputs

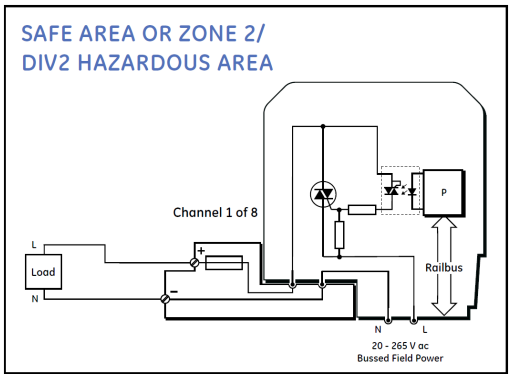
Number of channels 8
Output voltage range .....20–265 V ac
Frequency .....50/60 Hz
ON voltage drop .....< 1.2 V
OFF leakage current .....< 4mA
Switched current per channel ††
  Continuous .....1 A*
  For < 100 ms .....5 A
  For < 20 ms .....20 A
Minimum load current, per channel
  @ 115 V ac .....11 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 (12 V) 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

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

† 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.

8-channel Discrete Output 20-265 V ac, Isolated, Unpowered

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
- 1 A per channel switched

Module Specifications

Outputs

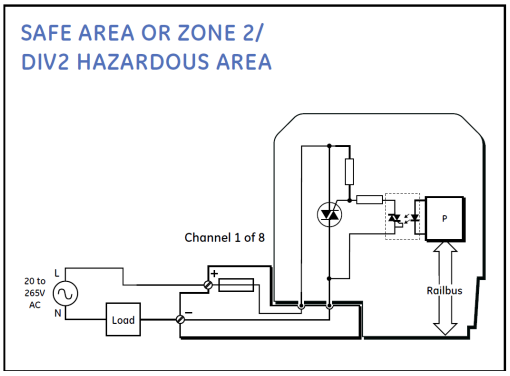
Number of channels 8
Output voltage range .....20–265 V ac
Frequency .....50/60 Hz
ON voltage drop .....< 1.2 V
OFF leakage current .....< 4 mA
Switched current per channel †
  Continuous .....1 A*
  For < 100 ms .....5 A
  For < 20 ms .....20 A
Minimum load current, per channel
  @ 115 V ac .....11 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 (12 V) 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

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

† 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.

8-channel Digital Input/Output 24 V dc, Non-isolated, Module Powered

NT-8129-IO-DC

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

Module Specifications

Inputs

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

Outputs

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

Configurable Parameters

Input
Filter time interval .....0 to 8 s (in 1 ms 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 .....1 ms to 60 s
Line fault detection* .....open line & short circuit detect/disable
* Normally de-energized channels only

Response Time

Input Signal change to availability on Railbus .....5 ms (max.)
Railbus command to output change .....1 ms (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% +5.3 Ω) for line resistance ≤ 220 Ω
greater of: ± 7% or ± (3.1% +27 Ω) for line resistance > 220 Ω, < 1 kΩ
With reverse biased test current
.....greater of: ± 7% or ± (3.1% +430 Ω)

Mechanical

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

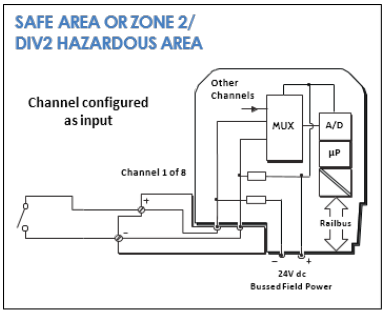
Field Terminals

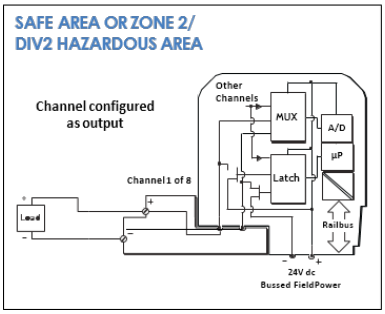
Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8604-FT-FU Fused	NT-8602-FT-ST Standard †
Class 1, Div 2 or Zone 2 Hazardous Area	NT-8611-FT-FU Non-arcing, Fused	NT-8610-FT-NA Non-arcing †

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





8-channel IS Analog Input 4-20 mA with HART®

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

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

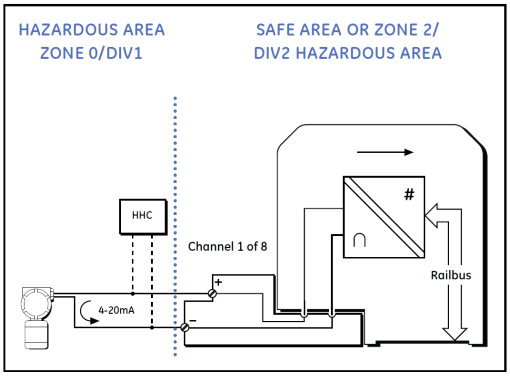
Module Specifications

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°C 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 (12 V) 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 Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
IS Standard	NT-8621-FT-IS	-
IS Loop Disconnect	NT-8622-FT-IS	-

8-channel IS Analog Input 0-10 V/Potentiometer Input

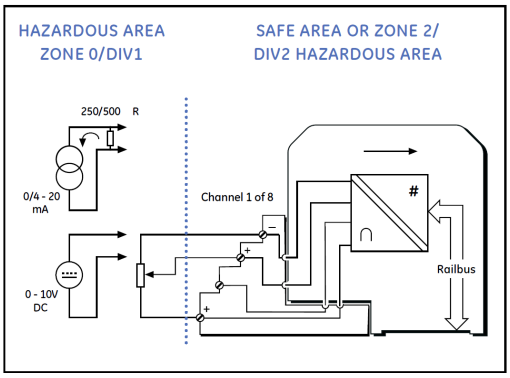
NT-8230-AI-IS *(Intrinsically Safe)*

- 8 single-ended input channels
- Intrinsically safe (IS) field circuits
- 0–10 V/100 Ω–10 kΩ potentiometer
- 4-20 mA 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
0–10 V input characteristics
Nominal signal range (span) .....0 to 10 V
Full signal range .....0 to +11 V
Resolution.....16 bits
Input impedance .....> 100 kΩ
Under-range indication .....-100 mV
Potentiometer input characteristics
Nominal signal range (span) .....0 to 100% of travel
Potentiometer resistance .....100 Ω to 10 kΩ
Excitation voltage (nom.) .....10 V (from 2.2 kΩ source)
Resolution (≥ 1 kΩ potentiometer) .....14 bits
Resolution (100 Ω 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
.....Ca = 0.22 µF, La = 5 mH

Power Supplies

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

Mechanical

Module Key Code C4
Module width .....42 mm
Weight .....200 g

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
IS Standard	NT-8623-FT-IS	-

8-channel IS Analog Input Thermocouple and mV

NT-8205-TI-IS *(Intrinsically Safe)*

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

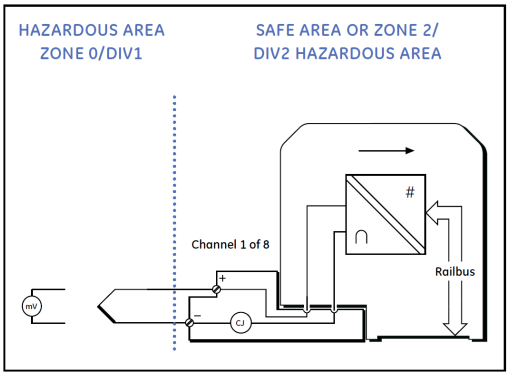
Module Specifications

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

Input Ranges

Input Type	Range
mV	-8 to +24 mV
	-20 to +60 mV
	-33.333 to +100 mV
	-100 to +100 mV
Thermocouples: B	0°C to 1820 °C
E	-270°C to +1000 °C
J	-210°C to +1200 °C
K	-270°C to +1372 °C
N	-270°C to +1300 °C
R & S	-50°C to +1768.1 °C
T	-270°C to +400 °C



Accuracy

T_{amb}	mV Inputs	THC Inputs
25°C	± 0.05%	± 0.05%
+10°C to +40 °C	± 0.08%	± 0.1%
-40°C to +70 °C	± 0.18%	± 0.3%

Temperature drift .....< ± 0.003% of span/°C
Cold junction compensation error†.....< ± 1°C (-40°C to +70 °C)
Resolution .....16 bits
Common mode rejection .....> 87 dB @ 50/60 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, 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, 8, wired as separate IS circuits
.....Voc = 16.4 V; Isc= 63.7 mA; Po = 131 mW
Channels 5 and 6, wired as separate intrinsic safety circuits
.....Uo = 1 V, Io + 1 mA, Po = 0.25 mW

Power Supplies

IS Railbus (12 V) 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

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
IS THC	NT-8625-FT-IS	-

8-channel IS Analog Input RTD and Resistance

NT-8206-TI-IS *(Intrinsically Safe)*

- 8 input channels
- Intrinsically safe (IS) 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

Input Type	Range
RTDs: Pt100, Pt500	-200°C to +850°C
jPt100	-200°C to +650°C
Ni120	-60°C to +250°C

Resistance input

Input Type	Range
211 µA	0 to 110 Ω
211 µA	0 to 280 Ω
211 µA	0 to 470 Ω
48 µA	0 to 2000 Ω

Accuracy (% of span), see note 2

T_{amb}	mV Inputs	THC Inputs
25°C	± 0.05%	± 0.05%
+10°C to +40°C	± 0.08%	± 0.1%
-40°C to +70°C	± 0.18%	± 0.3%

Note 1: Consult NovaTech for support in EBIM/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

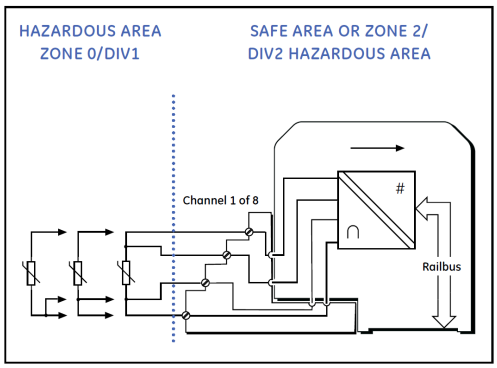
IS Railbus (12 V) current .....120 mA (max.)
Power dissipation within module .....1.5 W (max.)

Mechanical

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

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
IS Standard	NT-8626-FT-IS	-



8-channel IS Analog Output 4-20 mA with HART®

NT-8202-HO-IS *(Intrinsically Safe)*

- 8 single ended output channels
- Intrinsically safe (IS) 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 .....[EEx ia] IIC
Safety description
(each channel) ..... Vo = 24.6 V; Io = 93 mA; Po = 0.57 W
FM entity parameters .....Voc ≤ 24.6 V dc; Isc ≤ 93 mA
.....Ca ≤ 0.42 µF; La ≤ 4.2 mH

Power Supplies

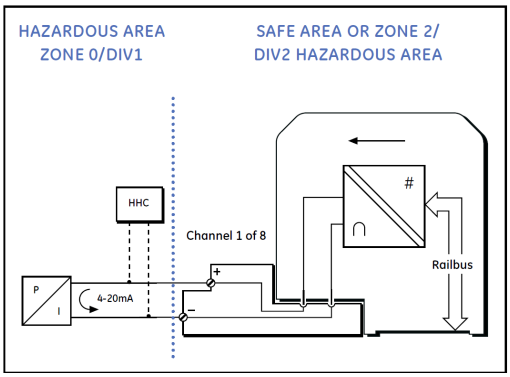
IS Railbus (12 V) current
(all channels @ 22 mA into 650 Ω load) .....630 mA
Power dissipation within module .....4.1 W (max.)

Mechanical

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

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
IS standard	NT-8621-FT-IS	-
IS loop disconnect	NT-8622-FT-IS	-



8-channel IS Analog Output 4-20 mA

NT-8204-AO-IS *(Intrinsically Safe)*

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

Module Specifications

Outputs

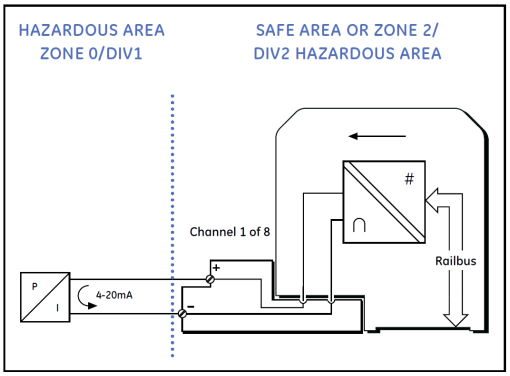
Number of channels 8
Nominal signal range (span) .....4 to 20 mA
Full signal range .....1 to 22 mA
Voltage to load .....13 V min. @ 20 mA
Load resistance .....450 Ω max.
Accuracy (@ 25°C) .....± 20 µA
Temperature stability
(-40°C to +70°C) ..... ± 0.006% of span per °C
Resolution .....12 bits
Open circuit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

Configurable 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) ..... Vo = 24.6 V; Io = 93 mA; Po = 0.57 W
FM entity parameters .....Voc ≤ 24.6 V dc; Isc ≤ 93 mA
.....Ca ≤ 0.42 µF; La = 4.2 mH

Power Supplies

IS Railbus (12 V) 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

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
IS standard	NT-8621-FT-IS	-
IS loop disconnect	NT-8622-FT-IS	-

16-channel IS Discrete Input Switch/Proximity Detector

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

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

Module Specifications

Inputs

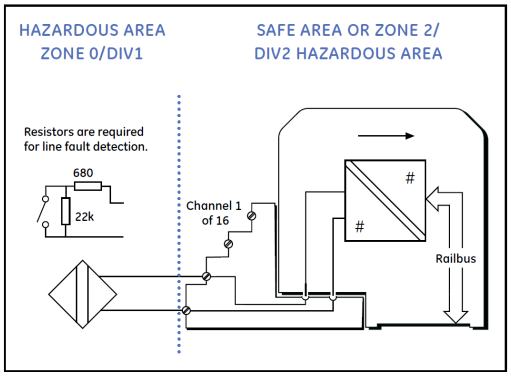
Number of channels 16
OFF current .....< 1.2 mA
ON current .....> 2.1 mA
Switching hysteresis .....200 µA (nom.)
Applicable specifications .....NAMUR, DIN19234
Voltage applied to sensor .....7.0 to 9.0 V from 1 kΩ ± 10%
Output (wetting) current
@ 100 Ω line impedance ..... > 6 mA
Line fault detection
Short circuit .....< 100 Ω
Open circuit .....> 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 3 ms 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
.....Ca ≤ 2.67 µF, La ≤ 176 mH
Isolation
(any channel to Railbus) .....60 V ac
(channels arranged in two groups of eight, with returns commoned within each group)

Power Supplies

IIS Railbus (12 V) 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

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
IS, 16-channel	NT-8623-FT-IS	-
IS, 8-channel loop disconnect	NT-8624-FT-IS	-

4-channel IS Discrete Output Solenoid Driver, IIC Gas Groups

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

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

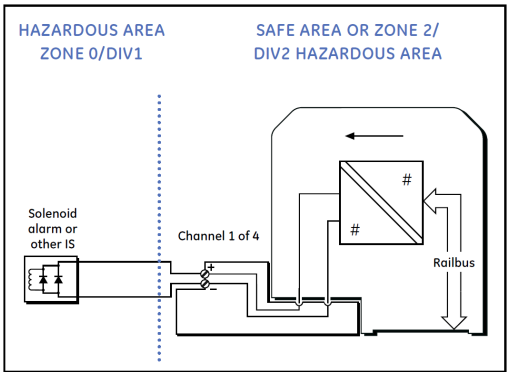
Module Specifications

Outputs

Number of channels 4
Minimum output voltage
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
Safety 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

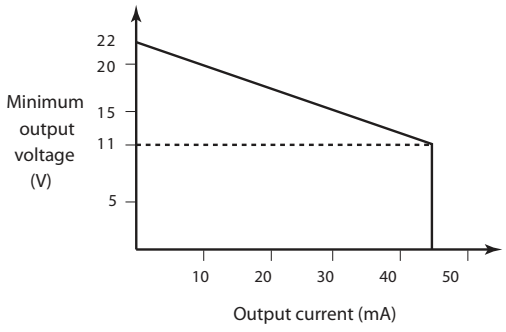
IS Railbus (12 V) current .....560 mA (max.)
Power Dissipation within module .....3.7 W (max.)

Mechanical

Module Key Code B5
Module width .....42 mm
Weight .....220 g

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
IS Standard	NT-8621-FT-IS	-
IS, Loop Disconnect	NT-8622-FT-IS	-



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