MTL PRODUCT DATA RESOURCE

# REMOTE I/O FOR ZONE 1

Overview

System Specification

Node Services Carrier

Power Supply

Bus Interface Module

I/O Modules

IS Isolator

Enclosure

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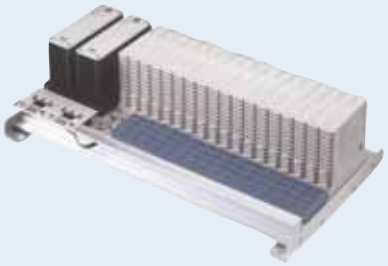
# MTL8000 1/1 Series - Overview



## General

**The MTL8000 1/1 is an innovative remote I/O system targeted at applications which require installation in Zone 1 hazardous areas and connection to Profibus-DP hosts, while maintaining a low installed cost.**

## System features

The system is designed and certified for installation in Zone 1, IIC T4 hazardous areas, with connections to intrinsically safe field instruments in Zone 1 or Zone 0. A single node can accommodate up to 16 I/O modules - equivalent to 64 I/O channels. A typical node consists of a carrier, with integral terminations, which accommodates power supply units, Bus Interface Modules, and the I/O modules, enclosed in a ruggedised stainless steel enclosure.

### *Key attributes*

- State-of-the art hazardous area technology, yielding a compact, efficient and easily maintained product.
- Low overhead cost for Bus Interface Module (BIM) and power supplies - ideal for multiple nodes. Combined with high density I/O modules (4-8 channels per 20 mm), it allows the I/O to follow the plant topology.
- Optional redundancy for BIM and power supply architecture, with full "hot-swapping" capability for all system components.
- Node size ideally suited to Profibus-DP applications.
- Rugged construction for serious process applications, with high-integrity mechanical mounting platform.
- Fully prepared, environmentally hardened field enclosure available as standard.
- Low cost per I/O point.

## Host connectivity

The Bus Interface Module (BIM) supports connection to Profibus-DP masters. The LAN medium is implemented as intrinsically safe RS485, supported via an IS interface in the safe area. Multi-dropping of nodes is possible in both the safe and hazardous areas - up to five remote I/O nodes may be multi-dropped in the hazardous area from one intrinsically safe interface unit.

Each BIM has a single Profibus LAN. Where supported by the host system, a second BIM may be added to implement redundant LAN media and BIM capability. An IS interface unit is required in the safe area for each LAN.

The Bus Interface Module is easily configured from the Profibus-DP master with the user parameterisation capability of Profibus.

The system is also capable of supporting Profibus-DP V1 which will allow more flexible configuration options with DP V1 masters. With masters using FDT/DTM based configuration over Profibus-DP V1, a single database holds configuration of the controller, I/O and HART field devices, offering, in an open system using MTL8000 I/O, one of the key benefits of a DCS.

## Node Services Carrier

The Node Services Carrier accommodates primary and redundant power supplies, primary and redundant BIMs and up to 16 I/O modules, providing up to 128 DI channels or 64 AI/TI/AO/DO channels per node. The carrier is supported by a strong, lightweight extruded aluminium platform, which provides excellent mechanical stability and ruggedness.

## Power supplies

Power supply modules convert locally available 24Vdc to a high-frequency bus that in turn powers the I/O modules and their field circuits. The power supplies are compact, lightweight, efficient and mount directly onto the Node Services Carrier. Supply redundancy is supported by adding a second unit. Power supplies may be changed while energised in the hazardous area. Where available, separate 24V feeds can be connected to each power supply module to provide integrity throughout the supply system.

Each power supply is used with an additional filter unit which protects against damage from incoming noise on the 24V supply. The filters are certified for installation in Zone 1 and locate inside the field enclosure.

## I/O modules

A wide range of I/O modules is offered including AI, AO, DI, DO, temperature input functions and pulse frequency. Each module handles 4 I/O channels (DI: 8 channels) in a slim, 20 mm wide package. The DI module is additionally software-configurable to operate with a combination of NAMUR switch inputs and ultra low-power solenoid outputs. The temperature input module can accept inputs from thermocouples or RTD sensors. A mechanical keying system ensures that modules cannot be replaced into wrong slots on the carrier during maintenance work.

# MTL8000 1/1 Series - Overview

## HART® capability

Analog modules "with HART" can obtain information from HART instruments of revision 5.0 or later. Each channel can communicate with a single HART instrument. The "with HART" modules regularly scan up to four HART process and device status variables which are communicated over Profibus-DP for easy integration in the controller. For example, this allows HART device status to be used in control algorithms, 32 bit high resolution IEEE754 format level and flow variables to be used in the system historian and travel of a HART valve positioner to be displayed on the HMI face plate.

In addition the MTL8000 1/1 can be used with instrument management software to configure, calibrate and maintain HART field devices.

## Field Enclosure

An environmentally hardened, stainless steel field enclosure is available to accommodate the 16-module Node Services Carrier. The enclosure is certified EEx e (increased safety) in order to provide the required level of protection for the power supply input terminals on the carrier, which are certified as EEx e components.

## Ease of maintenance

All system components, including BIM, I/O modules and power supplies, may be replaced under power in a Zone 1 hazardous area without gas clearance.

## Certification

The system employs mixed protection techniques according to the specific needs of individual system components. The I/O modules have intrinsically safe field wiring and internal bus connections. The power supply modules employ an innovative high-frequency technique for distributing power to the I/O modules, resulting in an extremely compact and efficient power supply architecture.

Terminals for the connection of 24V input to the power supplies are implemented as "increased safety" (EEx e). Specially designed connections between the power supply modules and Node Services Carrier allow the supplies to be removed and replaced while the 24V input is energised. The Bus Interface Module is intrinsically safe with IS LAN connections.

## Environmental

The electronic modules operate over an ambient temperature range of –20°C to +60°C and have a G2 rating according to ISA S71.02.

Note: When mounted in an MTL863 enclosure the ambient temperature range becomes –20°C to +40°C.

# Distributed I/O System

## Zone 1 mounting (1/1)

### SYSTEM SPECIFICATION

#### POWER SUPPLY

**Material** .....Aluminium anodized
**Colour** .....RAL 9002 + black
**External dimensions (W x H x D)** .....50 x 135 x 104 mm
**Weight** .....1 kg

#### I/O MODULES AND BUS INTERFACE MODULE

**Material**.....PC
**Fire protection class**.....V2, UL 94 (DIN IEC 707)
**Colour (light grey)** .....RAL 9002
**External dimensions (W x H x D)** .....20 x 104 x 104 mm
**Weight** .....0.15 kg
**Test voltage (fieldbus, PS, I/O)**.....1500 V
**Test voltage (fieldbus ➔ I/O)** .....1500 V
**Test voltage (I/O ➔ I/O)** .....500 V (where supported)

#### NODE SERVICES CARRIER

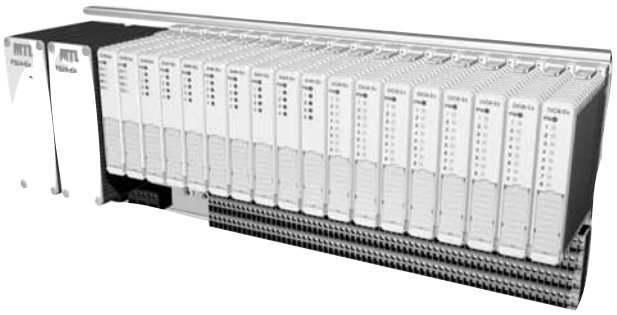
**Material**.....Aluminium chromatised
**Colour**.....Aluminium chromatised
**External dimensions (W x H x D)**.....498 x 274 x 134 mm
**Weight** .....3 kg
**Mounting** .....Zone 1 / Zone 2
**Operating temperature**
Horizontal mounting .....–20°C to 60°C
Vertical mounting.....not permitted
**Storage temperature**.....–40°C to 85°C

#### STANDARDS

**Transport / shock**.....30 g (DIN IEC 721)
**Function / Vibration**.....2 g (DIN IEC 721)
**Reference conditions**.....IEC 770
**EMC**.....EN 61326 / 55822
**Humidity**.....IEC 60 654 ,T 1-4
**Relative humidity**.....< 85% (average)
**Condensation** .....short duration, commissioning
.....or temperature transient
**Corrosive gases** .....ISA Class G2

#### SYSTEM ARCHITECTURE

**I/O modules per node**.....16
**No. of channels per I/O module** .....4 for most modules
.....8 for 818-DX-08
.....2 for 823-PI-02
**No. of grouped channels** .....1, 4 or 8
**Bus length (copper)**.....200 m (1.5 Mbaud)
.....400 m (0.5 Mbaud)



### SYSTEM COMPONENTS

| Item | Part No. |
|---|---|
| MTL8000 1/1 Field Enclosure, 16 module | 863-EN-16 |
| Node Services Carrier, 16 module | 870-CA-16 |
| Power Supply, 24V dc input | 890-PS-DC |
| Power Supply Filter | 895-FL-PS |
| PROFIBUS DP-V1 Bus Interface Module | 850-BI-DP |
| Intrinsically Safe PROFIBUS-DP connector | 858-PF-DP |
| 4–channel AI, 4–20mA | 803-AI-04 |
| 4–channel AI, 4–20mA with HART® | 801-HI-04 |
| 4–channel AI, 0/4–20mA with HART® current sinking | 808-HI-04 |
| 4–channel TI, THC/RTD | 805-TI-04 |
| 4–channel AO, 4–20mA with HART® | 802-HO-04 |
| 4–channel AO, 4–20mA, isolated | 804-AO-04 |
| 8–channel DI/DO | 818-DX-08 |
| 4–channel DO, solenoid driver | 815-DO-04 |
| 2–channel Pulse/Frequency input | 823-PI-02 |
| Dummy Module | 829-DU-MO |
| Intrinsically Safe PROFIBUS-DP interface | 853-IS-DP |
| Intrinsically Safe PROFIBUS-DP interface with terminator | 854-IS-DP |

### EXPLOSION PROTECTION

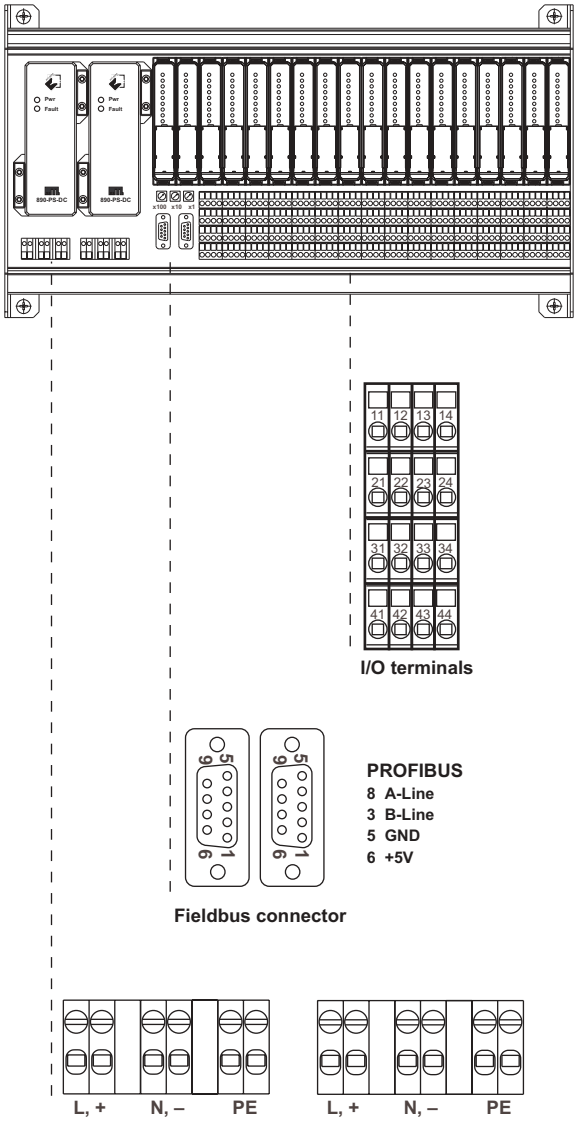
**System certificate number** .....Baseefa03ATEX0728X

# Node Services Carrier

## 16 - module

**870-CA-16**

- *mountings for up to 16 I/O modules*
- *prepared for redundant system power and communication*
- *up to 4 terminals per channel*
- *preselection of fieldbus address*
- *prepared for certified field housing*
- *mounting in Zone 1 or Zone 2 possible*




## MODULE SPECIFICATION

***See also System Specification***

### FIELD TERMINALS

**Rated supply voltage (PS)** .....19.2 to 33 V DC
**System power terminals** ..... EEx e
Rated terminal cross section .....0.5mm$^2$ to 2.5 mm$^2$
**Fieldbus connector** .....SUB D, 9 pins
**Bus address** .....1...126 (switch)
**I/O Terminals** .....EEx i (blue)
Rated terminal cross section.....0.08 mm$^2$ to 2.5 mm$^2$
**Connection** .....Spring loaded

### EXPLOSION PROTECTION

**Certificate number**.....PTB01ATEX2138U
**Ex-protection for:**
- Power supply .....II 2 G EEx m [ib] e IIC T4
- Bus Interface Module.....II 2 G EEx ib IIC T4
- I/O modules.....II 2 (1) G EEx ib [ia] IIC T4
- Node Services Carrier.....II 2 (1) G EEx e ib [ia] IIC

### GENERAL DATA

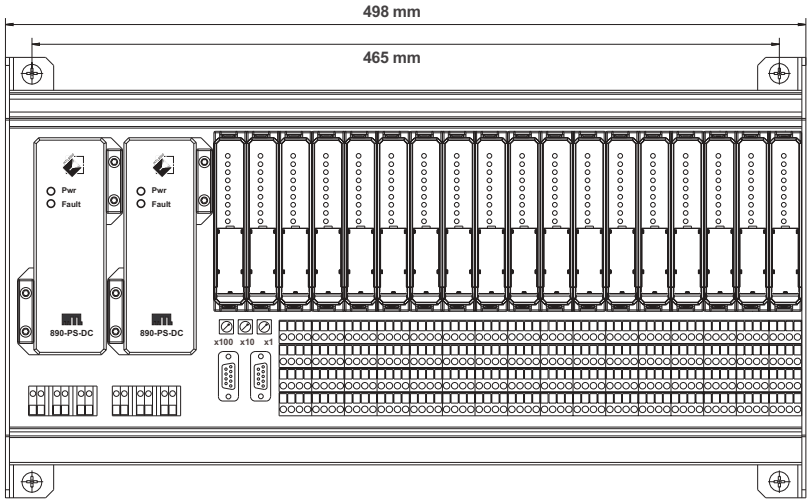
**Type of protection**
- I/O Terminals .....IP 20
- System power terminals .....IP 30

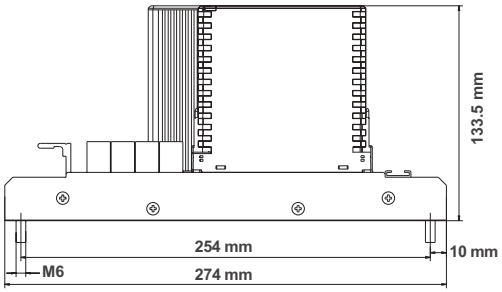
**Protection class**..... EN 61010
**Explosion protection** .....EN 50020, EN 50019
**Mounting in a junction box** .....Zone 1
**Required protection degree** .....IP 54 or better
**External dimensions (W x H x D)** .....498 x 274 x 134 mm
**Weight** .....3 kg

# Node Services Carrier

## 16 - module

**870-CA-16**




# Profibus Connector

**858-PL-DP**

- *intrinsically safe Profibus 9-pin D-type connector*
- *dual Profibus cable input per connector*
- *switch selectable termination resistors*

# Power supply

## 24 V dc input

**890-PS-DC**

- *powers BIM and I/O modules*
- *hot swap capability in Zone 1 or Zone 2*
- *redundant power for bumpless exchange (in case of redundancy)*

## MODULE SPECIFICATION

***See also System Specification***

### INPUT

**Power supply (PS)**..... 24 V DC (19.2 to 33 V)
**Power load**..... < 2.1 A / 24 V; < 2.6 A / 19.2 V
**Total power consumption** .....< 50 Watts

### OUTPUT

**Available power for modules**.....< 45 Watts
**Powered module capacity**
a) for I/O modules with power consumption < 2.6 W
.....16 I/O modules + 2 x 850-BI-DP
**Example**.....16 x 803-AI-04 + 2 x 850-BI-DP
b) for I/O modules with power consumption > 2.6 W
.....< 16 I/O modules + 2 x 850-BI-DP
**Examples**.....13 x 804-AO-04 + 2 x 850-BI-DP
(*275 mW < valves < 500 mW* ).....7 x 815-DO-04 + 2 x 850-BI-DP
(*Refer to Installation Guide for further information*)

### EXPLOSION PROTECTION

**Certificate number** .....PTB 01 ATEX 2141
**Type of protection**..... II 2 G EEx m [ib] e IIC T4

### DIAGNOSTIC INFORMATION

**System/Module power on**..... LED green / green

### TEST VOLTAGE

**Power supply**
- for module supply .....1500 V
- for Exi current circuits .....1500 V

**PA/PE**
- for Exi current circuits ..... 500 V

### GENERAL DATA

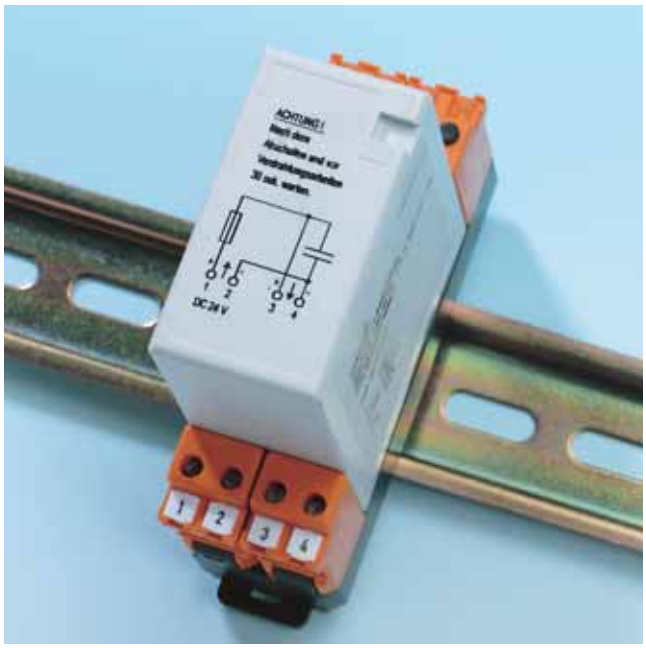
**External dimensions (W x H x D)**..... 50 x 135 x 104 mm
**Weight** .....1 kg

# Power conditioner

## 24 V dc supply filter

**895-FL-PS**

- *power supply filter with increased safety*
- *zone 1 mounting inside approved field housings*
- *operation on 24V DC power supply lines*
- *connect power conditioner between the primary supply and backplane*



## MODULE SPECIFICATION

***See also System Specification***

### INPUT

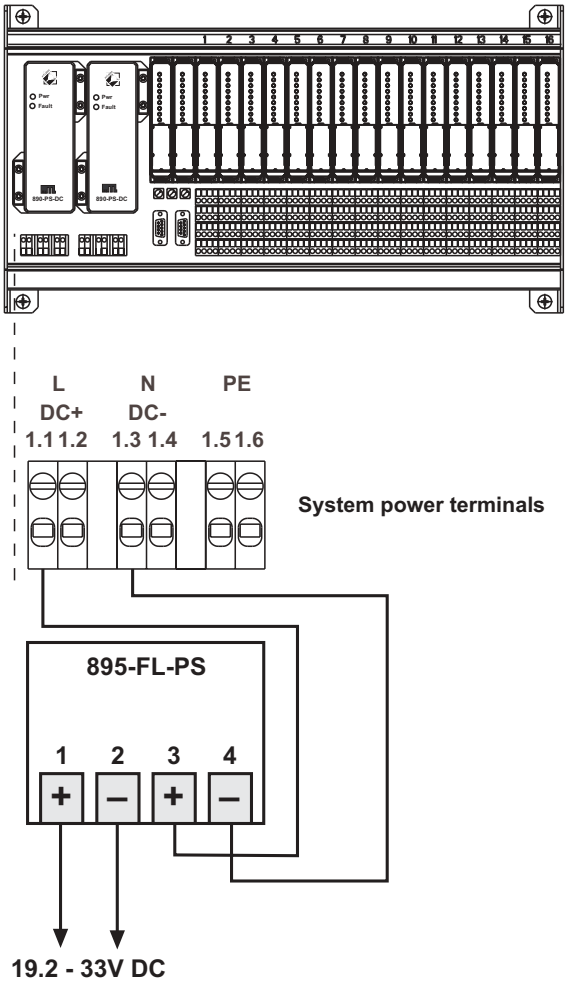
**Nominal voltage**.....24 V DC (19.2 to 33 V)
**Nominal current**.....4 A
**Integrated capacitance** .....470 µF

### EXPLOSION PROTECTION

**Certificate number**.....PTB 97 ATEX 1068 U
**Type of protection** .....II 2 G EEx de IIC[M 2 EEx de] T4

### GENERAL DATA

**Mounting** .....Zone1
**Mounting type** .....top hat DIN rail to EN 50022
**Protection class**.....IP 20
**Storage temperature** .....–40º to +60º C
**Operating temperature** .....–20º to +60º C
**Relative humidity** .....<85%
**Material**.....Thermoplast
**External dimensions (W x H x D)**.....30 x 91 x 94 mm
**Weight**.....approx. 0.27 kg



# Bus Interface Module

## Profibus-DP V1

**850-BI-DP**

- *fieldbus protocol PROFIBUS DP V1 (EN 50170)*
- *couples internal CAN bus to external PROFIBUS*
- *HART® protocol on PROFIBUS DP V1*
- *line/media redundancy via 2 coupling modules*
- *isolation between field bus, power, CAN bus*
- *diagnosis, configuration and parameterisation via PROFIBUS*

### MODULE SPECIFICATION

***See also System Specification***

#### INTERNAL BUS

**Internal bus protocol**.....CAN Open
**Cycle time for digital I/O´s** .....< 5 ms
**Cycle time for analog I/O´s** .....< 20 ms

#### FIELDBUS

**Protocol** .....PROFIBUS-DP V1 (EN 50170)
.....intrinsically safe
**I.S.Voltage for bus termination** .....5 V

#### EXPLOSION PROTECTION

**Certificate number**.....PTB 01 ATEX 2143
**Certificate code**.....II 2 G EEx ib IIC T4

#### DIAGNOSTIC INFORMATION

**Via LED indicators**

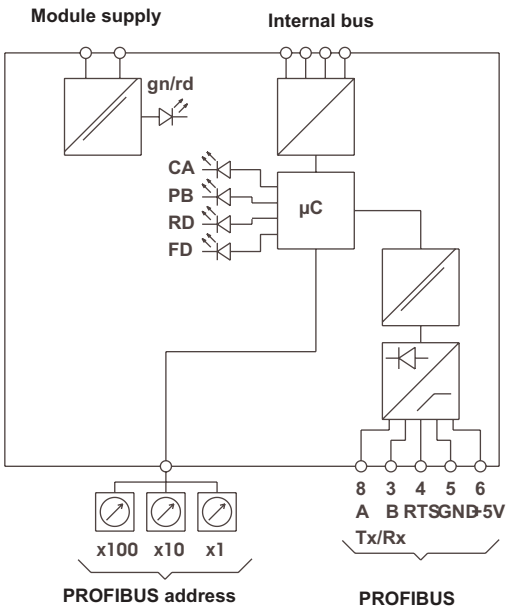
System / Module power on .....LED green / red
PROFIBUS communication..... LED yellow / red
Internal communication .....LED yellow / red
Active status.....LED yellow
Configuration error .....LED red

**Via fieldbus**

.....Power or communication loss
.....Internal module temperature
.....Redundancy mode

#### GENERAL DATA

**Total power consumption**.....approx. 2.4 W



# 4-channel Analog Input

## 4–20 mA

**803-AI-04**

- *power supply for 4–20 mA loop powered transmitters*
- *short and break detection*
- *isolation, input to bus and input to power*
- *common return for all inputs*
- *4-channel, EEx ia IIC*


## MODULE SPECIFICATION

***See also System Specification***

### INPUT

**Input current** .....4 to 20 mA
**Range** .....0 to 24 mA
**Transmitter supply** ..... > 15 V (20 mA)
**Internal current limitation** .....24 to 26 mA
**Input impedance** ..... 240 ohm
**Residual ripple** .....< 100 mV
**Short-circuit detection** .....< 5 V
**Line-break detection** .....< 2 mA

### EXPLOSION PROTECTION

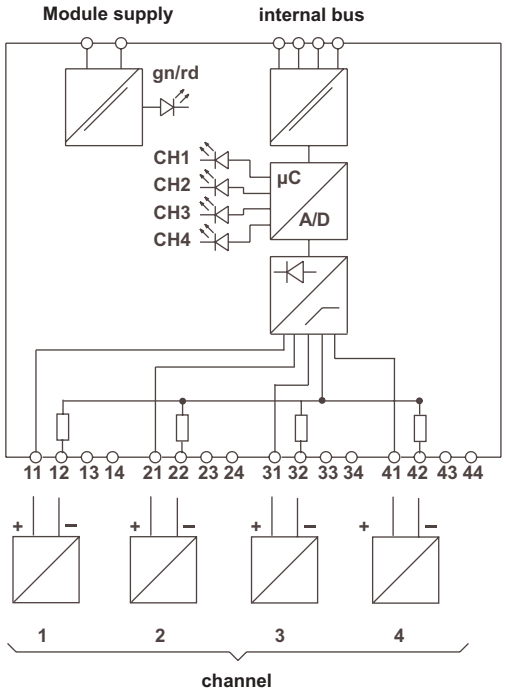
**Certificate number** .....PTB 01 ATEX 2137 X
**Max. short-circuit current** .....$I_0$ = 93 mA
**Voltage** .....$U_0$ = 22.1 V
**Performance** .....$P_0$ = 403 mW
**External inductance** .....$L_0$ = 1.78 mH
**External capacitance** .....$C_0$ = 100 nF

### DIAGNOSTIC INFORMATION

**System/ Module power on** .....LED green / red
**Line break or short circuit** .....LED 1 to 4, red
**Via fieldbus**
Break, short .....per channel
Over/under-range .....per channel
Simulation .....per channel
Communication, hardware .....for each I/O module

### CHARACTERISTICS AT RATED CONDITIONS

**Accuracy incl. nonlinearity** .....< 0.1 %
**Digital Accuracy** .....14 bit
**Linearity** .....< 0.05 %
**Temperature effect** .....< 0.05 % / 10 K
**Response time** .....50 ms (10% -> 90%)
**50/60 Hz filter** .....> 30 dB
**Damping per software** .....PT1
**Total power consumption** .....< 2.6 W (20 mA)



# 4-channel Analog Input

## 4–20 mA with HART®

**801-HI-04**

- *power supply for 4–20 mA loop powered transmitters*
- *short and break detection*
- *isolation, input to bus and input to power*
- *common return for all inputs*
- *4-channel, EEx ia IIC*
- *transmission of HART® frames*


## MODULE SPECIFICATION

***See also System Specification***

### INPUT

**Input current** .....4 to 20 mA
**Range** .....0 to 24 mA
**Transmitter supply** .....> 15 V (20 mA)
**Internal current limitation** .....24 to 26 mA
**Input impedance** .....240 ohm
**Residual ripple** .....< 100 mV
**Short-circuit detection** .....< 5 V
**Line-break detection** .....< 2 mA

### EXPLOSION PROTECTION

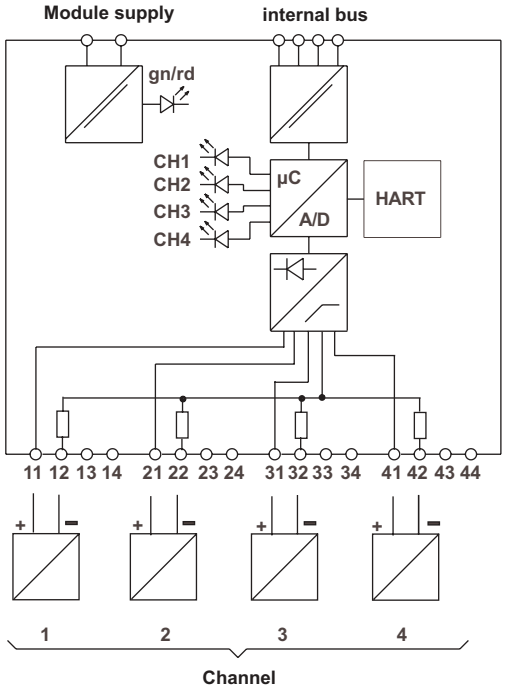
**Certificate number** .....PTB 01 ATEX 2137X
**Max. short-circuit current** .....$I_o$ = 93 mA
**Voltage** .....$U_o$ = 22.1 V
**Performance** .....$P_o$ = 403 mW
**External inductance** .....$L_o$ = 1.78 mH
**External capacitance** .....$C_o$ = 100 nF

### DIAGNOSTIC INFORMATION

**System / Module power on** .....LED green / red
**Line break or short circuit** .....LED 1 to 4, red
**Via fieldbus**
Break, short .....per channel
Over/under-range .....per channel
Simulation .....per channel
Communication, hardware .....for each I/O module

### CHARACTERISTICS AT RATED CONDITIONS

**Accuracy incl. nonlinearity** .....< 0.1 %
**Digital Accuracy** .....14 bit
**Linearity** .....< 0.05 %
**Temperature effect** .....< 0.05 % / 10 K
**Response time** .....50 ms (10% -> 90%)
**50/60 Hz filter** .....> 30 dB
**Damping per software** .....PT1
**Total power consumption** .....< 2.6 W (20 mA)



# 4-channel Analog Input

## Current sinking

**808-HI-04**

- *passive inputs for 0/4 to 20 mA*
- *short and break detection*
- *isolation, input to bus and input to power*
- *common return for all inputs*
- *4-channel, EEx ia IIC*
- *transmission of HART® frames*


## MODULE SPECIFICATION

***See also System Specification***

### INPUT

**Input current** .....0/4 to 20 mA
**Range** .....0 to 24 mA
**Input impedance** .....250 ohm
**Line-break / short circuit det.** .....< 2 mA (4 to 20 mA)

### EXPLOSION PROTECTION

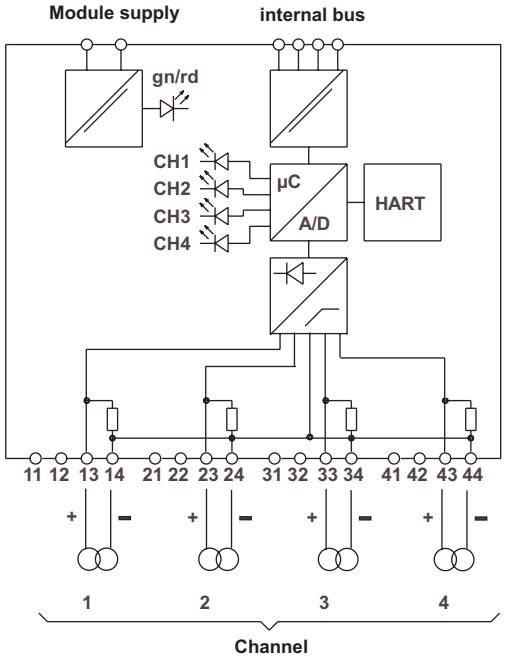
**Certificate number** .....PTB 01 ATEX 2137X
**Max. short-circuit current** .....$I_0$ = 16 mA
**Voltage** .....$U_0$ = 7.2 V
**Performance** .....$P_0$ = 29 mW

### DIAGNOSTIC INFORMATION

**System / Module power on** .....LED green / red
**Line break or short circuit** .....LED 1 to 4, red
**Via fieldbus**
Line-break or short-circuit .....per channel
Over/under-range .....per channel
Simulation .....per channel
Communication, hardware .....for each I/O module

### CHARACTERISTICS AT RATED CONDITIONS

**Accuracy incl. nonlinearity** .....< 0.1 %
**Digital Accuracy** .....14 bit
**Linearity** .....< 0.05 %
**Temperature effect** .....< 0.05 % / 10 K
**Response time** .....50 ms (10% -> 90%)
**50/60 Hz filter** .....> 30 dB
**Damping per software** .....PT1
**Total power consumption** .....< 2W



# 4-channel Temperature Input

## THC and RTD

**805-TI-04**

- *Pt 100, Pt 1000, Ni 100, 0..4 kOhm in 2/3/4 wire configuration*
- *thermocouple type B, E, J, K, L, N, R, S, T, U, mV*
- *internal cold junction compensation*
- *short and break detection*
- *isolation, input to bus and input to power*
- *isolation channel to channel*
- *4-channel, EEx ia IIC*


## MODULE SPECIFICATION

***See also System Specification***

### INPUT (PT 100, PT 1000)

**Wire resistance (4 wire)** .....< 50 ohm for each wire
**Wire resistance (3 wire)** .....0 to 10 ohm symmetric
**Wire resistance (2 wire)** .....< 10 ohm
**Short-circuit detection**.....< 5 ohm
**Sensor, line-break detection** .....> 10 kOhm

### INPUT (THERMOCOUPLE)

**Line-break detection**.....< 100 nA, > 150 mV

### EXPLOSION PROTECTION

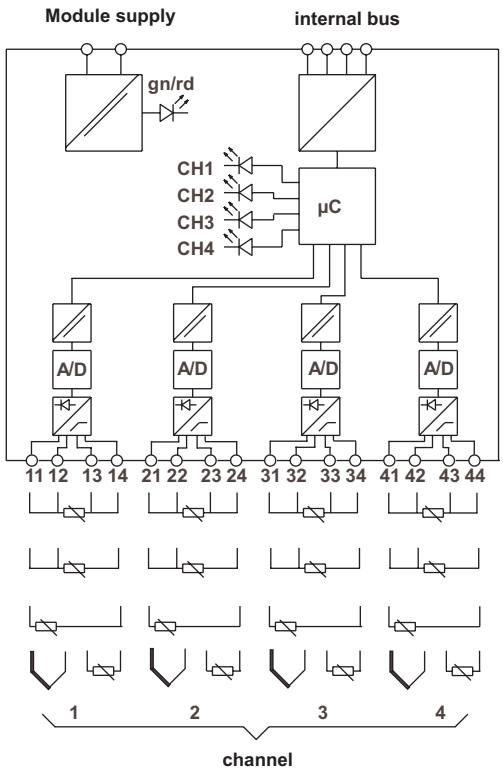
**Certificate number**.....PTB 01 ATEX 2140
**Max. short-circuit current** .....$I_0$ = 25 mA
**Voltage** .....$U_0$ = 5.5 V
**Performance** .....$P_0$ = 35 mW
**External inductance**.....Lo = 2 mH See Note 1
**External capacitance** .....Co = 2.6 µF See Note 1
***Note 1:*** *For permissible alternatives see PTB ATEX Certification.*

### DIAGNOSTIC INFORMATION

**System / Module power on** .....LED green / red
**Line break or short circuit** .....LED 1 to 4, red
**Via fieldbus**
Break, short .....per channel
Over/under-range .....per channel
Simulation .....per channel
Communication, hardware .....for each I/O module

### CHARACTERISTICS AT RATED CONDITIONS

**Calibrated accuracy** .....< 0.2K, < 80 mOhm, < 0.01 mV
**Digital Accuracy** .....16 bit
**Linearity** .....< 0.05 %
**Temperature effect** .....< 0.05 % / 10 K
**Response time** .....1 s (10% -> 90%)
**50/60 Hz filter** .....> 40 dB
**Damping per software**.....PT1
**Total power consumption**.....< 2 W



# 4-channel Analogue Output

## 0/4-20mA with HART®

**802-HO-04**

- output signal 0/4 to 20mA for actuators
- short and break detection
- electrical isolation between output/bus and output/power
- output with common ground
- 4 channel, EEx ia II C
- HART® pass-through
- HART® process and status variable reporting


## MODULE SPECIFICATION

***See also System Specification***

### OUTPUT

**Output current** .....0/4 to 20 mA
**Range** .....0 to 24 mA
**Load** .....700 ohm (20 mA)
**Short-circuit detection** .....< 30 ohm
**Line-break detection** .....>15 V

### EXPLOSION PROTECTION

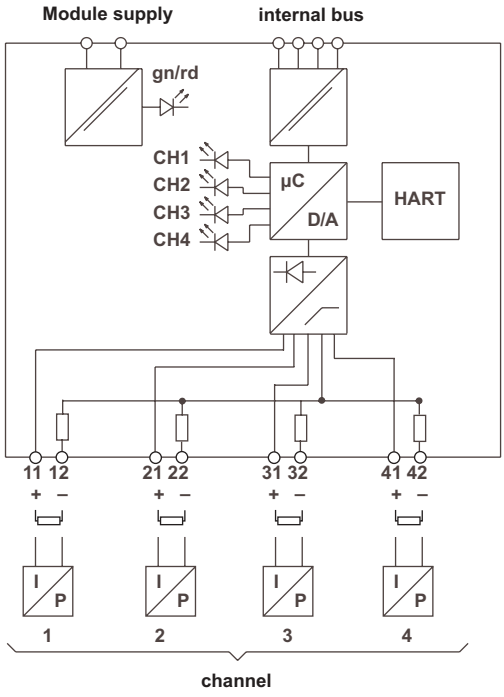
**Certificate number**.....PTB 02 ATEX 2168
**Max. short-circuit current** .....$I_o$ = 93 mA
**Voltage** .....$U_o$ = 22.1 V
**Performance** .....$P_o$ = 406 mW
**External inductance** .....$L_o$ = 1.78 mH
**External capacitance**.....$C_o$ = 100 nF

### DIAGNOSTIC INFORMATION

**System/Module power on** .....LED green / red
**Line break or short circuit** .....LED 1 to 4, red
**Via fieldbus**
Break, short .....per channel
Over/under-range .....per channel
Simulation .....per channel
Communication, hardware .....for each I/O module

### CHARACTERISTICS AT RATED CONDITIONS

**Accuracy incl. nonlinearity** .....< 0.1 %
**Digital Accuracy** .....13 bit
**Linearity** .....< 0.05 %
**Temperature effect** .....< 0.05 % / 10 K
**Response time** .....50 ms (10% -> 90%)
.....200 ms for HART
**Total power consumption** .....2.5 W



# 4-channel Analog Output

## 4–20 mA, isolated

**804-AO-04**

- *output signal 0/4 –20 mA for actuators*
- *short and break detection*
- *isolation, output to bus and output to power*
- *isolation channel to channel*
- *4-channel, EEx ia IIC*


## MODULE SPECIFICATION

***See also System Specification***

### OUTPUT

**Output current** .....0/4 to 20 mA
**Range** .....0 to 24 mA
**Load** .....700 ohm (20 mA)
**Short-circuit detection** .....< 100 ohm
**Line-break detection** .....< 2 mA

### EXPLOSION PROTECTION

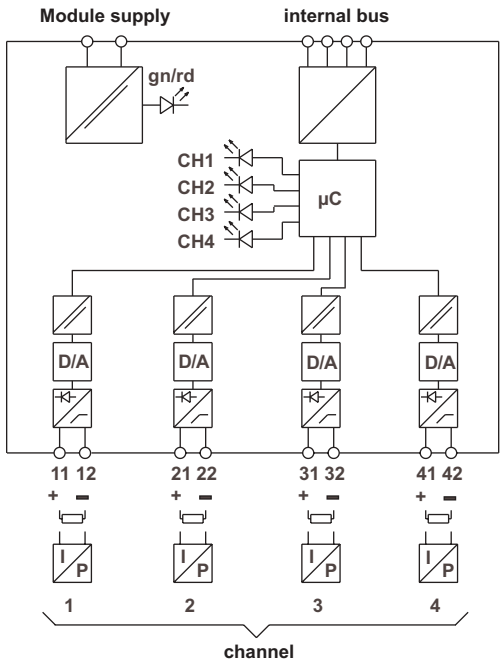
**Certificate number**.....PTB 01 ATEX 2142
**Max. short-circuit current** .....$I_0$ = 80 mA
**Voltage** .....$U_0$ = 18.9 V
**Performance** .....$P_0$ = 510 mW
**External inductance** .....$L_0$ = 2 mH
**External capacitance**.....$C_0$ = 100 nF

### DIAGNOSTIC INFORMATION

**System/Module power on** .....LED green / red
**Line break or short circuit** .....LED 1 to 4, red
**Via fieldbus**
Break, short .....per channel
Over/under-range .....per channel
Simulation .....per channel
Communication, hardware .....for each I/O module

### CHARACTERISTICS AT RATED CONDITIONS

**Accuracy incl. nonlinearity** .....< 0.1 %
**Digital Accuracy** .....13 bit
**Linearity** .....< 0.05 %
**Temperature effect** .....< 0.05 % / 10 K
**Response time** .....50 ms (10% -> 90%)
**Total power consumption** .....< 3.1 W



# 8-channel Digital Input/Output

**818-DX-08**

- *configurable as a mixture of inputs and outputs*
- *inputs - dry contacts/proximity switches (NAMUR)*
- *outputs - low power intrinsically safe valves*
- *short and break detection*
- *isolation - input to bus, input to power*
- *common return for all inputs/outputs*
- *8 I/O channel, EEx ia IIC*


## MODULE SPECIFICATION

***See also System Specification***

### INPUT

**No-load voltage** ..... 8 V DC
**Short-circuit current** ..... 3 mA to 4 mA
**Switching point in range** ..... 1.4 mA to 1.8 mA
**Switching hysteresis** ..... 0.2 mA
**Switching frequency** ..... < 100 Hz
**Short-circuit detection** ..... < 367 ohm
**Line-break detection** ..... < 0.2 mA
**Explosion protection** ..... PTB 01 ATEX 2139

### INPUT OR OUTPUT

**Max. short-circuit current** ..... $I_0$ = 44 mA
**Voltage** ..... $U_0$ = 9.6 V
**Performance** ..... $P_0$ = 106 mW
**External inductance** ..... $L_0$ = 2 mH
**External capacitance** ..... $C_0$ = 900 nF

### OUTPUT

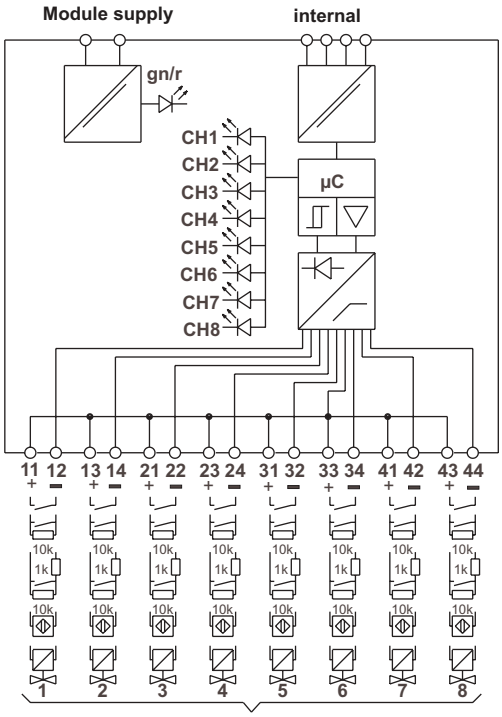
**No-load voltage** ..... < 8 V DC
**Effective current** ..... < 4 mA
**Internal resistance** ..... 320 ohm
**Switching frequency** ..... < 100 Hz
**Short-circuit detection** ..... < 1 kOhm
**Line-break detection** ..... < 0.2 mA

### DIAGNOSTIC INFORMATION

**System / Module power on** ..... LED green / red
**Open (off)/ closed (on)** ..... LED 1 to 8, off / yellow
**Line break or short circuit** ..... LED 1 to 8, red
**Via fieldbus**
Break, short ..... per channel
Simulation ..... per channel
Via fieldbus ..... for each I/O module

### CHARACTERISTICS AT RATED CONDITIONS

**De-bounce filter** ..... 2 to 100 ms
**Total power consumption** ..... < 1.1 W




**Inputs for :**
Dry contacts, NAMUR proximity switches
**Output for valves from eg.:**
Samson (all standard valves with 6 V coil)
Hoerbiger (only Piezo valve)
Asco-Joucomatic (only Piezo valve)

# 4-channel Digital Output

## Solenoid driver

**815-DO-04**

- *output for intrinsically safe valves or alarms*
- *integrated driving power*
- *short and break detection*
- *isolation - output to bus and output to power*
- *electrical isolation channel to channel*
- *4-channel, EEx ia IIC*


## MODULE SPECIFICATION

***See also System Specification***

### OUTPUT

**Supply voltage and current** .....21 V / 8 mA
.....18 V / 20 mA
.....15 V / 30 mA
.....12 V / 40 mA
**No-load voltage** .....24 V DC (16 V DC min)
**Internal resistance** ..... 300 ohm
**Switching frequency** .....< 100 Hz
**Short-circuit detection** ..... < 5 V
**Line-break detection** .....< 1 mA

### EXPLOSION PROTECTION

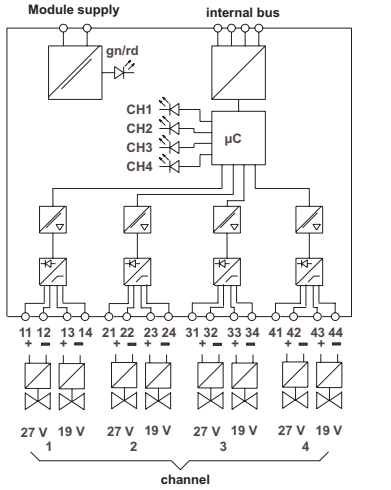
**Certificate number** .....PTB 01 ATEX 2136
**Safety description (terminals 11,12,21,22,31,32,41,42)**
Max. short-circuit current .....$I_o$ = 100 mA
Voltage..... $U_o$ = 27 V
Performance .....$P_o$ = 675 mW
External inductance ..... $L_o$ = 0.99 mH *See* Note 1
External capacitance..... $C_o$ = 30 nF *See* Note 1
**Safety description (terminals 13,14,23,24,33,34,43,44)**
Max. short-circuit current .....$I_o$ = 100 mA
Voltage..... $U_o$ = 18.9 V
Performance .....$P_o$ = 675 mW
External inductance ..... $L_o$ = 1 mH *See* Note 1
External capacitance..... $C_o$ = 86 nF *See* Note 1
***Note1:*** *For a list of permissible alternatives see PTB ATEX Certification.*

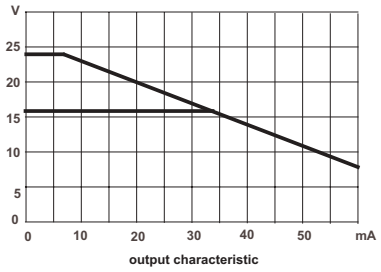
### DIAGNOSTIC INFORMATION

**System / Module power on**.....LED green / red
**Output on** .....LED 1 to 4, yellow
**Line break or short circuit** .....LED 1 to 4, red
**Via fieldbus**
Break, short..... per channel
Simulation ..... per channel
Communication, hardware .....for each I/O module

### CHARACTERISTICS AT RATED CONDITIONS

**Total power consumption** ....< 2.5 W (for valves < 275 mW)
.....< 5.2 W (for valves < 500 mW)



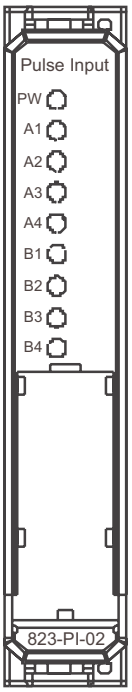




**Output for valves from e.g.:** ..... Asco-Joucomatic
.....Bürkert
.....Eugen Seitz e.g. PV12F73
.....Norgren-Herion
.....Parker-Lucifer
.....Samsomatic

# Pulse input

**823-PI-02**

- *frequency input for dry contacts or proximity switches*
- *short and break detection*
- *electrical isolation, input to bus and input to power*
- *frequency measurement or counting applications*
- *two function blocks*
- *reset via Fieldbus or control input*
- *status outputs / direction recognition*




## MODULE SPECIFICATION

***See also System Specification***

### INPUT

**No-load voltage** .....8 V DC
**Short-circuit current** .....3 to 4 mA
**Switching point in range** .....1.4 to 1.8 mA
**Switching hysteresis** .....0.2 mA
**Short-circuit detection**.....< 367 ohm
**Line-break detection**.....< 0.2 mA
**Input frequency** .....4 kHz
.....1.25 kHz with direction recognition
**Counter**.....30 bit (29 bit and digit sign)

### EXPLOSION PROTECTION

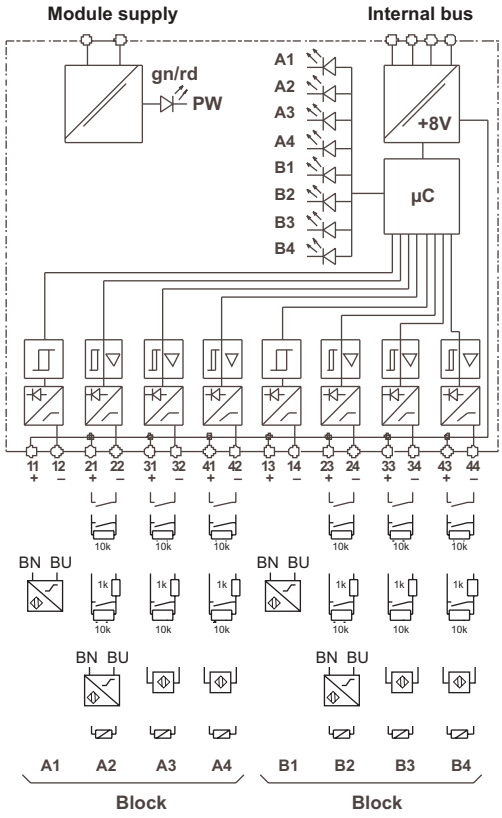
**Certificate number** .....PTB01ATEX2139
**Max. short-circuit current** .....$I_0$ = 44 mA
**Voltage** .....$U_0$ = 9.6 V
**Performance** .....$P_0$ = 106 mW
**External inductance** .....$L_0$ = 1 mH
**External capacitance**.....$C_0$ = 1100 nF

### DIAGNOSTIC INFORMATION

**System / Module power on** .....LED green / red
**Open (off) / Closed (on)**.....LED 1 to 8, off / yellow
**Line break or short circuit** .....LED 1 to 8, red
**Via fieldbus**
line-break or short-circuit .....per channel
Over/under-range .....per channel
Simulation .....per channel
Communication, hardware .....for each I/O module

### CHARACTERISTICS AT RATED CONDITIONS

**De-bounce filter** .....0 to 100 ms
**Total power consumption** .....< 1.1W
**Accuracy for frequency measurement**.....0.1% / 1%
.....depending on time window

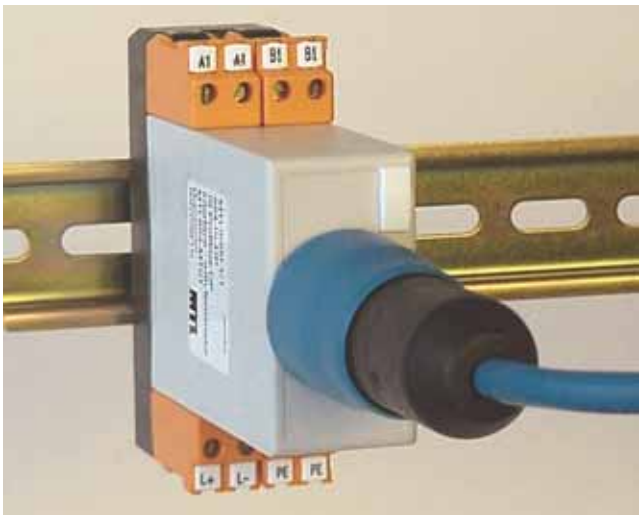


# Intrinsically safe isolator

## Profibus-DP and RS485

**853-IS-DP**
**854-IS-DP**

- *typically up to 5 MTL8000 1/1 IS nodes/interface*
- *fieldbus and RS485 repeater*
- *multidrop interfaces on single Profibus-DP or RS485 LAN*



## MODULE SPECIFICATION

***See also System Specification***

### ENVIRONMENTAL

**Ambient temp**

Operating, optimum orientation* .....–20°C to + 40°C

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

* see system specification

### PHYSICAL NETWORK

**Profibus-DP/IS Profibus-DP**.....1.5Mbits/s (max.)

**RS485/IS RS485**.....1.5Mbits/s (max.)

### HOST CONNECTIONS

| Profibus | | Power | |
|---|---|---|---|
| **A** | Profibus - DP A | **PE** | Protective Earth |
| **A** | Profibus - DP A | | |
| **B** | Profibus - DP B | **L+** | Power Supply +ve |
| **B** | Profibus - DP B | **L–** | Power Supply 0V |

**Type**.....rising cage clamp screw terminals

**Conductor size**.....0.14 to 2.5mm$^2$

### IS CONNECTION

| | |
|---|---|
| **A** | IS Profibus - DP A |
| **A** | IS Profibus - DP A |
| **B** | IS Profibus - DP B |
| **B** | IS Profibus - DP B |

**Plug connection** .....spring latch connector QUICKON®

**Conductor size** .....0.34 - 0.5mm$^2$

**Jacket diameter**.....6.0 - 7.5mm

**Approved cable for plug**

.....Lapp-Kabel Unitronic-EB JE-LiYCY...BD blue(EEx i)

.....2 x 2 x 0.34mm$^2$

### FIELDBUS TERMINATOR

**Host side**

853-IS-DP .....none

854-IS-DP.....permanently connected terminator

**IS side**.....permanently connected terminator

### OUTPUT

**Number of channels**.....1

### INPUT

**Input voltage**.....20 - 30V dc

**Current consumption**

.....95 mA (typical) at 20V

.....83 mA (typical) at 24V

.....76 mA (typical) at 28V

### SAFETY

**Location of module** .....Safe area

**Location of field wiring** .....Zone 0, IIC hazardous area

**Field wiring protection**.....intrinsically safe

**Certification Code**.....II [1] G EEx m [ia] IIC

**Safety description**

IS RS485/IS Profibus-DP .....4.1V, 144mA, 0.15W

IS Power .....10.5V, 284mA, 0.75W

IS RS485 and Power.....10.5V, 428mA, 0.9W

### Applicable standards:

- EN 50014: Electrical apparatus for potentially explosive atmospheres, general requirements
- EN 50020: Electrical apparatus for potentially explosive atmospheres, intrinsic safety "i"
- EN 50028: Electrical apparatus for potentially explosive atmospheres, encapsulation "m"
- EN 50039: Electrical apparatus for potentially explosive atmospheres. Specification for intrinsically safe electrical systems "i"
- EC Directive 94/9/EC

**Certification compatible with** .....IS Profibus-DP specification

*QUICKON® is a registered trademark of Phoenix*

# Intrinsically safe isolator

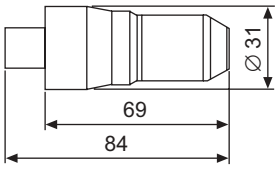
## Profibus-DP and RS485

**853-IS-DP**
**854-IS-DP**

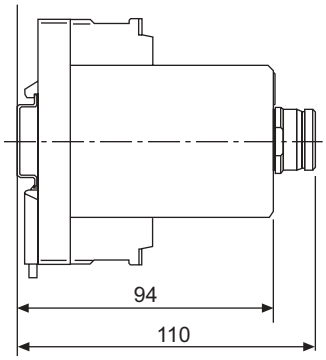
### MECHANICAL

**Mounting** .....DIN rail
**Module width** .....31 mm
**Weight (module)**.....200 g
**Weight (connector)**.....95 g

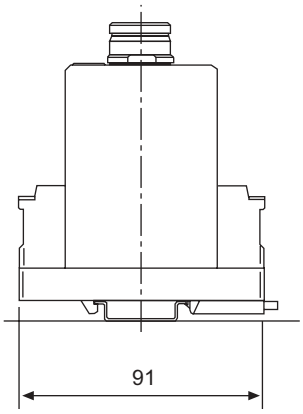
### Connector dimensions




### Module dimensions




Module width 31mm



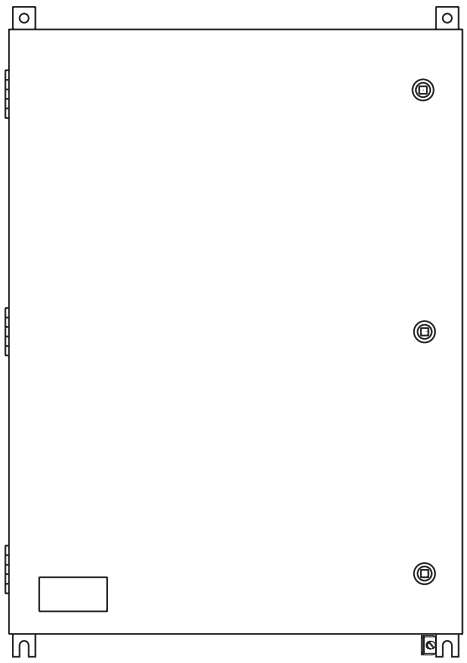
# Field Enclosure

## Stainless steel

**863-EN-16**

- *enclosure for 870-CA-16 Node Services Carrier*
- *prepared for wall mounting*
- *mounting in Zone 1*
- *DIN rail for power supply filters*

Enclosure type 863-EN-16 is designed to accommodate a complete MTL8000 1/1 node with up to 16 I/O modules in a Zone 1 hazardous area. It has integral mounting arrangements for the 870-CA-16 Node Services Carrier (not supplied) and provision for all wiring and accessories, including mounting brackets for two 895-FL-PS power supply filters. Generous internal space is provided for routing and termination of field wiring. There is a choice of gland plates, to suit a wide range of requirements, together with certified cable glands and blanking plugs as separate options.



## ENCLOSURE SPECIFICATION

### GENERAL DATA

**Body dimensions (W x H x D)** .....600 x 800 x 300 mm
**Material**.....stainless steel
**Door hinges**.....left hand side
**Cable gland-plate**.....see options below
**External earth connection**.....M6 stud
**Enclosure mounting** .....4 x M10 bolts
**Mounting bracket hole centres (mm)** .....830(H) x 560(W)

### EXPLOSION PROTECTION

**Certificate number**.....DNV-2001-OSL-ATEX0176
**Certificate code** .....II 2 G EExe e II T6-T4

### TYPE OF PROTECTION

**Enclosure** .....IP66
**Protection class**.....EN 60529

### WEIGHT

**Enclosure only**.....30 kg
**Fully populated**.....39 kg

## GLAND PLATE SPECIFICATIONS

### MODEL OPTIONS

**Undrilled (except for fixing holes)** .....877-GP-10
**50 I/O signal cable version** .....876-GP-50
**80 I/O signal cable version** .....875-GP-80

*All options include an IP66 protection breather–drain plug*

### GLAND HOLE DIMENSIONS (*drilled models*)

**Breather–drain plug**.....M25
**Power cable (x2)**.....M32
**Profibus LAN cable (x6)** .....M20, 7.5 - 13 mm cables
**I/O signal cable (*)**.....M16, 6 - 10 mm cables

** Number of signal cable gland holes depends upon gland plate ordered.*

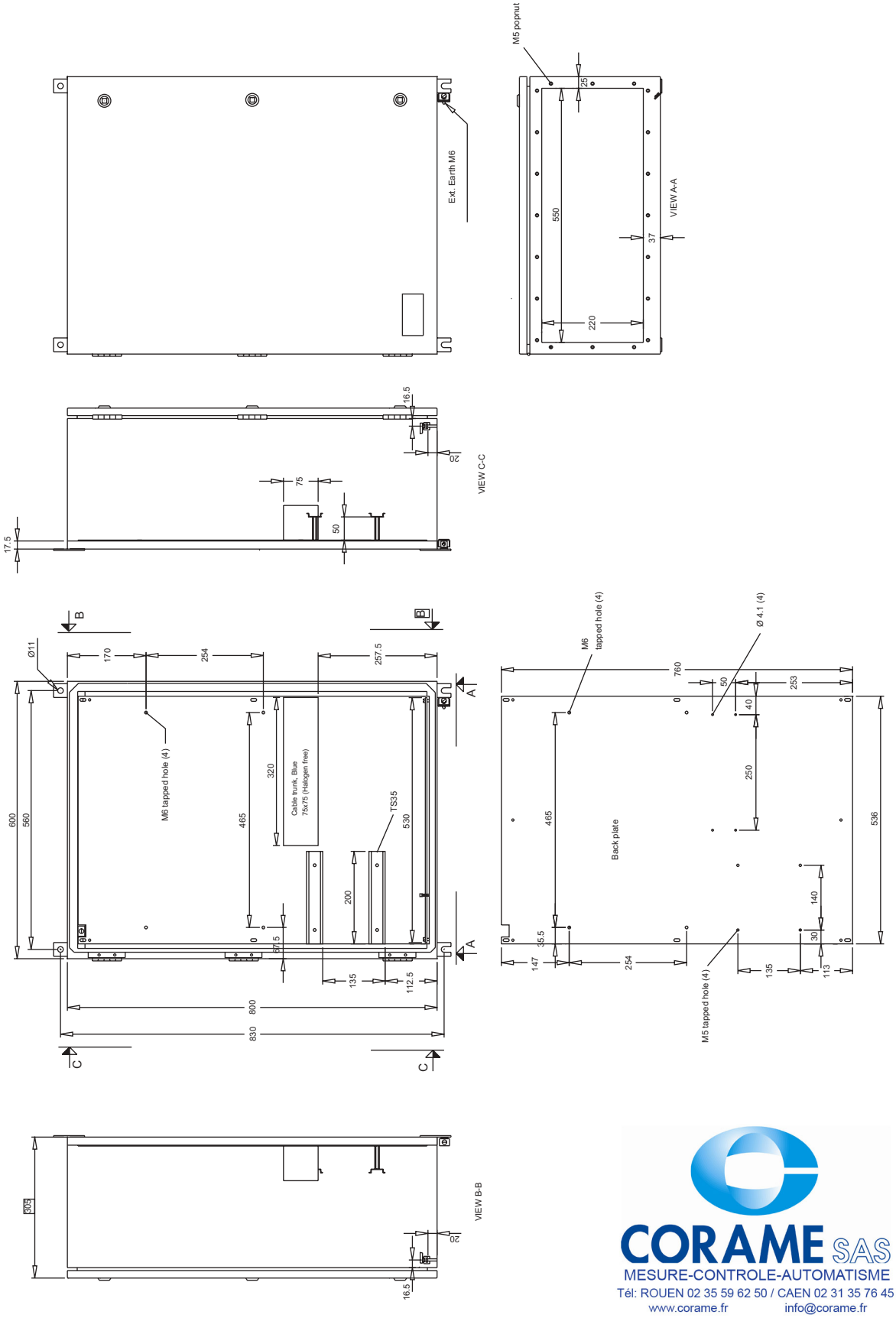
### CABLE GLAND KITS

| 880-CG-80 Size/Qty | M32 | M20 | M16 |
|---|---|---|---|
| Ex e cable glands | 2 | 6 | 80 |
| Ex e stopping plugs + locknuts | 1 | 3 | 20 |

| 881-CG-50 Size/Qty | M32 | M20 | M16 |
|---|---|---|---|
| Ex e cable glands | 2 | 6 | 50 |
| Ex e stopping plugs + locknuts | 1 | 3 | 20 |

## ORDERING INFORMATION

**Enclosure**.....863-EN-16
**Undrilled gland plate**.....877-GP-10
**Drilled gland plate (50 I/O gland holes)**.....876-GP-50
**Drilled gland plate (80 I/O gland holes)**.....875-GP-80
**Cable gland kit for 876-GP-50** .....881-CG-50
**Cable gland kit for 875-GP-80** .....880-CG-80





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