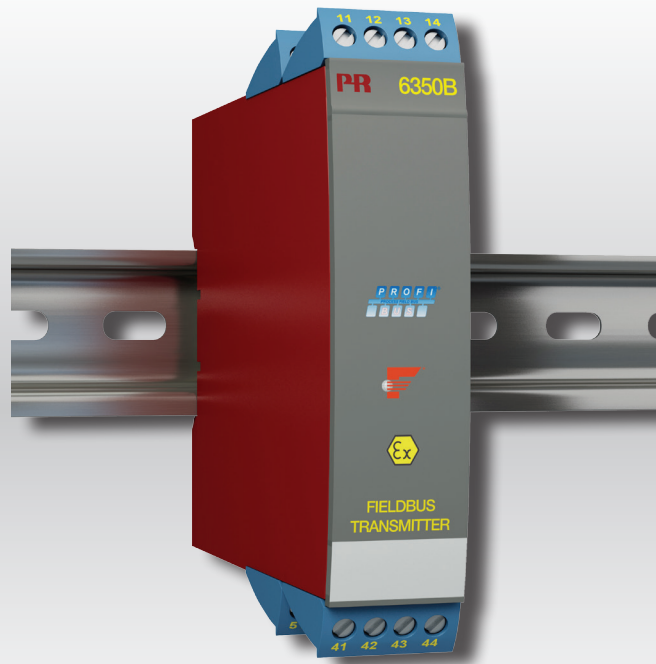


Product Manual  
**Burns Model T60** (PR 6350B2A)  
***PROFIBUS PA / FOUNDATION  
Fieldbus Transmitter***



**ATEX** 

**IECEX**

  
FM  
APPROVED

  
C <sup>®</sup> US



**EAC** **CE**

Burns FORM - 161222-C  
No. 6350V104-UK  
From serial no.: 151770053

**PR**  
electronics

# PROFIBUS PA / FOUNDATION Fieldbus Transmitter Burns T60 (PR 6350B2A)

## Table of contents

Technical characteristics .....	4
Mounting / installation .....	4
Applications .....	4
Order .....	5
Electrical specifications .....	5
Connections .....	8
Block diagram .....	11
Bus installation .....	11
ATEX Installation Drawing - 6350B .....	14
IECEX Installation Drawing - 6350B .....	19
FM/CSA Installation Drawing - 6350B .....	22
Document history .....	28

# PROFIBUS PA / FOUNDATION Fieldbus Transmitter

## 6350

- PROFIBUS PA ver. 3.0
- FOUNDATION Fieldbus ver. ITK 4.6
- Automatic switch between protocols
- FISCO-certified
- 1 channel version

### Application

- Linearized temperature measurement with RTD or TC sensor.
- Converts analog mA signals into digital values on the bus communication.
- Difference, average or redundancy temperature measurement with RTD or TC sensor.
- Linear resistance, potentiometer and bipolar mV

### Model T60:

- Rail Mount Transmitter
- RTD & Thermocouple Capable

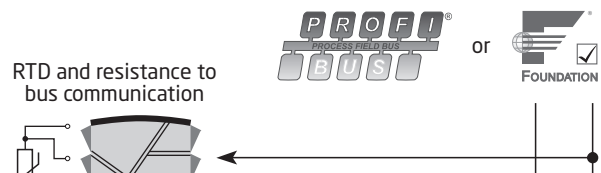
and for Foundation Fieldbus via Emerson DeltaV, Yokogawa CS 1000 / CS 3000, ABB Melody / Harmony and Honeywell Experion software.

- Built-in simulation mode function.
- Polarity-independent bus connection.
- 24 bit A/D converter ensures high resolution.
- Profibus PA function blocks: 2 analog.
- Foundation Fieldbus function blocks: 2 analog and 1 PID.
- Foundation Fieldbus capability: LAS or Basic.

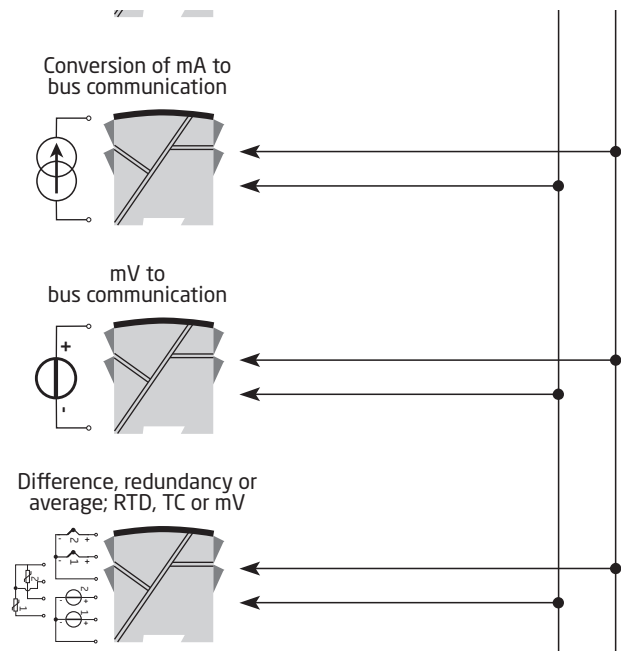
### Mounting / installation

- Mounted vertically or horizontally on a DIN rail. Using the 2-channel version up to 84 channels per metre can be mounted.
- The 6350B can be mounted in zone 0, 1, 2 and zone 20, 21, 22 including M1 / Class I/II/ III, Division 1, Groups A, B, C, D.

### Applications



- HART<sup>®</sup> 5 or 7 communication
- Hazardous Location Approvals:
  - ATEX, IECEx, FM, CSA, INMETRO



## Model T60:

- Rail Mount Transmitter
- RTD & Thermocouple Capable
- HART® 5 or 7 communication
- Hazardous Location Approvals:
  - ATEX, IECEx, FM, CSA, INMETRO

### Electrical specifications

#### Environmental conditions:

Specification range . . . . .	-40°C to +85°C
Storage temperature . . . . .	-40°C to +85°C
Calibration temperature. . . . .	20...28°
Humidity. . . . .	< 95% RH (non-cond.)
Protection degree . . . . .	IP20

#### Mechanical specifications:

Dimensions (H x W x D) . . . . .	109 x 23.5 x 104 mm
Weight (1 / 2 channels) . . . . .	145 / 185 g
DIN rail type. . . . .	DIN EN/IEC 60715 - 35 mm
Wire size. . . . .	0.13...2.08 mm <sup>2</sup> / AWG 26...14 stranded wire
Screw terminal torque. . . . .	0.5 Nm

#### Common specifications:

Supply voltage, DC	
Standard. . . . .	9.0...32 VDC
ATEX, CSA, FM & IECEx . . . . .	9.0...30 VDC
Internal consumption per channel. . . . .	< 11 mA
Isolation voltage, test . . . . .	1.5 kVAC for 60 s
Isolation voltage, operation . . . . .	50 VRMS / 75 VDC
Warm-up time. . . . .	30 s
Signal / noise ratio. . . . .	Min. 60 dB
Response time (programmable) . . . . .	1...60 s
Response time (bus communication) . . . . .	100 ms
Signal dynamics, input . . . . .	24 bit
Effect of supply voltage variation. . . . .	< 0.005% of span / VDC

Accuracy, the greater of general and basic values:

General values		
Input type	Absolute accuracy	Temperature coefficient
mA	$\leq \pm 0.05\%$ of reading	$\leq \pm 0.003\%$ of reading / °C
Other types	$\leq \pm 0.05\%$ of reading	$\leq \pm 0.002\%$ of reading / °C

Basic values		
Input type	Basic accuracy	Temperature coefficient
Pt100 and Pt1000	$\leq \pm 0.1^\circ\text{C}$	$\leq \pm 0.002^\circ\text{C} / ^\circ\text{C}$
Ni100...Ni1000	$\leq \pm 0.15^\circ\text{C}$	$\leq \pm 0.002^\circ\text{C} / ^\circ\text{C}$
Cu10	$\leq \pm 1.3^\circ\text{C}$	$\leq \pm 0.02^\circ\text{C} / ^\circ\text{C}$
Lin. R	$\leq \pm 0.05 \Omega$	$\leq \pm 0.002 \Omega / ^\circ\text{C}$
mA	$\leq \pm 1 \mu\text{A}$	$\leq \pm 0.06 \mu\text{A} / ^\circ\text{C}$
mV	$\leq \pm 10 \mu\text{V}$	$\leq \pm 0.2 \mu\text{V} / ^\circ\text{C}$
TC type: E, J, K, L, N, T, U	$\leq \pm 0.5^\circ\text{C}$	$\leq \pm 0.010^\circ\text{C} / ^\circ\text{C}$
TC type: B, R, S, W3, W5	$\leq \pm 1^\circ\text{C}$	$\leq \pm 0.025^\circ\text{C} / ^\circ\text{C}$

EMC immunity influence . . . . .	$< \pm 0.1\%$ of reading
Extended EMC immunity: NAMUR NE 21, A criterion, burst . . . . .	$< \pm 1\%$ of reading

**Electrical specifications, input:**

**RTD and linear resistance input:**

RTD type	Min. value	Max. value	Standard
Pt25...Pt1000	-200°C	+850°C	IEC 60751 / JIS C 1604
Ni25...Ni1000	-60°C	+250°C	DIN 43760
Cu10...Cu1000	-200°C	+260°C	$\alpha = 0,00427$
Lin. resistance	0 $\Omega$	10 k $\Omega$	-
Potentiometer	0 $\Omega$	100 k $\Omega$	-

Cable resistance per wire . . . . . 50  $\Omega$   
 Sensor current . . . . . Nom. 0.2 mA  
 Effect of sensor cable resistance (3- / 4-wire) . . . . .  $< 0.002 \Omega/\Omega$   
 Sensor error detection . . . . . Yes  
 Short circuit detection. . . . .  $< 15 \Omega$

**Bipolar current input:**

Measurement range . . . . . -100...+100 mA  
 Input resistance . . . . . 10  $\Omega$  + PTC  $< 20 \Omega$   
 Cable breakage detection (4...20 mA). . . . .  $< 0,3 \text{ mA}$

**Bipolar mV input:**

Measurement range . . . . . -800...+800 mV  
 Min. measurement range (span). . . . . 2.5 mV  
 Input resistance . . . . . 10 M $\Omega$   
 Short circuit detection. . . . .  $< 3 \text{ mV}$

**TC input:**

Type	Min. temperature	Max. temperature	Standard
B	+400°C	+1820°C	IEC 60584-1
E	-100°C	+1000°C	IEC 60584-1
J	-100°C	+1200°C	IEC 60584-1
K	-180°C	+1372°C	IEC 60584-1
L	-200°C	+900°C	DIN 43710
N	-180°C	+1300°C	IEC 60584-1
R	-50°C	+1760°C	IEC 60584-1
S	-50°C	+1760°C	IEC 60584-1
T	-200°C	+400°C	IEC 60584-1
U	-200°C	+600°C	DIN 43710
W3	0°C	+2300°C	ASTM E988-90
W5	0°C	+2300°C	ASTM E988-90
Ext. CJC	-40°C	+135°C	IEC60751

Cold junction compensation . . . . . < ±0.5°C

Sensor error detection . . . . . Yes

Sensor error current:

When detecting . . . . . Nom. 2 µA

Else. . . . . 0 µA

Short circuit detection. . . . . < 3 mV

**Output:****PROFIBUS PA connection:**

PROFIBUS PA protocol. . . . . Profile A&B, ver. 3.0

PROFIBUS PA protocol standard. . . . . EN 50170 vol. 2

PROFIBUS PA address (at delivery). . . . . 126

PROFIBUS PA function blocks . . . . . 2 analog

**FOUNDATION Fieldbus connection:**

FOUNDATION Fieldbus protocol . . . . . FF protocol

FOUNDATION Fieldbus protocol standard . . . . . FF design specifications

FOUNDATION Fieldbus capability . . . . . LAS or Basic

FOUNDATION Fieldbus version . . . . . ITK 4.6

FOUNDATION Fieldbus function blocks. . . . . 2 analog and 1 PIDA

**Approvals:**

EMC 2004/108/EC. . . . . EN 61326-1

EAC TR-CU 020/2011. . . . . EN 61326-1

**Ex / I.S.:**

ATEX 94/9/EC . . . . . KEMA 03ATEX1012 X

IECEX. . . . . IECEX DEK 14.0071X

CSA . . . . . 1418937

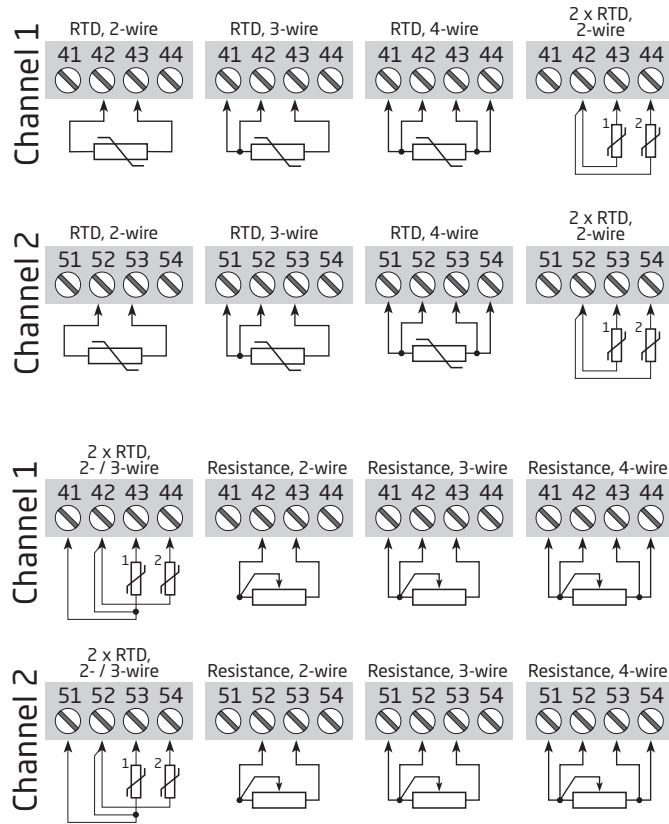
FM . . . . . 3015609

EAC Ex TR-CU 012/2011 . . . . . RU C-DK.GB08.V.00410

# RTD Connections

Connections with two sensors can be configured for two measurements, difference, average or redundancy

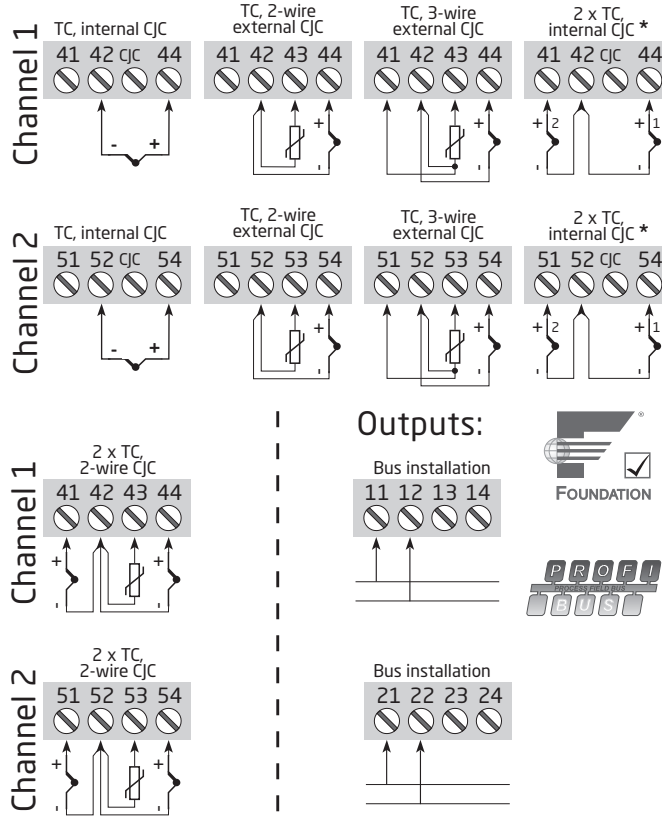
Inputs:



# Thermocouple Connections

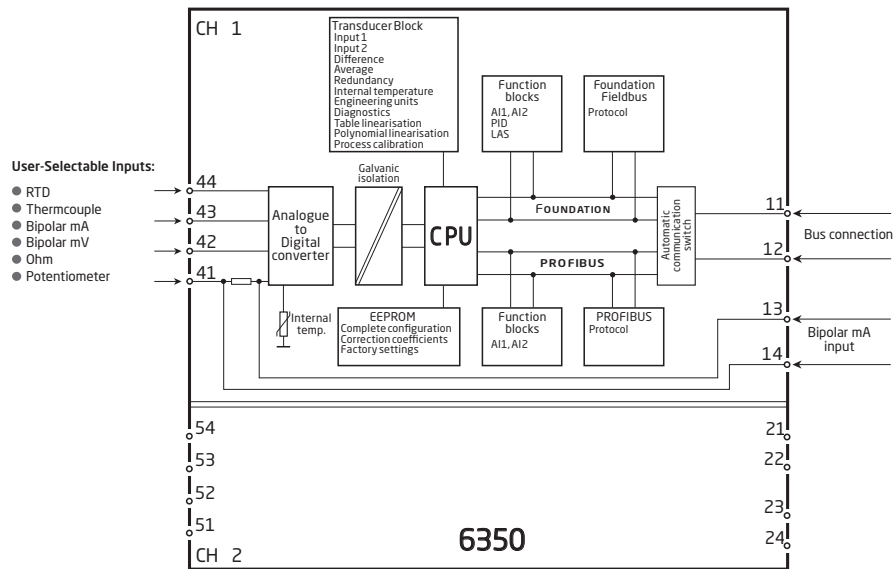
Connections with two sensors can be configured for two measurements, difference, average or redundancy

## Inputs:

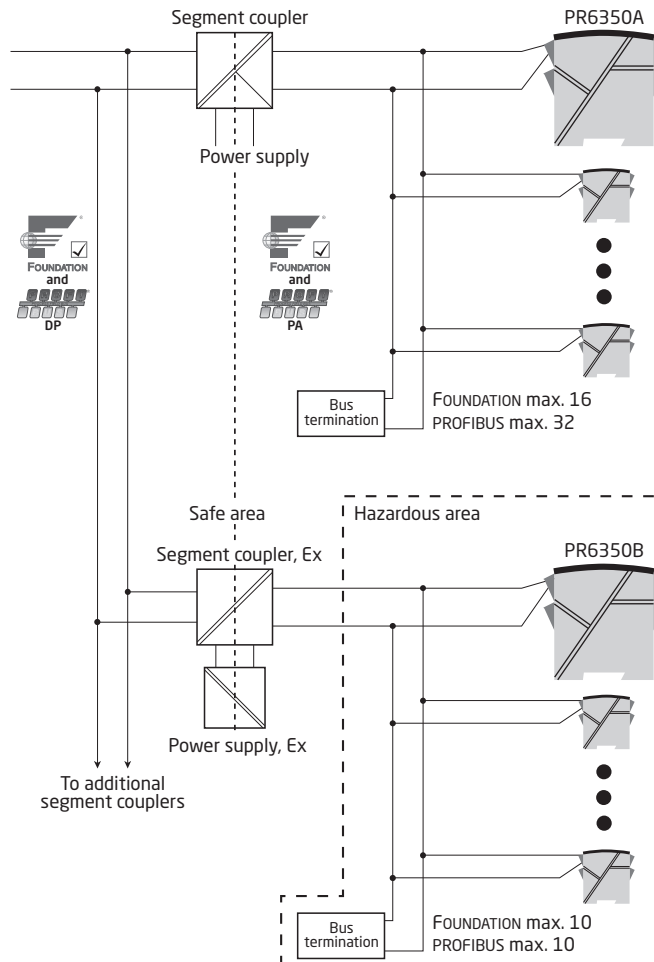




# Block diagram



# Bus installation




## ATEX Installation drawing



For safe installation of 6350B the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area.

Year of manufacture can be taken from the first two digits in the serial number.

ATEX Certificate	KEMA 03ATEX 1012 X
Marking	 II 1 G Ex ia IIC T6...T4 Ga or II 2 (1) G Ex ib [ia Ga] IIC T6...T4 Gb II 1 D Ex ia IIIC Da I M 1 Ex ia I Ma
Standards	EN 60079-0 : 2012, EN 60079-11 : 2012

### General installation instructions

Electrostatic charges on the transmitter enclosure shall be avoided.  
Install in pollution degree 2 or better.

Profibus / Foundation Fieldbus Transmitter Type 6350B2x, for rail mounting, with one or two independent channels, converts the measurement signals of temperature sensors, mV signals or mA signals into a Profibus PA fieldbus or to a Foundation Fieldbus.

x = A (Single Channel) and x = B (Double Channel).

#### For marking Ex ia IIC T6 ... T4 Ga

The transmitter shall be mounted in an enclosure that provides a degree of protection of at least IP20 according to EN/IEC 60529 and that is suitable for the application and correctly installed.  
Ambient temperature range is specified under chapter "Electrical and thermal data".

#### For marking Ex ia IIIC Da

The transmitter shall be mounted in an enclosure that provides a degree of protection of at least IP6X according to EN/IEC 60529, and that is suitable for the application and correctly installed.  
The surface temperature of the enclosure is equal to the ambient temperature +20 K for a dust layer with a maximum thickness of 5 mm.  
Ambient temperature range: -40 °C to +85 °C

#### For marking Ex ia I Ma

The transmitter shall be mounted in an enclosure that provides a degree of protection of at least IP6X according to EN/IEC 60529, and that is suitable for the application and correctly installed.  
Ambient temperature range: -40 °C to +85 °C

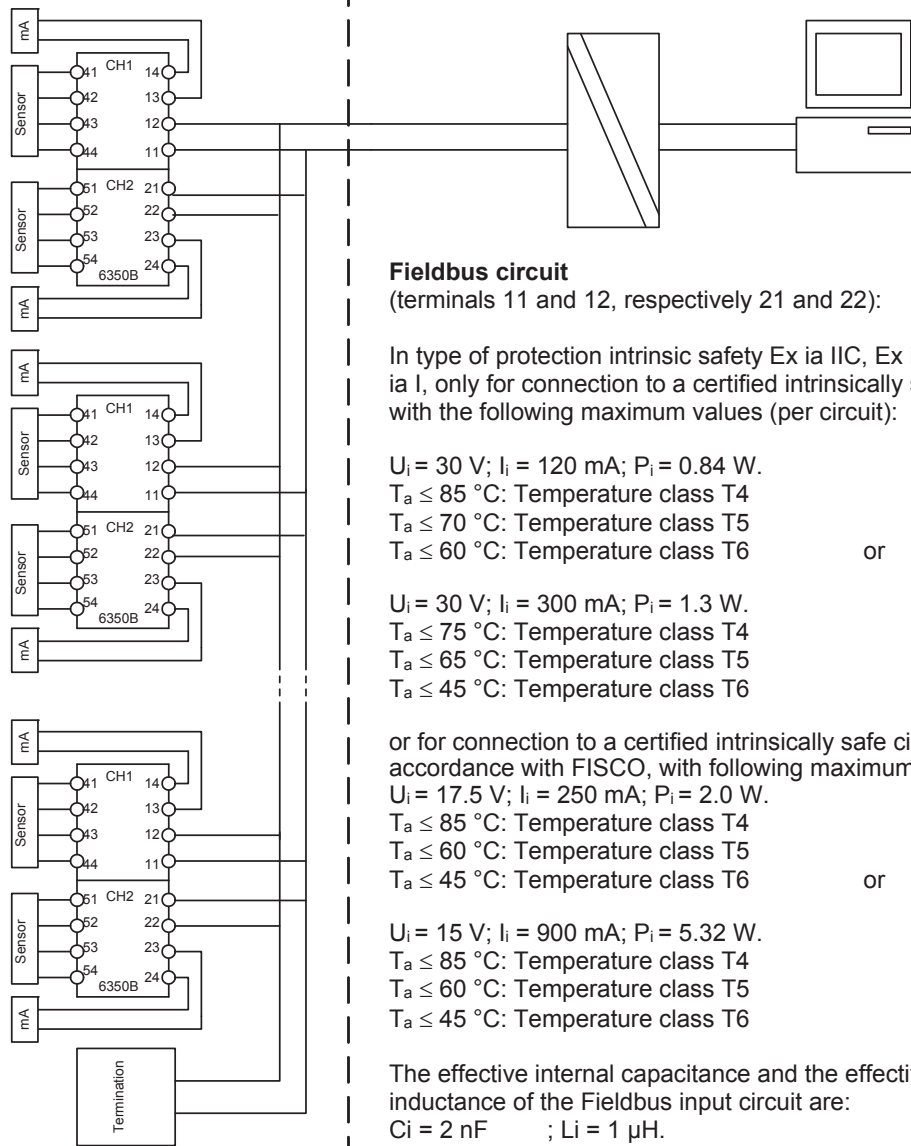
#### Sensor Circuit and the Current Measurement Input Circuit

The Sensor Circuit is galvanically connected to the Current Measurement Input Circuit and only one circuit can be connected at a time.

The Input Circuits are not infallibly galvanic isolated from the Fieldbus input circuit. However, the galvanic isolation is capable of withstanding a test voltage of 500Vac during 1 minute.

Hazardous Location  
Zone 0,1,2, 20, 21, 22

Non Hazardous Location



**Fieldbus circuit**

(terminals 11 and 12, respectively 21 and 22):

In type of protection intrinsic safety Ex ia IIC, Ex ia IIIC or Ex ia I, only for connection to a certified intrinsically safe circuit, with the following maximum values (per circuit):

$U_i = 30 \text{ V}$ ;  $I_i = 120 \text{ mA}$ ;  $P_i = 0.84 \text{ W}$ .

$T_a \leq 85 \text{ }^\circ\text{C}$ : Temperature class T4

$T_a \leq 70 \text{ }^\circ\text{C}$ : Temperature class T5

$T_a \leq 60 \text{ }^\circ\text{C}$ : Temperature class T6

or

$U_i = 30 \text{ V}$ ;  $I_i = 300 \text{ mA}$ ;  $P_i = 1.3 \text{ W}$ .

$T_a \leq 75 \text{ }^\circ\text{C}$ : Temperature class T4

$T_a \leq 65 \text{ }^\circ\text{C}$ : Temperature class T5

$T_a \leq 45 \text{ }^\circ\text{C}$ : Temperature class T6

or for connection to a certified intrinsically safe circuit in accordance with FISCO, with following maximum values:

$U_i = 17.5 \text{ V}$ ;  $I_i = 250 \text{ mA}$ ;  $P_i = 2.0 \text{ W}$ .

$T_a \leq 85 \text{ }^\circ\text{C}$ : Temperature class T4

$T_a \leq 60 \text{ }^\circ\text{C}$ : Temperature class T5

$T_a \leq 45 \text{ }^\circ\text{C}$ : Temperature class T6

or

$U_i = 15 \text{ V}$ ;  $I_i = 900 \text{ mA}$ ;  $P_i = 5.32 \text{ W}$ .

$T_a \leq 85 \text{ }^\circ\text{C}$ : Temperature class T4

$T_a \leq 60 \text{ }^\circ\text{C}$ : Temperature class T5

$T_a \leq 45 \text{ }^\circ\text{C}$ : Temperature class T6

The effective internal capacitance and the effective internal inductance of the Fieldbus input circuit are:

$C_i = 2 \text{ nF}$  ;  $L_i = 1 \text{ }^\mu\text{H}$ .

Sensor Circuit (terminals 41...44, respectively 51...54):

in type of protection intrinsic safety Ex ia IIC, Ex ia IIIC or Ex ia I, with following maximum values:

$U_o = 5.7 \text{ V}$ ;  $I_o = 8.4 \text{ mA}$ ;  $P_o = 12 \text{ mW}$ ;  $C_o = 40 \text{ }^\mu\text{F}$ ;  $L_o = 200 \text{ mH}$ .

Current Measurement Input Circuit (terminals 13 and 14, respectively 23 and 24):

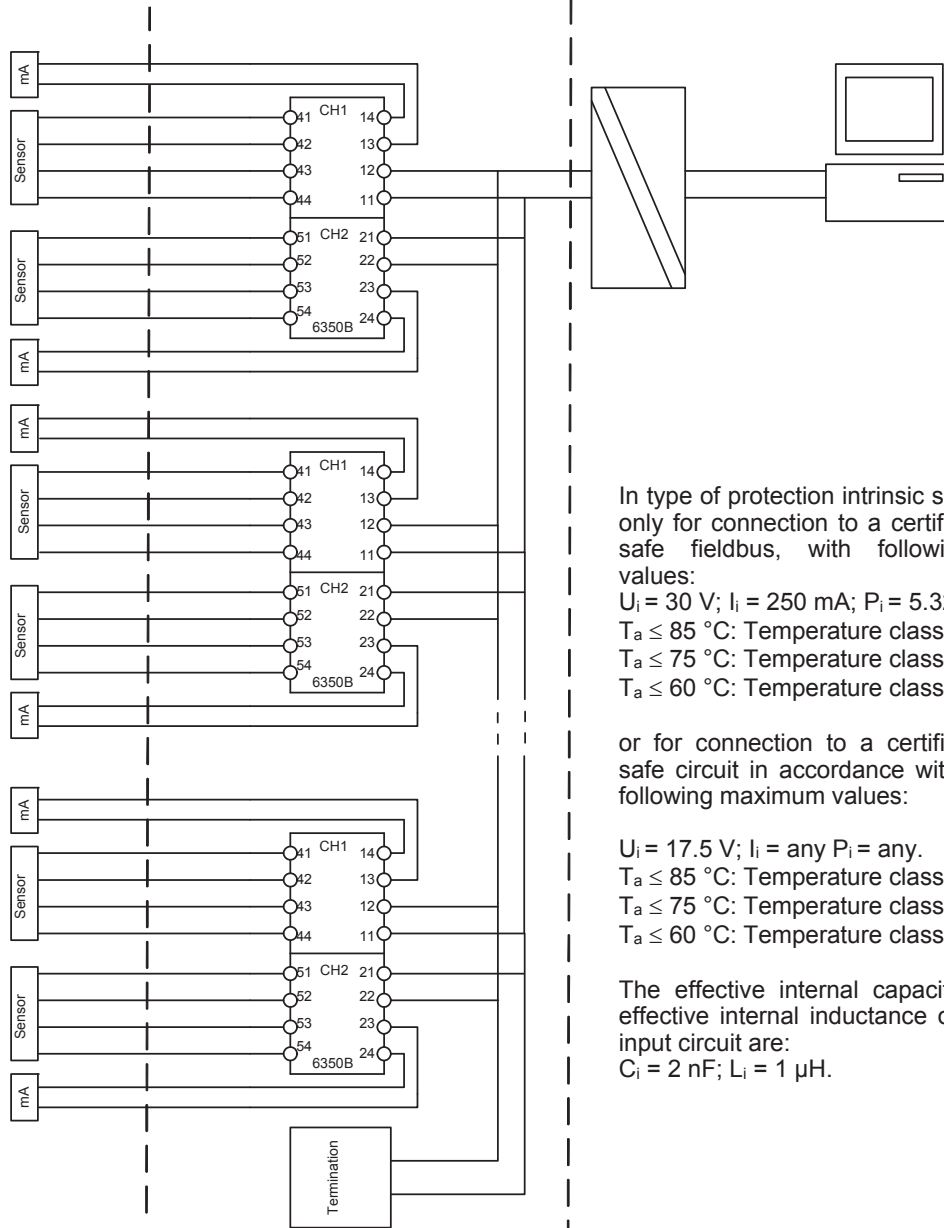
in type of protection intrinsic safety Ex ia IIC, Ex ia IIIC or Ex ia I, only for connection to a certified intrinsically safe circuit, with the following maximum values (per circuit):

$U_i = 30 \text{ V}$ ,  $I_i = 140 \text{ mA}$ ,  $P_i = 1 \text{ W}$ ,  $C_i = 0 \text{ nF}$ ,  $L_i = 0 \text{ mH}$

Hazardous area: Zone 0

Hazardous area: Zone 1

Non Hazardous area



In type of protection intrinsic safety Ex ib IIC, only for connection to a certified intrinsically safe fieldbus, with following maximum values:

$U_i = 30 \text{ V}$ ;  $I_i = 250 \text{ mA}$ ;  $P_i = 5.32 \text{ W}$ .

$T_a \leq 85 \text{ }^\circ\text{C}$ : Temperature class T4

$T_a \leq 75 \text{ }^\circ\text{C}$ : Temperature class T5

$T_a \leq 60 \text{ }^\circ\text{C}$ : Temperature class T6

or for connection to a certified intrinsically safe circuit in accordance with FISCO, with following maximum values:

$U_i = 17.5 \text{ V}$ ;  $I_i = \text{any}$   $P_i = \text{any}$ .

$T_a \leq 85 \text{ }^\circ\text{C}$ : Temperature class T4

$T_a \leq 75 \text{ }^\circ\text{C}$ : Temperature class T5

$T_a \leq 60 \text{ }^\circ\text{C}$ : Temperature class T6

The effective internal capacitance and the effective internal inductance of the Fieldbus input circuit are:

$C_i = 2 \text{ nF}$ ;  $L_i = 1 \text{ } \mu\text{H}$ .

Sensor Circuit (terminals 41...44, respectively 51...54):

in type of protection intrinsic safety Ex ia IIC, Ex ia IIIC or Ex ia I, with following maximum values:

$U_o = 5.7 \text{ V}$ ;  $I_o = 8.4 \text{ mA}$ ;  $P_o = 12 \text{ mW}$ ;  $C_o = 40 \text{ } \mu\text{F}$ ;  $L_o = 200 \text{ mH}$ .

Current Measurement Input Circuit (terminals 13 and 14, respectively 23 and 24):

in type of protection intrinsic safety Ex ia IIC, Ex ia IIIC or Ex ia I, only for connection to a certified intrinsically safe circuit, with the following maximum values (per circuit):

$U_i = 30 \text{ V}$ ,  $I_i = 140 \text{ mA}$ ,  $P_i = 1 \text{ W}$ ,  $C_i = 0 \text{ nF}$ ,  $L_i = 0 \text{ mH}$

## IECEX Installation drawing



For safe installation of 6350B the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area.

Year of manufacture can be taken from the first two digits in the serial number.

IECEX Certificate	DEK 14.0071X
Marking	Ex ia IIC T6..T4 Ga Ex ib [ia Ga] IIC T6..T4 Gb Ex ia IIIC Da Ex ia I Ma
Standards	IEC60079-11:2011, IEC60079-0: 2011

### General installation instructions

Electrostatic charges on the transmitters enclosure shall be avoided.

Install in pollution degree 2 or better.

Profibus / Foundation Fieldbus Transmitter Type 6350B2x, for rail mounting, with one or two independent channels, converts the measurement signals of temperature sensors, mV signals or mA signals into a Profibus PA fieldbus or to a Foundation Fieldbus.

x = A (Single Channel) and x = B (Double Channel).

#### For marking Ex ia IIC T6 ... T4 Ga

The transmitter shall be mounted in an enclosure that provides a degree of protection of at least IP20 according to EN/IEC 60529 and that is suitable for the application and correctly installed.

Ambient temperature range is specified under chapter "Electrical and thermal data".

#### For marking Ex ia IIIC Da

The transmitter shall be mounted in an enclosure that provides a degree of protection of at least IP6X according to EN/IEC 60529, and that is suitable for the application and correctly installed.

The surface temperature of the enclosure is equal to the ambient temperature +20 K for a dust layer with a maximum thickness of 5 mm.

Ambient temperature range: -40 °C to +85 °C

#### For marking Ex ia I Ma

The transmitter shall be mounted in an enclosure that provides a degree of protection of at least IP6X according to EN/IEC 60529, and that is suitable for the application and correctly installed.

Ambient temperature range: -40 °C to +85 °C

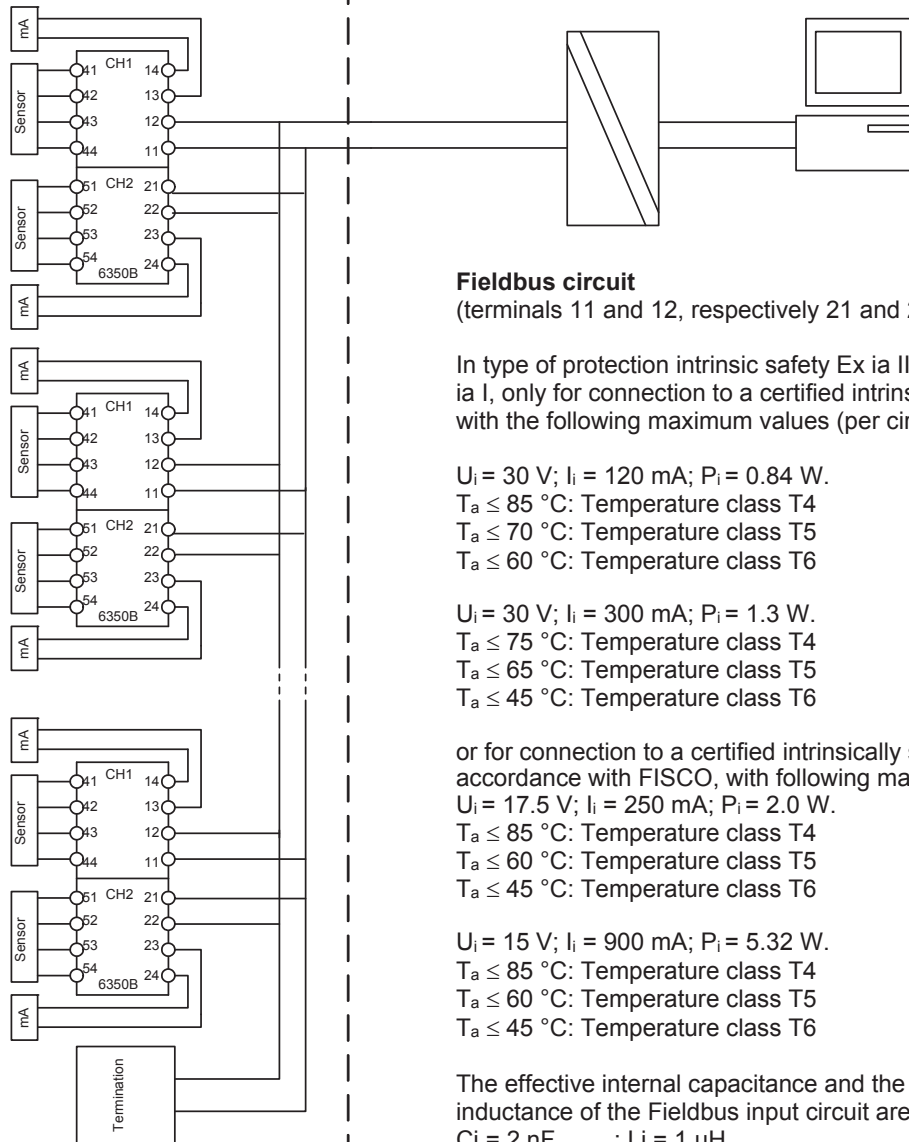
#### Sensor Circuit and the Current Measurement

The Sensor Circuit is galvanically connected to the Current Measurement Input Circuit and only one circuit can be connected at a time.

The Input Circuits are not infallibly galvanic isolated from the Fieldbus input circuit. However, the galvanic isolation is capable of withstanding a test voltage of 500Vac during 1 minute.

**Hazardous Location  
Zone 0,1,2, 20, 21, 22**

Non Hazardous Location



**Fieldbus circuit**

(terminals 11 and 12, respectively 21 and 22):

In type of protection intrinsic safety Ex ia IIC, Ex ia IIIC or Ex ia I, only for connection to a certified intrinsically safe circuit, with the following maximum values (per circuit):

$U_i = 30 \text{ V}$ ;  $I_i = 120 \text{ mA}$ ;  $P_i = 0.84 \text{ W}$ .

$T_a \leq 85 \text{ }^\circ\text{C}$ : Temperature class T4

$T_a \leq 70 \text{ }^\circ\text{C}$ : Temperature class T5

$T_a \leq 60 \text{ }^\circ\text{C}$ : Temperature class T6

or

$U_i = 30 \text{ V}$ ;  $I_i = 300 \text{ mA}$ ;  $P_i = 1.3 \text{ W}$ .

$T_a \leq 75 \text{ }^\circ\text{C}$ : Temperature class T4

$T_a \leq 65 \text{ }^\circ\text{C}$ : Temperature class T5

$T_a \leq 45 \text{ }^\circ\text{C}$ : Temperature class T6

or for connection to a certified intrinsically safe circuit in accordance with FISCO, with following maximum values:

$U_i = 17.5 \text{ V}$ ;  $I_i = 250 \text{ mA}$ ;  $P_i = 2.0 \text{ W}$ .

$T_a \leq 85 \text{ }^\circ\text{C}$ : Temperature class T4

$T_a \leq 60 \text{ }^\circ\text{C}$ : Temperature class T5

$T_a \leq 45 \text{ }^\circ\text{C}$ : Temperature class T6

or

$U_i = 15 \text{ V}$ ;  $I_i = 900 \text{ mA}$ ;  $P_i = 5.32 \text{ W}$ .

$T_a \leq 85 \text{ }^\circ\text{C}$ : Temperature class T4

$T_a \leq 60 \text{ }^\circ\text{C}$ : Temperature class T5

$T_a \leq 45 \text{ }^\circ\text{C}$ : Temperature class T6

The effective internal capacitance and the effective internal inductance of the Fieldbus input circuit are:

$C_i = 2 \text{ nF}$  ;  $L_i = 1 \text{ }^\mu\text{H}$ .

**Sensor Circuit (terminals 41...44, respectively 51...54):**

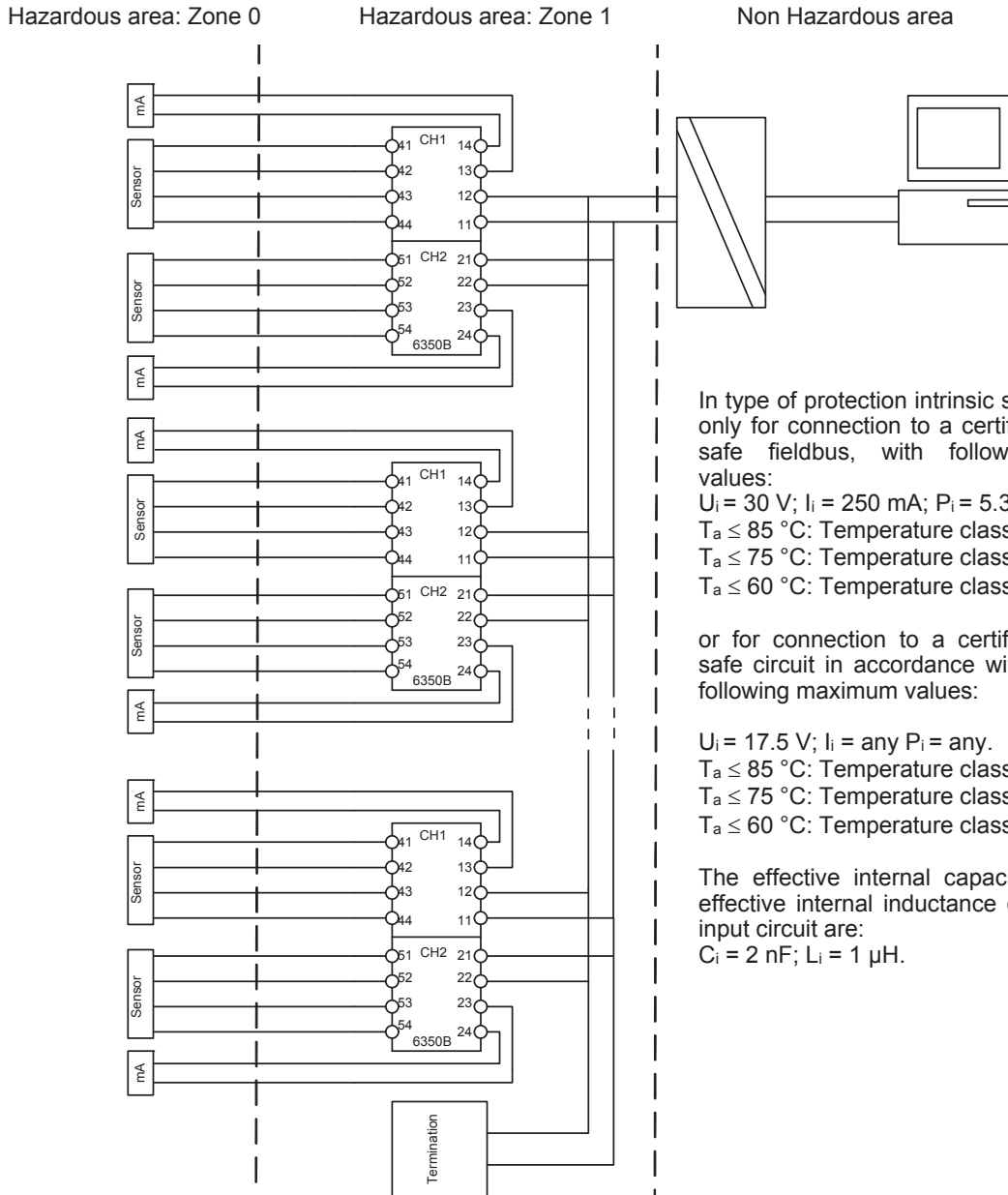
in type of protection intrinsic safety Ex ia IIC, Ex ia IIIC or Ex ia I, with following maximum values:

$U_o = 5.7 \text{ V}$ ;  $I_o = 8.4 \text{ mA}$ ;  $P_o = 12 \text{ mW}$ ;  $C_o = 40 \text{ }^\mu\text{F}$ ;  $L_o = 200 \text{ mH}$ .

**Current Measurement Input Circuit (terminals 13 and 14, respectively 23 and 24):**

in type of protection intrinsic safety Ex ia IIC, Ex ia IIIC or Ex ia I, only for connection to a certified intrinsically safe circuit, with the following maximum values (per circuit):

$U_i = 30 \text{ V}$ ,  $I_i = 140 \text{ mA}$ ,  $P_i = 1 \text{ W}$ ,  $C_i = 0 \text{ nF}$ ,  $L_i = 0 \text{ mH}$



In type of protection intrinsic safety Ex ib IIC, only for connection to a certified intrinsically safe fieldbus, with following maximum values:

$U_i = 30 \text{ V}$ ;  $I_i = 250 \text{ mA}$ ;  $P_i = 5.32 \text{ W}$ .

$T_a \leq 85 \text{ }^\circ\text{C}$ : Temperature class T4

$T_a \leq 75 \text{ }^\circ\text{C}$ : Temperature class T5

$T_a \leq 60 \text{ }^\circ\text{C}$ : Temperature class T6

or for connection to a certified intrinsically safe circuit in accordance with FISCO, with following maximum values:

$U_i = 17.5 \text{ V}$ ;  $I_i = \text{any}$ ;  $P_i = \text{any}$ .

$T_a \leq 85 \text{ }^\circ\text{C}$ : Temperature class T4

$T_a \leq 75 \text{ }^\circ\text{C}$ : Temperature class T5

$T_a \leq 60 \text{ }^\circ\text{C}$ : Temperature class T6

The effective internal capacitance and the effective internal inductance of the Fieldbus input circuit are:

$C_i = 2 \text{ nF}$ ;  $L_i = 1 \text{ } \mu\text{H}$ .

Sensor Circuit (terminals 41...44, respectively 51...54):

in type of protection intrinsic safety Ex ia IIC, Ex ia IIIC or Ex ia I, with following maximum values:

$U_o = 5.7 \text{ V}$ ;  $I_o = 8.4 \text{ mA}$ ;  $P_o = 12 \text{ mW}$ ;  $C_o = 40 \text{ } \mu\text{F}$ ;  $L_o = 200 \text{ mH}$ .

Current Measurement Input Circuit (terminals 13 and 14, respectively 23 and 24):

in type of protection intrinsic safety Ex ia IIC, Ex ia IIIC or Ex ia I, only for connection to a certified intrinsically safe circuit, with the following maximum values (per circuit):

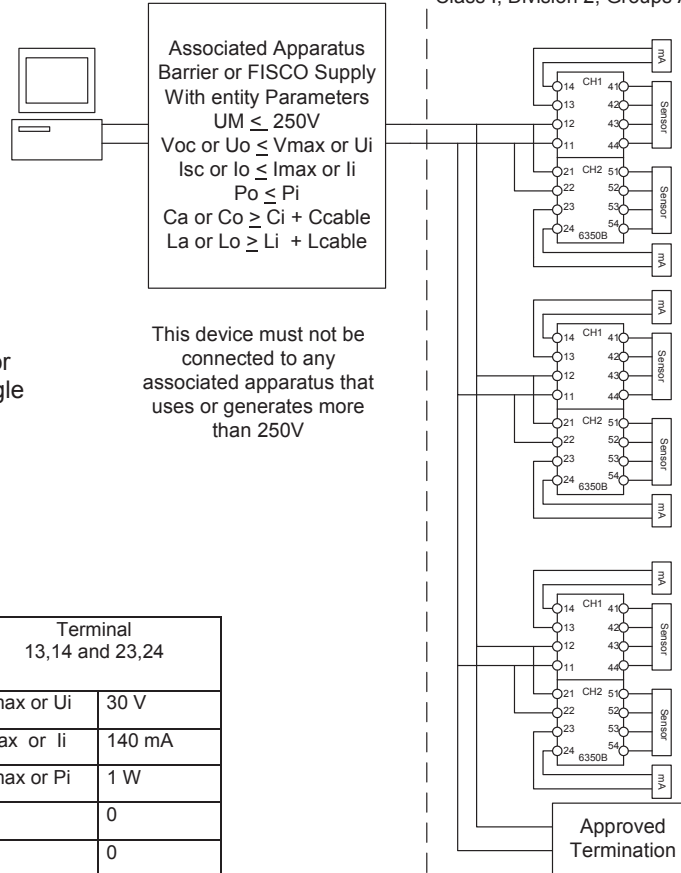
$U_i = 30 \text{ V}$ ,  $I_i = 140 \text{ mA}$ ,  $P_i = 1 \text{ W}$ ,  $C_i = 0 \text{ nF}$ ,  $L_i = 0 \text{ mH}$

## FM/CSA Installation Drawing

### Non Hazardous Location

### Hazardous (Classified) Location

Class I, Division 1, Group A, B, C, D  
Class I, Zone 0 and Zone 1 AEx ia IIC  
Class I, Division 2, Groups A, B, C, D



Applicable for:

6350B2a where  
a = A (Single Channel) or  
B (Double Channel)

All drawings are shown for  
Double Channel. For Single  
Channel installation  
Channel 2 (CH2) is not  
mounted (terminal 51-54  
and 21-24)

See Installation notes.

Associated Apparatus  
Barrier or FISCO Supply  
With entity Parameters  
 $UM \leq 250V$   
 $V_{oc}$  or  $U_o \leq V_{max}$  or  $U_i$   
 $I_{sc}$  or  $I_o \leq I_{max}$  or  $I_i$   
 $P_o \leq P_i$   
 $C_a$  or  $C_o \geq C_i + C_{cable}$   
 $L_a$  or  $L_o \geq L_i + L_{cable}$

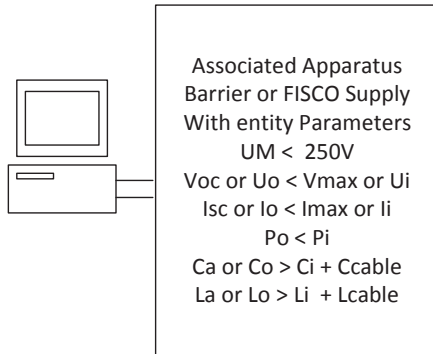
This device must not be  
connected to any  
associated apparatus that  
uses or generates more  
than 250V

Terminal 41-44 and 51-54		Terminal 13,14 and 23,24	
Vt or Uo	5.71 V	Vmax or Ui	30 V
It or Io	8.4 mA	Imax or Ii	140 mA
Pt or Po	12 mW	Pmax or Pi	1 W
Ca or Co	40 $\mu$ F	Ci	0
La or Lo	200 mH	Li	0

Terminal 11-12 21-22	IS, Class I, Division 1, Group A,B,C,D Class I, Zone 0 AEx ia IIC Entity, Fisco				Class I, Division 2, Group A,B,C,D Class I, Zone 1 AEx ib IIC	
	T1..T5	Ta $\leq$ +60°C	Ta $\leq$ +60°C	Ta $\leq$ +60°C	Ta $\leq$ +60°C	Ta $\leq$ +60°C
T6	Ta $\leq$ +60°C	Ta $\leq$ +45°C	Ta $\leq$ +45°C	Ta $\leq$ +45°C	Ta $\leq$ +60°C	Ta $\leq$ +60°C
Vmax or Ui	30 V	30V	17.5 V	15V	30 V	17.5 V
Imax or Ii	120 mA	300mA	250 mA	any	250 mA	any
Pmax or Pi	0.84 W	1.3 W	2.0 W	any	5.32 W	any
Ci	2 nF	2 nF	2 nF	2 nF	2 nF	2 nF
Li	1 $\mu$ H	1 $\mu$ H	1 $\mu$ H	1 $\mu$ H	1 $\mu$ H	1 $\mu$ H

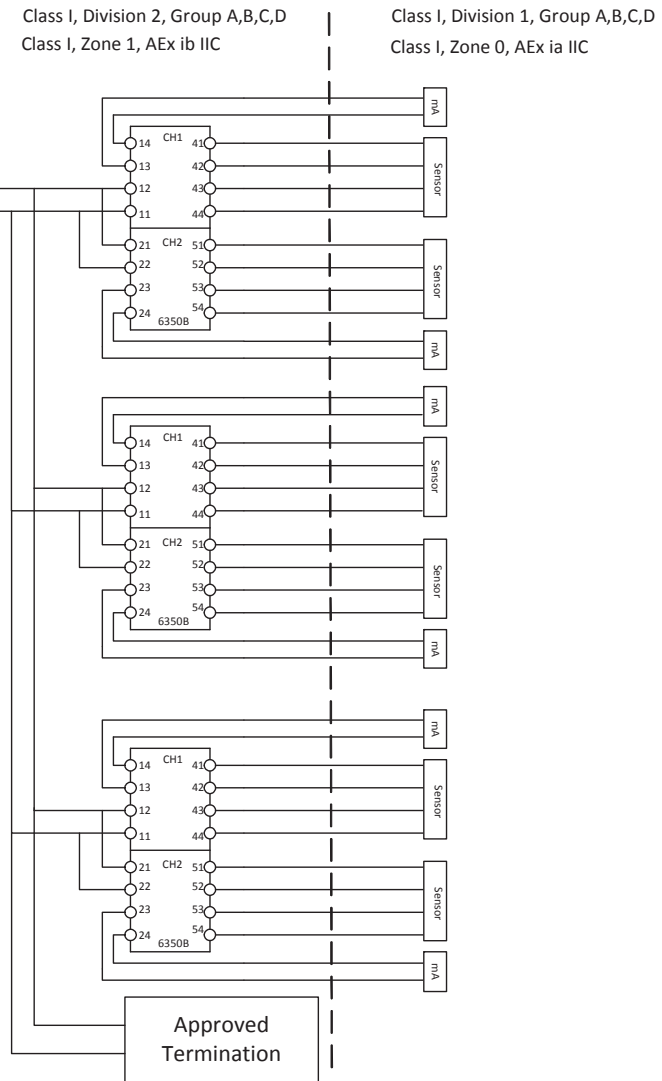


**Non Hazardous Location**



Applicable for 6350B2a where  
a = A (Single Channel) or  
B (Double Channel)  
All drawings are shown for Double  
Channel. For Single Channel  
installation Channel 2 (CH2) is not  
mounted (terminal 51-54 and 21-24)  
In each segment only one active device,  
normally the associated apparatus is  
allowed to provide the necessary energy  
for the fieldbus system. All other  
equipment connected to the bus are not  
allowed to provide energy to the system.  
Separately powered equipment needs a  
galvanic insulation to assure that the  
intrinsic safe fieldbus circuit remains  
passive.  
See Installation notes

**Hazardous (Classified) Location**



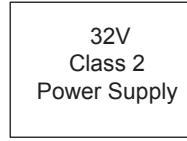
Terminal 13,14 and 23,24		Terminal 11,12 and 21,22	
$V_{max} (U_i)$	30 V	30 V	17.5 V
$I_{max} (I_i)$	140 mA	250 mA	any
$P_{max} (P_i)$	1 W	5.32 W	any
$C_i$	0	2 nF	2 nF
$L_i$	0	1 $\mu H$	1 $\mu H$

Terminal 41-44 and 51-54	
$V_t \text{ or } U_o$	5.71 V
$I_t \text{ or } I_o$	8.4 mA
$P_t \text{ or } P_o$	12 mW
$C_a \text{ or } C_o$	40 $\mu F$
$L_a \text{ or } L_o$	200 mH

Non Hazardous Location

Hazardous (Classified) Location

This device must not be connected to any associated apparatus which uses or generates more than 250VRMS



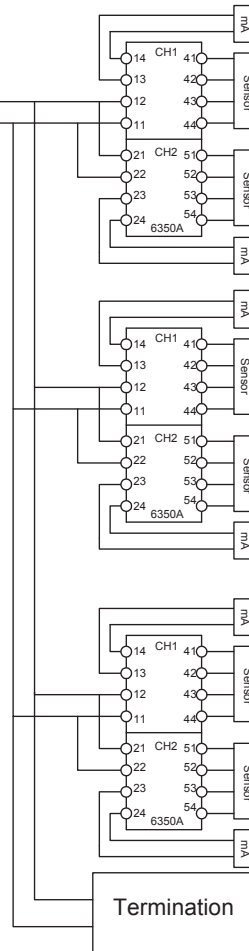
Applicable for:

6350A2a where  
a = A (Single Channel) or  
B (Double Channel)

All drawings are shown for Double Channel. For Single Channel installation Channel 2 (CH2) is not mounted (terminal 51-54 and 21-24)

See Installation notes.

Class I, Zone 2  
Class I, Division 2, Groups A, B, C, D



Terminal: 11, 12 and 21, 22	Class I, Division 2, Group A, B, C, D Class I, Zone 2 IIC
	Ta ≤ +60°C
Vmax (Ui)	32 V

**Installation notes:**

This drawing applies to models 6350A2a and 6350B2a  
Where: a = A (Single Channel) or B (Double Channel)

All drawings are shown as Double Channel.  
For Single Channel installation Channel 2 (CH2) is not mounted (terminal 51-54 and 21-24)

For installation in the US the 6350 must be installed according to National Electrical Code (ANSI-NFPA 70).

For installation in Canada the transmitter must be installed in a suitable enclosure to meet installation codes stipulated in the Canadian Electrical Code (CEC).

For installation in Canada different intrinsically safe circuits need to be separated as outlined in the Canadian Electrical Code (CEC)

**The entity concept**

Equipment that is FM / CSA -approved for intrinsic safety may be connected to barriers based on the ENTITY CONCEPT. This concept permits interconnection of approved transmitters, meters and other devices in combinations which have not been specifically examined by FM / CSA, provided that the agency's criteria are met. The combination is intrinsically safe, if the entity concept is acceptable to the authority having jurisdiction over the installation.

The entity concept criteria are as follows:

The intrinsically safe devices, other than barriers, must not be a source of power.

The maximum voltage  $U_i(V_{MAX})$  and current  $I_i(I_{MAX})$ , and maximum power  $P_i(P_{MAX})$ , which the device can receive and remain intrinsically safe, must be equal to or greater than the voltage ( $U_o$  or  $V_{OC}$  or  $V_t$ ) and current ( $I_o$  or  $I_{SC}$  or  $I_t$ ) and the power  $P_o$  which can be delivered by the barrier.

The sum of the maximum unprotected capacitance ( $C_i$ ) for each intrinsically device and the interconnecting wiring must be less than the capacitance ( $C_a$ ) which can be safely connected to the barrier.

The sum of the maximum unprotected inductance ( $L_i$ ) for each intrinsically device and the interconnecting wiring must be less than the inductance ( $L_a$ ) which can be safely connected to the barrier.

The entity parameters  $U_o, V_{OC}$  or  $V_t$  and  $I_o, I_{SC}$  or  $I_t$ , and  $C_a$  and  $L_a$  for barriers are provided by the barrier manufacturer.

**FISCO rules**

The FISCO Concept allows the interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criterion for such interconnection is that the voltage ( $V_{max}$ ), the current ( $I_{max}$ ) and the power ( $P_i$ ) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage ( $U_o, V_{oc}, V_t$ ), the current ( $I_o, I_{sc}, I_t$ ), and the power ( $P_o$ ) which can be provided by the associated apparatus (supply unit). In addition, the maximum unprotected residual capacitance ( $C_i$ ) and inductance ( $L_i$ ) of each apparatus (other than the terminators) connected to the Fieldbus must be less than or equal to 5 nF and 10  $\mu$ H respectively.

In each I.S. Fieldbus segment only one active source, normally the associated apparatus, is allowed to provide the necessary power for the Fieldbus system. The allowed voltage ( $U_o, V_{oc}, V_t$ ) of the associated apparatus used to supply the bus must be limited to the range of 14V d.c. to 24V d.c. All other equipment connected to the bus cable has to be passive, meaning that the apparatus is not allowed to provide energy to the system, except to a leakage current of 50  $\mu$ A for each

connected device. Separately powered equipment needs a galvanic isolation to insure that the intrinsically safe Fieldbus circuit remains passive.

The cable used to interconnect the devices needs to comply with the following parameters:

Loop resistance R': 15 ...150 Ω/KM  
Inductance per unit length L': 0.4...1mH/km  
Capacitance per unit length C': 80 ...200 nF/km  
C' = C' line/line + 0.5 C' line/screen, if both lines are floating  
or  
C'= C' line/line + C' line/screen, if the screen is connected to one line  
Length of spur Cable: max. 30m  
Length of trunk cable: max. 1Km  
Length of splice: max. 1m

#### Terminators

At each end of the trunk cable an approved line terminator with the following parameters is suitable:

R = 90 ...100 Ω  
C = 0 ...2.2 μF.

#### System evaluation

The number of passive devices like transmitters, actuators, connected to a single bus segment is not limited due to I.S. reasons. Furthermore, if the above rules are respected, the inductance and capacitance of the cable need not to be considered and will not impair the intrinsic safety of the installation.

The sensor circuit is not infallibly galvanic isolated from the Fieldbus input circuit. However, the galvanic isolation between the circuits is capable of withstanding a test voltage of 500Vac during 1 minute.

#### Installation Notes For FISCO and Entity Concepts:

1. The Intrinsic Safety Entity concept allows the interconnection of FM / CSA Approved Intrinsically safe devices (Div 1 or Zone 0 or Zone1) and non.incendive apparatus (Div 2 or Zone 2) ,with entity parameters not specifically examined in combination as a system when:  
 $U_o$  or  $V_{oc}$  or  $V_t \leq V_{max}$ ,  $I_o$  or  $I_{sc}$  or  $I_t \leq I_{max}$ ,  $P_o \leq P_i$ .  
 $C_a$  or  $C_o \geq \Sigma C_i + \Sigma C_{cable}$ ,  $L_a$  or  $L_o \geq \Sigma L_i + \Sigma L_{cable}$ ,  $P_o \leq P_i$ .
2. The Intrinsic Safety FISCO concept allows the interconnection of FM / CSA Approved Intrinsically safe devices with FISCO parameters not specifically examined in combination as a system when:  
 $U_o$  or  $V_{oc}$  or  $V_t \leq V_{max}$ ,  $I_o$  or  $I_{sc}$  or  $I_t \leq I_{max}$ ,  $P_o \leq P_i$ .
3. Dust-tight conduit seals must be used when installed in Class II and Class III environments.
4. Control equipment connected to the Associated Apparatus must not use or generate more than 250 Vrms or Vdc.
5. Installation should be in accordance with ANSI/ISA RP12.6 (except chapter 5 for FISCO Installations) "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electrical Code® (ANSI/NFPA 70) Sections 504 and 505.
6. The configuration of associated Apparatus must be Factory Mutual Research or CSA Approved under the associated concept.
7. Associated Apparatus manufacturer's installation drawing must be followed when installing this equipment.

8. The 6350 Series are Approved for Class I, Zone 0, applications. If connecting AEx[ib] associated Apparatus or AEx ib I.S. Apparatus to the 6350 the I.S. circuit is only suitable for Class I, Zone 1, or Class I, Zone 2, and is not suitable for Class I, Zone 0 or Class I, Division 1, Hazardous (Classified) Locations."
9. No revision to drawing without prior FM / CSA Approval.
10. Simple Apparatus is defined as a device that neither generates nor stores more than 1.2V, 0.1A 20uJ or 25mW.
11. The termination must be NRTL approved, and the resistor must be infallible.
12. **Warning:**  
For applications in Div2 or Zone 2 (Classified Locations) Explosion hazard: Except for field circuits, do not disconnect the apparatus unless the area is known to be non hazardous.
13. **Warning:**  
Substitution of Components May Impair Safety.

## Document history

The following list provides notes concerning revisions of this document.

<b>Rev. ID</b>	<b>Date</b>	<b>Notes</b>
104	15/48	IECEX approval added

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