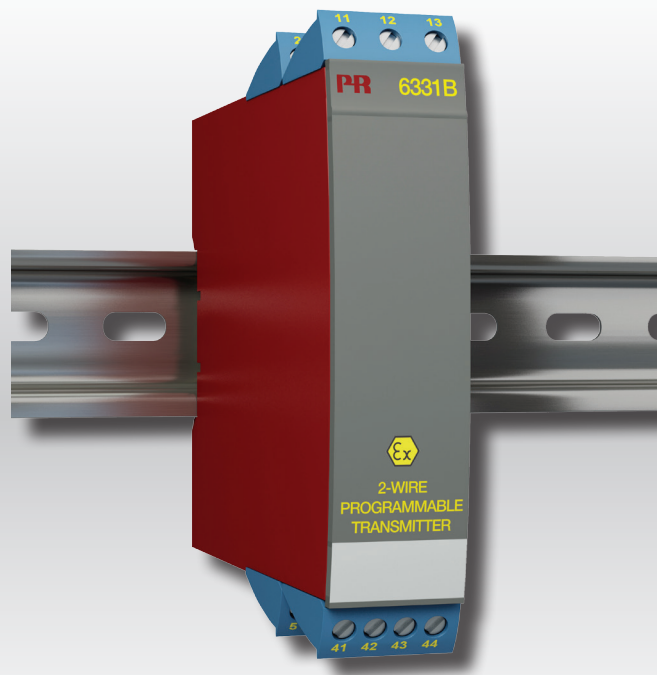


Product Manual

Burns T61 (PR 6331B2A)

2-wire programmable transmitter



ATEX 

IECEX


FM
APPROVED


C SP[®] US



EAC

CE

Burns FORM-161222-D

No. 6331V106-UK

From serial no.: 159740001

PR
electronics

2-wire programmable transmitter

Burns T61 (PR 6331B2A)

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2-wire programmable transmitter

Burns T61 (PR 6331B2A)

- RTD, TC, Ohm, or mV input
- Extremely high measurement accuracy
- Galvanic isolation
- Programmable sensor error value
- 1- or 2-channel version

Application

- Linearised temperature measurement with Pt100... Pt1000, Ni100...Ni1000, or TC sensor.
- Conversion of linear resistance variation to a standard analogue current signal, for instance from valves or Ohmic level sensors.
- Amplification of a bipolar mV signal to a standard 4...20 mA current signal.

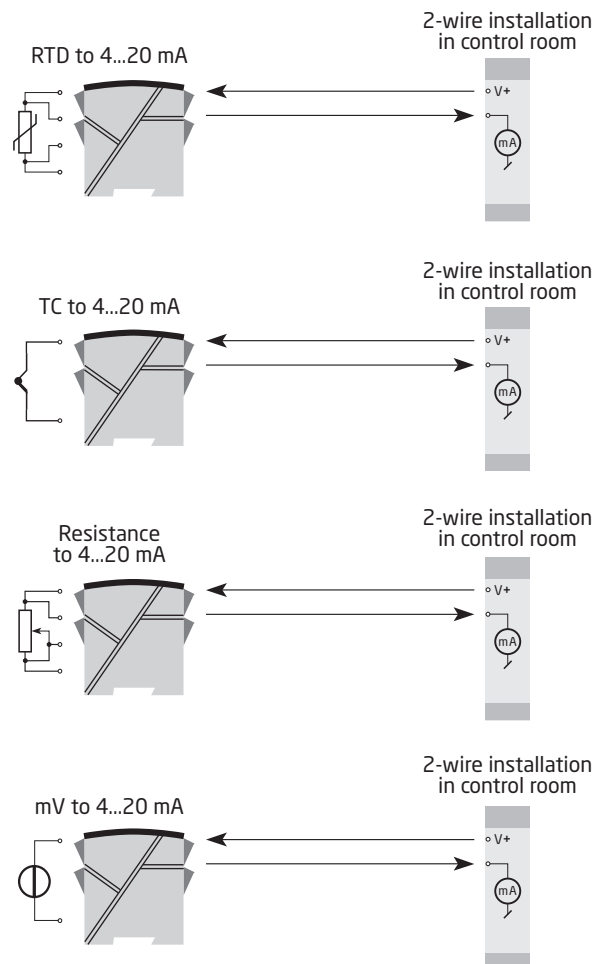
Technical characteristics

- Within a few seconds the user can program PR6331 to measure temperatures within all ranges defined by the norms.
- The RTD and resistance inputs have cable compensation for 2-, 3- and 4-wire connection.
- Continuous check of vital stored data for safety reasons.

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 6331B 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



Model T61:

- Rail Mount Transmitter
- RTD & Thermocouple Capable
- Hazardous Location Approvals:
 - ATEX, IECEx, FM, CSA

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 ² / AWG 26...14 stranded wire
Screw terminal torque.	0.5 Nm

Common specifications:

Supply voltage, DC	
Standard.	7.2...35 VDC
ATEX, CSA, FM & IECEx	7.2...30 VDC
Internal consumption	0.17...0.8 W
Voltage drop	7.2 VDC
Isolation voltage, test / operation.	1.5 kVAC / 50 VAC
Warm-up time.	5 min.
Communications interface	Loop Link
Signal / noise ratio.	Min. 60 dB
Response time (programmable)	1...60 s
EEPROM error check	< 3.5 s
Signal dynamics, input	20 bit
Signal dynamics, output	16 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
All	$\leq \pm 0.05\%$ of span	$\leq \pm 0.01\%$ of span / °C

Basic values		
Input type	Basic accuracy	Temperature coefficient
RTD	$\leq \pm 0.2^\circ\text{C}$	$\leq \pm 0.01^\circ\text{C}/^\circ\text{C}$
Lin. R	$\leq \pm 0.1 \Omega$	$\leq \pm 10 \text{ mW} / ^\circ\text{C}$
Volt	$\leq \pm 10 \mu\text{V}$	$\leq \pm 1 \mu\text{V} / ^\circ\text{C}$
TC type: E, J, K, L, N, T, U	$\leq \pm 1^\circ\text{C}$	$\leq \pm 0.05^\circ\text{C} / ^\circ\text{C}$
TC type: B, R, S, W3, W5, LR	$\leq \pm 2^\circ\text{C}$	$\leq \pm 0.2^\circ\text{C} / ^\circ\text{C}$

EMC - immunity influence.	$< \pm 0.5\%$ of span
Extended EMC immunity: NAMUR NE 21, A criterion, burst	$< \pm 1\%$ of span

Electrical specifications, input:

Max. offset 50% of selec. max. value

RTD and linear resistance input:

RTD type	Min. value	Max. value	Min. span	Standard
Pt100	-200°C	+850°C	25°C	IEC 60751
Ni100	-60°C	+250°C	25°C	DIN 43760
Lin. R	0 Ω	5000 Ω	30 Ω	----

Cable resistance per wire (max.). 5 Ω
 Sensor current Nom. 0.2 mA
 Effect of sensor cable resistance (3- / 4-wire) $< 0.002 \Omega/\Omega$
 Sensor error detection Yes

TC input:

Type	Min. temperature	Max. temperature	Min. span	Standard
B	+400°C	+1820°C	100°C	IEC584
E	-100°C	+1000°C	50°C	IEC584
J	-100°C	+1200°C	50°C	IEC584
K	-180°C	+1372°C	50°C	IEC584
L	-100°C	+900°C	50°C	DIN 43710
N	-180°C	+1300°C	50°C	IEC584
R	-50°C	+1760°C	100°C	IEC584
S	-50°C	+1760°C	100°C	IEC584
T	-200°C	+400°C	50°C	IEC584
U	-200°C	+600°C	50°C	DIN 43710
W3	0°C	+2300°C	100°C	ASTM E988-90
W5	0°C	+2300°C	100°C	ASTM E988-90
LR	-200°C	+800°C	50°C	GOST 3044-84

Cold junction compensation $< \pm 1.0^\circ\text{C}$
 Sensor error detection Yes

Sensor error current:

When detecting	Nom. 33 μ A
Else.	0 μ A

Voltage input:

Measurement range	-12...800 mV
Min. span	5 mV
Input resistance	10 M Ω

Output:

Current output:

Signal range.	4...20 mA
Min. signal range..	16 mA
Updating time	440 ms
Output signal at EEprom error	\leq 3.5 mA
Load resistance.	\leq (V _{supply} - 7.2) / 0.023 [Ω]
Load stability	$<$ \pm 0.01% of span / 100 Ω

Sensor error detection:

Programmable	3.5...23 mA
NAMUR NE43 Upscale	23 mA
NAMUR NE43 Downscale.	3.5 mA

Of span = Of the presently selected range

Approvals:

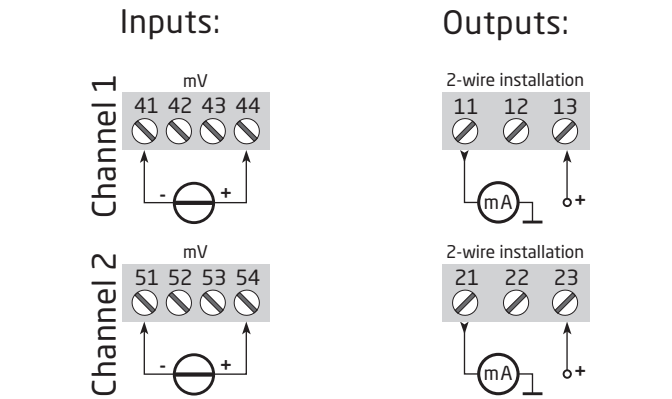
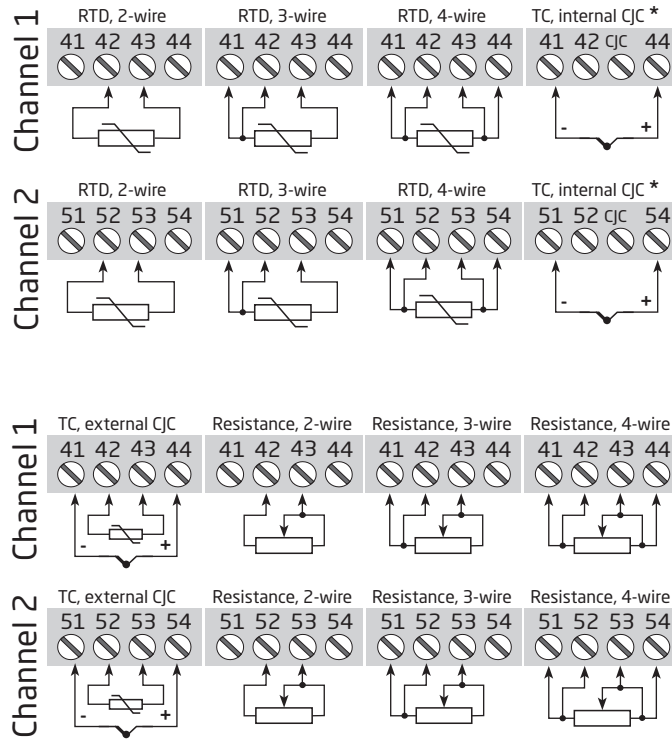
EMC 2004/108/EC.	EN 61326-1
EAC TR-CU 020/2011.	EN 61326-1

Ex / I.S.:

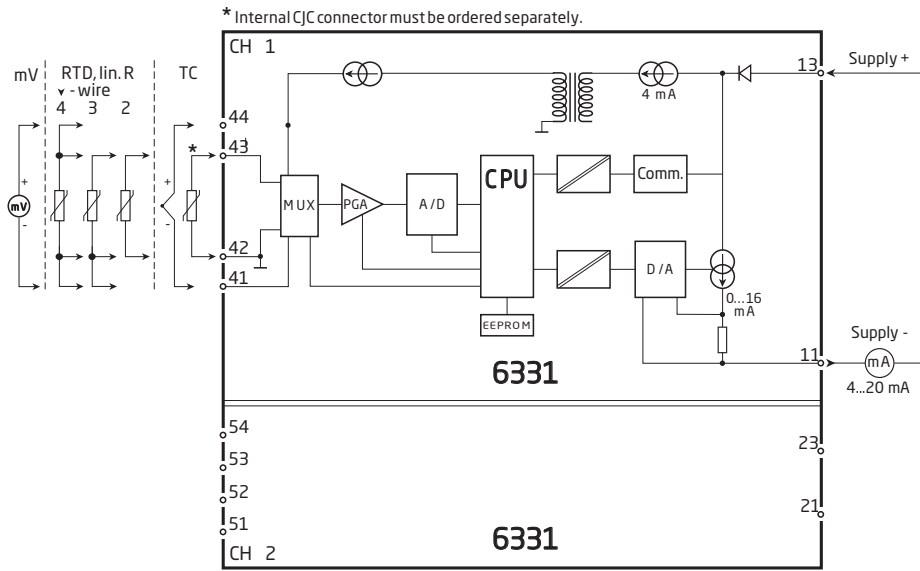
ATEX 94/9/EC	KEMA 06ATEX0115 X
IECEX.	IECEX DEK 14.0047X
CSA	1125003
FM	2D5A7
EAC Ex TR-CU 012/2011	RU C-DK.GB08.V.00410

Connections

Inputs:

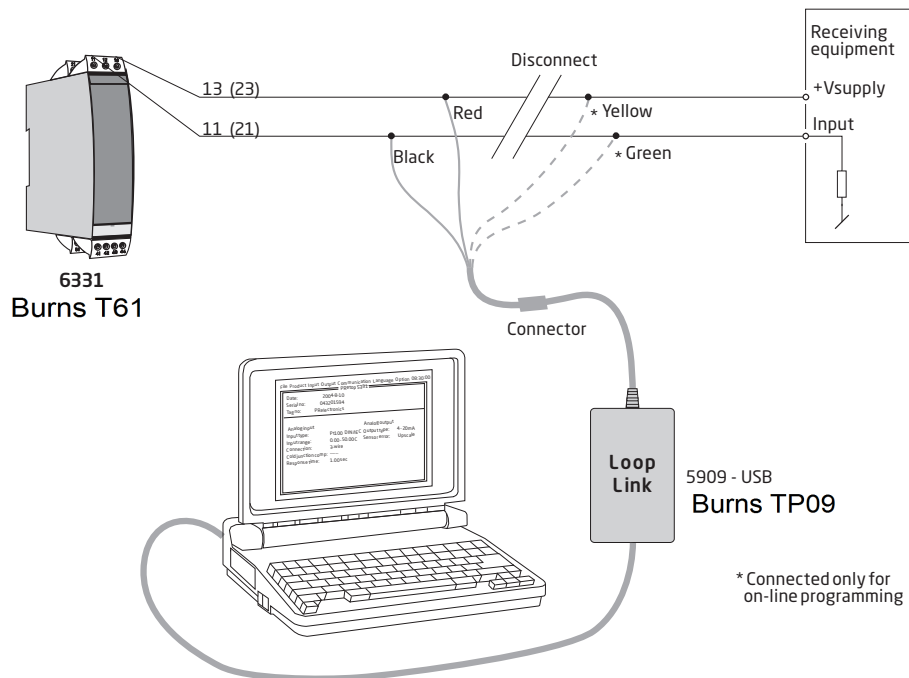


Block diagram



Programming

- Loop Link is a communications interface that is needed for programming 6331.
- For programming please refer to the drawing below and the help functions in PRset.
- When communicating with non-installed modules, connectors 11, 12, 13 (channel 1) and 21, 22, 23 (channel 2) can be dismantled in the safe area to connect the terminals of the communications interface to the pins.
- Loop Link is not approved for communication with modules installed in hazardous (Ex) areas.



ATEX Installation drawing



For safe installation of 6331Bxx or 6334Bxx 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 06ATEX 0115X

Marking  II 1 G Ex ia IIC T6..T4 Ga
II 1 D Ex ia IIIC Da
I M 1 Ex ia I Ma

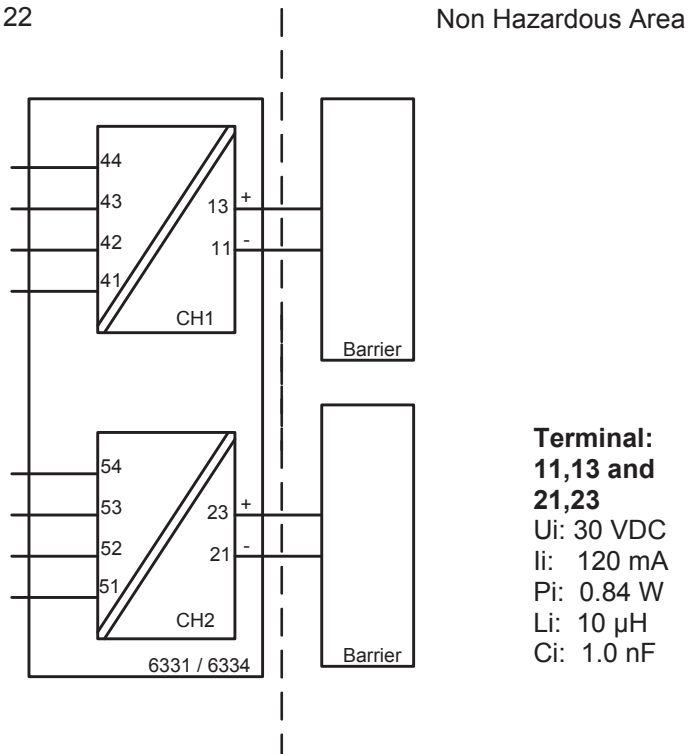
Standards EN 60079-0 : 2012, EN 60079-11 : 2012, EN 60079-26 : 2007

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

T4: $-40 \leq T_a \leq 85^\circ\text{C}$
T5: $-40 \leq T_a \leq 60^\circ\text{C}$
T6: $-40 \leq T_a \leq 40^\circ\text{C}$

**Terminal:
41,42,43,44**
Uo: 9.6 VDC
Io: 25 mA
Po: 60 mW
Lo: 33 mH
Co: 2.4 μF

**Terminal:
51,52,53,54**
Uo: 9.6 VDC
Io: 25 mA
Po: 60 mW
Lo: 33 mH
Co: 2.4 μF



**Terminal:
11,13 and
21,23**
Ui: 30 VDC
Ii: 120 mA
Pi: 0.84 W
Li: 10 μH
Ci: 1.0 nF

General installation instructions

To avoid risk of ignition during installation and maintenance appropriate safety measures against electrostatic discharge (ESD) are to be considered.

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

For installation in a potentially explosive gas atmosphere the following instructions apply:

To avoid risk of ignition due to electrostatic discharge (ESD) the transmitter shall be mounted in an enclosure providing a degree of protection of at least IP20 according to EN/IEC 60529.

Ambient temperature range:

T4: $-40 \leq T_a \leq 85^{\circ}\text{C}$

T5: $-40 \leq T_a \leq 60^{\circ}\text{C}$

T6: $-40 \leq T_a \leq 40^{\circ}\text{C}$

For installation in a potentially explosive dust atmosphere, the following instructions apply:

The transmitter shall be mounted in a metal enclosure or equivalent that is providing a degree of protection of at least IP6X according to EN/IEC 60529 that is suitable for the application and correctly installed. Cable entries and blanking elements shall be used that are suitable for the application and correctly installed. The surface temperature of the enclosure is equal to the ambient temperature +20K for a dust layer with a maximum thickness of 5 mm.

Ambient temperature range:

T4: $-40 \leq T_a \leq 85^{\circ}\text{C}$

For installation in a potentially explosive atmosphere in mines, the following instructions apply:

The transmitter shall be mounted in an enclosure providing a degree of protection of at least IP6X according to EN/IEC 60529. Cable entries and blanking elements shall be used that are suitable for the application and correctly installed.

Ambient temperature range:

T4: $-40 \leq T_a \leq 85^{\circ}\text{C}$

IECEx Installation drawing

For safe installation of 6331Bxx or 6334Bxx 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	IECEx DEK 14.0047X
Marking	Ex ia IIC T6..T4 Ga Ex ia IIIC Da Ex ia I Ma
Standards:	IEC60079-11:2011, IEC60079-0: 2011, IEC60079-26:2006

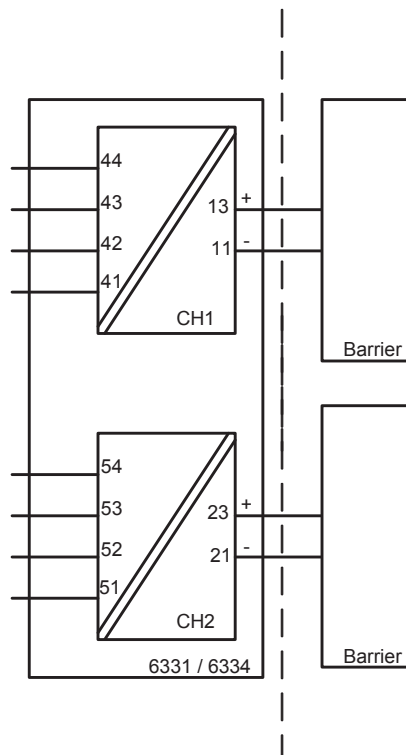
Hazardous area
Zone 0, 1, 2, 20, 21, 22

Non Hazardous Area

T4: $-40 \leq T_a \leq 85^\circ\text{C}$
T5: $-40 \leq T_a \leq 60^\circ\text{C}$
T6: $-40 \leq T_a \leq 40^\circ\text{C}$

**Terminal:
41,42,43,44**
Uo: 9.6 VDC
Io: 25 mA
Po: 60 mW
Lo: 33 mH
Co: 2.4 μF

**Terminal:
51,52,53,54**
Uo: 9.6 VDC
Io: 25 mA
Po: 60 mW
Lo: 33 mH
Co: 2.4 μF



**Terminal:
11,13 and
21,23**
Ui: 30 VDC
Ii: 120 mA
Pi: 0.84 W
Li: 10 μH
Ci: 1.0 nF

General installation instructions

To avoid risk of ignition during installation and maintenance appropriate safety measures against electrostatic discharge (ESD) are to be considered.

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

For installation in a potentially explosive gas atmosphere the following instructions apply:

To avoid risk of ignition due to electrostatic discharge (ESD) the transmitter shall be mounted in an enclosure providing a degree of protection of at least IP20 according to EN/IEC 60529.

Ambient temperature range:

T4: $-40 \leq T_a \leq 85^{\circ}\text{C}$

T5: $-40 \leq T_a \leq 60^{\circ}\text{C}$

T6: $-40 \leq T_a \leq 40^{\circ}\text{C}$

For installation in a potentially explosive dust atmosphere, the following instructions apply:

The transmitter shall be mounted in a metal enclosure or equivalent that is providing a degree of protection of at least IP6X according to EN/IEC 60529 that is suitable for the application and correctly installed. Cable entries and blanking elements shall be used that are suitable for the application and correctly installed. The surface temperature of the enclosure is equal to the ambient temperature +20K for a dust layer with a maximum thickness of 5 mm.

Ambient temperature range:

T4: $-40 \leq T_a \leq 85^{\circ}\text{C}$

For installation in a potentially explosive atmosphere in mines, the following instructions apply:

The transmitter shall be mounted in an enclosure providing a degree of protection of at least IP6X according to EN/IEC 60529. Cable entries and blanking elements shall be used that are suitable for the application and correctly installed.

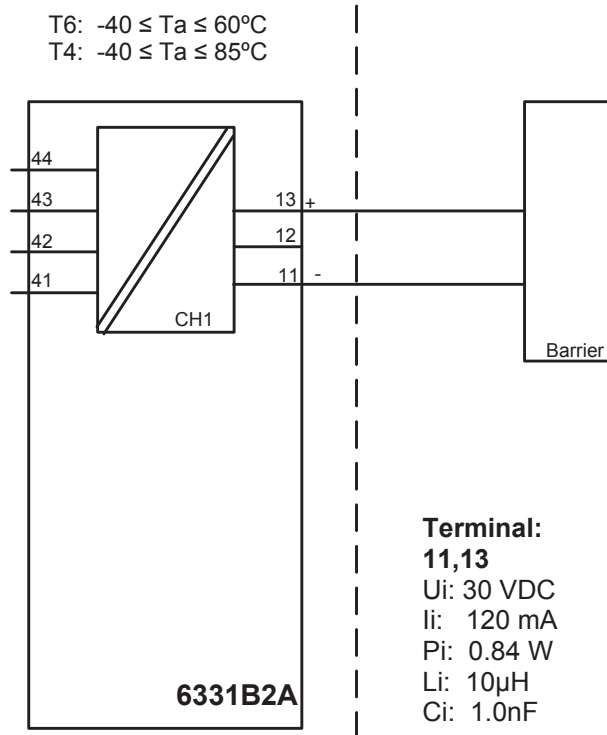
Ambient temperature range:

T4: $-40 \leq T_a \leq 85^{\circ}\text{C}$

Hazardous (Classified) Location
IS, Class I, Division 1, Group A,B,C,D T4..T6
Ex ia IIC T4..T6 Ga
Class I, Zone 0, AEx ia IIC T4..T6 Ga

Non Hazardous Location

Terminal: 41,42,43,44
Connect to passive or non-energy storing devices such as RTD's Resistors and Thermocouples only.



$$Co(Ca) > \sum(Ci+Ccable)$$

$$Lo(La) > \sum(Li+Lcable)$$

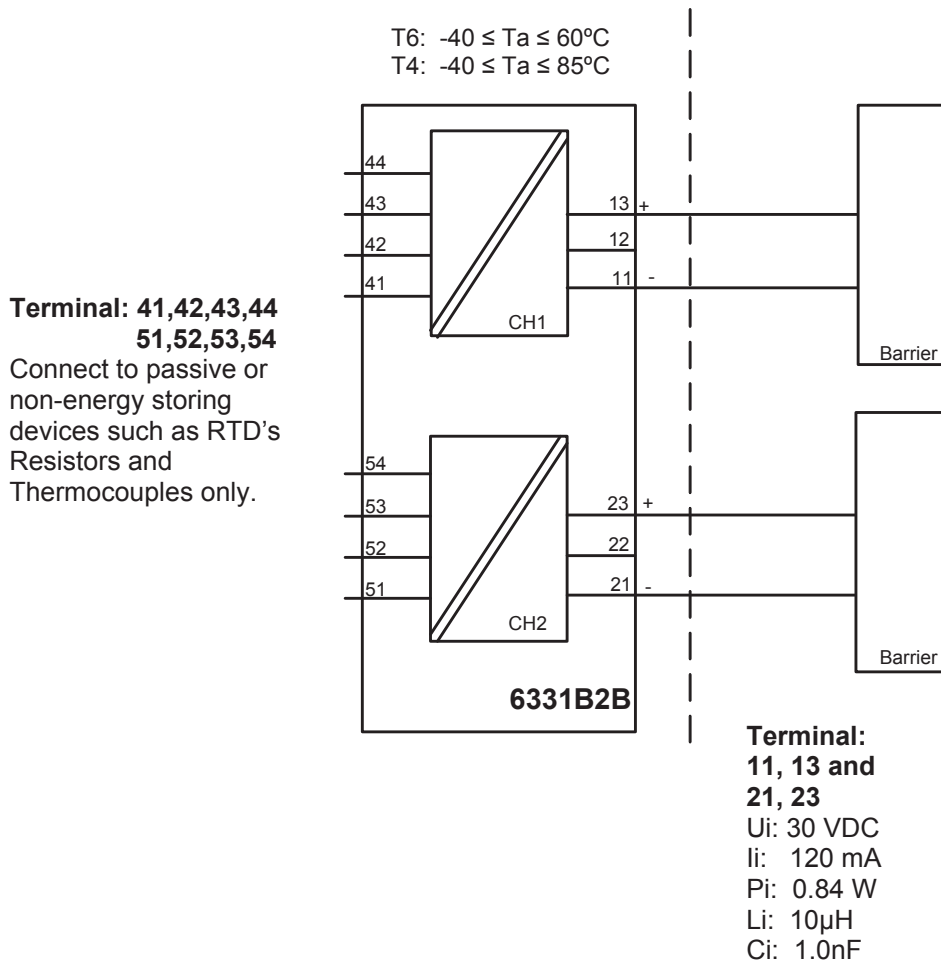
Installation notes.

The Transmitter must be installed in a suitable enclosure to meet installation codes stipulated in The Canadian Electrical Code (CEC).

Substitution of components may impair intrinsic safety.

Hazardous (Classified) Location
IS,Class I, Division 1, Group A,B,C,D T4..T6
Ex ia IIC T4..T6 Ga
Class I, Zone 0, AEx ia IIC T4..T6 Ga

Non Hazardous Location



$$Co(Ca) > \sum(Ci+C_{cable})$$

$$Lo(La) > \sum(Li+L_{cable})$$

Installation notes.

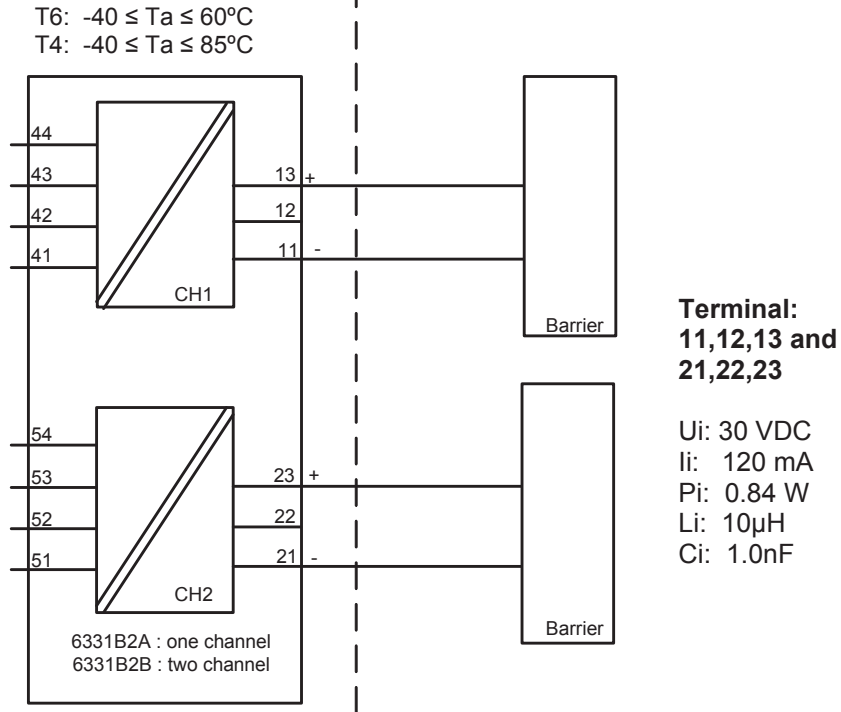
The Transmitter must be installed in a suitable enclosure to meet installation codes stipulated in The Canadian Electrical Code (CEC).

Channel 1 and Channel 2 are separate channels and therefore separate shielded cables shall be used for each channel.

Substitution of components may impair intrinsic safety.

Hazardous (Classified) Location
Class I, Division 1, Group A,B,C,D T4..T6
Class I, Zone 0, AEx ia IIC T4..T6

Non Hazardous Location



Installation notes.

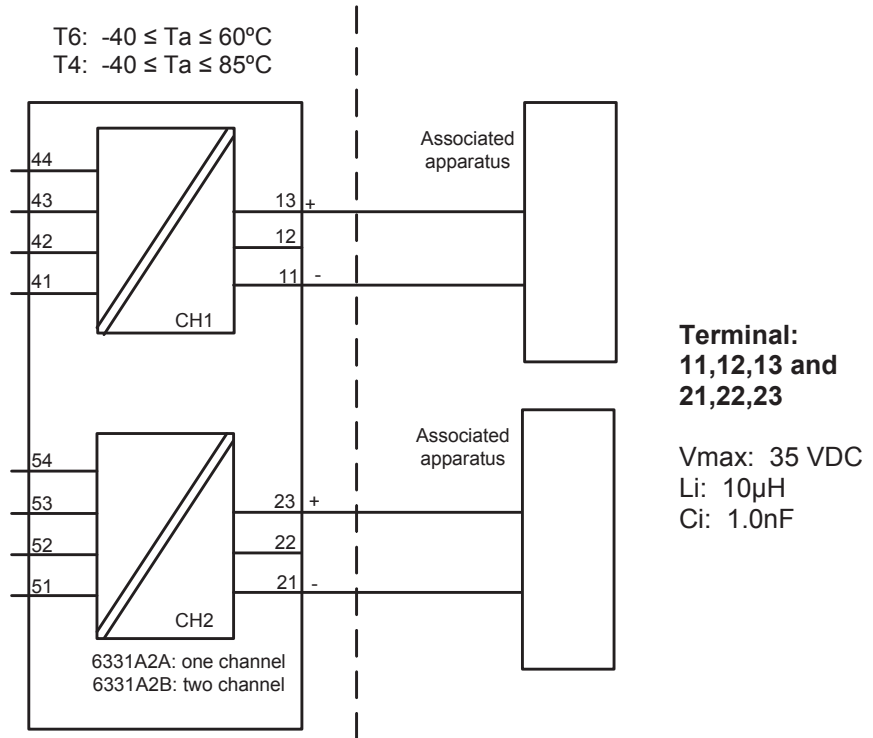
For installation in Class I the Transmitter must be installed in a suitable enclosure to meet installation codes stipulated in The National Electrical Code (ANSI-NFPA 70).

Equipment that is FM-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, provided that the agency's criteria are met. The combination is then 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.

Hazardous (Classified) Location
Class I, Division 2, Group A,B,C,D T4..T6
Class I, Zone 2, IIC T4..T6

Non Hazardous Location



Installation notes.

The Transmitter must be installed in a suitable enclosure to meet installation codes stipulated in The National Electrical Code (ANSI-NFPA 70).

To assure a Non-Incendive system the transmitter and associated apparatus must be wired in accordance with the associated apparatus manufacturers field wiring instructions and the circuit diagram shown above.

Document history

The following list provides notes concerning revisions of this document.

Rev. ID	Date	Notes
106	15/48	CSA, FM & IECEx approvals added

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