Manual do produto

5350

Transmissor PROFIBUS PA / FOUNDATION Fieldbus

No. 5350V114-BR
De ser.: 181815001

TEMPERATURA | INTERFACES INTRÍNSECAS | INTERFACE DE COMUNICAÇÃO | MULTIFUNCIONAL | ISOLAÇÃO | DISPLAY
6 Product Pillars
to meet your every need

Individually outstanding, unrivalled in combination

With our innovative, patented technologies, we make signal conditioning smarter and simpler. Our portfolio is composed of six product areas, where we offer a wide range of analog and digital devices covering over a thousand applications in industrial and factory automation. All our products comply with or surpass the highest industry standards, ensuring reliability in even the harshest of environments and have a 5-year warranty for greater peace of mind.

Our range of temperature transmitters and sensors provides the highest level of signal integrity from the measurement point to your control system. You can convert industrial process temperature signals to analog, bus or digital communications using a highly reliable point-to-point solution with a fast response time, automatic self-calibration, sensor error detection, low drift, and top EMC performance in any environment.

We deliver the safest signals by validating our products against the toughest safety standards. Through our commitment to innovation, we have made pioneering achievements in developing I.S. interfaces with SIL 2 Full Assessment that are both efficient and cost-effective. Our comprehensive range of analog and digital intrinsically safe isolation barriers offers multifunctional inputs and outputs, making PR an easy-to-implement site standard. Our backplanes further simplify large installations and provide seamless integration to standard DCS systems.

We provide inexpensive, easy-to-use, future-ready communication interfaces that can access your PR installed base of products. All the interfaces are detachable, have a built-in display for readout of process values and diagnostics, and can be configured via push-buttons. Product specific functionality includes communication via Modbus and Bluetooth and remote access using our PR Process Supervisor (PPS) application, available for iOS and Android.

Our unique range of single devices covering multiple applications is easily deployable as your site standard. Having one variant that applies to a broad range of applications can reduce your installation time and training, and greatly simplify spare parts management at your facilities. Our devices are designed for long-term signal accuracy, low power consumption, immunity to electrical noise and simple programming.

Our compact, fast, high-quality 6 mm isolators are based on microprocessor technology to provide exceptional performance and EMC-immunity for dedicated applications at a very low total cost of ownership. They can be stacked both vertically and horizontally with no air gap separation between units required.

Our display range is characterized by its flexibility and stability. The devices meet nearly every demand for display readout of process signals, and have universal input and power supply capabilities. They provide a real-time measurement of your process value no matter the industry, and are engineered to provide a user-friendly and reliable relay of information, even in demanding environments.
Transmissor PROFIBUS PA / FOUNDATION Fieldbus 5350

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Transmissor PROFIBUS PA / FOUNDATION Fieldbus 5350

- PROFIBUS PA ver. 3.0
- FOUNDATION Fieldbus ver. ITK 4.6
- Chave automática entre protocolos
- Certificado FISCO
- Capacidade básica com F.F.

Aplicação
- Medição de temperatura linearizada com sensor RTD ou TC.
- Diferença média, ou redundância medicação de temperatura com sensor RTD ou TC.
- Medicação de resistência linear, potenciômetro e mV bipolar.

Características técnicas
- Transmissor de barramento com ambos PROFIBUS PA e FOUNDATION Fieldbus comunicação. Uma única chave de função garante a troca automática entre os dois protocolos.
- Configuração para PROFIBUS PA pode ser feita via Siemens Simatic PDM, ABB Melody / Software Harmony e Metso DNA e para FOUNDATION Fieldbus via software Emerson DeltaV, Yokogawa CS 1000 / CS 3000, ABB Melody / Harmony e Honeywell Experion.
- A função de modo de simulação pode ser ativada por meio de um imã.
- Polaridade independente do barramento de conexão.
- Conversor 24 bit A/D garante alta resolução.
- Blocos de função PROFIBUS PA: 2 analógicos.
- Blocos de função Foundation Fieldbus: 2 analógicos e 1 PID.
- Capacidade FOUNDATION Fieldbus: básica ou LAS.

Montagem / instalação
- Para sensor tipo cabeçote B. Em áreas não perigosas o 5350 pode ser montado no trilho DIN com o suporte da PR 8421.

<table>
<thead>
<tr>
<th>RTD à barramento de comunicação</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC à barramento de comunicação</td>
</tr>
<tr>
<td>Resistência à barramento de comunicação</td>
</tr>
<tr>
<td>mV à barramento de comunicação</td>
</tr>
<tr>
<td>Diferença, média, ou redundância; RTD, TC ou mV</td>
</tr>
</tbody>
</table>
Código de compra

<table>
<thead>
<tr>
<th>Tipo</th>
<th>Versão</th>
</tr>
</thead>
<tbody>
<tr>
<td>5350</td>
<td>Padrão, Área 2</td>
</tr>
<tr>
<td></td>
<td>ATEX, IECEx, FM, CSA, INMETRO &amp; NEPSI : A</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*NB!* Por favor lembre-se de pedir à PR o conector tipo 8422 se a função de modo de simulação é usado.

**Especificações elétricas**

**Condições ambientais:**
- Especificações de range: -40°C a +85°C
- Temperatura de calibração: 20...28°C
- Umidade de relativa: < 95% HR (non-cond.)
- Grau de proteção (capa / terminal): IP68 / IP00

**Especificações mecânicas:**
- Dimensões: Ø 44 x 20,2 mm
- Peso: 55 g
- Tamanho de cabo: 1 x 1,5 mm² cabo flexível
- Torque do terminal de parafuso: 0,4 Nm
- Vibração: IEC 60068-2-6
  - 2...25 Hz: ±1,6 mm
  - 25...100 Hz: ±4 g

**Especificações comuns:**
- Tensão de alimentação, DC
  - Padrão: 9,0...32 V
  - ATEX, IECEx, FM, CSA, INMETRO & NEPSI: 9,0...30 V
  - Em instalações FISCO: 9,0...17,5 V
- Potência necessária máxima: < 350 mW
- Corrente de repouso: < 11 mA
- Max. aumento de corrente em caso de erro: < 7 mA
- Tensão de isolação, teste: 1,5 kVAC para 60 s
- Tensão de isolação, operação: 50 VRMS / 75 VDC
- Tempo de aquecimento: 30 s
- Sinal / relação de ruído: Min. 60 dB
- Tempo de resposta (programável): 1...60 s
- Tempo de atualização: < 400 ms
- Tempo de execução, entrada analógica: < 50 ms
- Dinâmica de sinal, entrada: 24 bit
Precisão, a maior para valores básicos e gerais:

<table>
<thead>
<tr>
<th>Valores gerais</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tipo de entrada</td>
<td>Precisão absoluta</td>
</tr>
<tr>
<td>Todos</td>
<td>≤ ±0,05% de leitura</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Valores básicos</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tipo de entrada</td>
<td>Precisão básica</td>
</tr>
<tr>
<td>Pt100 &amp; Pt1000</td>
<td>≤ ±0,1°C</td>
</tr>
<tr>
<td>Ni100</td>
<td>≤ ±0,15°C</td>
</tr>
<tr>
<td>Cu10</td>
<td>≤ ±1,3°C</td>
</tr>
<tr>
<td>R lin.</td>
<td>≤ ±0,05 Ω</td>
</tr>
<tr>
<td>Volt</td>
<td>≤ ±10 μV</td>
</tr>
<tr>
<td>Tipo TC: E, J, K, L, N, T, U</td>
<td>≤ ±0,5°C</td>
</tr>
<tr>
<td>Tipo TC: B, R, S, W3, W5</td>
<td>≤ ±1°C</td>
</tr>
</tbody>
</table>

Influência de imunidade EMC: < ±0,1% da leitura

Imunidade EMC extendida:
NAMUR NE 21, critério A, explosão: < ±1% da leitura

Especificações elétricas, entradas:

Entrada RTD e resistência linear:

<table>
<thead>
<tr>
<th>Tipo RTD</th>
<th>Valor mínimo</th>
<th>Valor máximo</th>
<th>Padrão</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt25...Pt1000</td>
<td>-200°C</td>
<td>+850°C</td>
<td>IEC60751/JIS C 1604</td>
</tr>
<tr>
<td>Ni25...Ni1000</td>
<td>-60°C</td>
<td>+250°C</td>
<td>DIN 43760</td>
</tr>
<tr>
<td>Cu10...Cu1000</td>
<td>-50°C</td>
<td>+200°C</td>
<td>α = 0,00427</td>
</tr>
<tr>
<td>Res. linear</td>
<td>0 Ω</td>
<td>10 kΩ</td>
<td>-</td>
</tr>
<tr>
<td>Potenciômetro</td>
<td>0 Ω</td>
<td>100 kΩ</td>
<td>-</td>
</tr>
</tbody>
</table>

Resistência de cabo por fio: 50 Ω
Corrente de sensor: Nom. 0,2 mA
Efeito da resistência do cabo do sensor (3-/4-linhas): < 0,002 Ω / Ø
Detecção de erro do sensor: Sim
Detecção de curto-circuito: < 15 Ø

Entrada TC:

<table>
<thead>
<tr>
<th>Tipo</th>
<th>Valor mínimo</th>
<th>Valor máximo</th>
<th>Padrão</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>+400°C</td>
<td>+1820°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>E</td>
<td>-100°C</td>
<td>+1000°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>J</td>
<td>-100°C</td>
<td>+1200°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>K</td>
<td>-180°C</td>
<td>+1372°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>L</td>
<td>-200°C</td>
<td>+900°C</td>
<td>DIN 43710</td>
</tr>
<tr>
<td>N</td>
<td>-180°C</td>
<td>+1300°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>R</td>
<td>-50°C</td>
<td>+1760°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>S</td>
<td>-50°C</td>
<td>+1760°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>T</td>
<td>-200°C</td>
<td>+400°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>U</td>
<td>-200°C</td>
<td>+600°C</td>
<td>DIN 43710</td>
</tr>
<tr>
<td>W3</td>
<td>0°C</td>
<td>+2300°C</td>
<td>ASTM E988-90</td>
</tr>
<tr>
<td>W5</td>
<td>0°C</td>
<td>+2300°C</td>
<td>ASTM E988-90</td>
</tr>
<tr>
<td>Ext. CJC</td>
<td>-40°C</td>
<td>+135°C</td>
<td>IEC60751</td>
</tr>
</tbody>
</table>
Compensação de junta fria (CJC) ............................... < ±0,5 °C  
Detecção de erro de sensor ................................. Sim  
Corrente de erro de sensor:  
  quando detectado ........................................ Nom. 4 μA  
  ou ......................................................... 0 μA  
Detecção de curto circuito .................................. < 3 mV

Entrada de tensão:  
Range de medição ........................................... -800...+800 mV  
Resistência de entrada ........................................ 10 MΩ

Saída:  
Conexão PROFIBUS PA:  
Protocolo PROFIBUS PA ..................................... Profile A&B, ver. 3.0  
Protocolo padrão PROFIBUS PA ................................. EN 50170 vol. 2  
Endereço PROFIBUS PA address: ............................ 126  
Bloco de função PROFIBUS PA: .............................. 2 analógicos

Conexão FOUNDATION Fieldbus:  
Protocolo FOUNDATION Fieldbus .............................. Protocolo FF  
Protocolo padrão FOUNDATION Fieldbus ...................... Especificação de design FF  
Capacidade FOUNDATION Fieldbus: .......................... Basic ou LAS  
Versão FOUNDATION Fieldbus: ................................ ITK 4.6  
Blocos de função FOUNDATION Fieldbus .............. 2 analógicas e 1 PID

Determinações das autoridades observados:  
EMC ............................................................... 2014/30/UE  
RoHS ............................................................... 2011/65/UE  
ATEX ............................................................... 2014/34/UE  
EAC ................................................................. TR-CU 020/2011

Aprovações I.S. / Ex:  
ATEX .............................................................. KEMA 02ATEX1318 X  
IECEEx ............................................................. IECEx BVS 12.0035 X  
c CSA us ......................................................... CSA-1418937  
FM ................................................................. FM-3015609  
INMETRO .......................................................... DEKRA 18.0006X  
NEPSI  
5350A .............................................................. GYJ14.1100U  
5350B .............................................................. GYJ14.1101X  
EAC Ex TR-CU 012/2011 ........................................ RU C-DK.GB08.V.00410
Conexões de entrada

Entrada:

1. **RTD, 2-linhas**
   - Conexões com dois sensores pode ser configurado para 2 medições, diferença, média ou redundância.

2. **RTD, 3-linhas**
3. **RTD, 4-linhas**
4. **RTD, 2-linhas**

5. **resistência, 2-linhas**
6. **resistência, 3-linhas**
7. **resistência, 4-linhas**

8. **TC, CJC interna**
9. **TC, CJC externa**

10. **2 x mV**

11. **2 x RTD, 2-linhas**
12. **2 x RTD, 3-linhas**
13. **2 x RTD, 4-linhas**

**Potenciômetro, compensação do cabo**

**Dois 3-linhas potenciômetros**
Conexões de saída

Saída:

Terminação do barramento

Conexão do barramento

Acoplador de barramento

Terminação do barramento

Conexão do barramento

Acoplador de barramento

Especificações mecânicas

Montagem dos cabos do sensor

As linhas devem ser montados entre as placas metálicas.

As linhas devem ser montados entre as placas metálicas.
Diagrama de bloco

Instalação de barramento
ATEX Installation drawing 5350QA01-V3R0

5350B

For safe installation 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 02ATEX 1318X

Marking

 II 1 G Ex ia IIC T6...T4 Ga
 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+A11, EN 60079-11 : 2012

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

Non Hazardous Area
Sensor input, terminal 3,4,5 and 6

<table>
<thead>
<tr>
<th>Unit</th>
<th>Barrier where $P_o &lt; 0.84$ W</th>
<th>Barrier where $P_o &lt; 1.3$ W</th>
<th>Suitable for FISCO systems</th>
<th>Suitable for FISCO systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>$U_i$</td>
<td>30 VDC</td>
<td>30 VDC</td>
<td>17.5 VDC</td>
<td>15 VDC</td>
</tr>
<tr>
<td>$I_i$</td>
<td>120 mA DC</td>
<td>300 mA DC</td>
<td>250 mA DC</td>
<td>900 mA DC</td>
</tr>
<tr>
<td>$P_i$</td>
<td>0.84 W</td>
<td>1.3 W</td>
<td>2.0 W</td>
<td>5.32 W</td>
</tr>
<tr>
<td>$L_i$</td>
<td>1 μH</td>
<td>1 μH</td>
<td>1 μH</td>
<td>1 μH</td>
</tr>
<tr>
<td>$C_i$</td>
<td>2 nF</td>
<td>2 nF</td>
<td>2 nF</td>
<td>2 nF</td>
</tr>
<tr>
<td>$T_{1..T4}$</td>
<td>$T_{amb} &lt; 85^\circ$C</td>
<td>$T_{amb} &lt; 75^\circ$C</td>
<td>$T_{amb} &lt; 85^\circ$C</td>
<td>$T_{amb} &lt; 85^\circ$C</td>
</tr>
<tr>
<td>$T_{5}$</td>
<td>$T_{amb} &lt; 70^\circ$C</td>
<td>$T_{amb} &lt; 65^\circ$C</td>
<td>$T_{amb} &lt; 60^\circ$C</td>
<td>$T_{amb} &lt; 60^\circ$C</td>
</tr>
<tr>
<td>$T_{6}$</td>
<td>$T_{amb} &lt; 60^\circ$C</td>
<td>$T_{amb} &lt; 45^\circ$C</td>
<td>$T_{amb} &lt; 45^\circ$C</td>
<td>$T_{amb} &lt; 45^\circ$C</td>
</tr>
</tbody>
</table>

Supply, terminal 1,2 for Ex ia IIC

Supply, terminal 1,2 for Ex ib IIC

<table>
<thead>
<tr>
<th>Unit</th>
<th>Barrier where $P_o &lt; 5.32$ W</th>
<th>FISCO segment coupler</th>
</tr>
</thead>
<tbody>
<tr>
<td>$U_i$</td>
<td>30 VDC</td>
<td>17.5 VDC</td>
</tr>
<tr>
<td>$I_i$</td>
<td>250 mA DC</td>
<td>any</td>
</tr>
<tr>
<td>$P_i$</td>
<td>5.32 W</td>
<td>any</td>
</tr>
<tr>
<td>$L_i$</td>
<td>1 μH</td>
<td>1 μH</td>
</tr>
<tr>
<td>$C_i$</td>
<td>2 nF</td>
<td>2 nF</td>
</tr>
<tr>
<td>$T_{1..T4}$</td>
<td>$T_{amb} &lt; 85^\circ$C</td>
<td>$T_{amb} &lt; 85^\circ$C</td>
</tr>
<tr>
<td>$T_{5}$</td>
<td>$T_{amb} &lt; 75^\circ$C</td>
<td>$T_{amb} &lt; 75^\circ$C</td>
</tr>
<tr>
<td>$T_{6}$</td>
<td>$T_{amb} &lt; 60^\circ$C</td>
<td>$T_{amb} &lt; 60^\circ$C</td>
</tr>
</tbody>
</table>

General installation instructions

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

If the transmitter is installed in an explosive atmosphere requiring the use of equipment of category 1G, and if the enclosure is made of aluminum, it must be installed such, that ignition sources due to impact and friction sparks are excluded.

If the enclosure is made of non-metallic material or of metal having a paint layer thicker of more than 0.2mm (group IIC) or 2mm for (group IIB, IIA, I), electrostatic charging shall be avoided.

For installation in a potential explosive gas atmosphere:
The transmitter shall be mounted in an enclosure form B according to DIN43729 or equivalent that provides a degree of protection of at least IP20 according to EN/IEC 60529, that is suitable for the application and correctly installed.

For installation in a potential explosive dust atmosphere:
The transmitter shall be mounted in an enclosure form B according to DIN43729 or equivalent that provides 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 +20 K.

If the enclosure is made of non-metallic material or of metal having a paint layer, electrostatic charging shall be avoided.

For installation in mines:
The transmitter shall be mounted in a steel or non-metallic 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. Cable entries and blanking elements shall be used that are suitable for the application and correctly installed. If the enclosure is made of non-metallic materials or painted metals electrostatic charging shall be avoided.
5350A: For safe installation 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.

Marking

II 3 G  Ex nA [ic] IIC T6..T4 Gc
II 3 G  Ex ic IIC T6..T4 Gc
II 3 D  Ex ic IIIIC Dc


<table>
<thead>
<tr>
<th>Terminal: 3,4,5,6</th>
<th>Terminal: 1,2</th>
<th>Terminal: 1,2</th>
<th>Terminal: 1,2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal: nA</td>
<td>Terminal: ic</td>
<td>Terminal: ic</td>
<td>Terminal: FISCO</td>
</tr>
<tr>
<td>Uo: 5.7 V</td>
<td>U ≤ 32 VDC</td>
<td>Ui = 32 VDC</td>
<td>Ui = 17.5 VDC</td>
</tr>
<tr>
<td>Io: 8.4 mA</td>
<td>Li = 1 μH</td>
<td>Li = 1 μH</td>
<td>Li = 1 μH</td>
</tr>
<tr>
<td>Po: 12 mW</td>
<td>Ci = 2.0 nF</td>
<td>Ci = 2.0 nF</td>
<td>Co: 40 μF</td>
</tr>
<tr>
<td>Lo: 200 mH</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

General installation instructions:
The Sensor Circuit is not infallibly galvanic isolated from the Fieldbus circuit. However, the galvanic isolation is capable of withstanding a test voltage of 500Vac during 1 minute. If the enclosure is made of non-metallic material or of metal having a paint layer thicker of more than 0.2mm (group IIC) or 2mm for (group IIB, IIA), electrostatic charging shall be avoided. For an ambient temperature above 60°C, heat resistant cables shall be used with a rating of at least 20K above the ambient temperature.

For installation in a potential explosive gas atmosphere:
For Ex ic installation, 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. For Ex nA installation the transmitter shall be installed in an enclosure providing a degree of protection of at least IP54, according to EN/IEC 50529 that is suitable for the application and correctly installed, e.g. an enclosure with protection Ex n or Ex e. Cable entry devices and blanking elements shall fulfill the same requirements.

For installation in a potential explosive dust atmosphere:
For Ex ic installation interfacing intrinsically safe signal "ic" ( e.g. a passive device ), the transmitter shall be mounted in a metal enclosure form B according to DIN 43729 or equivalent, that provides a degree of protection of at least IP6X according to EN/IEC 60529, that is suitable for the application. Cable entry devices and blanking elements shall fulfill the same requirements. For non intrinsically safe installation the transmitter shall be mounted in an enclosure that provides a degree of protection of at least IP6X according to EN/IEC 60529, and in conformance with type of protection EX t that is suitable for the application and correctly installed. Cable entry devices and blanking elements shall fulfill the same requirements. If the enclosure is made of non-metallic material or of metal having a paint layer, electrostatic charging shall be avoided.
The surface temperature of the enclosure is equal to the ambient temperature +20 K.
**Hazardous (Classified) Location**

Class I, Division 1, Groups A, B, C, D
OR
Class I, Zone 0, IIC

- **Terminal 1,2**
  - Vt or Uo : 5.71 V
  - It or Io : 8.4 mA
  - Pt or Po : 12 mW
  - Ca or Co : 40 µF
  - La or Lo : 200 mH

**Terminal 3, 4, 5, 6**
- Vt or Uo : 5.71 V
- It or Io : 8.4 mA
- Pt or Po : 12 mW
- Ca or Co : 40 µF
- La or Lo : 200 mH

**Unapproved Terminal**

**Associated Apparatus**
- Barrier or FISCO Supply with entity Parameters:
  - UM ≤ 250V
  - Voc or Uo ≤ Vmax or Ui
  - Isc or Io ≤ Imax or li
  - Po ≤ Pi
  - Ca or Co ≥ Ci + Ccable
  - La or Lo ≥ Li + Lcable

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

**Terminal 1,2**

<table>
<thead>
<tr>
<th>Class I, Zone 0, Ex ia IIC, Entity / FISCO</th>
</tr>
</thead>
<tbody>
<tr>
<td>iS, Class I, Division 1, Group A, B, C, D</td>
</tr>
<tr>
<td>Entity / FISCO</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Barrier type</th>
<th>Linear barrier</th>
<th>Trapezoid barrier</th>
<th>Suitable for FISCO systems</th>
<th>Suitable for FISCO systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1..T4:</td>
<td>Ta ≤ +85°C</td>
<td>Ta ≤ +75°C</td>
<td>Ta ≤ +85°C</td>
<td>Ta ≤ +85°C</td>
</tr>
<tr>
<td>T5:</td>
<td>Ta ≥ +70°C</td>
<td>Ta ≥ +65°C</td>
<td>Ta ≥ +65°C</td>
<td>Ta ≥ +65°C</td>
</tr>
<tr>
<td>T6:</td>
<td>Ta ≥ +60°C</td>
<td>Ta ≥ +45°C</td>
<td>Ta ≥ +45°C</td>
<td>Ta ≥ +45°C</td>
</tr>
<tr>
<td>Vmax or Ui</td>
<td>30 V</td>
<td>30 V</td>
<td>17.5 V</td>
<td>15 V</td>
</tr>
<tr>
<td>Imax or li</td>
<td>120 mA</td>
<td>300 mA</td>
<td>250 mA</td>
<td>900 mA</td>
</tr>
<tr>
<td>Pi</td>
<td>0.84 W</td>
<td>1.3 W</td>
<td>2.0 W</td>
<td>5.32W</td>
</tr>
<tr>
<td>Ci</td>
<td>2.0 nF</td>
<td>2.0 nF</td>
<td>2.0 nF</td>
<td>2.0 nF</td>
</tr>
<tr>
<td>Li</td>
<td>1 µH</td>
<td>1 µH</td>
<td>1 µH</td>
<td>1 µH</td>
</tr>
</tbody>
</table>

See Installation notes.
Hazardous (Classified) Location

Class I, Division 2, Groups A, B, C, D
OR
Class I, Zone 1, IIC

Terminal 3, 4, 5, 6
Vt or Uo : 5.71 V
It or Io : 8.4 mA
Pt or Po : 12 mW
Ca or Co : 40 uF
La or Lo : 200 mH

See Installation notes.

Nonincendive Field Wiring

T1..T4:
Ta ≤ +85°C

T5:
Ta ≤ +75°C

T6:
Ta ≤ +60°C

Vmax / Ui:
30 V

Imax or li:
250 mA

Pi:
5.32 W

Ci:
2.0 nF

Li:
1 µH

Unlimited Location

Class I, Division 2, Groups A, B, C, D
OR
Class I, Zone 1, IIC

Associated Apparatus
Barrier with entity Parameters:
UM ≤ 250 V
Voc or Uo ≤ Vmax or Ui
Isc or Io ≤ Imax or li
Po < Pi
Ca or Co ≥ Ci +Ccable
La or Lo ≥ Li + Lcable
or
FISCO Supply

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

Entity Parameters

Terminal 1, 2
Class I, Zone 1, Ex ib IIC
Entity / FISCO

Barrier type:
Rectangular barrier
FISCO Segment coupler

T1..T4:
Ta ≤ +85°C

T5:
Ta ≤ +75°C

T6:
Ta ≤ +60°C

Vmax / Ui:
30 V

Imax or li:
250 mA

Pi:
5.32 W

Ci:
2.0 nF

Li:
1 µH

For a current-controlled circuit the parameter Imax is not required and need not be aligned with the parameter Isc or It of the barrier or associated nonincendive field wiring apparatus.
Hazardous (Classified) Location

- Class I, Division 2, Groups A, B, C, D
- OR
- Class I, Zone 2, IIC

Unqualified Location

- 32V
- Class 2
- Power Supply

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

Terminal 3, 4, 5, 6
- Vt or Uo : 5.71 V
- It or Io : 8.4 mA
- Pt or Po : 12 mW
- Ca or Co : 40 μF
- La or Lo : 200 mH

Terminal 1, 2
- Ci : 2.0 nF
- Li : 1 μH

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1..T4</td>
<td>-40°C ≤ Ta ≤ +85°C</td>
</tr>
<tr>
<td>T5</td>
<td>-40°C ≤ Ta ≤ +75°C</td>
</tr>
<tr>
<td>T6</td>
<td>-40°C ≤ Ta ≤ +60°C</td>
</tr>
</tbody>
</table>

See installation notes:
Installation notes:

**FM / CSA:**
For installation in the US the 5350 shall be installed according to the National Electrical Code (ANSI-NFPA 70).
For installation in Canada the transmitter shall be installed in a suitable enclosure to meet installation codes stipulated 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/FNICO 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:
FISCO: 5 nF and 10 \( \mu \)H.
FNICO: 5 nF and 20 \( \mu \)H.
The Nonincendive Field Wiring concept allows the interconnection of nonincendive field wiring apparatus using any of the wiring methods permitted for unclassified locations. 

\[ V_{\text{max}} \geq V_{\text{oC}} \text{ or } V_{t}, \quad C_a \geq C_i + C_{\text{cable}}, \quad L_a \geq L_i + L_{\text{cable}} \]

The Nonincendive Field Wiring concept allows the interconnection of FM-approved nonincendive devices with FNICO parameters not specifically examined in combination as a system when: 

\[ U_{o} \text{ or } V_{oC} \text{ or } V_{t} \leq V_{\text{max}}, \quad P_{o} \leq P_{i} \]

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 \(\mu\text{A}\) 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 \(\Omega\)/Km
- Inductance per unit length \(L'\): 0.4...1mH/km
- Capacitance per unit length \(C'\): 80 ...200 nF/km

\[ C' = C'_{\text{line/line}} + 0.5 C'_{\text{line/screen}}, \quad \text{if both lines are floating} \]
\[ \text{or} \]
\[ C' = C'_{\text{line/line}} + C'_{\text{line/screen}}, \quad \text{if the screen is connected to one line} \]

- Length of spur Cable: max. 30 m
- Length of trunk cable: max. 1 Km
- Length of splice: max. 1 m

Terminators

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

\[ R = 90 \ldots 100 \Omega \]
\[ C = 0 \ldots 2.2 \mu\text{F} \]

System evaluation

The number of passive devices like transmitters, actuators, connected to a single bus segment is not limited due to I.S. or N.I. 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 or nonincendive safety of the installation as applicable. The sensor circuit is not infallibly galvanically isolated from the Fieldbus input circuit. However, the galvanic isolation between the circuits is capable of withstanding a test voltage of 500 Vac during 1 minute.
**Nonincendive Field Wiring Concept:**
The Nonincendive Field Wiring concept allows for the interconnection of nonincendive field wiring apparatus using any of the wiring methods permitted for unclassified locations.
Vmax >= Voc or Vt, Ca >= Ci +Ccable, La >= Li + Lcable

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

1. The Intrinsic Safety Entity concept allows the interconnection of FM / UL / CSA-approved intrinsically safe devices (Div. 1 or Zone 0 or Zone1), with entity parameters not specifically examined in combination as a system when: Uo or Voc or Vt <= Vmax, Io or Isc or It <= Imax, Po <= Pi. Ca or Co >= Ci + Ccable, La or Lo >= Li + Lcable, Po <= Pi.

2. The Intrinsic Safety FISCO concept allows the interconnection of FM / UL / CSA-approved intrinsically safe devices with FISCO parameters not specifically examined in combination as a system when: Uo or Voc or Vt <= Vmax, Io or Isc or It <= Imax, Po <= Pi.

3. Control equipment connected to the Associated Apparatus must not use or generate more than 250 Vrms or Vdc.

4. Intrinsically Safe Installation should be in accordance with ANSI/ISA RP12.6.01 (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.

5. The configuration of associated Apparatus must be FM Approvals or UL / CSA Approved under the associated concept.

6. Associated Apparatus manufacturer’s installation drawing must be followed when installing this equipment.

7. The 5350B is approved for Class I, Zone 0, applications. If connecting AEx[ib] associated Apparatus or AExib I.S. Apparatus to the 5350B 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”.

8. No revision to drawing without prior FM / UL / CSA Approval.

9. Simple Apparatus is defined as a device that neither generates nor stores more than 1.5 V, 0.1 A or 25 mW.

10. The termination must be NRTL-approved, and the resistor must be infallible.

11. **Warning:**
For applications in Div. 2 or Zone 2 (Classified Locations) Explosion hazard: Except for nonincendive field circuits, do not disconnect the apparatus unless the area is known to be non hazardous.

12. **Warning:**
Substitution of Components May Impair Safety.
NEPSI Installation drawing

Transmitter with Bus technology of Series 5350A manufactured by PR electronics A/S via the test made by NEPSI (National Supervision and Inspection Center for Explosion Protection and Safety of Instrumentation have been proved that they are fulfilling the General Requirements according to Article I, GB3836.1-2010 “Electrical equipment using in the Explosive gas Environment” and the specified requirements for “n” series in Article IX, GB3836.8-2003. The symbol of explosive protection applied should be Ex nA(L) II C T4~T6 while the Certificate No. is GYJ14.1100U.

Firstly, Note for the use of the products
1. The Symbol U applied after the Cert. No., indicates that this transmitter cannot be applied in explosive environment of danger until the Protection Grade of the box where the transmitter will later on be placed is not lower than IP54 (GB4208), and has been approved by the National Authorized Inspection Body.
2. The rated Voltage for the transmitter should be 32Vd.c. Proper measures should be applied to protect the working voltage from instantaneously jumping up to 40% of the rated Voltage caused by disturbance.
3. The relationship between the temperature Code and ambient temperature is indicated as follows:

<table>
<thead>
<tr>
<th>Temperature Code</th>
<th>Ambient Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>T4</td>
<td>-40~+85</td>
</tr>
<tr>
<td>T5</td>
<td>-40~+75</td>
</tr>
<tr>
<td>T6</td>
<td>-40~+60</td>
</tr>
</tbody>
</table>
4. the parameters of the transmitter output which will be connected with the inputs of the Sensor (X3, X4, X5, X6) are as follows:
   Uo=5.7V  Io=8.4V  Po=12mW  Co=40μF  Io=200 mH
5. Only when the transmitter is combined with other power-restraint devices which have also been tested and approved by the National Authorized Inspection Body and met the requirements of GB3836.1-2000 and GB3836.8-2000 can the explosion protection system be applied in the explosive environment.
   Uo<Ui  Io<i  Po<Pi  Co<Cc+Ci  Lo>Lc+Li
   Note: Cc, Lc indicated the parameters of distributed electric capacity of connecting cable.
   Ui, i, Pi indicted the parameters of the output of other power-restraint devices; Ci, Li indicated the maximum of the external parameter of the power-restraint devices.
6. Users are not allowed to replace the inner electrical parts with permission.
Transmitter with Bus technology of Series 5350B manufactured by PR electronics A/S via the test made by NEPSI (National Supervision and Inspection Center for Explosion Protection and Safety of Instrumentation) have been proved that they are fulfilling the General Requirements according to, GB 3836.1-2010, GB3836.4-2010, GB3836.20-2010. The symbol of explosive protection are EX ia IIC T4~T6 or Ex ib(ia) IIC T4~T6 while the Certificate No. is GYJ14.1101X.

Note for the use of transmitter:

1. The Symbol “X” applied after the Cert. No., indicates that this transmitter cannot be applied in explosive environment of danger until the Protection Grade of the box where the transmitter will later on be placed is not lower than IP20 (GB4208), and has been approved by the National Authorized Inspection Body. The metallic case must accord to item 8, GB3836.1-2010; the nonmetallic case must accord to item 7.3, GB3836.1-2010.

2. The relationship of the explosive protection ingress, the temperature Code, ambient temperature and max. output parameter is indicated as follows:

<table>
<thead>
<tr>
<th></th>
<th>Ex ia IIC</th>
<th>Ex ib(ia) II C</th>
</tr>
</thead>
<tbody>
<tr>
<td>T4:</td>
<td>-40°C~+85°C</td>
<td>-40°C~+85°C</td>
</tr>
<tr>
<td>T5:</td>
<td>-40°C~+70°C</td>
<td>-40°C~+75°C</td>
</tr>
<tr>
<td>T6:</td>
<td>-40°C~+60°C</td>
<td>-40°C~+65°C</td>
</tr>
<tr>
<td>Ui</td>
<td>30V</td>
<td>17.5V</td>
</tr>
<tr>
<td>Li</td>
<td>120mA</td>
<td>250mA</td>
</tr>
<tr>
<td>Pi</td>
<td>0.84W</td>
<td>2.0W</td>
</tr>
</tbody>
</table>

Ci= 2nF, Li=1µH
IECEx Installation drawing

For safe installation of 5350 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        BVS 12.0035X
Marking
Ex ia IIC T6..T4 Ga
Ex ib [ia Ga] IIC T6..T4 Gb
Ex ia IIC T135°C Da
Ex ia I Ma
Ex nA [ic] IIC T6..T4 Gc
Ex ic IIC T6..T4 Gc


Hazardous area
Zone 0, 1, 2, 20, 21, 22, M1

Non Hazardous Area

Sensor input terminals 3,4,5,6

| Uo | 5.7 VDC |
| Io | 8.4 mA  |
| Po | 12 mW  |
| Lo | 200 mH |
| Co | 40 µF  |

Max 10 modules
Termination

Revision date: 2015-10-27
Version /Revision V4/R0  5350QI01 V2R0
Installation notes.

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

For an ambient temperature ≥ 60°C, heat resistant cables shall be used with a rating of at least 20 K above the ambient temperature.

For installation in a potentially explosive gas atmosphere requiring EPL Ga or EPL Gb, the following instructions apply:
The transmitter shall be mounted in an enclosure that is providing a degree of protection of at least IP54 according to IEC 60529 that is suitable for the application and correctly installed.

For installation in a potentially explosive dust atmosphere requiring EPL Da or EPL Db, the following instructions apply:
The transmitter shall be mounted in an Form B enclosure according to DIN 43729, that is providing a degree of protection of at least IP6X according to IEC 60079-0 and IEC 60079-31 “Equipment dust ignition protection by enclosure ID” 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.

Maximum surface temperature with a 5 mm layer of dust is T ≤ 135°C.

For installation in mines the following instructions apply:
The transmitter shall be mounted in a metal enclosure that is providing a degree of protection of at least IP6X according to IEC 60529, and 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.

For installation in a potentially explosive gas atmosphere requiring EPL Gc the following instructions apply:
The transmitter shall be mounted in an enclosure according to IEC 60079-15, that is suitable for the application and correctly installed.
Instalação INMETRO 5350QB01-V3R0

Para uma instalação segura, o seguinte deve ser observado. O módulo só deve ser instalado por pessoal qualificado e familiarizado com as leis, diretrizes e normas nacionais e internacionais aplicáveis a essa área.

Certificado DEKRA 18.0006X

Notas
Ex ia IIC T6..T4 Ga
Ex ib [ia Ga] IIC T6..T4 Gb
Ex ia IIC T135°C Da
Ex ia I Ma
Ex nA [ic] IIC T6..T4 Gc
Ex ic IIC T6...T4 Gc

Normas
ABNT NBR IEC 60079-11:2013 : Versão corrigida 2017
ABNT NBR IEC 60079-15:2012

Área Classificada
Zone 0, 1, 20, 21, 22, e mineração de carvão

Área Não classificada

Entrada do sensor
Terminais 3,4,5,6

U₀  5.7 VDC
I₀  8.4 mA
P₀  12 mW
L₀  200 mH
C₀  40 µF

Máximo de 10 módulos
Instruções de Instalação.

O circuito do sensor não é galvânicamente infaível isolado do circuito de entrada. No entanto, o isolamento galvânico entre os circuitos é capaz de suportar uma tensão de teste de 500Vac durante 1 minuto.

Para uma temperatura ambiente ≥ 60ºC, devem ser utilizados cabos resistentes ao calor com uma classificação de pelo menos 20 K acima da temperatura ambiente.

Para instalação em atmosfera de gás potencialmente explosiva que requeira EPL Ga ou EPL Gb, aplicam-se as seguintes instruções:
O transmissor deve ser montado em um invólucro que forneça um grau de proteção de pelo menos IP54, de acordo com a ABNT NBR IEC 60529, adequado para a aplicação e instalado corretamente.

Para instalação em atmosfera de poeira potencialmente explosiva que requeira EPL Da ou EPL Db, as seguintes instruções se aplicam:
O transmissor deve ser montado em um invólucro Modelo B de acordo com a norma DIN 43729 ou equivalente, que forneça um grau de proteção de pelo menos IP6X conforme ABNT NBR IEC 60079-0 e ABNT NBR IEC 60079-31 “Equipamento proteção contra ignição por invólucro tD ”que é adequado para a aplicação e instalado corretamente.

Entradas de cabos e elementos de supressão devem ser usados adequados à aplicação e instalados corretamente.
A temperatura máxima da superfície com uma camada de poeira de 5 mm é de T 135 ° C.

Para instalação em minas, as seguintes instruções se aplicam:
O transmissor deve ser montado em um invólucro de metal que forneça um grau de proteção de pelo menos IP6X de acordo com a ABNT NBR IEC 60529 e seja adequado para a aplicação e instalado corretamente.
Entradas de cabos e elementos de supressão devem ser usados adequados à aplicação e instalados corretamente.

Para instalação em atmosfera de gás potencialmente explosiva que requeira EPL Gc, aplicam-se as seguintes instruções:
O transmissor deve ser montado em um invólucro de acordo com a ABNT NBR IEC 60079-15, adequado para a aplicação e instalado corretamente.
História do documento

A lista a seguir fornece notas sobre as revisões deste documento.

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<thead>
<tr>
<th>ID de rev.</th>
<th>Data</th>
<th>Notas</th>
</tr>
</thead>
<tbody>
<tr>
<td>114</td>
<td>18/45</td>
<td>Certificação INMETRO alterada para DEKRA</td>
</tr>
</tbody>
</table>
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