

# Product Insert

# FBT-6 and FBT-6-PA

# Fieldbus Monitor

## 1010.1 Equipment Information

Equipment Class II, Pollution Degree 2, Installation Category II

Maximum Altitude: 2000m

Humidity: 0 to 90% (non-condensing)

Operating Temperature: -20°C to 50°C

**Electrical Ratings** (see Drawing for connection information and certified devices)

Area Classification	Ratings	Agency	Drawing
General Purpose; Class I, Div 2/Zone 2 NIFW, FNICO	See drawing	FM	501-353
Class I, Div 1/Zone 1/Zone 0 (Ex ia IIC T4) Entity IS, FISCO	See drawing	FM, LCIE	501-353
General Purpose; Class I, Div 2/Zone 2 (ATEX Ex nL IIC T4, Ex ic IIC T4)	See ATEX category 3 instructions	Relcom	Page 4
Class I, Zone 1/Zone 0 (Ex ia IIC T4) Entity IS, FISCO; Class I, Zone 2 (Ex ic IIC T4)	See drawing	IECEX	502-409

## General Information

The FBT-6 and FBT-6-PA Fieldbus Monitors are hand-held electronic devices for determining the health of Foundation Fieldbus and Profibus PA networks, respectively. In this document, FBT-6(-PA) is used to refer to either the FBT-6 or the FBT-6-PA. They can be used in safe (non-hazardous) locations as well as Class I Division 2/Zone2 and Class I Division1/Zone 1/Zone 0 areas. For use in hazardous areas, refer to drawing 501-353 on the following page.



The FBT-6(-PA) carrying case is not approved for use in hazardous areas.

## Special Conditions of Use



The USB connector shall only be connected to other apparatus when the FBT-6(-PA) is located in an unclassified (a.k.a. safe or non-hazardous) location.

The Fieldbus and USB connections shall not be connected to electrical circuits at the same time.

For IECEX, all connections must be supplied from a galvanically isolated intrinsically safe supply.

## Operation

See the FBT-6 User Manual or FBT-6-PA User Manual for operating instructions and software installation instructions.

## Maintenance

The FBT-6(-PA) contains no user serviceable parts and must be returned to the manufacturer for repair.

Check for frayed or broken wires, missing insulation, case damage, LCD damage and connector damage before use. Replace a damaged FBT-6(-PA) or damaged cables.

The FBT-6(-PA) may be cleaned with a slightly damp cloth. Do not use any chemicals or abrasives to clean the FBT-6(-PA).

## For Further Information

Contact your local MTL representative or Relcom Inc. as listed at the bottom of this page.



**Relcom Inc.**

INDUSTRIAL LAN | WIRING COMPONENTS AND TESTERS

# 501-353: FBT-6(-PA) Intrinsically Safe (IS) and FISCO Installations (FM, LCIE)

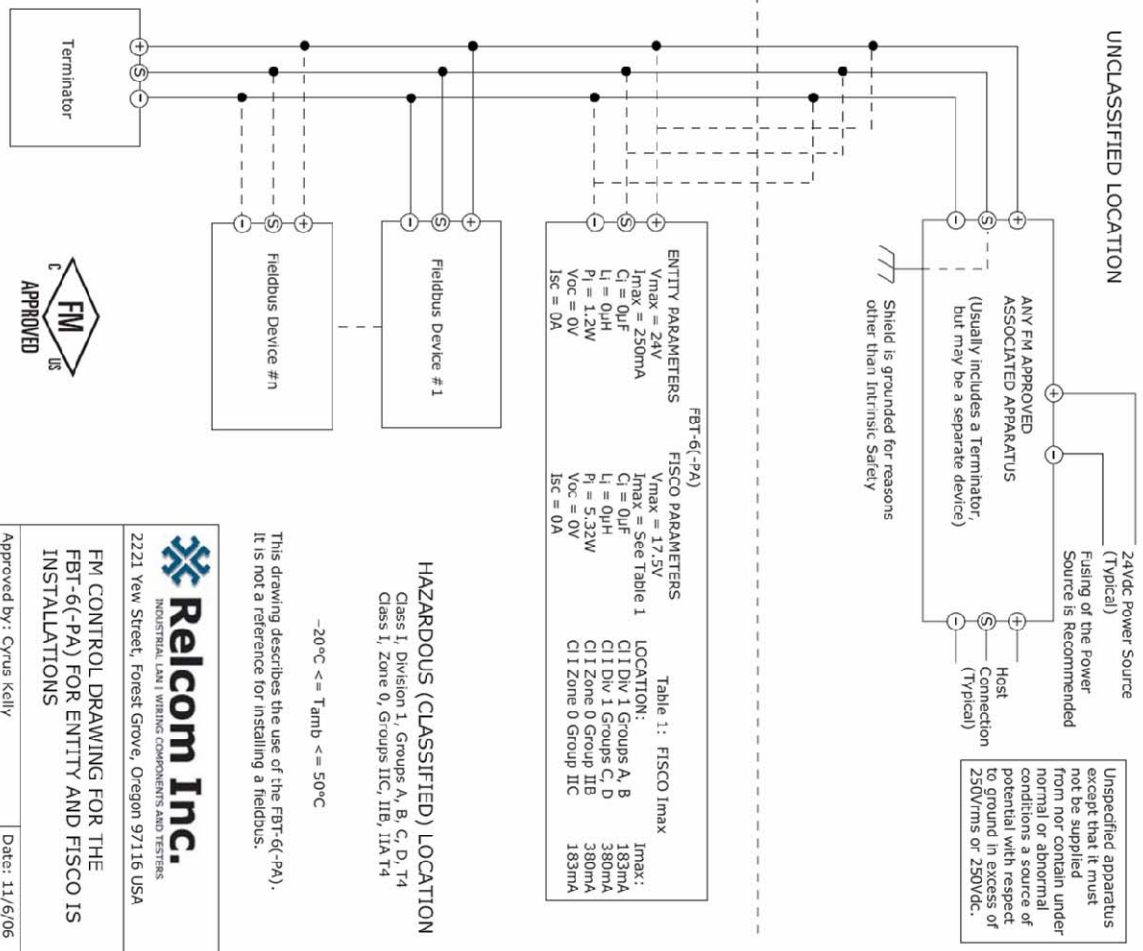
- Notes:**
1. Installation shall be in accordance with the National Electrical Code and ISA RP12.06.01 - recommended practice for the installation of intrinsically safe circuits.
  2. The FBT-6(-PA) shall not be connected to the intrinsically safe circuit at the same time as the unclassified location circuit.
  3. The "Entry" concept allows interconnections of intrinsically safe apparatus to associated apparatus, not specifically examined in such combination. The criteria for interconnection is that maximum voltage ( $V_{max}$ ) and current ( $I_{max}$ ) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal to or greater than the maximum voltage ( $V_{oc}$  or  $V_I$ ) and current ( $I_{sc}$  or  $I_I$ ) levels which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance ( $C_I$ ) and inductance ( $L_I$ ) of the intrinsically safe apparatus, including interconnecting wiring, must be equal to or less than the maximum capacitance ( $C_A$ ) and inductance ( $L_A$ ) which can be safely connected to associated apparatus. If these criteria are met, then the combination may be connected.

4. 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 ( $P_{max}$ ) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage ( $V_{oc}$ ,  $V_{oc}$  or  $V_I$ ), the current ( $I_{sc}$  or  $I_I$ ) 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 terminators) connected to the Fieldbus must be less than or equal to  $5nF$  and  $1\mu H$  respectively.

In each IS Fieldbus segment only one active source, normally the associated apparatus, is allowed to provide the necessary power for the Fieldbus system. The allowed voltage ( $V_{oc}$ ,  $V_{oc}$  or  $V_I$ ) of the associated apparatus used to supply the bus must be limited to the range of 14Vdc to 17.5Vdc. 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 a leakage current of 50µA for each connected device. Separately powered equipment needs galvanic isolation to ensure 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...200nF/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 (**not recommended**)
  - 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...100Ω  
C = 0...2nF.

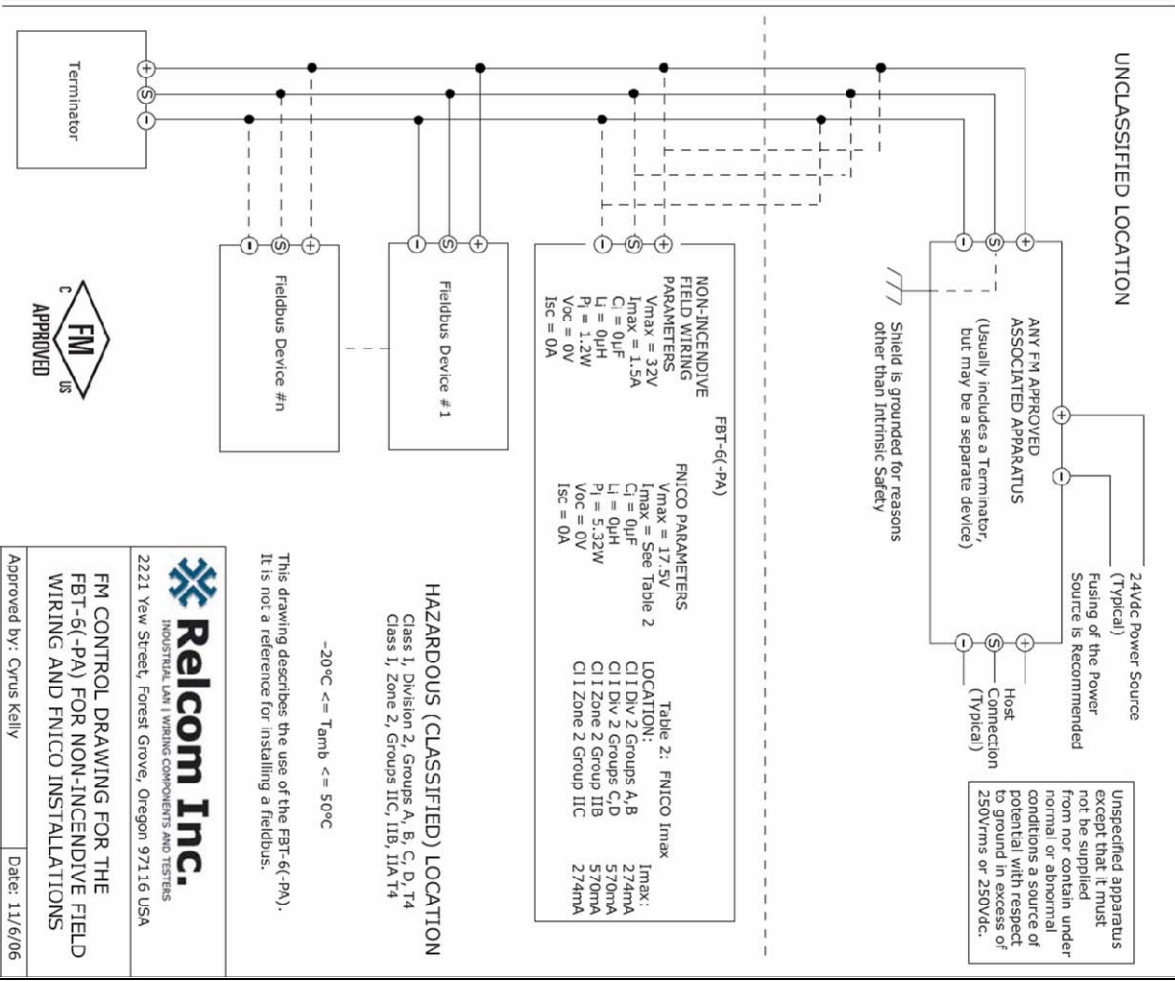
5. The FBT-6(-PA) may be connected to a circuit operating at up to 32V that is not FISCO or Entry IS certified without impacting the ability to use the FBT-6(-PA) in HSCO or Entry IS circuits.



# 501-353: FBT-6(-PA) Fieldbus Non-Incendive Field Wiring and FNICO Installations (FM)

- Notes:**
1. Installation shall be in accordance with the National Electrical Code and ISA RP12.06-01 - recommended practise for the installation of non-incendive circuits.
  2. The FBT-6(-PA) shall not be connected to the non-incendive circuit at the same time as the unclassified location circuit.
  3. The Non-Incendive Field Wiring concept allows interconnections of non-incendive apparatus to associated apparatus, not specifically examined in such combination. The criteria for interconnection is that maximum voltage (Vmax) and current (Imax) which non-incendive apparatus can receive and remain non-incendive, considering faults, must be equal to or greater than the maximum voltage (Voc or Vi) and current (Isc or Ii) levels which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance (Ci) and inductance (Li) of the intrinsically safe apparatus, including interconnecting wiring, must be equal to or less than the maximum capacitance (Co) and inductance (Lo) which can be safely connected to associated apparatus. If these criteria are met, then the combination may be connected.
  4. The FNICO concept allows the interconnection of non-incendive apparatus to associated apparatus not specifically examined in such combination. The criterion for such interconnection is that the voltage (Vmax), the current (Imax) and the power (Pmax) which non-incendive apparatus can receive and remain non-incendive, considering faults, must be equal or greater than the voltage (Vo, Voc or Vi), the current (Io, Isc or Ii) and the power (Po) which can be provided by the associated apparatus (supply unit). In addition, the maximum unprotected residual capacitance (Ci) and inductance (Li) of each apparatus (other than terminators) connected to the Fieldbus must be less than or equal to 5nF and 20µH respectively.

- In each non-incendive Fieldbus segment only one active source, normally the associated apparatus, is allowed to provide the necessary power for the Fieldbus system. The allowed voltage (Vo, Voc or Vi) of the associated apparatus used to supply the bus must be limited to the range of 14Vdc to 17.5V dc. 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 a leakage current of 50µA for each connected device. Separately powered equipment needs galvanic isolation to ensure 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...200µH/km
  - Capacitance per unit length C: 45...200nF/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 (**not recommended**)
  - Length of spur Cable: max. 60m
  - Length of trunk cable: max. 1km in IIC and 5km in IIB
  - Length of splice: max. 1m
- Terminations:**
- At each end of the trunk cable an approved line terminator with the following parameters is suitable:
- R = 90...102Ω
  - C = 0...2.2µF
5. The FBT-6(-PA) may be connected to a circuit operating at up to 32V that is not FNICO or Non-Incendive Field Wiring certified without impacting the ability to use the FBT-6(-PA) in FNICO or Non-Incendive Field Wiring circuits.



# 502-409: FBT-6(-PA) Intrinsically Safe (IS) and FISCO Installations (IECEx)

**NOTES:**

- The FBT-6(-PA) shall not be connected to the intrinsically safe circuit at the same time as the non-hazardous area circuit.
- The FBT-6(-PA) may be connected to a circuit operating at up to 24V that is not FISCO or Entry IS certified without impacting the ability to use the FBT-6(-PA) in FISCO or Entry IS circuits at some later time (cannot connect to IS and non-IS circuits at the same time).
- The "Entry" concept allows interconnections of intrinsically safe apparatus to associated apparatus, not specifically examined in such combination. The criteria for interconnection is that maximum voltage (U<sub>i</sub>) and current (I<sub>i</sub>) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal to or greater than the maximum voltage (U<sub>o</sub>) and current (I<sub>o</sub>) levels which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance (C<sub>i</sub>) and inductance (L<sub>i</sub>) of the intrinsically safe apparatus, including interconnecting wiring, must be equal to or less than the maximum capacitance (C<sub>o</sub>) and inductance (L<sub>o</sub>) which can be safely connected to associated apparatus. If these criteria are met, then the combination may be connected.

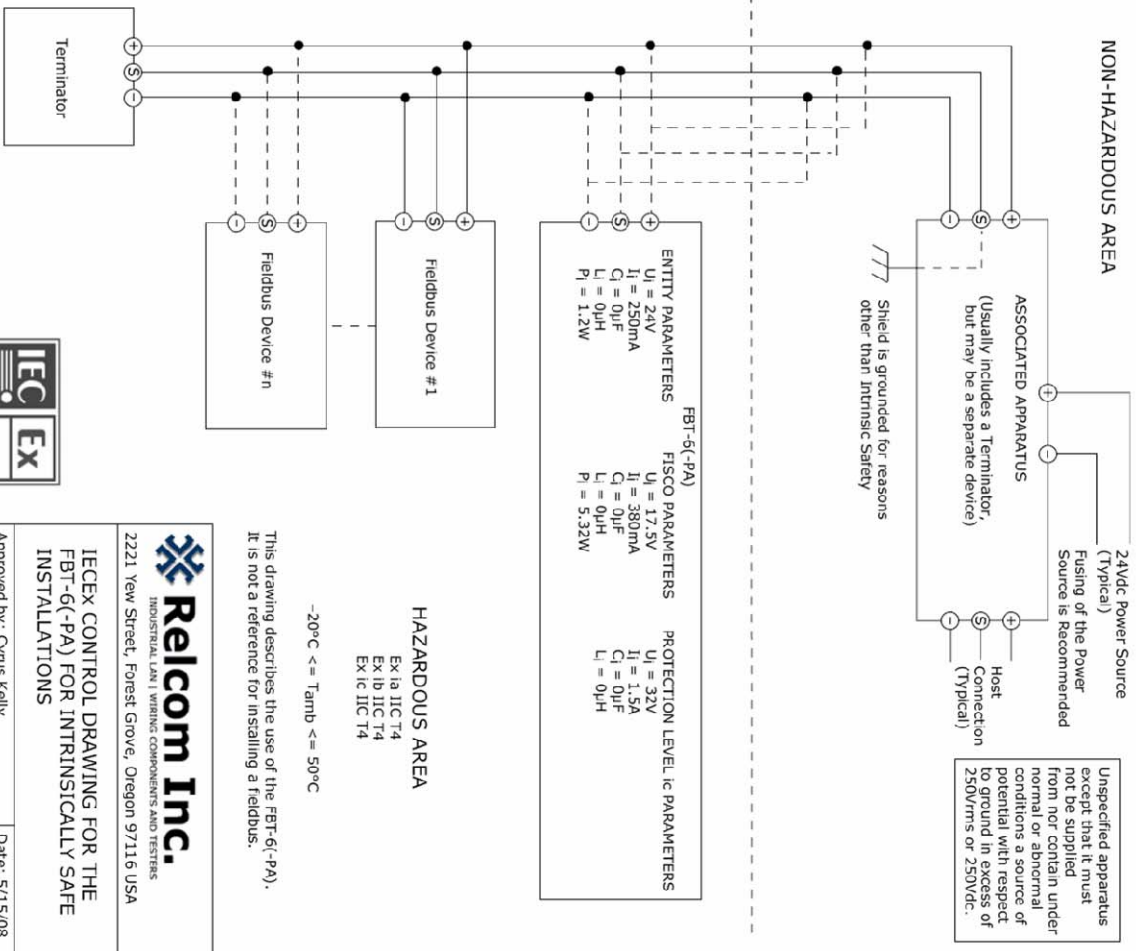
4. The FISCO Concept allows the interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criterion for such interconnection is that the voltage (U<sub>i</sub>), the current (I<sub>i</sub>) and the power (P<sub>i</sub>) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (U<sub>o</sub>), the current (I<sub>o</sub>) and the power (P<sub>o</sub>) which can be provided by the associated apparatus (supply unit). In addition, the maximum unprotected residual capacitance (C<sub>i</sub>) and inductance (L<sub>i</sub>) of each apparatus (other than terminators) connected to the Fieldbus must be less than or equal to 5nF and 10µH respectively.

In each IS 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<sub>o</sub>) of the associated apparatus used to supply the bus must be limited to the range of 14Vdc to 17.5V dc. 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 a leakage current of 50µA for each connected device. Separately powered equipment needs galvanic isolation to ensure 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...200nF/km
  - C = C' line/shield + 0.5 C" line/shield, if both lines are floating or
  - C = C' line/shield + C" line/shield, if the shield is connected to one line. **(not recommended)**
  - Length of trunk cable: max. 30m
  - Length of spur cable: max. 1m
  - 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...100Ω
  - C = 0...2.2µF

All connections must be supplied from a galvanically isolated intrinsically safe supply.



## ATEX CATEGORY 3 INSTRUCTIONS

Safety instructions for installation and operating personnel

This product insert and the user manual contain basic safety instructions for installation, operation and maintenance and servicing. Failure to comply with these instructions can endanger personnel, the plant and the environment.

Before use:

- Read the product insert and user manual.
- Give adequate training to the operating personnel.
- Ensure that the contents of the product insert and user manual are fully understood by responsible personnel.
- The national installation and mounting regulations (e.g. IEC 60079-14, National Electrical Code) apply.

When operating the apparatus:

- Make the product insert and user manual available at all times.
- Observe safety instructions.
- Observe national safety and accident prevention regulations.
- Operate the equipment within its published specification.

Servicing/maintenance work or repairs which are not described in the operating instructions must not be performed without prior agreement with the manufacturer.

Any damage may render explosion protection null and void.

No changes to the devices or components impairing their explosion protection are permitted.

The device may only be used if it is in an undamaged, dry and clean state.

Electrical Ratings

Vmax	I <sub>max</sub>	Ci	Li	Voc	Isc
32V	1.5A	0uF	0uH	0V	0A