STT 3000 Smart Temperature Transmitter

Model STT35F

Operator Manual

EN1I-6196
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FIGURES

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ABBREVIATIONS AND DEFINITIONS

APM .... Advanced Process Manager
AWG .... American Wire Gauge
DB .... Database
EEPROM .... Electrically Erasable Programmable Read Only Memory
EMI .... Electromagnetic Interference
LRV .... Lower Range Value
mA .... Milliamperes
NV .... Non-volatile
PC .... Personal Computer (workstation)
PCB .... Printed Circuit Board
PM .... Process Manger
PROM .... Programmable Read Only Memory
RAM .... Random Access Memory
RFI .... Radio Frequency Interference
ROM .... Read only Memory
URL .... Upper Range Limit
URV .... Upper Range Value
Vdc .... Volts Direct Current
XMTR .... Transmitter

ABBREVIATIONS AND DEFINITIONS, Continued

Term	Abbreviation	Definition
Alarm		The detection of a block leaving a particular state and when it returns back to that state.
Analog Input (function block)	**AI**	One of the standard function blocks defined by the Fieldbus Foundation.
Application		A software program that interacts with blocks, events and objects. One application may interface with other applications or contain more than one application.
Block		A logical software unit that makes up one named copy of a block and the associated parameters its block type specifies. It can be a resource block, transducer block or a function block.
Configuration (of a system or device)		A step in system design: selecting functional units, assigning their locations and identifiers, and defining their interconnections.
Device		A physical entity capable of performing one or more specific functions. Examples include transmitters, actuators, controllers, operator interfaces.
Device Description	**DD**	Description of FBAPs within a device.
Device Description Language	**DDL**	A standardized programming language (similar to C) used to write device descriptions.
Event		An instantaneous occurrence that is significant to scheduling block execution and to the operational (event) view of the application.
Function Block Application Process	**FBAP**	The part of the device software that executes the blocks (function, transducer, or resource blocks).
FOUNDATION Fieldbus	**FF**	Communications protocol for a digital, serial, two-way system which interconnects industrial field equipment such as sensors, actuators and controllers.
Function Block	**FB**	An executable software object that performs a specific task, such as measurement or control, with inputs and outputs that connect to other entities in a standard way.
Link Active Scheduler	**LAS**	A device which is responsible for keeping a link operational. The LAS executes the link schedule, circulates tokens, distributes time messages and probes for new devices.
Macrocycle		The least common multiple of all the loop times on a given link.
Manufacturer's Signal Processing	**MSP**	A term used to describe signal processing in a device that is not defined by FF specifications.

Continued on next page

Term	Abbreviation	Definition
Network Management	**NM**	A set of objects and services which provide management of a device's communication system.
Network Management Agent	**NMA**	Part of the device software that operates on network management objects.
Network Management Information Base	**NMIB**	A collection of objects and parameters comprising configuration, performance and fault-related information for the communication system of a device.
Objects		Entities, such as blocks, alert objects, trend objects, parameters, display lists, etc.
Object Dictionary	**OD**	Definitions and descriptions of network visible objects of a device. There are various object dictionaries within a device. The dictionaries contain objects and their associated parameters which support the application in which they are contained.
Parameters		A value or variable which resides in block objects.
Proportional Integral Derivative control	**PID**	A standard control algorithm. Also refers to a PID function block.
System Management	**SM**	Provides services that coordinate the operation of various devices in a distributed fieldbus system.
System Management Agent	**SMA**	Part of the device software that operates on system management objects.
System Management Information Base	**SMIB**	A collection of objects and parameters comprising configuration and operational information used for control of system management operations.
Status		A coded value that qualifies dynamic variables (parameters) in function blocks. This value is usually passed along with the value from block to block. Fully defined in the FF FBAP specifications.
Virtual Communication Reference	**VCR**	A defined communication endpoint. Fieldbus communications can primarily only take place along an active communications "path" that consists of two VCR endpoints. For example, to establish communications between a transducer block and a function block, a VCR must be defined at the transducer block and a VCR must be defined at the function block.
Virtual Field Device	**VFD**	A logical grouping of "user layer" functions. Function blocks are grouped into a VFD, and system and network management are grouped into a VFD.

REFERENCES

Publications from the Fieldbus Foundation

We recommend that you obtain these publications which provide additional information on Fieldbus technology:

Publication Title	Publication Number	Publisher
Technical Overview, FOUNDATION ™ Fieldbus	FD-043	
Wiring and Installation 31.25 kbit/s, Voltage Mode, Wire Medium Application Guide	AG-140	Available from the
31.25 kbit/s Intrinsically Safe Systems Application Guide	AG-163	Fieldbus Foundation.
Fieldbus Specifications	Various Documents	

To Contact the Fieldbus Foundation

To order these publications and other information products produced by the Fieldbus Foundation, contact them at :

Fieldbus Foundation
9390 Research Boulevard
Suite II-250
Austin, TX 78759
USA

or via the World Wide Web at:
http://www.fieldbus.org/information/

TECHNICAL ASSISTANCE

If you encounter a problem with your STT35 F Smart Transmitter, please contact your nearest Sales Office (See the address list at the end of this manual).

An engineer will discuss your problem with you. Please have your complete model number, serial number, and software revision number on hand for reference. You can find the model and serial numbers on the transmitter nameplates. You can also view the firmware revision numbers of the electronics boards and boot code by accessing and reading the REVISION_ARRAY parameter in the resource block of the device. (For further details see Section 6.6.)

If it is determined that a hardware problem exists, a replacement instrument or part will be shipped with instructions for returning the defective unit. Do not return your instrument without authorization from your Sales Office or until the replacement has been received.

Where to Find Information in This Manual

About this Manual

This manual provides installation, operation, maintenance for the STT35F Transmitter with FOUNDATION™ Fieldbus communications option. Reference information is also provided.
The sections of information contained in the manual follow this order:

- Background and Pre-installation
- Transmitter mechanical and electrical installation
- Transmitter configuration
- Operation and maintenance
- Reference information

Background and Pre-installation Information

Sections 1 through 4 cover the information on:

1. Basic transmitter description
2. Overview of installation procedures
3. Bench check of the transmitter calibration
4. Conditions to consider before installation is performed.

These sections provide background and pre-installation information if you are not familiar with the STT35F transmitter or if this is a new installation. For replacement of an existing STT35F transmitter, you may not need to review these sections.

Transmitter Installation Procedures

Section 5 covers mechanical and electrical installation procedures for the transmitter. These procedures instruct you on how to properly:

- Mount the transmitter
- Install piping to the transmitter
- Make the electrical connections and
- Apply power to the transmitter.

Transmitter Configuration

Section 6 tells you how to configure the transmitter so it will operate according to your process application. This information outlines the configuration procedure which can be done through an operator station or using a host computer. Examples are provided showing sample configuration parameters for a number of process applications.

Operation, Maintenance and Troubleshooting

Section 7 covers operation information.
Troubleshooting routines and diagnostic information are covered in Section 9.

Reference Information

Sections 8 and 10 contain reference information:

- Section 8 provides descriptions of fieldbus elements that make up the transmitter (device) configuration. These elements are block parameters and device objects that comprise the software application of the transmitter. Background information also is provided on device configuration as it relates to the STT35F application. A dictionary listing of Honeywell-defined parameters is given.
- Section 10 contains figures and listings of replacement parts for all models of the STT35F transmitters.

CE Conformity (Europe) Notice

About conformity and special conditions

This product is in conformity with the protection requirements of **2004/108/EC** , the EMC Directive. Conformity of this product with any other "CE Mark" Directive(s) not referenced in this manual shall not be assumed.
Deviation from the installation conditions specified in this manual, and the following special conditions, may invalidate this product's conformity with the EMC Directive.

- You must use shielded, twisted-pair cable such as Belden 9318 for all signal/power wiring.
- You must connect the shield to ground at the power supply side of the wiring only and leave it insulated at the transmitter side.

ATTENTION

ATTENTION

The emission limits of IEC 61000-6-4, Electromagnetic Compatibility – Generic Emission Standard for Industrial Environments, are designed to provide reasonable protection against harmful interference when this equipment is operated in an industrial environment. Operation of this equipment in a residential area may cause harmful interference. This equipment generates, uses and can radiate radio frequency energy and may cause interference to radio and television reception when the equipment is used closer than 30 meters (98 feet) to the antenna(e). In special cases, when highly susceptible apparatus is used in close proximity, the user may have to employ additional mitigating measures to further reduce the electromagnetic emissions of this equipment.

1. STT35F DESCRIPTION

1.1 Introduction

Section Contents

This section includes these topics:

About this Section

This section is intended for users who have never worked with our STT35F Smart Transmitter. It provides some general information to acquaint you with the STT35F transmitter.

ATTENTION

Honeywell offers NI-FBUS Configurator software that runs on a variety of Personal Computer (PC) platforms using Windows 95® or Windows NT™.

It is a bundled Microsoft Windows software and PC-interface hardware solution that allows quick, error-free configuration and diagnosis of Honeywell Smartline instruments with FOUNDATION™ Fieldbus communications.
The NI-FBUS Configurator allows users to communicate with the transmitter from a remote location to:

- Configure the transmitter by selecting and setting operating parameters.
- Access diagnostic information to identify configuration, communication, transmitter or process problems.
- Request and display transmitter data.

NI-FBUS Configurator, version 2.25 or higher is compatible with our STT35F transmitters. Please contact your Honeywell representative for more information.

1.2 STT35F Smart Transmitter

About the Transmitter

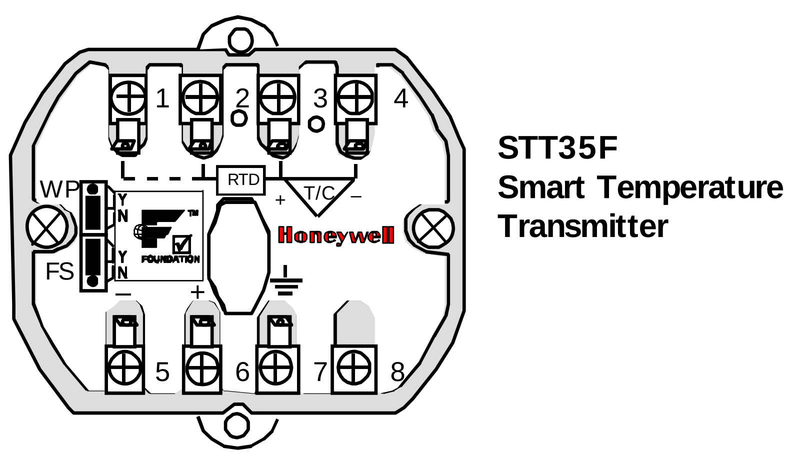
The STT35F Smart Transmitter is furnished with FOUNDATION Fieldbus protocol interface to operate in a compatible distributed fieldbus system. The transmitter will interoperate with any FOUNDATION-registered device. See Section 1.3 for an overview of fieldbus.

The transmitter includes FOUNDATION Fieldbus electronics for operating in a 31.25 kbit/s fieldbus network. It features standard fieldbus function blocks with manufacturer-specific additions for enhanced operation. This transmitter can function as a link master device in a fieldbus network.

The STT35F accepts signals from a wide variety of industry standard thermocouples or resistance temperature detectors (RTDs) as well as a straight millivolt or ohms sensor.

The STT35F Smart Temperature Transmitter is a microprocessor based sealed unit that converts a primary sensor input into a digital value proportional to the measured variable which is transmitted over a two-wire pair.

Figure 1-1 Typical STT35F Smart Temperature Transmitter



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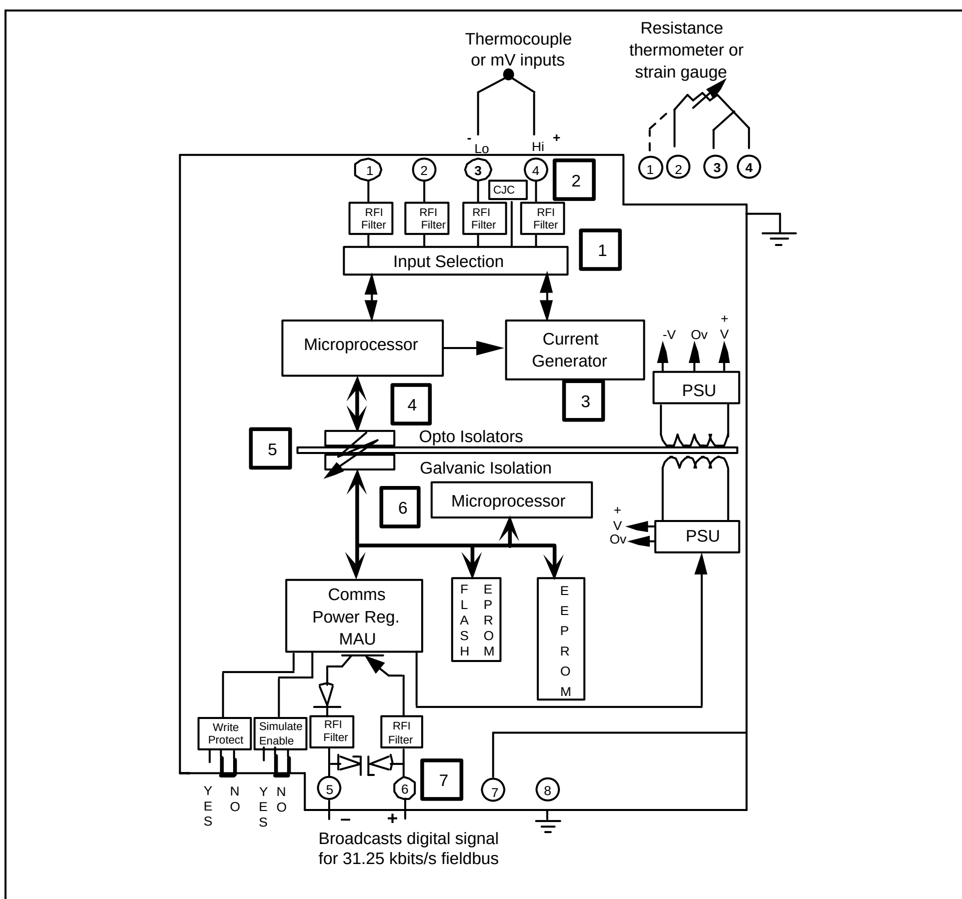
The STT35F transmits its output in a digital fieldbus protocol format for direct digital communications with control systems.
The Process Variable (PV) is available for monitoring and control purposes. The transmitter's body temperature is also available as a secondary variable for monitoring purposes only through the operator interface.

The block diagram in Figure 1-2 shows the transmitter circuits involved in converting the input signal into a proportional output signal. The boxed numbers in the diagram identify the phases which are explained in the next paragraph.

Figure 1-2 STT35F Block Diagram with I/O Phase Identification



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What happens in the different phases

Table 1-1 gives an explanation for each phase of the I/O signal processing identified in Figure 1-2.

Table 1-1 Explanation of I/O Phases

Phase	What Happens
1 & 2	Input signal is sampled at a rate of 4 times per second. Signal is compensated for cold junction temperature or resistance lead length as applicable.
3	Input signal is digitized.
4	Input signal is linearized, if applicable. Transmitter's Random Access Memory (RAM) contains characteristics of most commonly used non-linear temperature sensors.
5	Input signal is transferred across galvanic isolation interface.
6	Input signal is converted into proportional output signal in digital form.
7	Digital output signal can be published over the fieldbus network.

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Mounting approaches

The STT35F Smart Temperature Transmitter is available with one of these mounting approaches.

- Explosionproof housing, or
- DIN rail mounting clips

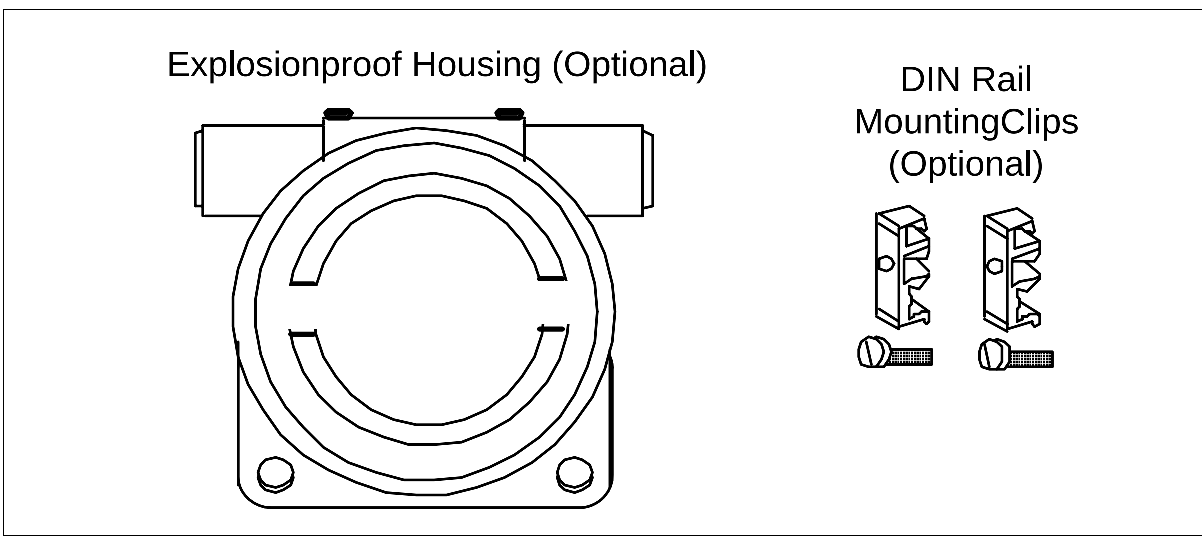
The explosionproof housing is suitable for any one of these mounting variations.

- Surface mounting on a wall,
- Direct sensor mounting to a thermowell, or
- 2-inch (50 mm) pipe mounting with our optional mounting bracket.

The DIN rail mounting clips are designed for a user-supplied top hat or G type DIN rail.

Figure 1-3 illustrates the mounting approaches for the STT35F transmitter.

Figure 1-3 Mounting approaches for STT35F Transmitter



Transmitter Adjustments

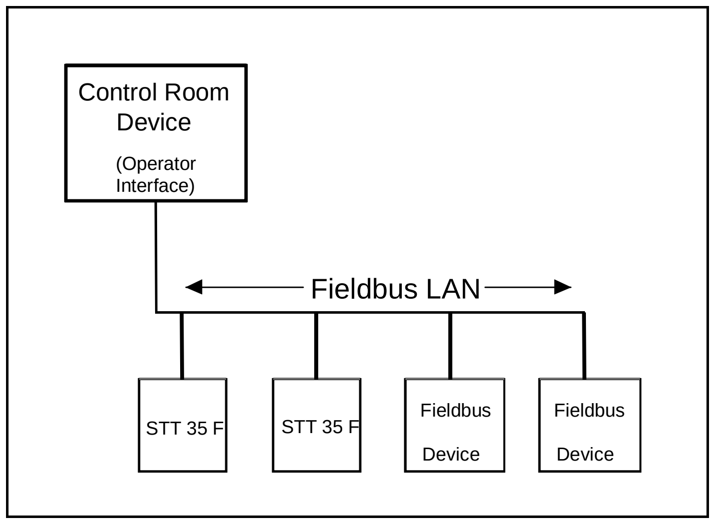
The STT35F has no physical adjustments. You can use a Personal Computer (PC) running NI-FBUS Configurator software (or other fieldbus device configuration application) to make any adjustments in an STT35F transmitter.

1.3 Fieldbus Overview

What is Fieldbus

Fieldbus is an all digital, serial, two-way communication system which interconnects industrial "field" equipment such as sensors, actuators, and controllers. Fieldbus is a Local Area Network (LAN) for field instruments with built-in capability to distribute the control application across the network.
See Figure 1-4.

Figure 1-4 Fieldbus Connecting Control Room and Field Devices



Open System Design

The Fieldbus Foundation has defined standards to which field devices and operator/control stations communicate with one another. The communications protocol is built as an "open system" to allow all field devices and control equipment which are built to fieldbus standards to be integrated into a control system, regardless of the device manufacturer. This interoperability of devices using fieldbus technology is to become the industry standard for automation and distributed control systems.

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Hardware Architecture

The physical architecture of fieldbus allows installation of fieldbus devices using a twisted-pair cable. Often, existing wiring from analog devices can be used to wire up digital fieldbus devices. Multiple field devices can be connected on one cable (a multi-drop link), rather than conventional point-to-point wiring used for analog devices. For more details on wiring fieldbus networks, see Section 5.7.

Software Architecture

Fieldbus software architecture provides for more control functions to be available in the microprocessor-based field device. Since fieldbus is a digital communication system, more data are available to operators for process monitoring, trend analysis, report generation, and trouble analysis. Device software changes can be downloaded to field devices remotely from the operator station (or PC) in the control room.

Application

An application is software that contains function block data and operating parameters (objects) which help define the operation of a device such as sensor data acquisition or control algorithm processing. Some devices may contain more than one application.

Function Blocks

Usually, a device has a set of functions it can perform. These functions are represented as function blocks within the device. See Figure 1-5. Function blocks are software that provide a general structure for specifying different device functions. Each function block is capable of performing a control function or algorithm. Device functions may include analog input, analog output, and Proportional Integral Derivative (PID) control. These blocks can be connected together to build a process loop. The action of these blocks can be changed by adjusting the block's configuration and operating parameters.

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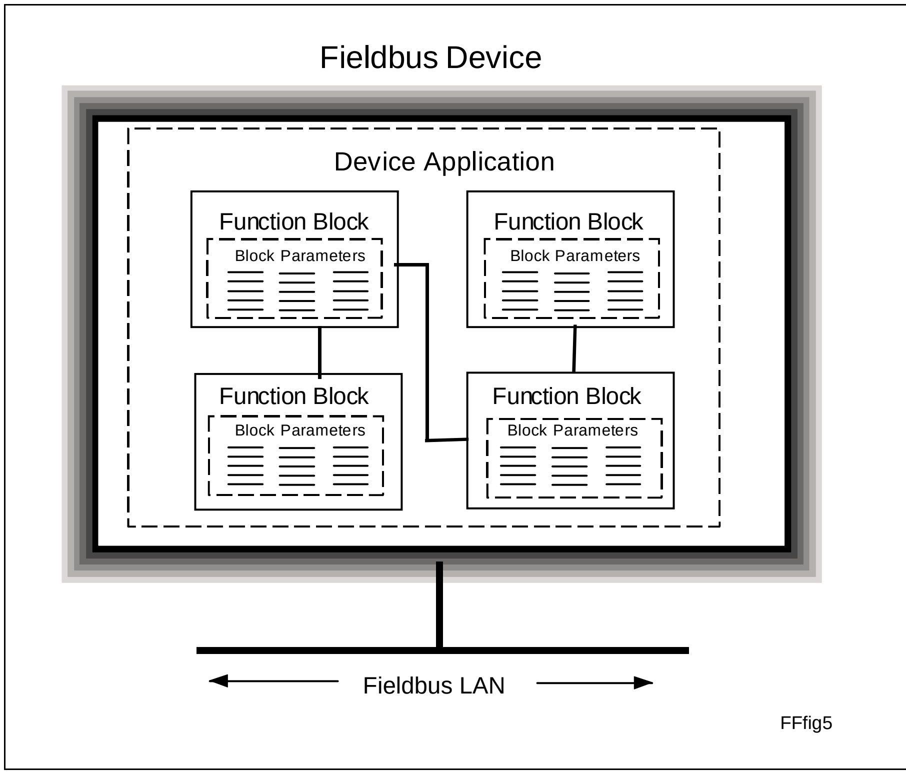
Figure 1-5 Fieldbus Devices Contain Device Applications and Function Blocks



STT35F Transmitter Application

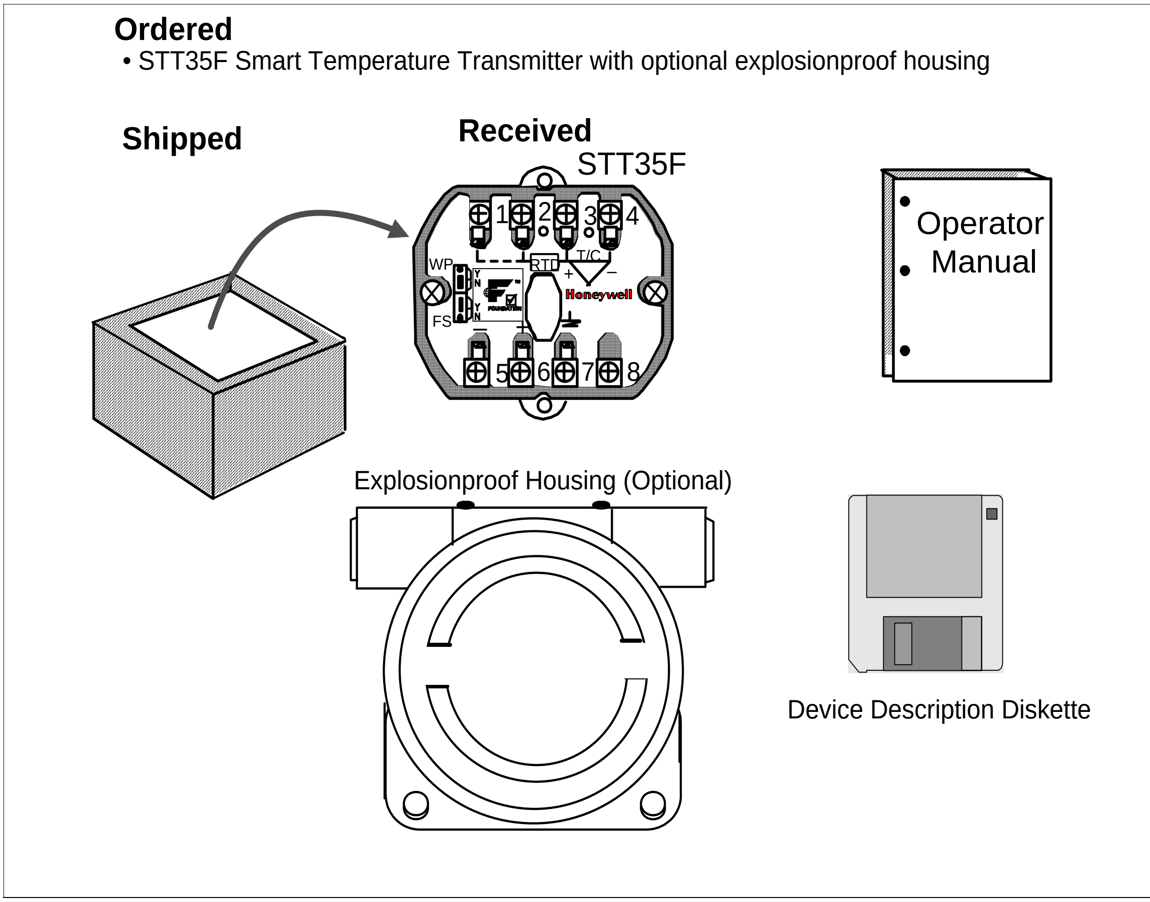
The STT35F Fieldbus Transmitter contains the electronics interface compatible for connecting to a fieldbus network. STT35F application is configured using NI-FBUS Configurator software or other configuration program. The configurator software allows the operator to configure blocks, change operating parameters and create linkages between blocks that make up the STT35F application. The changes to the STT35F application are then written to the device and initialized.

1.4 Transmitter Order

Order Components

Figure 1-6 shows the components that would be shipped and received for a typical STT35F transmitter order.

Figure 1-6 Typical STT35F Transmitter Order Components



About Documentation

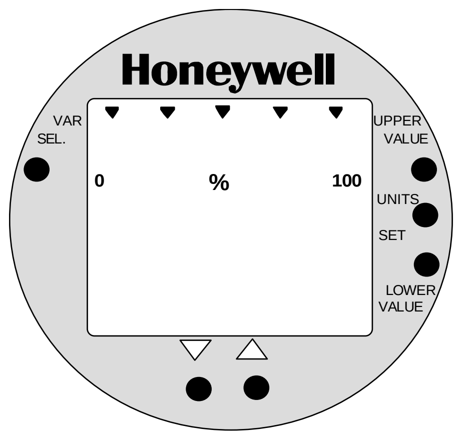
STT35F Operator Manual EN1I-6196: One copy is shipped with each transmitter for one to 9 units and 10 copies for 10 to 19 units etc. This document provides information for checking, installing, wiring and configuring the STT35F transmitter for operation. The Device Description Diskette is provided with the manual.

1.5 Local Meter Option

Option Availability

The STT35F can be equipped with the Local Meter option as shown in
Figure 1-7. The local meter provides read-only output value of the Analog Input block in both % of full span and in actual engineering units. The units are shown on the display as configured in the transmitter. The engineering units are selected by accessing and changing (if necessary) the OUT_SCALE parameter in the analog input block. (See Section 7.4 for procedure).

Figure 1-7 Local Meter Faceplate



Local Meter Panel Pushbuttons

The pushbuttons on the meter panel are not active and do not function when pressed.

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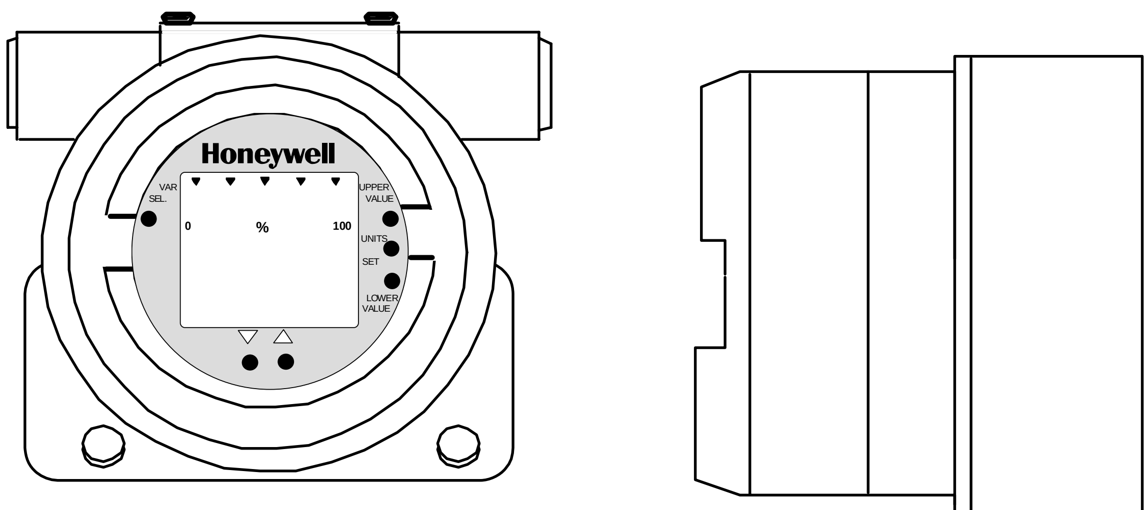
About the option

Each Local Meter is a separate assembly which is designed to snap fit on the transmitter’s electronics module. The option assembly includes a cable and plug assembly for mating with a connector on the transmitter’s terminal block. A meter end-cap which includes a window is supplied on the bottom side of the transmitter’s housing so you can view the meter display with the end cap installed.

Figure 1-8 STT35F with Local Meter Option



STT35F with Explosionproof Housing (face view)

Profile view

2. INSTALLATION OVERVIEW

2.1 Introduction

Section Contents

This section includes these topics:

About this Section

This section provides a list of components needed to install and operate the STT35F transmitter. Also provided is a list of typical start-up tasks and places where you can find detailed information about performing the tasks.

2.2 Installation Components

Components Needed for Installation

The STT35F transmitter contains electronics that enables it to operate using the FOUNDATION Fieldbus protocol. This digital interface requires a number of components to provide control and data communications between field devices and the control room environment. Table 2-1 outlines the basic component parts needed to install and operate the STT35F on a fieldbus network.

Table 2-1 Components Required for STT35F Installation

Components	Description
STT35F Transmitter (Field Device)	Measures process temperature and transmits process data to operator station or host computer.
Power Supply	Furnishes DC power to fieldbus devices.
Power Conditioner	Acts as a filter to prevent the power supply from interfering with the fieldbus signaling. (May be part of a Fieldbus power supply).
Fieldbus Cable	Twisted pair shielded wire used to interconnect fieldbus devices.
Fieldbus Terminators	A signal termination device used to prevent reflected signals (noise) from distorting Fieldbus communications.
Fieldbus IS Barriers (For hazardous area installations)	Intrinsic safety wire barriers are required for hazardous location installations.
Fieldbus Wiring Blocks	Wiring blocks allowing easy connection of devices, cable, terminators, surge suppressors and other fieldbus network components.

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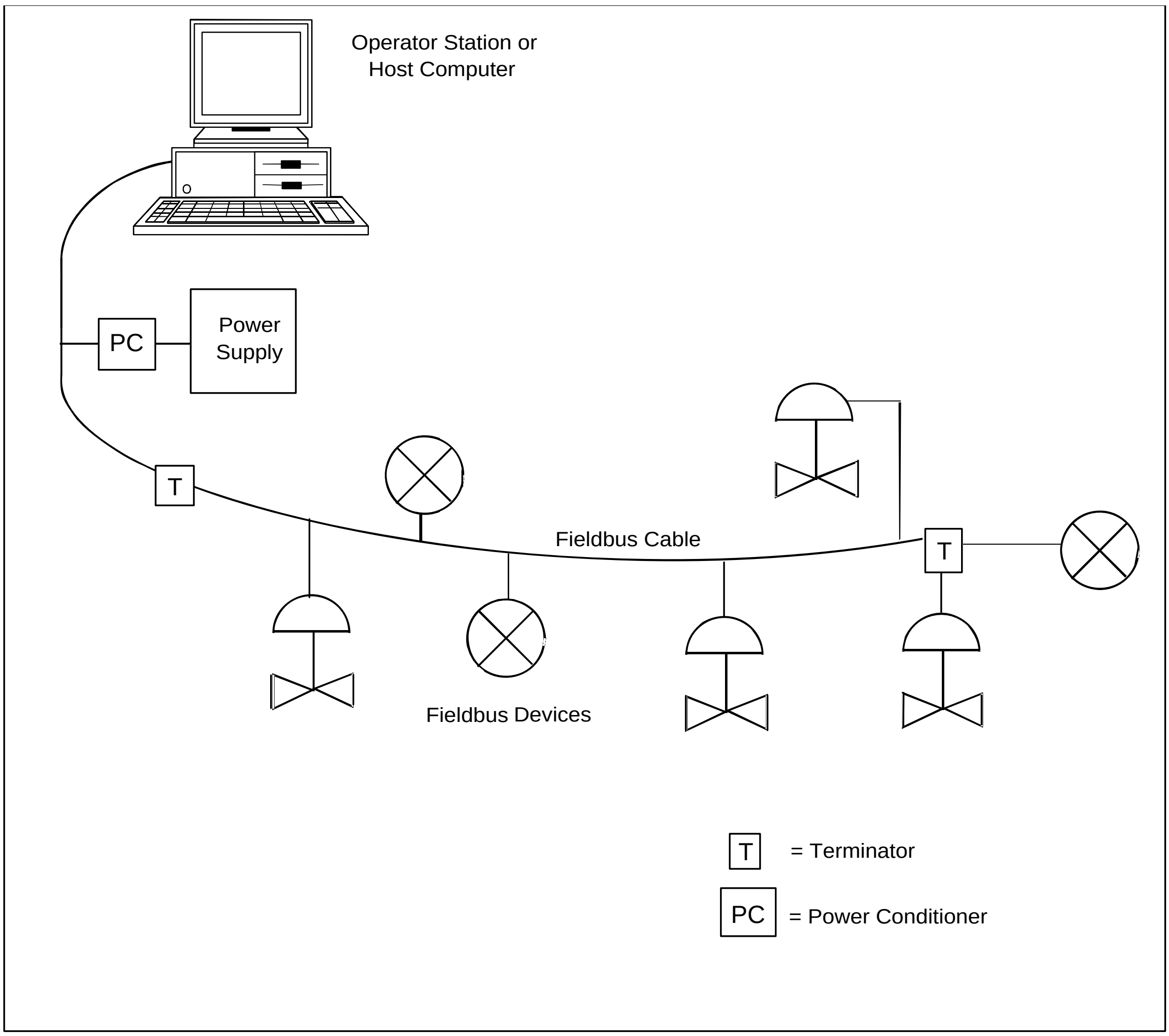
Operator Interface

In the control room an operator station, personal computer or host computer acts as the operator interface to the fieldbus network. Using supervisory control software applications, the field devices on a fieldbus network can be monitored and controlled at the operator interface.

Figure 2-1 shows how these components go together to operate on a fieldbus network.

Figure 2-1 Fieldbus Network Components



2.3 Installation/Operation Tasks

Installation Tasks

Installation of the STT35F is not difficult. The tasks for installing and operating the transmitter are outlined in Table 2-2 Installation/Operation Task Summary.

Table 2-2 Installation/Operation Task Summary

Task	Procedure	Refer to
-	Bench Check (optional) (Off-line configuration)	Section 3
1	Pre-installation Considerations	Section 4
2	Install STT35F Transmitter • Mounting • Piping • Wiring	Section 5 Section 5.2 - 5.3 - 5.5 - 5.6 Section 5.4 Section 5.7
3	Power Up Transmitter	Section 5.10
4	Establish Communications Initial checks	Section 6.7 Section 6.8
5	Configure STT35F transmitter	Section 6.9 & 8 in this manual and also the user manual supplied with NI-FBUS Configurator.
6	Operation	Section 7. Also see supervisory control application documentation.
-	Troubleshooting (if problems arise)	Section 9
-	Replacement (if needed)	Section 10

3. OFF-LINE CONFIGURATION (optional)

3.1 Introduction

Section Contents

This section includes these topics:

Section	Topic	See Page

About this Section

The off-line configuration is an optional procedure for checking your transmitter. This section provides a procedure for configuring the STT35F off-line, meaning you can load configuration information into the transmitter before it is connected in a fieldbus network. This enables you to perform a bench check and configuration of the transmitter before installation. Calibration is also possible before the transmitter is installed in the field.

Device Calibration

Your transmitter was factory calibrated. This means there is no need to calibrate the transmitter during installation.

3.2 Off-line Bench check

Configure STT35F before Installation

Using the NI-FBUS Configurator (or other fieldbus device configuration application), you can perform an off-line check of the STT35F before it is mounted and connected to the process hardware and the fieldbus network. By wiring the transmitter to the fieldbus interface of a PC and using a fieldbus power supply to furnish power to the transmitter, you can read and write parameters in the STT35F.
See Figure 3-1 and Table 3-1 for procedure.

Figure 3-1 Bench check Setup Figure

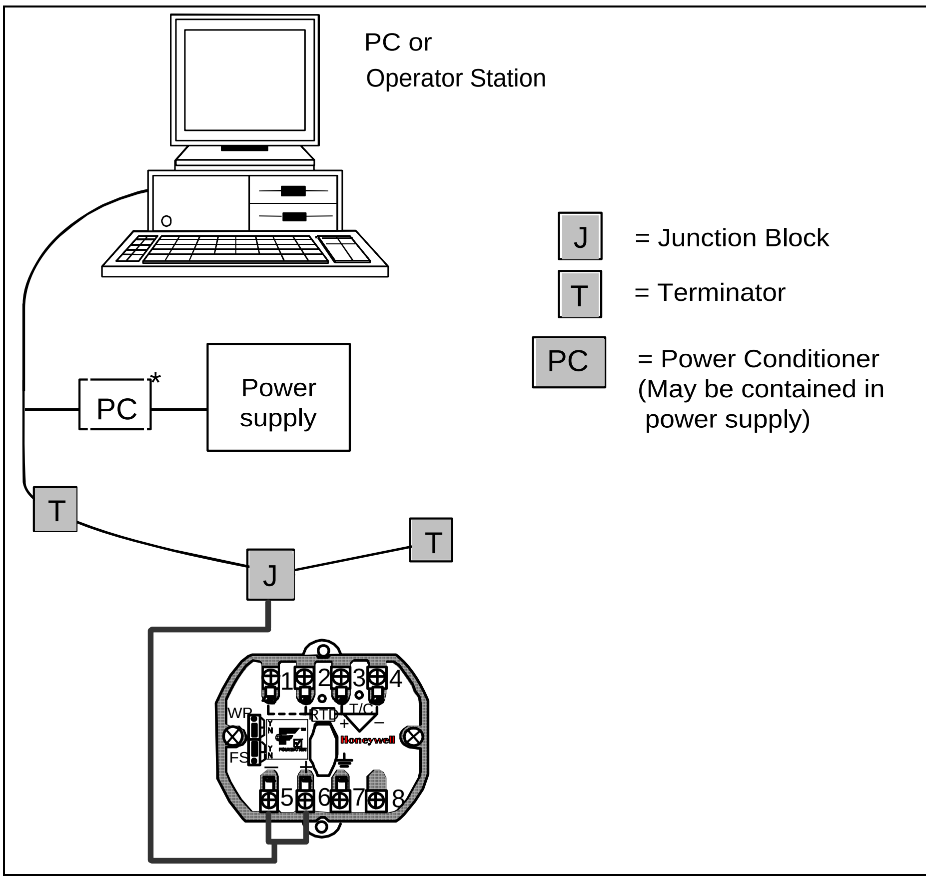


Table 3-1 Bench check Wiring Procedure

Step	Action
1	Connect fieldbus cable to junction block and to fieldbus interface card on the PC. **ATTENTION** Observe polarity of fieldbus cable throughout the network.

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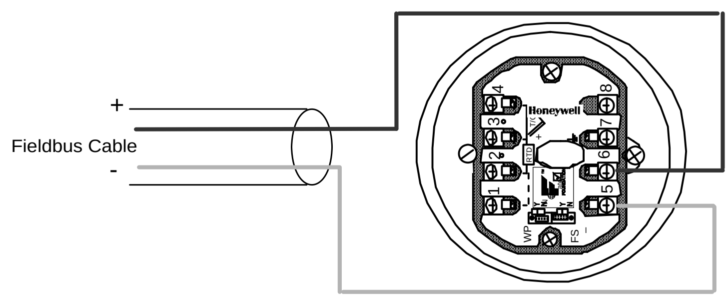
Table 3-1 Bench check Wiring procedure, continued

Step	Action
2	Observing polarity, connect positive fieldbus lead to Signal + terminal and negative fieldbus lead to Signal – terminal. Example: Connecting fieldbus to transmitter. 
3	For bench check purposes only, put a jumper across the input terminals 3 and 4. However, if you know that your transmitter is configured for an RTD input, put a 100 to 300 ohm resistor across terminals 2, 3, and 4 instead. This is only done to avoid Critical alarms for Open Input during bench check.
4	At the junction block, connect a fieldbus terminator in parallel with the transmitter. Refer to Figure 3-1.
5	Connect a power supply, power conditioner (if needed), and a fieldbus terminator to the fieldbus cable.
6	Turn on PC.
7	Turn on power supply.
8	Start fieldbus configuration application on PC.

Establish Communications

Once you have established communications between the transmitter and the PC, you can then check out the transmitter.

Assign Bus Address and Device Tag

You can check the device ID and serial number of the transmitter, assign a network node address to the device and assign tag names to the device.
Note that the transmitter is shipped with default node addresses and tag names that appear at start-up. These can be changed to actual network addresses and tag names.

Device Configuration

You can view the various block parameters that make up the transmitter configuration, enter parameter values for your process application and write them to the device.

3.3 Mode of Measurement Considerations

About measurement mode

The STT35F transmitter determines the mode of measurement based on the sensor configuration and the sensor type. This means you must be sure that sensor type and the sensor configuration are correct at startup or whenever the sensor type and/or configuration is changed in the transducer block and the transducer block is changed back to auto mode. Table 3-2 summarizes the possible modes of measurement.

Table 3-2 Summary of Mode of Measurement Determinations

If sensor type is	And sensor configuration is for	Then Mode of Measurement is
Millivolt (mV) or Thermocouple Type (B, C, . . .)	Single sensor	Straight temperature or millivolts
Thermocouple Type (B, C, . . .)	Redundant	Straight temperature with backup thermocouple
Thermocouple Type (B, C, . . .)	Differential	Differential temperature (T/C1 - T/C2)
0 to 2000 Ohms, Cu 10 probe, or Cu 25 probe	2- or 3-wire ohms source or single RTD 2- or 3-wire sensor or single sensor	Straight temperature or ohms
0 to 2000 Ohms, Cu 10 probe, or Cu 25 probe	4-wire sensor single sensor	Straight temperature or ohms
Resistance Temperature Detector (Pt100, Pt200 . . .)	2- or 3-wire single RTD 2- or 3-wire single sensor	Straight temperature
Resistance Temperature Detector (Pt100, Pt200 . . .)	4-wire sensor	Straight temperature
Resistance Temperature Detector (Pt100, Pt200 . . .)	Differential	Differential temperature (RTD1 - RTD2)

ATTENTION

See Section 5.7 in this manual for wiring details.

4. PRE-INSTALLATION CONSIDERATIONS

4.1 Introduction

Section Contents

This section includes these topics:

About this Section

This section reviews things you should take into consideration before you install the transmitter. Of course, if you are replacing an existing STT35F transmitter you can skip this section.

4.2 Considerations for STT35F Transmitter

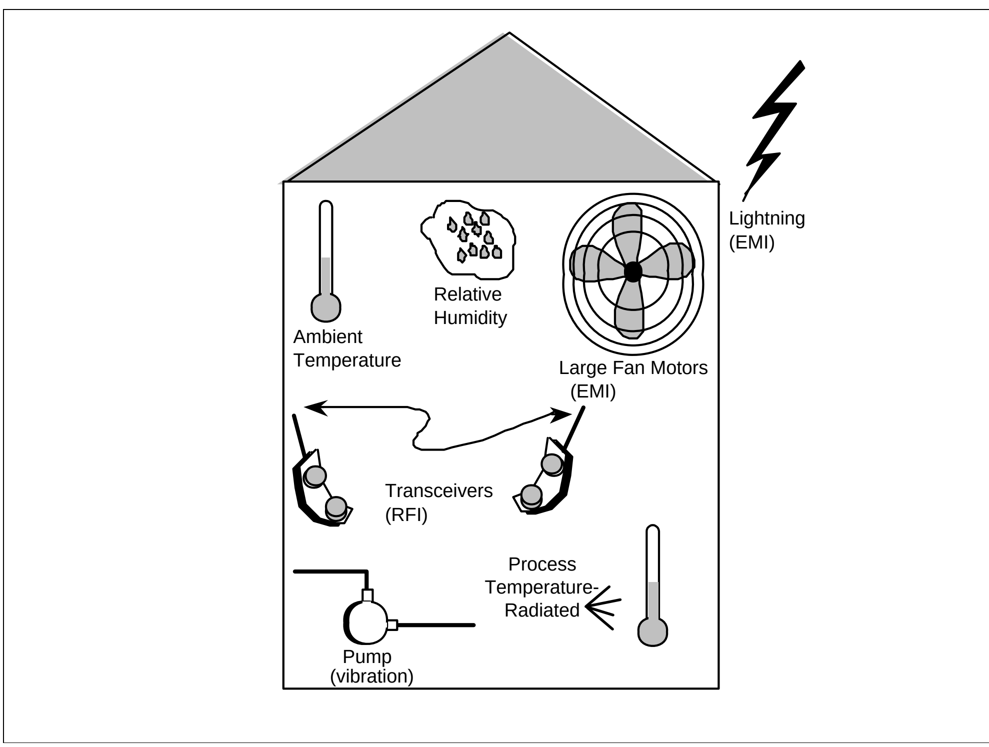
Evaluate conditions

The STT35F transmitter is designed to operate in common indoor industrial environments as well as outdoors. To assure optimum performance, evaluate these conditions at the mounting area relative to published transmitter specifications and accepted installation practices for electronic transmitters.

- Environmental Conditions
  - Ambient Temperature
  - Relative Humidity
- Potential Noise Sources
  - Radio Frequency Interference (RFI)
  - Electromagnetic Interference (EMI)
- Vibration Sources
  - Pumps
  - Motorized Valves
- Process Characteristics
  - Temperature (radiated heat)

Figure 4-1 illustrates typical mounting area considerations to make before installing a transmitter.

Figure 4-1 Typical Mounting Area Considerations Prior to Installation



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Temperature/humidity ratings

Table 4-1 lists the temperature and humidity ratings for reference, rated, operating, and transportation and storage conditions for an STT35F transmitter.

ATTENTION

See *Specification and Model Selection Guide* for complete performance specifications for the Version STT35F transmitter.

Table 4-1 Temperature and Humidity Ratings

Parameter	Reference Condition	Rated Condition	Operating Limits	Transportation and Storage*
Ambient Temperature °C °F	 23 ±1 73 ±2	 –40 to 85 –40 to 185	 –40 to 85 –40 to 185	 –50 to 100 –58 to 212
Relative Humidity % RH	10 to 55	5 to 95 (Non-condensing)	5 to 100 (Non-condensing)	5 to 100

*While transmitters can be stored at these conditions for a reasonable length of time, it is best to store transmitters in an area that has more or less normal ambient conditions.

Power Requirements

The STT35F is a bus-powered device, meaning that it receives its power from the dc voltage on a fieldbus wiring segment. There are certain guidelines and limitations regarding the wiring of fieldbus devices. See Section 5.7 for more information on wiring the transmitter.

Table 4-2 lists the operating power requirements for the STT35F transmitter.

Table 4-2 STT35F Power Requirements

	Minimum	Maximum
Static Power	9 Vdc † @ 27mA	32 Vdc @ 27mA ‡

† The physical layer parameters of the transmitted waveform are out of specification below 9.5 volts.
‡ Current ramp at startup is 1.2 mA/ms.

Basic operation

Inputs are sampled at a rate of 4 times per second, digitized by the A/D converter, compensated for cold junction or resistance lead length and transferred across the galvanic isolation interface. However, the AI block can be run faster than 4 times a second. In this case, the PV published over the network will not be refreshed every time.

4.3 Considerations for Local Meter Option

Reference Specifications Table 4-3 lists pertinent Meter specifications for reference.

Table 4-3 Local Meter Specifications

Operating Conditions		
Parameter	**Rated**	**Extreme, Transportation and Storage**
Ambient Temperature	–40 to 185 °F –40 to 85 °C	–58 to 194 °F –50 to 90 °C
Relative Humidity %RH	10 to 90	0 to 100
Design		
Accuracy	No error. Reproduces transmitter signal exactly within its resolution.	
Display Resolution	±0.005 for ±19.99 reading range, ±0.05 for ±199.9 reading range, ±0.5 for ±1999 reading range, ±5 for ±19990 reading range, ±50 for ±199900 reading range, ±500 for ±1999000 reading range, ±50000 for ±19990000 reading range.	Shown as: 19.99 199.9 1999 19.99 K 199.9 K 1999 K 19990 K
Display Update Rate	Above 32 °F (0 °C): ½ second @ or below 32 °F (0 °C): 1½ seconds.	

ATTENTION

The rated temperature limits for the local meter are listed above and are true in that no damage to the meter will occur over these temperatures however the readability of the LCD is affected if taken to these extreme temperatures:

- The LCD will turn black at some temperature between 80 and 90°C (176 and 194°F), rendering the display unreadable. This effect is only temporary and normally occurs at 90°C (194°F).
- At low temperatures, the update rate of the display is lengthened to 1.5 seconds due to the slower response time of the display. At –20°C (-4°F), the display becomes unreadable due to slow response of the LCD. This is also only temporary and normal readability will return when temperature returns above –20°C (-4°F).

5. TRANSMITTER INSTALLATION

5.1 Introduction

Section Contents

This section includes these topics:

About this Section

This section provides information about the mechanical and electrical installation of the STT35F transmitter. It includes procedures for mounting, piping and wiring the transmitter for operation.

5.2 Mounting Variations

Overview

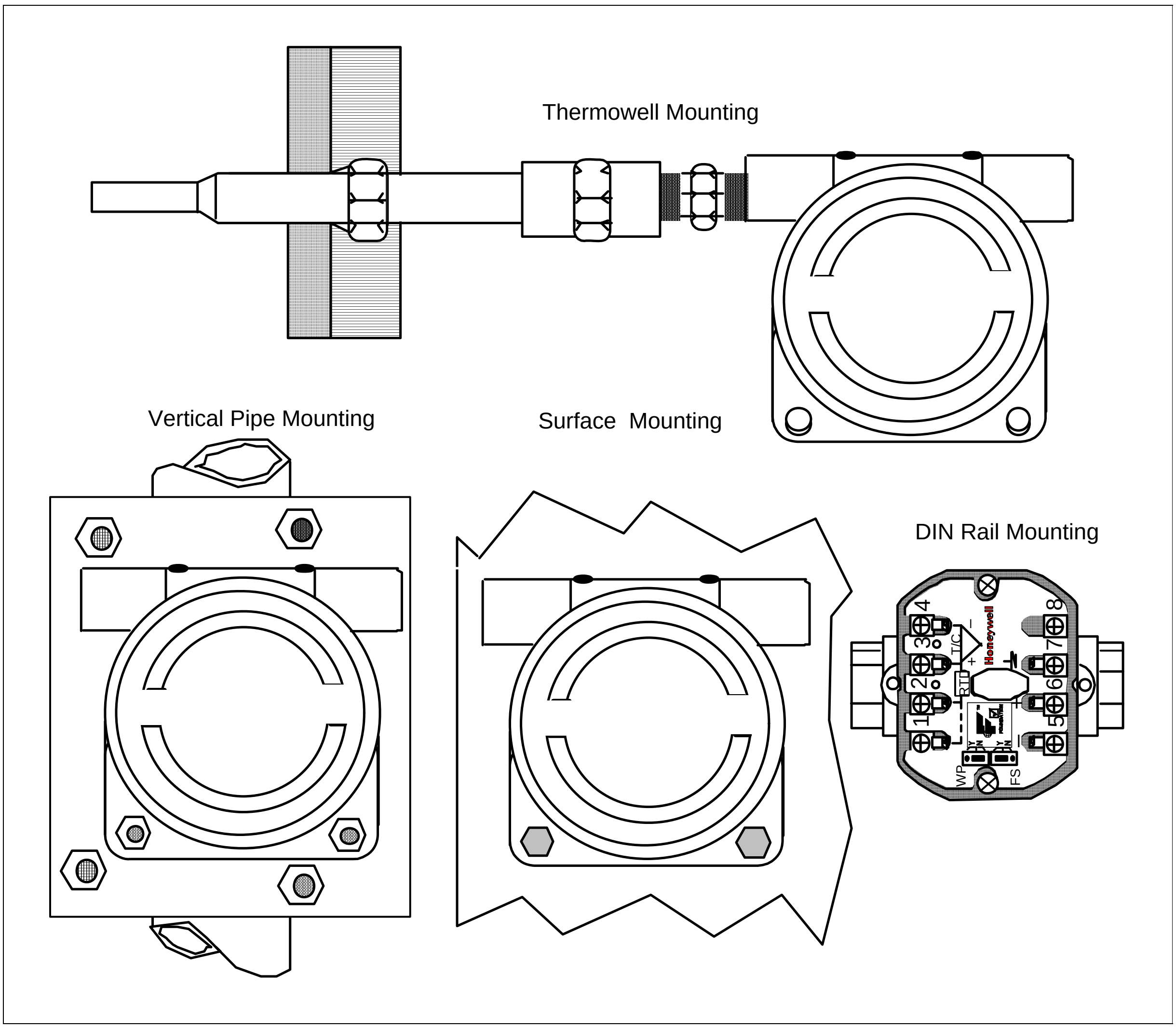
You can mount a transmitter installed in an optional explosionproof housing to a:

- Surface of a wall,
- Thermowell of a sensor, or
- 2-inch (50 mm) vertical or horizontal pipe, using our optional mounting bracket.

You can also mount a transmitter to a top hat or G type DIN rail using our optional DIN rail clips.

Figure 5-1 shows typical explosionproof housing and DIN rail-mounted transmitter installations for comparison.

Figure 5-1 Typical Explosionproof Housing and DIN Rail-Mounted Installations



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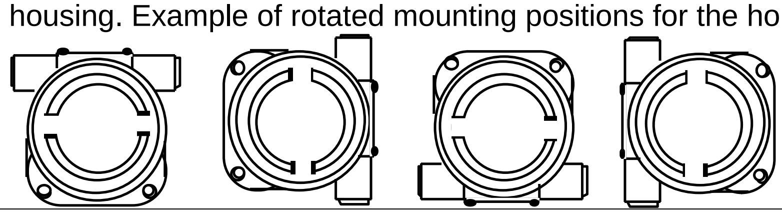
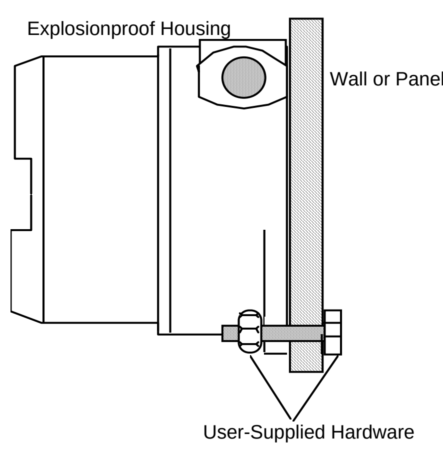
5.3 Surface Mounting Explosionproof Housing

Procedure Table 5-1 summarizes typical steps for mounting a transmitter in an explosionproof housing on the surface of a wall or panel.

ATTENTION User must supply hardware, such as two bolts with nuts and lockwashers, to attach explosionproof housing to surface.

Table 5-1 Mounting STT35F Transmitter to a Surface

Step	Action
1	Position explosionproof housing in desired location on mounting surface. **ATTENTION** You can rotate the housing in 90 degree increments to meet your particular installation requirements. Note that the transmitter itself can be rotated 180 degrees within the housing. Example of rotated mounting positions for the housing: 
2	Use center punch or scribe to mark location of holes in housing on surface.
3	Prepare surface for user-supplied mounting hardware as required.
4	Secure housing to surface using mounting holes and user-supplied hardware. Example - Securing housing to wall or panel. 

Continued on next page

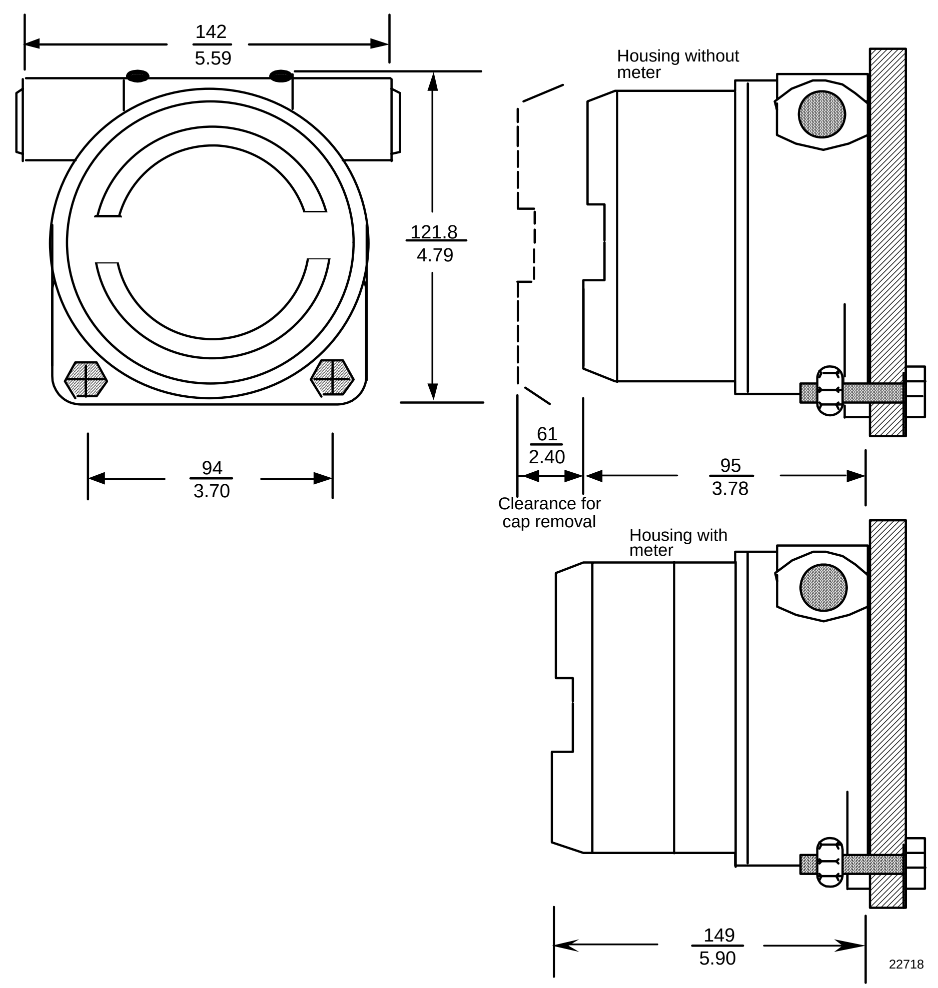
Procedure, continued

Table 5-1 Mounting STT35F Transmitter to a Surface, continued

Step	Action
5	If applicable, connect conduit to 1/2-inch NPT female wiring outlet connection in housing observing local connection practices.
6	Go to Wiring section.

Dimensions Figure 5-2 shows explosionproof housing, surface mounting dimensions for reference.

Figure 5-2 Surface Mounting Dimensions

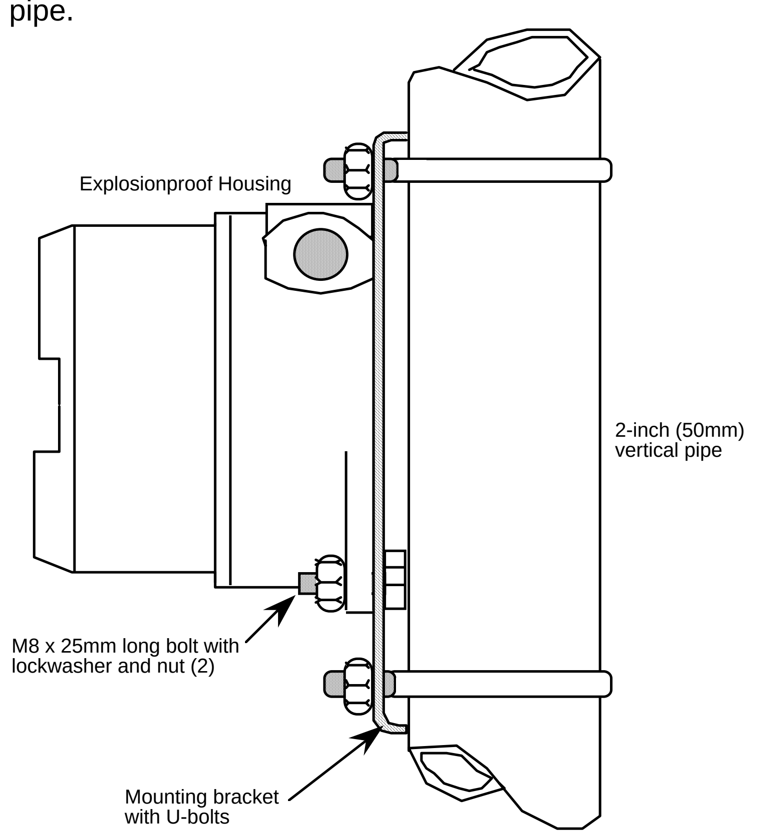


5.4 Pipe Mounting Explosionproof Housing

Procedure

Table 5-2 summarizes typical steps for mounting a transmitter in an explosionproof housing to an optional pipe mounting bracket.

Table 5-2 Mounting STT35F Transmitter to a Bracket

Step	Action
1	Position explosionproof housing in desired location on flat side of our optional mounting bracket. Align mounting holes in housing with holes in bracket. **ATTENTION** You can rotate the housing in 90 degree increments on the mounting bracket to meet your installation requirements. Note that you can rotate the transmitter itself 180 degrees within the housing.
2	Use two M8 x 25 mm long bolts with nuts and lockwashers supplied with mounting bracket to secure housing to bracket.
3	Position bracket on vertical or horizontal pipe and secure with supplied U-bolts. Example - Securing housing to 2-inch (50 mm) vertical pipe. 

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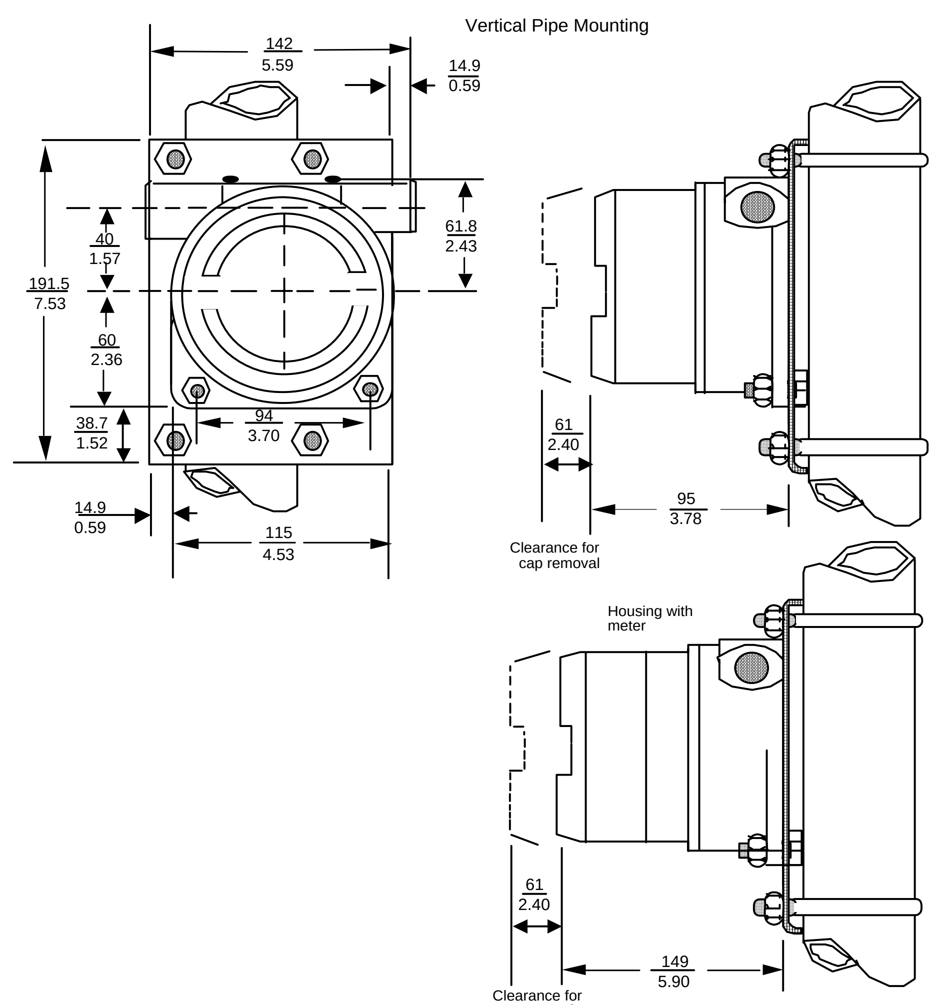
Procedure, continued

Table 5-2 Mounting STT35F Transmitter to a Bracket, continued

Step	Action
4	If applicable, connect conduit to 1/2-inch NPT female wiring outlet connection in housing observing local connection practices.
5	Go to Wiring section.

Dimensions Figure 5-3 shows explosionproof housing, pipe mounting dimensions for reference.

Figure 5-3 Pipe Mounting Dimensions



5.5 Thermowell Mounting Explosionproof Housing

Considerations

Review these considerations before mounting an STT35F transmitter in an explosionproof housing directly to a thermowell.

- Be sure to use an extension pipe that is long enough to keep any heat transfer from the process from raising the ambient temperature above the 85°C (185°F) operating limit.
- If an RTD or a T/C sensor is being used, be sure to use a spring-load accessory to hold the sensor against the end of the thermowell.
- Be sure sensor leads extend at least 5.9 inches (150 mm) from the end of the thermowell or the extension pipe as applicable.

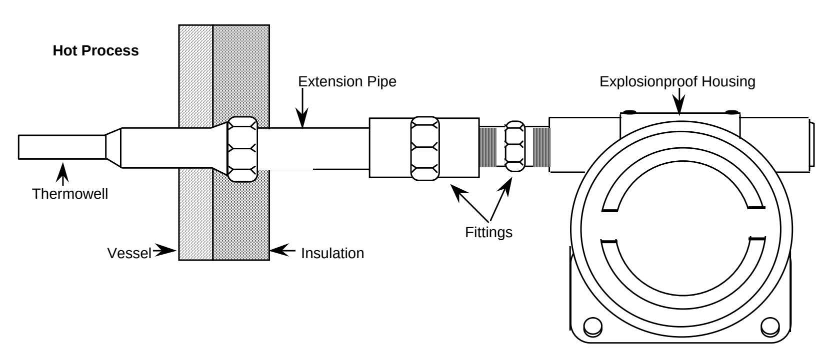
Procedure

Table 5-3 summarizes typical steps for mounting a transmitter in an explosionproof housing directly to a thermowell.

Table 5-3 Mounting STT35F Transmitter to a Thermowell

Step	Action
1	Follow accepted piping practices to connect extension pipe and fittings to thermowell and provide 1/2-inch NPT male connection to 1/2-inch NPT female outlet connection in explosionproof housing.
2	Feed sensor leadwires into conduit connection on one side of explosionproof housing and secure housing to pipe fitting from thermowell. **ATTENTION** Be sure that there is enough slack in sensor leadwires for connection to transmitter's terminals. Example - See Figure 5-4.
4	If applicable, connect conduit to 1/2-inch NPT female wiring outlet connection in housing observing local connection practices.
5	Go to Wiring section.

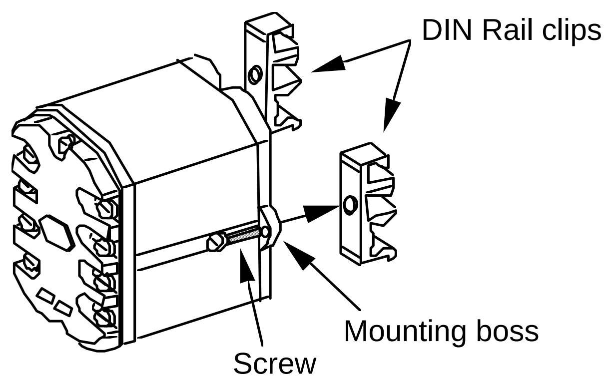
Figure 5-4 Securing Housing to Thermowell



5.6 DIN Rail Mounting

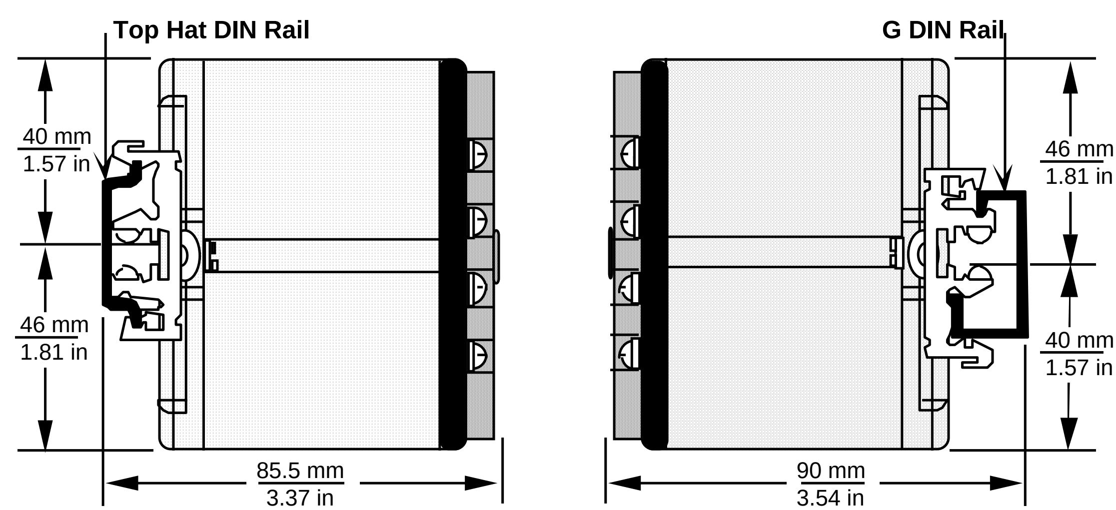
Procedure Table 5-4 summarizes typical steps for mounting a transmitter to a top hat or G type DIN rail.

Table 5-4 Mounting STT35F Transmitter to a DIN Rail

Step	Action
1	With front of transmitter facing you, turn transmitter on its left side. Attach mounting clips to rear of transmitter with screws supplied through mounting bosses on top and bottom of transmitter. Example - Installing DIN rail clips on back of transmitter. 
2	Snap transmitter onto DIN rail.

Dimensions Figure 5-5 shows DIN rail clip dimensions for reference.

Figure 5-5 DIN Rail Mounting Dimensions



5.7 Wiring STT35F Transmitter

Wiring the Transmitter to a Fieldbus Network

The STT35F transmitter is designed to operate in a two-wire fieldbus network. Although wiring the transmitter to a fieldbus network is a simple procedure, there are a number of rules that should be followed when constructing and wiring a network. This section provides general guidelines that should be considered when wiring the transmitter to a fieldbus network segment. A procedure is given in this section for properly wiring the transmitter.

For Detailed Fieldbus Wiring Information

Refer to Fieldbus Foundation document AG-140, *Wiring and Installation 31.25 kbit/s, Voltage Mode, Wire Medium Application Guide* for complete information on wiring fieldbus devices and building fieldbus networks.

Fieldbus Device Profile Type

The STT35F is identified as either of the following Fieldbus Device Profile Types in Table 5-5, (as per Fieldbus document #FF-816):

Table 5-5 Foundation Fieldbus Profile Types

Device Profile Type:		**Characteristic**
111	**113**	
X	X	Uses standard-power signaling to communicate on a fieldbus network.
X	X	Is a bus-powered device. (The transmitter does not have an internal power supply and so it receives its dc power from the fieldbus).
X		Is acceptable for intrinsically safe (I.S.) applications.
	X	Is acceptable for non I.S. applications.

Fieldbus Network Components

There are a number of basic components used in constructing a fieldbus network. These items can include:

- Fieldbus cable - Consists of a shielded, twisted pair made to fieldbus specifications. (Although existing two-wire cable can be used in some installations, fieldbus cable is recommended for new installations.)
- Fieldbus power supply.
- Power conditioner is a fieldbus component that provides impedance matching between the power supply and the fieldbus segment. (This may be included as part of a fieldbus power supply.)

Continued on next page

Fieldbus Network Components, Continued

- Fieldbus terminators - This component acts as a signal termination. Two are required for each fieldbus segment. One is connected at or near each end of a network segment.
- Junction block - This is a terminal block used as a junction point for fieldbus cable leads to individual devices.
- Fieldbus I.S. barriers - Limits the available power to the fieldbus segment to eliminate explosion hazards. (Barriers must be designed for fieldbus networks.)

Fieldbus Network Wiring Schemes

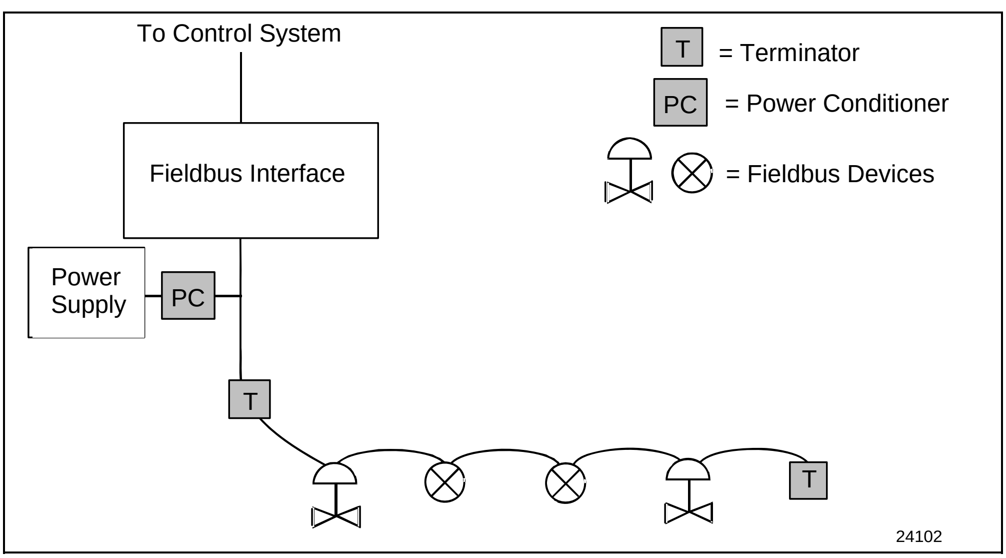
There are various schemes that can be used to wire devices in a fieldbus network. Devices can be connected:

- In a daisy-chain, (in parallel)
- To a bus, where the devices are attached in a multidrop scheme
- In a tree fashion, where devices are connected to a network segment via a common junction block.

Daisy-Chain Wiring

The fieldbus cable is routed from device to device in parallel along a bus segment. The cable is interconnected at the terminals of each field device. (This installation must be powered down to modify or replace transmitter.) This scheme is illustrated in Figure 5-6.

Figure 5-6 Daisy-Chain Wiring Scheme



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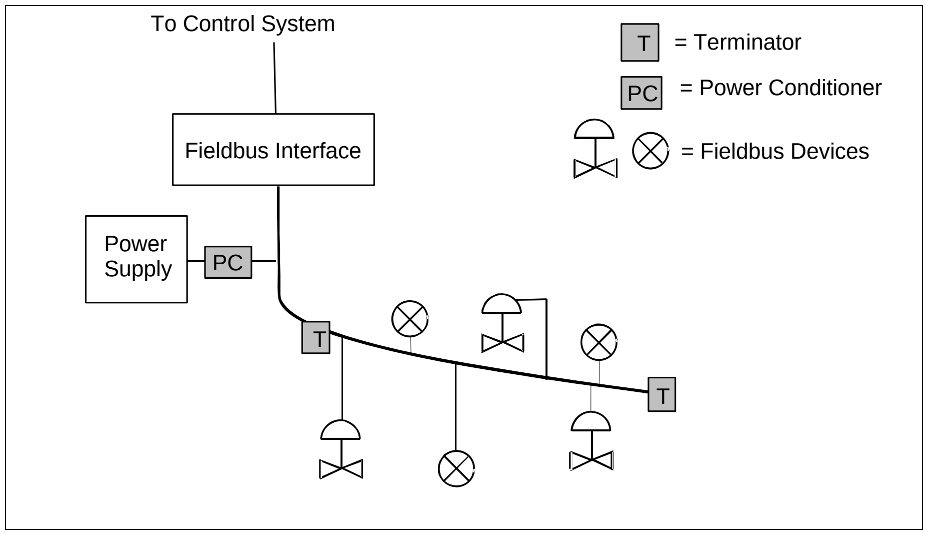
Bus with Spurs Wiring

In this scheme, field devices are connected to a bus by a length of fieldbus cable called a spur (or drop). The spur can vary in length from 1 meter (3.28 ft.) to 120 m (394 ft.). Figure 5-7 shows devices and spurs connected to a bus segment.

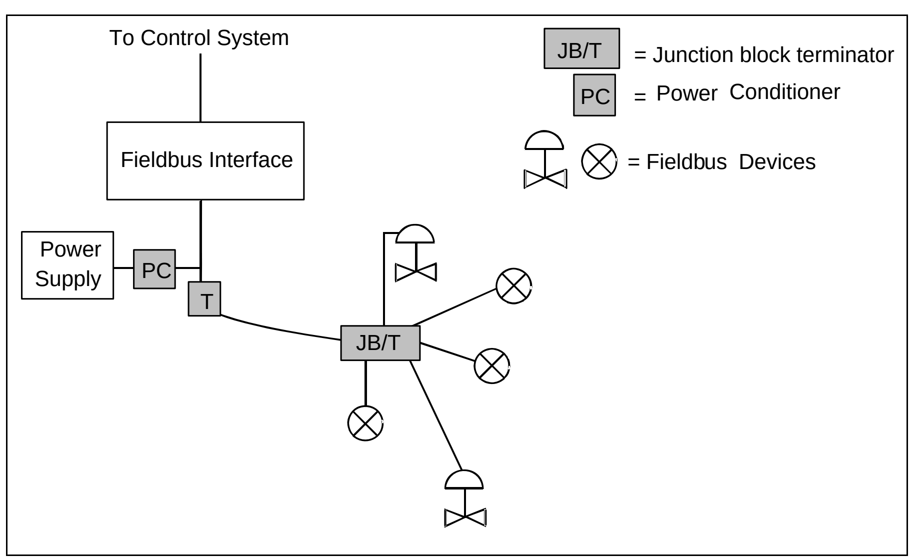
Figure 5-7 Bus with Spurs Wiring



Tree Wiring Scheme

In this scheme, field devices are connected to a single fieldbus segment via a spur cable to a common junction block, terminal, or marshalling panel. This scheme is practical if devices on the segment are well separated, but in the general area of the same junction block. Figure 5-8 shows the tree wiring scheme.

Figure 5-8 Fieldbus Network using Tree Wiring Scheme



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Fieldbus Network Limitations

A number of factors limit the size of a fieldbus network:

1. The cable type used in the wiring system limits the length of a network segment. (See Fieldbus Cable Types.)
2. The number of field devices connected on a segment is limited depending on:
   - voltage of the power supply,
   - resistance of the cable and
   - current drawn by each device.

   (See Voltage, Resistance and Current.)
3. Attenuation and distortion of the signal on the fieldbus due to:
   - resistance of the cable,
   - varying characteristic impedance along the cable,
   - signal reflections from spur connections, and
   - other factors that limit the size of a network segment.

Fieldbus Cable Types

Various types of cable are useable for fieldbus network wiring. Table 5-6 lists the cable types. Please note that Type A is the preferred cable to use for fieldbus; then type B, etc.

Table 5-6 Fieldbus Cable Types

Fieldbus Cable Type	Construction
Type A ⇒	Shielded, twisted pair ⇓
Type B ⇒	Multi-twisted pair, with shield ⇓
Type C ⇒	Multi-twisted pair, without shield ⇓
Type D ⇒	Multi-core, without twisted pairs and having an overall shield ⇓

Parameter	Conditions	D	C	B	A
Characteristic Impedance - Ohms	31.25 kHz	*	*	70-130	80-120
Maximum DC resistance - Ohms/km	per conductor	20	132	56	24
Maximum attenuation - db/km	39 kHz	8	8	5	3
Wire Size - AWG #		16	26	22	18
Wire cross sectional area - mm^2		1,25	0,13	0.32	0.8
Maximum Capacitive unbalance - pf	1 kilometer length	*	*	2000	2000

* Not specified

Continued on next page

Voltage, Resistance and Current

Power supply output voltage, cable resistance and device current requirements limit the number of devices on a network segment.

1. The output voltage of the power supply must be considered when building a fieldbus segment. Typical fieldbus devices require a minimum of 9 volts to operate. (See power requirements for the STT35F in Section 4.2).
2. Resistance of the fieldbus cable produces a voltage drop along a segment and must also be considered.
3. The device startup current as well as the operating current must be considered, because some devices require considerably more current when they are first powered up and begin to operate. (The STT35F does not require extra current at start up.)

The power calculation for a network segment should allow for these factors (voltage, current and resistance), otherwise the network may not start up when power is first applied.

Number of Devices and Spur Length

For the bus with spurs and tree wiring scheme, there are guidelines for the length of spurs and the number of devices that can be connected on these spurs. The guidelines established are only recommendations for the maximum cable length to assure adequate signal quality. Spur length depends on:

- Cable type/characteristics/wire gauge, (Types A, B, C, or D)
- Wiring scheme, (bus or trees)
- Number and type of devices, (are devices bus or self-powered and are they suitable for I.S. applications).

In any fieldbus segment there may be a variety of cable and the quality of existing cable may vary, therefore you should try to use the shortest cable length possible.

For details on these guidelines, refer to the Fieldbus wiring document number AG-140.

ATTENTION

If you are installing intrinsically safe field devices in hazardous areas, there are more things to consider. See Intrinsically Safe Applications section.

STT35F Wire Connections

Fieldbus signal communications and DC power are supplied to the transmitter using the same fieldbus twisted-pair cable.

Continued on next page

Intrinsically Safe Applications

Fieldbus barriers should be installed per manufacturer's instructions for transmitters to be used in Intrinsically Safe (I.S.) applications.

The number of field devices on a segment may be limited due to power limitations in hazardous area installations. Special fieldbus barriers and special terminators may be required. Also the amount of cable may be limited due to its capacitance or inductance per unit length.

For Detailed I.S. Information

Refer to Fieldbus Foundation document AG-163, *31.25 kbit/s Intrinsically Safe Systems Application Guide* for more detailed information on connecting fieldbus devices for I.S. applications.

Input wiring procedure

The procedure in Table 5-7 shows the steps to connect the input signal to the transmitter.

ATTENTION

All wiring must comply with local codes, regulations, and ordinances.

Table 5-7 Wiring Input to the Transmitter

Step	Action	
1	**If transmitter …**	**Then…**
	is installed in an explosionproof housing	go to Step 2
	is not installed in an explosionproof housing	go to Step 5
2	Remove cap from explosionproof housing.	
3	If transmitter is supplied with an optional integral meter, pull meter from transmitter mounting adapter and unscrew plastic cage to expose wiring connections on transmitter.	
4	Feed input leads through one of conduit entrances on either side of explosionproof housing. Plug whichever entrance you do not use.	

Continued on next page

Input wiring procedure, continued

Table 5-7 Wiring Input to the Transmitter, continued

Step	Action	
5	Strip 1/4 inch (6.35 mm) of insulation from input leads.	
	If input is from …	**Then…**
	Thermocouple or millivolt source	Observing polarity, connect positive input lead to T/C + terminal 3 and negative input lead to T/C – terminal 4. See Figure 5-9.
	2-wire RTD or ohms source	Connect RTD leads to terminals 2 and 3. Insert jumper between terminals 3 and 4. See Figure 5-11A.
	3-wire RTD or ohms source	Connect RTD leads to terminals 2, 3, and 4. See Figure 5-11A.
	4-wire RTD or ohms source	Connect RTD leads to terminals 1, 2, 3, and 4 See Figure 5-11A.
	Two 2-wire RTDs for differential measurement	Connect RTD 1 leads to terminals 3 and 4 and RTD 2 leads to terminals 2 and 4. See Figure 5-11B.
	Two thermocouples for redundant operation	Connect thermocouple 1 leads to terminals 3 (+) and 4 (–) and thermocouple 2 leads to terminals 2 (+) and 4 (–). See Figure 5-10.
	Two thermocouples for differential measurement	Connect thermocouple 1 leads to terminals 3 (+) and 4 (–) and thermocouple 2 leads to terminals 2 (+) and 4 (–). See Figure 5-10.
6	Replace integral meter, plastic cage and cap, if applicable.	

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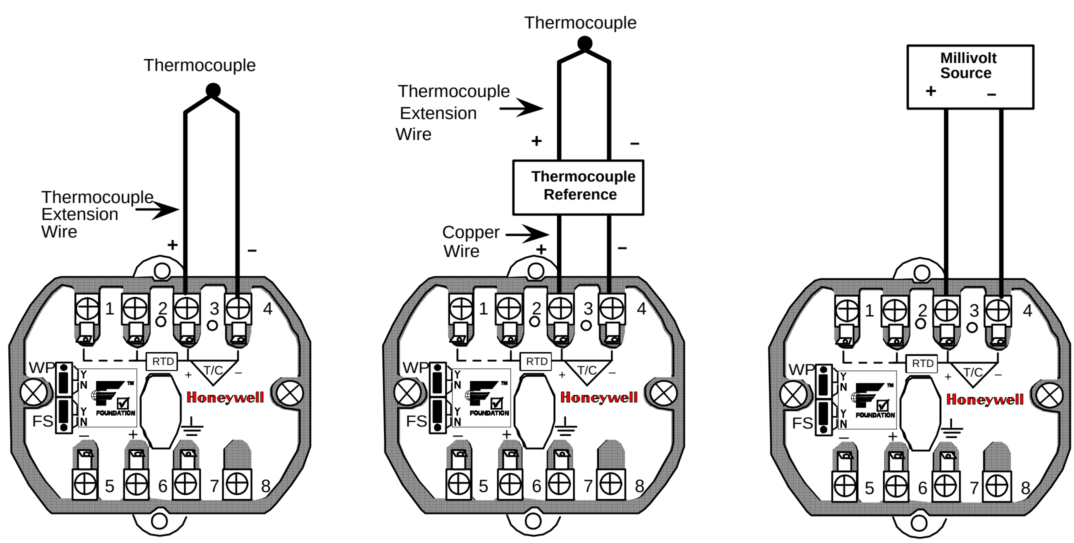
Input wiring procedure, continued

Figure 5-9 Single Thermocouple or Millivolt Source Input Wiring Connections



Thermocouple Connections with Internal Cold Junction Compensation

Thermocouple Connections with External Cold Junction Compensation

Millivolt Connections

About thermocouple extension wire

Table 5-8 lists the thermocouple extension cable color codes commonly used in the United States for extending thermocouple leads for a given thermocouple type. One of these cables is likely to be used for connecting a thermocouple to the STT35F transmitter.

Table 5-8 Thermocouple Extension Cable Color Codes

Cable for Thermocouple Type	Leads or Cores		Cable Cover
	Positive +	Negative –	
B	Gray	Red	Gray
E	Violet	Red	Violet
J	White	Red	Black
K	Yellow	Red	Yellow
R & S	Black	Red	Green
T	Blue	Red	Blue

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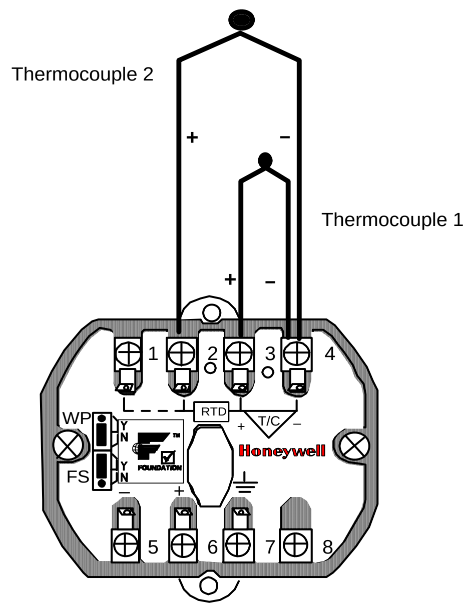
Input wiring procedure, continued

Figure 5-10 Two Thermocouples for Redundant Operation or Differential Measurement Input Wiring Connections.



Thermocouple Connections for Redundant Operation or Differential Measurement

ATTENTION You must select the appropriate sensor through the sensor type and sensor configuration transducer block parameters for the transmitter to select the correct measurement mode based on the input wiring.

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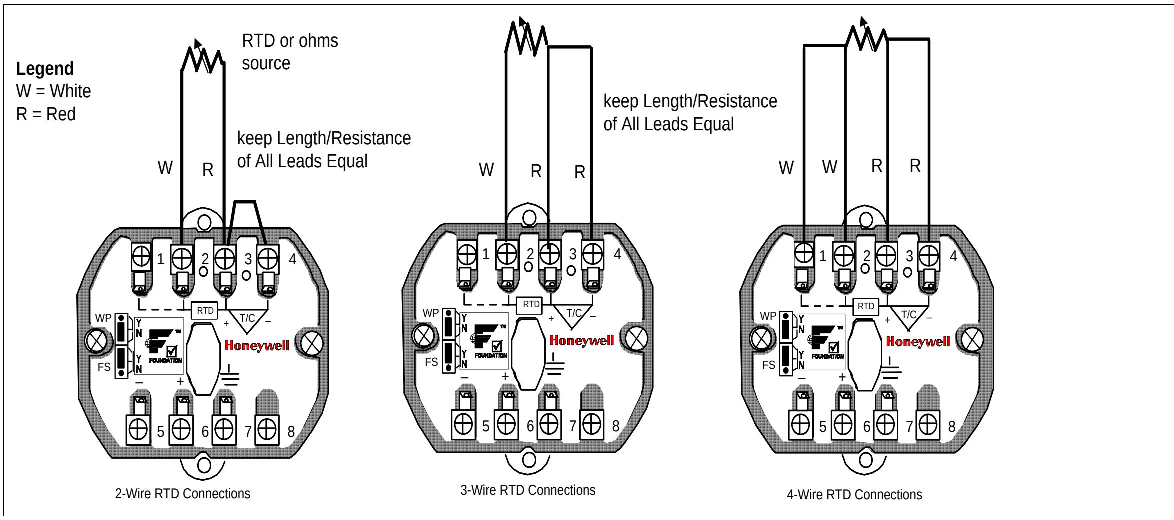
Input wiring procedure, continued

Figure 5-11A Single RTD or Ohms Source Input Wiring Connections



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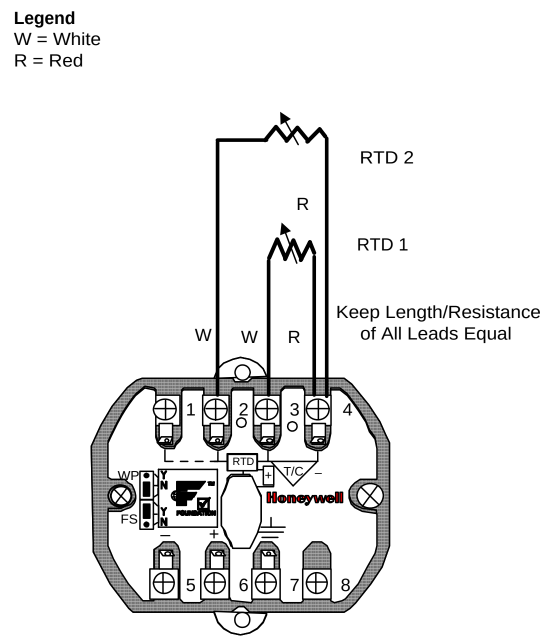
Input wiring procedure, continued

Figure 5-11B Two 2-wire RTDs for Differential Measurement Input Wiring Connections.



Two RTDs for Differential Measurement Connections

ATTENTION You must select the appropriate sensor through the sensor type and sensor configuration transducer block parameters for the transmitter to select the correct measurement mode based on the input wiring.

Output/power wiring procedure

The procedure in Table 5-9 shows the steps for connecting output/power to the transmitter.

ATTENTION All wiring must comply with local codes, regulations, and ordinances.

Table 5-9 Wiring Output/Power to the Transmitter

Step	Action	
1	**If transmitter …**	**Then…**
	is installed in an explosionproof housing	go to Step 2
	is not installed in an explosionpr housing	go to Step 5

Continued on next page

Output/power wiring procedure, continued

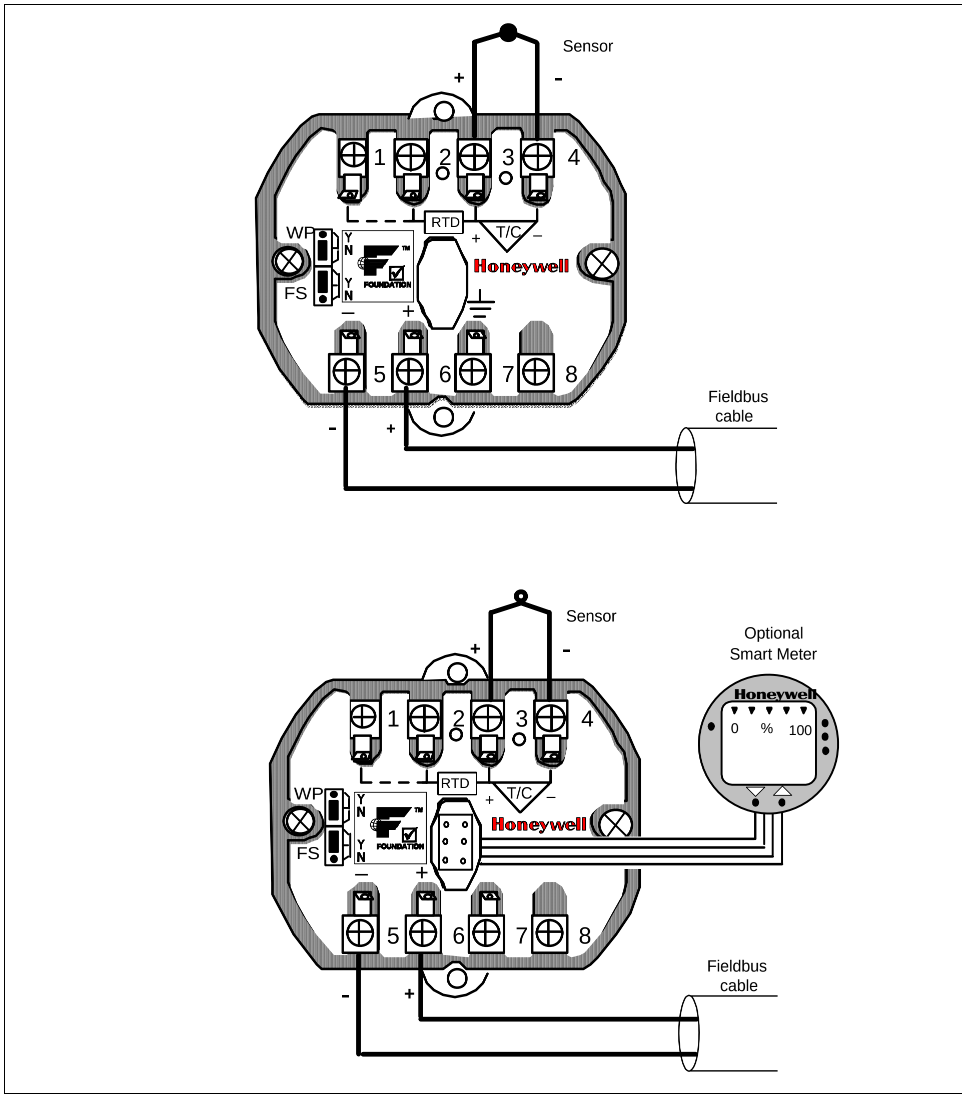
Table 5-9 Wiring Output/Power to the Transmitter, continued

Step	Action	
2	Remove cap from explosionproof housing.	
3	If transmitter is supplied with an optional integral meter, pull meter from transmitter and unscrew plastic cage to expose wiring connections on transmitter.	
4	Feed output/power wires through one of conduit entrances on either side of explosionproof housing. Plug whichever entrance you do not use.	
5	Strip 1/4 inch (6.35 mm) of insulation from output/power wires.	
	If transmitter is supplied…	**Then…**
	without an integral meter	Observing polarity, connect positive loop output/power wire to + terminal 6 and negative loop output/power wire to – terminal 5. See Figure 5-12.
	with an integral smart meter	Connect the local meter connector into the 6 pin connector. Observing polarity, connect positive loop output/power wire to + terminal 6 and negative loop output/power wire to – terminal 5. See Figure 5-12.
6	Replace integral meter, plastic cage and cap, if applicable.	

Continued on next page

Output/power wiring procedure, continued

Figure 5-12 Typical Output/Power Wiring Connections Without Meter or With Local Meter



Ground connection

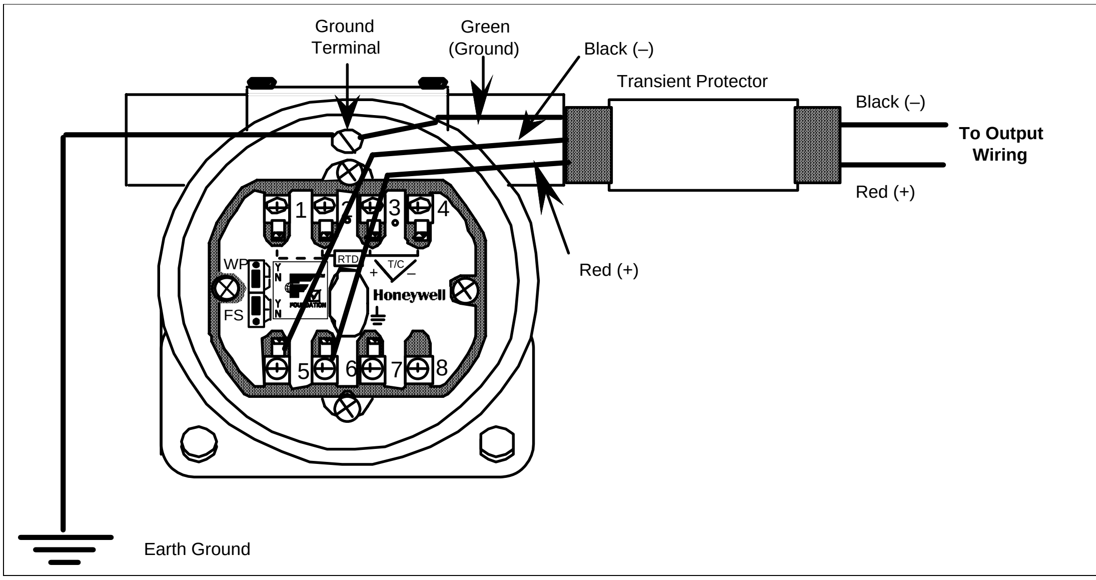
Each explosionproof housing includes a ground terminal for connecting the housing to a suitable earth ground using a #6 or larger nickel-clad wire.

When your housing is supplied with an optional transient protector, you must connect the green wire from the protector to the ground terminal as shown in Figure 5-13 to make the protection effective.

Continued on next page

Ground connection, continued

Figure 5-13 Ground Connection with Transient Protector



ATTENTION In explosive atmospheres and non-intrinsically safe loops, do not apply power to the transmitter with the explosionproof housing cap removed and do not remove the cap with power applied to the transmitter.

Wiring an explosionproof transmitter

For an explosionproof installation, you must seal the conduit entrances in the explosionproof housing. Use a conduit seal such as Crouse-Hinds type EYS or equivalent on the wiring outlet(s) of the housing.

Install the conduit seal according to the instruction packaged with the product.

Approval Body Requirements

Awaiting information on approval body requirements.

5.8 External Lightning Protection

Wiring reference

When your transmitter is equipped with optional lightning protection, you must connect a wire from the transmitter to ground as shown in Figure 5-13 to make the protection effective.

Installation procedure

The procedure in Table 5-10 outlines the steps to install a transient protector on an STT 3000 Model STT35F transmitter.

Table 5-10 Transient protector installation

Step	Action
1	Unscrew housing cap.
2	Apply pipe joint tape or compound suitable for operating environment to threads on transient protector - leave first two threads clean.
3	Hold transient protector so end with three wires points toward the right-hand conduit connection in transmitter's housing.
4	Feed three wires through conduit connection and screw protector into connection.
5	Connect red wire to positive (+) terminal 6.
6	Connect black wire to negative (-) terminal 5.
7	Connect green wire to ground terminal inside housing. **ATTENTION**: be sure to keep green wire short and straight.
8	Replace cap.
9	Connect the housing to a suitable earth ground using a #6 or larger Nickel-clad copper wire.
10	Observing polarity, connect field wiring to two wires on other end of transient protector, red wire is positive (+) and black wire is negative (-).

5.9 Internal Surge Protection

Introduction

ATTENTION

In hazardous area/location applications where explosive gases may be present the following instructions MUST be followed:
EEx d / explosion-proof: in explosion-proof / flame-proof applications the loop must be isolated before any EEx d / explosion-proof covers are removed.
EEx i / intrinsic safety: in intrinsically-safe circuits use only IS certified test equipment.

The HW48 can be installed within the housing of a Honeywell STT35F Smart Transmitter to give protection against surges such as those generated by lightning. The unit mounts against the side of the STT35F and fits inside a Honeywell EP housing. Loop wiring is made to the terminal block on the HW48, with connection to the transmitter being made by the HW48 spade terminals. Other connections are made directly to the Honeywell STT35F. The HW48 adds 36 ohms to the loop resistance and so it might be necessary to increase the voltage of the loop supply to compensate, to allow the transmitter to function correctly.

The HW48 diverts any surge safely away from the STT35F to the housing, which acts as an equipotential point for the transmitter. The transmitter housing should be bonded to the plant earth by as short a length of wire as possible, using wire of at least 4 mm^2 cross-section.

Used in conjunction with the EP housing, the HW48 does not affect the EEx d / explosion-proof certification of the enclosure. In Zone 2 / Div 2 applications, introducing an HW48, when used in the EP housing, will not adversely affect the safety of the system. In intrinsically safe circuits, the HW48 can be classified as non-energy storing apparatus (<1.2 V, <0.1A, <20μJ, <25mW, $C_{eq} = 0$, $L_{eq} = 0$).

NOTE

This surge protection device (SPD) is designed to limit the voltage that can occur both line-line and line-earth and, therefore, this unit will not pass a 500V insulation test. Any system insulation test should be carried out before the HW48 is installed.

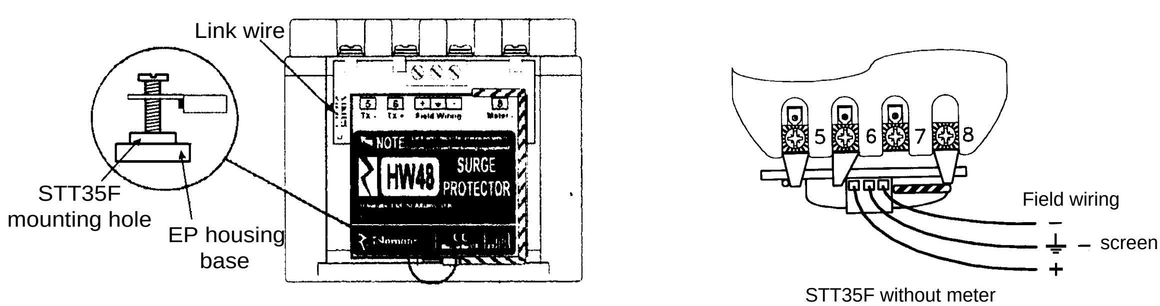
Continued on next page

Installation

Refer to Figure 5-14 for guidance in installing the HW48, using the following instructions. (If a Local Smart Meter is being used on the transmitter, unplug the cable and unscrew the plastic cage before installing the HW48 on the transmitter. (see Figure 5-14).

1. Remove the cover of the transmitter housing (if applicable). The HW48 fits on the side of the STT35F transmitter adjacent to terminals 5, 6, 7 & 8.
2. Remove the retaining screw at the base of the STT35F transmitter on the side of the transmitter by terminals 5, 6, 7 & 8 and loosen the screws on terminals 5, 6 & 8.
3. Replace the fixing screw removed in (2) using it to attach the bonding ring to the housing at the same time, this is the surge bond for the HW48. (This operation can be done with the green/yellow bonding wire uncoiled from the HW48). When the screw is tightened, ensure that the ring terminal does not rotate to such an extent that it will interfere with the replacement of the transmitter housing cover.
4. Mount the HW48 against the side of the STT35F. In doing this, the green/yellow wire must be guided into the channel in the side of the HW48. The transmitter retaining screw head will fit into the recess in the base of the HW48 and the terminals of the HW48 will slide into the STT35F terminals 5, 6 & 8. Before tightening the terminal screws, ensure that the HW48 is pressed tightly against the side of the STT35F, and hold it in place while tightening the terminals.
5. Attach the wires for the Fieldbus network to the terminals marked + and - on the HW48. If there is a screen, it should be connected to the central terminal on the HW48.
6. Replace the transmitter housing cover.

Figure 5-14 Mounting of the HW48 on a transmitter



Maintenance The unit is designed to give a long "normal" service life. However, if exposed to a large number of high energy transients beyond the capability of the unit , it may fail. The unit has been designed so that, under excessive surge conditions, it should failsafe, protecting the transmitter. If the unit has failed, it can be replaced in the field - the process for removal is the reverse of that for installing the unit. If a replacement HW48 is not immediately available, it is possible to bypass the unit by wiring directly to the transmitter; however, it should be remembered that, in this case, the transmitter will be unprotected from surges.

5.10 Power Up Transmitter

Prepower Checklist

Before applying power to the fieldbus network you should make the following checks:

- Verify that the STT35F transmitter has been properly mounted and connected to a system.
- The transmitter has been properly wired to a fieldbus network.
- The transmitter housing has been properly connected to a suitable earth ground.
- The operator station or host computer has been installed and connected to a fieldbus network.

NOTE: If you want to enable the write protect, you must change hardware jumpers on the transmitter's terminal blocks. This requires that the power be removed from the transmitter. See Section 6.5 (Setting Write Protect Feature) for details.

Power Up

To apply power to the fieldbus network:

1. Turn on all power supplies that furnish DC power to the fieldbus network.
2. Use a digital voltmeter and measure the DC voltage across the terminals 5 and 6 of the STT35F transmitter.
3. Minimum voltage for transmitter operation is 9.5 Vdc.
4. Maximum voltage on fieldbus segment is 32 Vdc.

6. TRANSMITTER CONFIGURATION

6.1 Introduction

This section includes these topics:

About this Section

This section explains the tasks to establish communications and configure the STT35F Transmitter for the process application. An overview is given of the configuration tasks using the NI-FBUS Configurator application as an example. Detailed information on using the configurator application is found in the user manual supplied with the software.

ATTENTION

Before proceeding with the tasks in this section it is assumed that the STT35F transmitter has been installed and wired correctly. It also assumes that you are somewhat familiar with using a fieldbus configuration application (such as the NI-FBUS Configurator).

If the transmitter has not been installed and wired, or if you are not familiar with device configuration, and/or you do not know if the transmitter is configured, please read the other sections of this manual before configuring your transmitter.

6.2 STT35F Communications

Communications and Control

All communications with the STT35F is through an operator station or host computer running supervisory control and monitoring applications. These applications provide the operator interface to fieldbus devices and the fieldbus network.

Configuration Applications

Configuration of the transmitter for your process application is also performed through the operator interface, (operator station or PC) running a fieldbus configuration software application.

ATTENTION

There are various applications available for you to configure fieldbus devices. The examples presented in this manual refer to the NI-FBUS Configurator application. For further details on fieldbus configuration solutions see your Honeywell Sales Representative.

6.3 Transmitter Configuration Process

STT35F Transmitter Configuration

Configuration of the STT35F Transmitter (device) involves the following steps:

Step	Task	See Section
1	Establishing communication between the operator interface and the device (bringing the transmitter on-line in a fieldbus network).	6.7
2	Making initial checks on the device serial number and firmware revision numbers.	6.8
3	Using a fieldbus configuration application, create or make changes to the device configuration.	6.9
4	Writing the device configuration changes to the device.	6.9
5	Saving device configuration to disk.	6.9

6.4 Device Configuration

Function Block Application Process

All fieldbus devices contain one or more Function Block Application Processes (FBAP) as part of their device configuration. The Function Block Application Process in the STT35F is a software application that defines the particular characteristics of transmitter. The FBAP comprises function blocks, a transducer block, and a resource block, plus other functions which support these blocks. Each function block contains a set of operating parameters (some of which are user-configurable) that define the operating characteristics of the transmitter.

Function blocks perform (or execute) their specific functions according to a schedule. This schedule provides the sequence and timing of events which occur within a device and also between other fieldbus devices. This schedule is coordinated with the function block execution schedules in the device and other fieldbus devices on the network.

Additional information on the FBAP contained in the STT35F is found in Section 8, Device Configuration.

Fieldbus Configuration Application

The STT35F transmitter is configured using a fieldbus configuration application running on an operator station or host computer. (The NI-FBUS configurator actually provides the means for you to configure the FBAP's of fieldbus devices.) This configuration tool is a windows-based application that operates under Windows NT environment.

The NI-FBUS configurator application allows you to:

- Connect function block inputs and outputs according to the process requirements.
- Make changes to function block parameters according to the process requirements.
- Make changes to the schedule of function block execution.
- Write the FBAP changes to the device.

Default Configuration

An FBAP containing default configuration parameters is resident in the firmware of the transmitter and is loaded on power up. By using the NI-FBUS configurator (or other fieldbus configuration) application, you can create or make changes to an FBAP for the transmitter's process application.

Device Configuration

Configuring the STT35F results in:

- Function blocks that execute according to a user-defined schedule.
- Measurements that are processed according to various user-configurable parameters found within function blocks.
- An output "published" on the fieldbus network according to a user-defined publishing schedule.

6.5 Setting Write Protect Feature

Write Protect Feature

The STT35F transmitters are available with a “write protect feature”. It consists of a jumper located on the transmitter’s terminal block that can be set to enable read only access (write protect) to the transmitter’s configuration. When the jumper is in the read only ("Y") position, the transmitter’s configuration parameters and calibration data can only be read or viewed (transmitter configuration is write protected). The jumper is factory set for read and write access (not write protected) "N" position.

ATTENTION

Note that the write protect jumper is used in conjunction with the FEATURE_SEL parameter, and it is explained below.

Refer to Table 6-1 to set the write protect jumper.

Table 6-1 How to Set Write Protect Jumper

Step	Action
1	Remove power to transmitter.
2	If applicable, carefully turn Local Smart Meter counterclockwise to remove it from electronics module and unplug cable from connector on back of meter assembly. Loosen the two retaining screws and pull the Local Smart Meter plastic cage.
3	Set Write Protect jumper to the appropriate position on the terminal block. See Figure 6-1 and Table 6-2.
4	Insert the plastic cage back and the Local Smart Meter by reversing the steps in this procedure.

Continued on next page

6.5 Setting Write Protect Feature, continued

Figure 6-1 shows the location of the write protect jumper on the transmitter’s terminal block. Refer to Table 6-2 to set the write protect jumper.

Figure 6-1 Write Protect Jumper Location on the transmitter’s terminal block

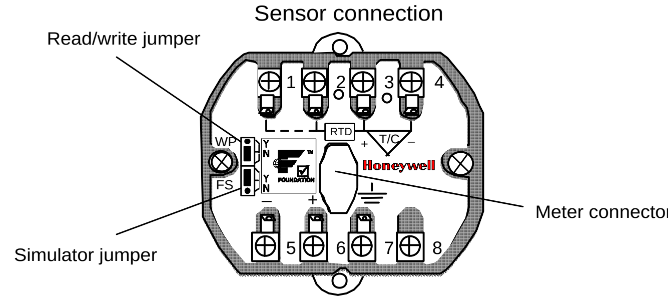
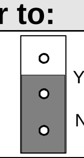
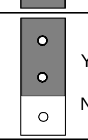


Table 6-2 Setting the Write Protect Jumper

To	Set the Jumper to:	
Enable read and write access to the transmitter’s configuration. (Factory set default)	“N” position on the terminal block.	
Set read only access to the transmitter’s configuration (Write Protect)	“Y” position on the terminal block.*	

*FEATURE_SEL parameter must also be set accordingly to enable write protect

Enabling Write Protect Feature

The FEATURES parameter (in the resource block) shows the access of the hardware lock. The write protect feature is enabled only when the Hard W Lock option is set in the FEATURE_SEL parameter. Once the bit is set and W/P jumper is in “Y” position, the device will remain write-protected until the device is powered down and the jumper is placed in the "N" position. See Table 6-3 for truth table.

Table 6-3 Write Protect Feature Truth Table

When the Read/Write Jumper on the terminal block is set to:	**and the FEATURE_SEL Bit is set to:** **0 (No)**🡻	**1(Yes)**🡻
“N” Position	Write Protect Disabled	Write Protect Disabled
“Y” Position	Write Protect Disabled	**Write Protect Enabled**

6.6 Simulation Jumper

Simulation Jumper

There is a second jumper also on the transmitter's terminal block which is used for debugging communication problems independent of sensor function. See Figure 6-1.

A simulation parameter in the AI block is used to aid in system debug if the process is not running. A hardware jumper on the terminal block is provided to enable or disable the simulate parameter. See Section 9.9 for more details on setting the simulation jumper.

6.7 Establishing Communications

Starting Communications

Once the transmitter is connected to the fieldbus network and powered up, you are ready to start communicating with the transmitter.

The procedure in Table 6-4 outlines the steps to initiate communications with an STT35F transmitter using the NI-FBUS Configurator.

Table 6-4 Starting Communications with Transmitter

Step	To:	Action
1	Check that the fieldbus is powered up.	Verify that the power supply is on and supplying power to the fieldbus segment to which the transmitter is connected. • Minimum voltage 9.5 Vdc • Maximum voltage 32 Vdc.
2	Verify that the operator station is loaded with the NI-FBUS configurator or other configuration application.	Start the application on the computer.
3	View the active devices connected to the network.	Start the NI-FBUS driver. NOTE: If you do not see the device on the list of active devices, check to make sure that the correct polarity is observed on the fieldbus cable connection to the transmitter terminal block. If the polarity is reversed, no damage will result, the device simply will not work.
4	Access the transmitter's blocks and parameters.	Start the NI-FBUS configurator application.

Tag Name Assignments

Please note that if device or block tags have not been assigned to a device, the NI-FBUS configurator will automatically assign a default tag name. This is done so that the devices are visible on the network. You can then change tag names according to your process requirements.

6.8 Making Initial Checks

Identifying the Transmitter

Before doing anything else, it is a good idea to verify the following to make sure that you are communicating with the correct transmitter:

- Transmitter type, (temperature transmitter)
- device tag, (tag description of the transmitter)
- transmitter's serial number
- firmware revision level, (revision level of the firmware elements)

Table 6-5 lists the block parameters to quickly identify the transmitter.

Table 6-5 Transmitter identification

Step	View Parameter	Verify
1	RS.DEV_TYPE	The temperature transmitter device type is 0101.
2	RS.REVISION_ARRAY REVISION_ARRAY = REVISION_ARRAY = REVISION_ARRAY =	The revision number of the: • Stack board firmware ______________ • Transducer board firmware _____________ • Stack board boot code _________ Note: These numbers are helpful when troubleshooting the device. The numbers, when viewed as hexadecimal numbers, are in the format “MMmm”. Where, MM is the major revision number and mm is the minor revision number.
3	Physical Device Tag Note: The device tagname is not contained in a parameter. It can be set and viewed using the fieldbus device configurator application.	The physical device tag is correct. ___________________
4	XD.SERIAL_NUMBER	Transmitter Serial Number _________________

6.9 Function Block Application Process

Function Block Application Process

All fieldbus devices contain one or more Function Block Application Processes (FBAP) as part of their device configuration. The Function Block Application Process in the STT35F is a software application that defines the particular characteristics of the transmitter. The FBAP comprises function blocks, a transducer block, and a resource block, plus other functions which support these blocks. Each function block contains a set of operating parameters (some of which are user-configurable) that define the operating characteristics of the transmitter.

Function blocks perform (or execute) their specific functions according to a schedule. This schedule provides the sequence and timing of events which occur within a device and also between other fieldbus devices. This schedule is coordinated with the function block execution schedules in the device and other fieldbus devices on the network.

Additional information on the FBAP contained in the STT35F is found in Section 8, Function Block Application Description.

Default FBAP Configuration

An FBAP containing default configuration parameters is resident in the firmware of the transmitter and is loaded on power up. By using the NI-FBUS configurator (or other fieldbus configuration) application, you can create or make changes to a FBAP for the transmitter's process application.

Device Configuration

Configuring the STT35F results in:

- Function blocks that execute according to a user-defined schedule
- Measurements that are processed according to various user-configurable parameters found within the function blocks
- An output "published" on the fieldbus network according to a user-defined publishing schedule. The output then is available to other fieldbus devices and function blocks.

Continued on next page

Fieldbus Configuration Application

The STT35F transmitter is configured using a fieldbus configuration application running on a operator station, PC or host computer. (The NI-FBUS configurator actually provides the means for you to configure the FBAPs of fieldbus devices.) This configuration tool allows you to:

- Connect function block inputs and outputs according to the process requirements
- Make changes to function block parameters according to the process requirements
- Make changes to the schedule of function block execution.
- Write the FBAP changes to the device.
- Save the FBAP file.

Creating a New FBAP

Again, all fieldbus devices contain one or more Function Block Application Processes as part of their device configuration. Some or all of a device's function blocks may be used as a part of an FBAP. Also, function blocks from a number of field devices may be connected as part of an FBAP. Using a fieldbus configuration application you can create and make changes to a FBAP according to your process application requirements. The procedure in Table 6-6 outlines the tasks for creating a typical FBAP file.

Table 6-6 Creating an FBAP file.

Step	Task
1	Connect configurator/builder to network. Load and startup the fieldbus configuration program on the host computer, PC or other operator interface.
2	Connect fieldbus devices to the network. The configurator program will display all active devices.
3	Create a new FBAP or window. Drag appropriate function blocks into the application area. Select function blocks to be used and drag them into the function block application graphic area.
4	Interconnect function blocks. Use the configurator program's tools to connect the function blocks to one another.
5	Interconnect trend and alert objects.
6	Review schedule for both function blocks and publishing. Break up strategy into sub-schedules if desired.

Continued on next page

Creating a new FBAP, continued

Table 6-6 Creating an FBAP file, continued

Step	Task
7	Assign processing order to function blocks, if default assignments are not desired.
8	Download application to the field devices.
9	Review errors and correct.
10	Upload the network configuration.
11	Save application file.
12	Tune loops.

6.10 Configuration Tasks

Device Configuration Procedure Overview

A typical device configuration consists of the following tasks listed in Table 6-7 using the NI-FBUS configurator application. Details on using the configurator application are found in the NI-FBUS Configurator user manual supplied with the application software.

This procedure assumes that the hardware installation of the transmitter is complete and the transmitter is powered up.

Table 6-7 STT35F Configuration Task List

Task	Procedure	Result
1	Start the Fieldbus Process application.	Scans the fieldbus network and provides a listing of all active fieldbus devices on the network or selected link.
2	Start the Fieldbus Configurator application.	Configurator windows are displayed on screen listing the active fieldbus devices.
3	Select a fieldbus device you want to configure.	
4	Change the device and block tags, if desired.	Any unassigned tags are given a default tag name automatically by the configurator.
5	Select/add/edit function blocks you need to create a function block application process. Note: Configure block objects in the following order: 1. Resource block 2. Transducer block 3. Analog Input block	Shows a representation of function blocks in the graphical interface window.
6	Connect (or wire) function blocks to define process loops.	Linkages between function block inputs and outputs are created by using wiring tools. Preconfigured templates can also be used.
7	Change block parameters, if necessary.	Parameters changed for the process requirements.
8	Configure trends and alarms.	Trending and alarms configured according to the process requirements.
9	Adjust the block execution schedule.	The function block execution schedule is changed according to the process requirements.

10	Write configuration to the fieldbus network.	The configuration changes are sent to the appropriate fieldbus devices on the network.
11	Save the device configuration to disk.	A copy of the device configuration file is saved on the hard disk of the computer or other disk.

7. OPERATION

7.1 Introduction

Section Contents

This section includes these topics:

About this Section

This section outlines the tasks for operating and monitoring the STT35F transmitter on a fieldbus network and as part of distributed process control system.

7.2 Operation Tasks

Fieldbus Device Operations

Once the STT35F is configured, it is ready for operation. The tasks listed in Table 7-1 outline the steps to startup and monitor transmitter operation. Note that the task list serves as a typical example using the NI-FBUS configuration application and Honeywell's SCAN 3000 supervisory system control applications.

Depending upon your control system and operator interface and the supervisory control applications which you are using, the tasks involved for operation and control of fieldbus devices will vary.

Table 7-1 STT35F Operating Task List

Task	Procedure	Result
1	Start NIFB.exe process application.	Loads the communication drivers in the operator station memory.
2	Start SCAN 3000 system application.	Blank screen.
3	Select controller to fieldbus network.	A window showing a list of configured data points for the network.
4	Select point detail for STT35F transmitter.	Point detail display shows current status and operating values.
5	Verify range values and operating values.	Correct, calibrate or troubleshoot if necessary.

7.3 Operation Considerations

Operation Considerations

There are a number of considerations you should note when configuring an STT35F to operate in a fieldbus network.

LAS Capability

The STT35F is capable of operating as the Link Active Scheduler (LAS). The LAS is a fieldbus device which controls traffic on the network, such as controlling token-rotation and coordinating data publishing. This fieldbus function is active in only one device at any given time on a network. Devices which can be designated as the LAS may be an operator station or a field device. The STT35F can be designated as a LAS so that, in the event of a failure of the *primary* LAS, control in the field could continue.

Please note that the STT35F does not support being configured as the *primary* LAS, and therefore the LAS capability in the transmitter is regarded as a "backup" LAS.

Special Non-volatile parameters and NVM Wear-out

All function block parameters designated as Non-Volatile (N) in the FF specifications are updated to non-volatile memory (NVM) on a periodic basis. NV_CYCLE_T parameter in the resource block specifies this update interval.

To provide predictable restart behavior in the transmitter, the following Non-Volatile parameters are updated to NVM each time they are written over the fieldbus.

- MODE.TARGET for all blocks
- SP.VALUE for the PID block

Since these are user-written parameters, these additional updates to NVM contribute negligibly to NVM wear out. However, user's are cautioned to not construct control configurations where the above parameters are written continuously (via a computer application for example) or at rates greater than the NV_CYCLE_T interval. This consideration will help minimize the possibility of NVM wear-out.

In the case of MODE this should not be a problem. When users wish to provide set-points to the PID block via a computer application, users should use RCAS mode with its corresponding setpoint value RCAS_IN. RCAS_IN is updated only at the NV_CYCLE_T update rate and this mode supports full shedding functionality and PID initialization necessary for a robust application.

Mode Restricted Writes to Parameters

Some block parameters have restrictions on having write access to them. These are specified in the FF specifications. Writing to certain AI block and PID block parameters is restricted based on the block's Target and/ or Actual mode. The listing of these parameters are given in the AI block description and PID block descriptions in Section 8.

7.4 Monitoring Local Smart Meter Display

Display Description

The Local Smart Meter provides a means of monitoring the transmitter process values. At the transmitter the display shows the output (OUT parameter) of the AI block of the transmitter. The value is shown as % of range (shown on the numeric display) and user-selected engineering units (shown on the numeric display). When using engineering units, the values are auto-ranged for the most precision available within the limits of the display.

When showing engineering units, the values are auto-ranged for the most precision available within the limits of the display. The units are shown as configured in the transmitter and are determined by setting the OUT_SCALE parameter (in the AI block). If the engineering units are not supported by the meter, or if the units are unknown, the display shows no units indication. Stick-on labels can be applied to the display to indicate units that are not supported by the meter. See Table 7-2.

Display Self-test

The meter runs a brief self-test whenever power is applied to the transmitter. You can check the status of all the indicators on the local meter LCD display by cycling power to the transmitter. All the display indicators are lit for two seconds during the self-test. Figure 7-1 shows a local meter display with all display indicators lit. Table 7-2 gives a brief description of all the possible indicators when in operation.

Figure 7-1 Smart Meter Display

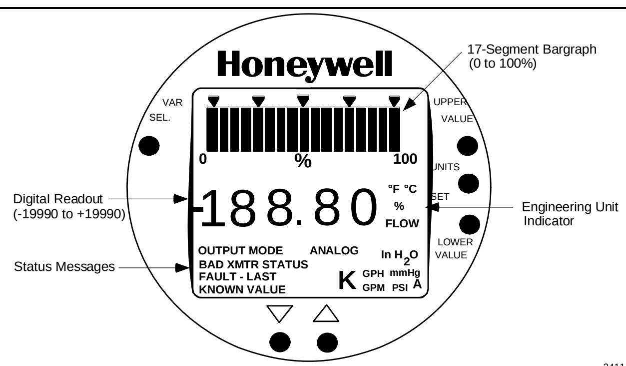


Table 7-2 Description of Display Indicators Shown in Figure 7-1

Display Indicator	What It Means When Lit
17-Segment Bargraph	Gives a gross indication of the AI block OUT parameter from 0 to 100%. Bargraph range indicates the same range as defined in OUT_SCALE parameter (or XD_SCALE if L_TYPE = Direct). A percent (%) symbol located between 0 and 100 on the display is part of the bargraph scale.
Digital Readout	Gives a precise indication of the transmitter's PV output in either percent of span or actual engineering units. The display range is ±19,990,000 and it is automatically ranged to provide the best precision possible within the limits of the display. A second decimal place expands the precision of range values within ±19.99 to 1/100th of a unit.

Continued on next page

Display Description, continued

Table 7-2 Description of Display Indicators Shown in Figure 7-1, Continued

Display Indicator	What It Means When Lit
%	The percent sign appears when the digital readout represents output in percent of span.
K	Multiplies digital reading by 1,000. Turns on automatically when reading exceeds 1999.
°C	The digital readout represents output in °C
°F	The digital readout represents output in °F
Stick-On Label (not shown)	Selected engineering units equal one of these units which is available as a stick-on label from Honeywell drawing number 30756918-001. °K = Degrees Kelvin °R = Degrees Rankine ...
OUTPUT MODE	Transmitter AI block is in MAN mode or simulate feature is enabled.
CHECK STATUS	Status message appears when a critical device fault occurs.

Local Meter Pushbuttons

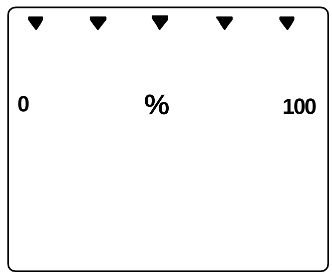
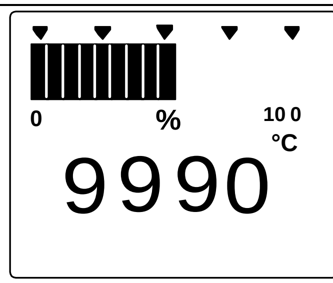
The pushbuttons located on the front of the local meter face are non-functional when the meter is used on the STT35F transmitter.

Continued on next page

Typical Operation Indications

Table 7-3 summarizes typical Local Smart Meter indications. Note that other combinations of status messages are possible.

Table 7-3 Summary of Typical Local Smart Meter Indications

Meter Indication	What It Means
	No power applied.
	Normal display for transmitter.

Fault Indications

When a fault is detected in the transmitter, the following indications appear on the meter display:

Meter Display	How Displayed	Meaning
Err	Flashes No value displayed.	A Critical fault has occurred. Such as background diagnostics fault. See Section 9, Troubleshooting, for fault identification and corrective actions.
unc	Alternates with transmitter OUT parameter value.	AI block output status is Uncertain
O_S	Alternates with transmitter OUT parameter value.	AI block or Transducer block is in Out of Service mode.
	“no” and “sch” alternate on	No function blocks are executing because they

No Sch	display.	are not in the current FB schedule.
Pid	Flashes No value displayed.	Only PID block is executing in the FB schedule.

7.5 Changing Local Smart Meter Display

Changing Output Display

The local meter display can be changed to display output in user-selected engineering units. Table 7-4 lists the steps to select the engineering units for your process application.

Table 7-4 Changing Local Meter Display Units

Step	Action
1	At the operator station, access the device tag of the transmitter.
2	Set the AI block MODE_BLK parameter to OOS (Out Of Service).
3	Set the XD block MODE_BLK parameter to OOS (Out Of Service).
4	Change the XD.PV_UNITS parameter to the proper units.
5	Set the OUT_SCALE.UNITS_INDEX in the AI block to the desired engineering unit to be shown on the meter display.
6	Set parameters OUT_SCALE.EU_100 and OUT_SCALE.EU_0 to a range for the unit selected in step 5.
7	Set parameter L_TYPE to INDIRECT This allows the OUT_SCALE parameter values to be shown on the meter display.
8	Set the following parameters to values which do not exceed the OUT_SCALE.EU100 and .EU0 parameter values: HI_HI_LIM HI_LIM LO_LO_LIM LO_LIM For example, If OUT_SCALE.EU100 = 400 and OUT_SCALE.EU0 = 0 Then: HI_HI_LIM and HI_LIM must be $\leq$ 400 and LO_LO_LIM and LO_LIM must be $\geq$ 0.
9	Write the changes to the XD block and to the AI block.
10	Verify that the parameters MODE_BLK.ACTUAL in both the AI and the XD block are set to AUTO.
11	At the transmitter, verify that the display shows the proper engineering units or that the proper stick-on label is attached to the display faceplate.

8. CONFIGURATION DESCRIPTION

8.1 Introduction

Section Contents

This section includes these topics:

About this Section

This section provides information about the construction and contents of the STT35F Function Block Application Process (FBAP); (This is the application that defines transmitter function and operation in the process application). This information is provided to give some understanding of the elements that make up the configuration of the device application.

For More Information on FBAP

The FBAP elements are described as they apply to the STT35F transmitter in the following sections. More detailed information can be found in Fieldbus Foundation documents, FF-890 and FF-891 *Foundation Specification Function Block Application Process Parts 1 and 2*.

8.2 Function Block Application Process (FBAP)

Function Block Application Process (FBAP)

The Function Block Application Process (FBAP) (or application) comprises a set of elementary functions which are modeled as function blocks. Function blocks provide a general structure for defining different types of device functions (such as analog inputs, analog outputs and proportional integral derivative (PID) control).

The FBAP also contains other objects that provide other device functions, such as furnishing alarm information, historical data, and links to other blocks for transferring data.

FBAP Elements

The key elements of the Function Block Application Process are:

- Block objects and their parameters
  (and consist of the following block types)
  - Resource blocks
  - Transducer blocks
  - Function blocks
- Link Objects
- Alert Objects
- Trend Objects
- View Objects
- Domain Objects

Device Objects

Link objects allow the transfer of process data from one block to another. View, Alert and Trend objects provide a way of handling function block parameters for operator interface of views, alarms and events, and historical data. A brief description of these objects is presented in the following sections.

8.3 Block Description

Block Objects

Blocks are some of the key elements that make up the FBAP. The blocks contain data, (block objects and parameters) which define the application, such as the inputs and outputs, signal processing and connections to other applications. The STT35F transmitter application contains following block objects:

- Resource block
- Transducer block
- Analog Input (AI) function block
- Proportional Integral Derivative (PID) Controller function block

Table 8-1 briefly describes the operation of these blocks.

Table 8-1 Function Block Application Process Elements

Block Type	Function
Resource	Contains data which describes the hardware (physical) characteristics of the device. The resource block does not perform any action, but contains parameters which support application downloads.
Transducer	Insulates the function blocks from I/O devices such as sensors, actuators and switches. The transducer block interfaces with the sensor hardware and provides a measure and a status to the AI function block. It also allows sensor selection and configuration, and STT35F configuration.
Analog Input (AI) function block	In general, function blocks perform basic automation functions that are integral to automated control and processing operations. The analog input block performs engineering units scaling, square root, alarming, and publishing of the PV on the bus.
PID Controller function block	Performs standard or robust proportional integral derivative algorithm used in closed loop processing.

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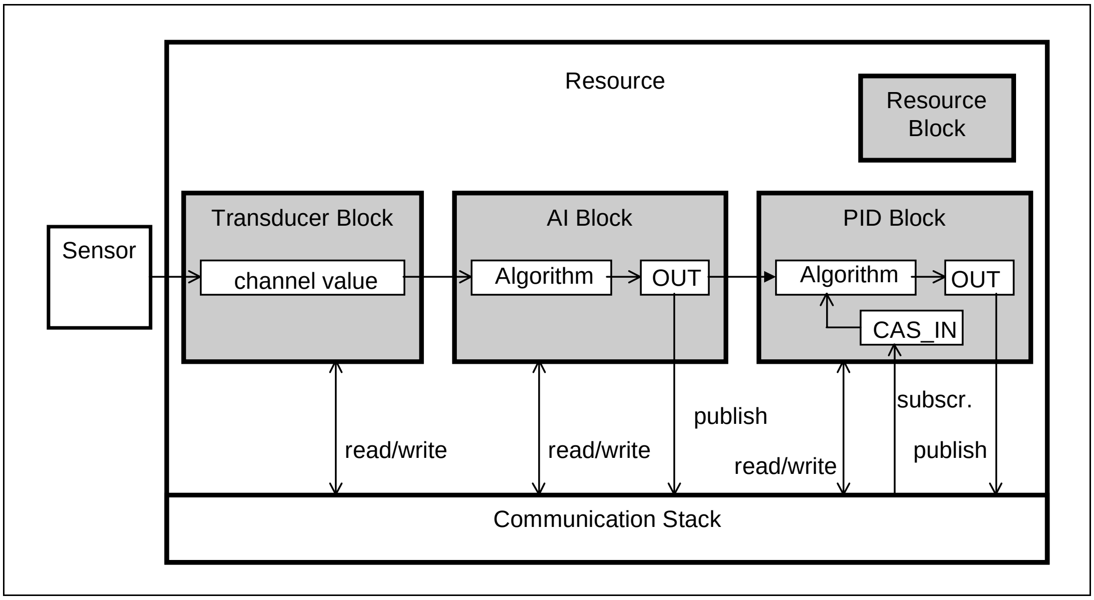
FBAP Block Diagram

Figure 8-1 shows the important elements of the STT35F FBAP.

Figure 8-1 FBAP Block Diagram



Block Descriptions

Each of these blocks contain parameters which are standard Fieldbus Foundation-defined parameters. In other words, the parameters are pre-defined as part of the FF protocol for all fieldbus devices. Additionally, there are parameters which are defined by Honeywell and are specific to the STT35F transmitter.

The following pages provide descriptions of the block objects in the STT35F along with a complete listing of the parameters contained in each block.
The block description lists the predefined fieldbus parameters as well as the Honeywell-defined extension parameters. A summary of the Honeywell parameters is provided also. For a complete description of the FF parameters, see the Fieldbus Foundation document FF-891, *Foundation Specification Function Block Application Process Part 2*.

Continued on next page

Block Parameter Column Descriptions

Tables on the following pages list all of the block parameters contained in each of the block objects. Table 8-2 explains the column headings for the parameter listings.

Table 8-2 Block Parameter List Column Description

Column Name	Description
Index	A number which corresponds to the sequence of the parameter in the block parameter segment of the object dictionary. See Object Dictionary, Section 8.16.
Name	The mnemonic character designation for the parameter.
Data Type/Structure	Data Type or Structure for the parameter value: **1**. Data Types consist of simple variables or arrays and are: **Unsigned8, Unsigned16 Unsigned32** - An unsigned variable of 8, 16 or 32 bits. **Floating point** - Floating point variable. **Visible string** - Visible string variable. **Octet string** - Octet string variable. **Bit string** - Bit string variable. **2**. Data Structures consist of a record which may be: **Value and Status - float** - Value and status of a floating point parameter. **Scaling** - Static data used to scale floating point values for display purposes. **Mode** - Bit strings for target, actual, permitted and normal modes. **Access permissions** - Access control flags for access to block parameters. **Alarm - float** - Data that describes floating point alarms. **Alarm - discrete** - Data that describes discrete alarms. **Event - update** - Data that describes a static revision alarm. **Alarm - summary** - Data that summarizes 16 alerts. **Simulate - Float** - Simulate and transducer floating point value and status, and a simulate enable/disable discrete. **Test** - Function block test read/write data.
Store	Indicates the type of memory where the parameter is stored: **S** - Static. Writing to the parameter changes the static revision counter parameter ST_REV **N** - Non-volatile. Non-volatile parameters are stored internally to actual non-volatile memory on periodic basis to protect the life of the memory. This interval is set by the resource block parameter NV_CYCLE_T at 15 minutes (displayed as 28800000 in 1/32 milliseconds). It cannot be changed by the user. Parameter must be retained during a power cycle. **D** - Dynamic. The value is calculated by the block, or read from another block.
Default Value	Default values for the configurable block parameters. These are the values that are used when: • the FBAP is initialized for the first time, or • selecting "restart with defaults" of the resource block parameter RESTART.

8.4 Resource Block

Resource Block Function

The resource block contains data and parameters related to overall operation of the device and the FBAP. Parameters that describe the hardware specific characteristics of the device and support application download operations make up the resource block.

Resource Block Parameters

Table 8-3 lists the FF and Honeywell-defined parameters and their default values contained in the resource block.

Table 8-3 Resource Block Parameters

Index	Name	Data Type/Structure	Store	Default Value
1	ST_REV	Unsigned16	S	
2	TAG_DESC	Octet string	S	all blanks
3	STRATEGY	Unsigned16	S	0
4	ALERT_KEY	Unsigned8	S	1
5	MODE_BLK	Mode	mix	Target = O/S *
6	BLOCK_ERR	Bit string	D	
7	RS_STATE	Unsigned8	D	
8	TEST_RW	Test	D	
9	DD_RESOURCE	Visible string	S	
10	MANUFAC_ID	Unsigned32	S	
11	DEV_TYPE	Unsigned16	S	
12	DEV_REV	Unsigned8	S	
13	DD_REV	Unsigned8	S	
14	GRANT_DENY	Access permissions	N	
15	HARD_TYPES	Bit string	S	
16	RESTART	Unsigned8	D	
17	FEATURES	Bit string	S	
18	FEATURE_SEL	Bit string	S	0
19	CYCLE_TYPE	Bit string	S	
20	CYCLE_SEL	Bit string	S	scheduled
21	MIN_CYCLE_T	Unsigned32	S	
22	MEMORY_SIZE	Unsigned16	S	
23	NV_CYCLE_T	Unsigned32	S	
24	FREE_SPACE	Floating point	D	
25	FREE_TIME	Floating point	D	
26	SHED_RCAS	Unsigned32	S	32000
27	SHED_ROUT	Unsigned32	S	8000

* O/S = Out of Service

Continued on next page

Table 8-3 Resource Block Parameters, continued

Index	Name	Data Type/Structure	Store	Default Value
28	FAULT_STATE	Unsigned8	N	
29	SET_FSTATE	Unsigned8	D	
30	CLR_FSTATE	Unsigned8	D	
31	MAX_NOTIFY	Unsigned8	S	
32	LIM_NOTIFY	Unsigned8	S	8
33	CONFIRM_TIME	Unsigned32	S	32000
34	WRITE_LOCK	Unsigned8	S	
35	UPDATE_EVT	Event - update	D	
36	BLOCK_ALM	Alarm - discrete	D	
37	ALARM_SUM	Alarm - summary	D	all disabled
38	ACK_OPTION	Bit string	S	0
39	WRITE_PRI	Unsigned8	S	0
40	WRITE_ALM	Alarm - discrete	D	
Honeywell Parameters				
41	DL_CMD1	Unsigned8	D	
42	DL_CMD2	Unsigned8	D	
43	DL_APPSTATE	Unsigned16	S	
44	DL_SIZE	Unsigned32	S	
45	DL_CHECKSUM	Unsigned16	S	
46	REVISION_ARRAY	Unsigned32	S	
47	BLOCK_TEST	Unsigned8	D	
48	ERROR_DETAIL	Unsigned16	D	

Continued on next page

Resource Block Honeywell-defined Parameter Descriptions

Table 8-4 describes the Honeywell-defined parameters in the resource block which are used during the application download procedure.

Table 8-4 Resource Block Parameter Descriptions

Name	Description or Parameter Contents
DL_CMD1 DL_CMD2	Used to "unlock" or access the domain (flash memory area) of the STT35F for download. Entering a series of values in these two parameters changes the internal state of the device so that it will accept the downloaded application software. The download cannot begin until the device is put into the correct internal state. The internal state of the device is read in the DL_APPSTATE parameter.
DL_APPSTATE	Contains the state of the downloaded(ing) application.
DL_SIZE	Contains the size of the downloaded application. (This will always be an even number).
DL_CHECKSUM	Contains the 16-bit checksum of the downloaded application.
REVISION_ARRAY	A read only parameter that contains the application firmware revision level for: 1. Stack board application 2. Stack board boot code 3. Transducer board application.
BLOCK_TEST	An internal Honeywell test parameter.
ERROR_DETAIL	Contains data indicating the cause of device-critical errors. Parameter contains 3 sub-elements: 1. Error type 2. Location 3. Sub-type Only Error Type element contains information meaningful to users. A description of this parameter is found in Section 9, Troubleshooting.

8.5 Transducer Block

Transducer Block Function

The transducer block de-couples (or insulates) function blocks from local I/O devices, such as sensors or actuators. In the STT35F, the transducer block takes the measure that comes from the Transducer Board, linearizes, filters, cold junction compensates, converts to the good units this value in order to provide the AI Block with a primary value which corresponds to the user's selections.

Transducer Block Parameters

Table 8-5 lists the FF and Honeywell-defined parameters and their default values in the transducer block.

Table 8-5 Transducer Block Parameters

Index	Name	Name or Description	Data Type/Structure	Store	Default Value
1	ST_REV	Static revision level	Unsigned16	S	
2	TAG_DESC	Tag description	Octet string	S	all blanks
3	STRATEGY	Strategy field	Unsigned16	S	0
4	ALERT_KEY	Alert key	Unsigned8	S	0
5	MODE_BLK	Mode block record	Mode	mix	Target = O/S*
6	BLOCK_ERR	Block error	Bit string	D	
7	UPDATE_EVT	Update event alert	Event - update	D	
8	ALARM_SUM	Block alarm summary	Alarm - summary	D	all disabled
9	BLOCK_ALM	Block alarm	Alarm - discrete	D	
Honeywell Parameters					
10	XD_DIAGNOSTICS	Diagnostic message	Unsigned8	D	0 No specific problem
11	PRIMARY_VALUE	Measure provided as an input to the AI Block	Value and status - float	D	
12	PV_UNITS	Units in which the PV is displayed	Unsigned16	S	(1243) "mV"
13	CJT_INTERNAL	Value of the internal cold junction	Value and status -float	D	
14	CJT_EXTERNAL	Value of the external cold junction	Floating point	S	0
15	CJT_UNITS	Units of the cold junction	Unsigned16	S	(1001) "°C"
16	CJT_TYPE	Defines whether the cold junction is internal or external	Boolean	S	(1) "Internal Cold Junction"
17	LIMITS_HIGHEST	Highest value recorded by the transmitter	Floating point	D	NAN Value
18	LIMITS_LOWEST	Lowest value recorded by the transmitter	Floating point	D	NAN Value
19	RESET_LIMITS	Reset the highest and lowest limits recorded	Boolean	D	(1) "Do not reset the limits "

* O/S = Out of Service

Continued on next page

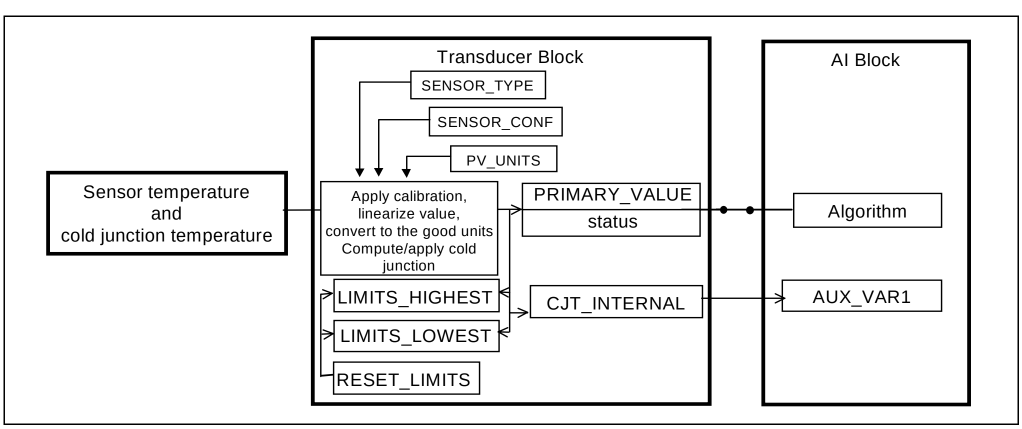
Table 8-5 Transducer Block Parameters, continued

Index	Name	Name or Description	Data type/structure	Store	Default Value
20	SENSOR_TYPE	Type of the sensor connected to the STT35F	Unsigned8	S	(103) "mV"
21	SENSOR_CONF	Sensor configuration	Unsigned8	S	(3) "Single sensor wired"
22	BREAK_DETECT	Thermocouple break detection enabled or not	Boolean	S	(2) "Sensor fault detection ENABLED"
23	LATCHING	"Latching" or not of the critical alarms	Boolean	S	(1) "Latching DISABLED"
24	POWER_FILTER	Filters either the 50 Hz or the 60 Hz	Boolean	S	(1) "50 Hz filtering"
25	EMISSIVITY	Value of the emissivity	Floating point	S	10
26	SERIAL_NUMBER	Transmitter's serial number	Floating point	S	
27	MAN_LOCATION	Manufacturing location	Octet string	S	
28	WEEK	Manufacturing week	Unsigned8	S	
29	YEAR	Manufacturing year	Unsigned8	S	
30	BATCH_NUMBER	Batch number of the different boards comprising the transmitter	Octet string	S	
31	COMMAND	Factory calibration or configuration command	Octet string	D	
32	CAL_VALUE	Value associated with the command	Floating point	D	
33	BLOCK_TEST	Block test. Honeywell specific parameter	Unsigned8	D	

Transducer Block Diagram

Figure 8-2 is a block diagram showing the basic components of the Transducer block.

Figure 8-2 Transducer Block Diagram



Transducer Block Honeywell-defined Parameters

This section describes the Honeywell parameters included in the transducer block.

Factory Configuration and Calibration Parameters

The following parameters are written during factory configuration or calibration. They allow tracking of the defaults encountered after the transmitter has left the factory.

Table 8-6 Factory configuration and calibration parameters

Name	Description or Parameter Contents
SERIAL_NUMBER	Serial number of the transmitter.
MAN_LOCATION	Manufacturing location. Place where the transmitter has been manufactured.
WEEK	Week during which the transmitter has been manufactured.
YEAR	Year during which the transmitter was manufactured.
BATCH_NUMBER	Batch number of the different boards comprising the transmitter.
COMMAND	Command used for factory calibration or factory configuration. This parameter is a factory configuration or calibration command and should not be written by the user. This is an internal Honeywell parameter.
CAL_VALUE	Value sent along with the command. This parameter is a factory configuration or calibration parameter and should not be written by the user. This is an internal Honeywell parameter.
BLOCK_TEST	An internal Honeywell test parameter.

Device User Configuration

The following parameters allow the configuration of the transmitter. These parameters can only be written when the transducer block is in Out of Service mode. Attempting to write to these parameters when the block is in another mode than the Out of Service mode will lead to a failure.

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Table 8-7 Device user configuration

Name	Description or Parameter Contents
LATCHING	This parameter is used if BREAK_DETECT is ON. It has an impact on how some alarms are handled. If LATCHING is ON then if the sensor is seen as a broken sensor, the mode of the transducer block will switch to Out Of Service. The mode cannot go back to Auto unless the sensor is good again. The alarm generated is cleared when the block is switched back to Auto. If LATCHING is OFF then the block does not switch to the Out Of Service mode when the sensor is seen as broken and when the sensor is good again, the alarm is auto acknowledged.
POWER_FILTER	This parameter helps reducing the noise induced by the power supply. This parameter can filter effects coming from a 50 Hz or a 60 Hz based power supply.
BREAK_DETECT	This parameter is used to determine whether the transmitter should generate an alarm when the sensor is seen as opened or not. See section dealing with alarming for more information on this parameter.
SENSOR_TYPE	Type of the sensor connected to the terminal block. This sensor can either be a thermocouple or an RTD sensor. The user should pick up the sensor connected to the device in the list proposed by the transmitter.
SENSOR_CONF	This parameter allows sensor configuration, i.e. it defines how the sensor(s) are wired to the transmitter. The user picks up a hardware configuration corresponding to how the sensor(s) used are wired to the transmitter.
EMISSIVITY	This parameter is used with the radiamatic sensor (Rh).
CJT_EXTERNAL	External temperature used for cold junction compensation. This parameter is used only if External Cold junction is selected with the CJT_TYPE parameter.
PV_UNITS	Units in which the measure is displayed, the possible values for this parameter depend on the type of sensor and sensor configuration selected. Changing this parameter to a value which is not compatible with the sensor type and sensor configuration will lead to a configuration error while attempting to switch the XD block to the Auto mode.
CJT_TYPE	Type of the cold junction compensation, it can be either internal (use of self temperature measures performed by the STT) or external (use of the CJT_EXTERNAL parameter as the cold junction temperature).
CJT_UNITS	Units in which the cold junction temperature is displayed.

Reset of the limits

This parameter is used to refresh the limits (upper and lower values recorded by the transmitter), i.e. reset them to a NAN value until a valid value is recorded. This parameter can be written when the XD mode is in Auto or OOS mode.

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Process Values The following parameters are process results, they are read only.

Table 8-8 Process values

Name	Description or Parameter Contents
LIMITS_HIGHEST	Highest limit recorded by the transmitter since last reset of this limit. The refresh frequency of this parameter is independant from the transducer block schedule.
LIMITS_LOWEST	Lowest limit recorded by the transmitter since last reset of this limit.
CJT_INTERNAL	Internal temperature of the transmitter.
PRIMARY_VALUE	Primary value measured and status returned by the transmitter. This is the value transferred to the AI block. A status is associated to this value.

Diagnostics and Troubleshooting The STT35F is constantly running internal diagnostics to monitor the status of the sensor(s) connected to the transmitter. See Section 9 for Transmitter's diagnostics and message interpretation.

Table 8-9 Diagnostics and Troubleshooting

Name	Description or Parameter Contents
XD_DIAGNOSTICS	This parameter contains the reason for the error. Used in conjunction with BLOCK_ERR parameter, it provides a diagnostic for the error.

8.6 Analog Input Function Block

Analog Input Function Block

The Analog Input function block takes the output signal from the transducer block and makes it available to other function blocks as its output.

Interface to AI Block

Primary value is the only value supplied as an input to the AI block.

CHANNEL Parameter

The CHANNEL parameter selects the input from the transducer block. In the STT35F transmitter, only the PRIMARY_VALUE parameter can be selected.

CHANNEL parameter	Value Selected (from Transducer Block)
1	Selects PRIMARY_VALUE which is the process temperature computed according to the user's selections.
Other	Error - the AI block remains in (O/S) mode.

XD_SCALE parameter

The XD_SCALE parameter of the AI block is user-defined, and must contain the same units code as the PV_UNITS parameter of the transducer block. If not, the AI block remains in the out of service (O/S) mode.

AUX_VAR1 parameter

Contains the same value as the CJT_INTERNAL parameter of the transducer block.

Continued on next page

AI Block Parameter List

Table 8-10 lists the block parameters and default values for the AI function block.

Table 8-10 AI Function Block Parameter List

Index	Name	Data Type/Structure	Store	Default Value
1	ST_REV	Unsigned16	S	
2	TAG_DESC	Octet string	S	all blanks
3	STRATEGY	Unsigned16	S	0
4	ALERT_KEY	Unsigned8	S	0
5	MODE_BLK	Mode	mix	Target = O/S*
6	BLOCK_ERR	Bit string	D	
7	PV	Value and Status - float	D	
8	OUT	Value and Status - float	N	
9	SIMULATE	Simulate - float	D	
10	XD_SCALE	Scaling	S	scale = 0-100 units = 1001 decimal places = 0
11	OUT_SCALE	Scaling	S	scale = 0-100 units = 1001 decimal places = 0
12	GRANT_DENY	Access permissions	N	0,0
13	IO_OPTS	Bit string	S	0
14	STATUS_OPTS	Bit string	S	0
15	CHANNEL	Unsigned16	S	0
16	L_TYPE	Unsigned8	S	0
17	LOW_CUT	Floating point	S	0
18	PV_FTIME	Floating point	S	0
19	FIELD_VAL	Value and Status - discrete	D	
20	UPDATE_EVT	Event - update	D	
21	BLOCK_ALM	Alarm - discrete	D	
22	ALARM_SUM	Alarm - summary	D	all disabled
23	ACK_OPTION	Bit string	S	0

* O/S = Out of Service

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Table 8-10 AI Function Block Parameter List, continued

Index	Name	Data Type/Structure	Store	Default Value
24	ALARM_HYS	Floating point	S	0.5
25	HI_HI_PRI	Unsigned8	S	0
26	HI_HI_LIM	Floating point	S	+INF
27	HI_PRI	Unsigned8	S	0
28	HI_LIM	Floating point	S	+INF
29	LO_PRI	Unsigned8	S	0
30	LO_LIM	Floating point	S	-INF
31	LO_LO_PRI	Unsigned8	S	0
32	LO_LO_LIM	Floating point	S	-INF
33	HI_HI_ALM	Alarm - float	D	
34	HI_ALM	Alarm - float	D	
35	LO_ALM	Alarm - float	D	
36	LO_LO_ALM	Alarm - float	D	
Honeywell Parameters				
37	AUX_VAR1	Floating point	D	
38	BLOCK_TEST	Unsigned8	D	

AI Block Honeywell-defined Parameters

Table 8-11 describes the Honeywell parameters included in the AI block.

Table 8-11 AI Block Parameter Descriptions

Parameter Name	Description/Parameter Contents
AUX_VAR1	AUX_VAR1 is the secondary variable of the block. In the STT35F, it contains the same value as the CJT_INTERNAL (internal cold junction value) parameter of the transducer block.
BLOCK_TEST	An internal Honeywell test parameter.

Local Meter Option

The local meter display shows the contents of the AI block OUT parameter. If the status is Bad, then an error condition is shown on the display.

Normally, the OUT parameter is shown in engineering units. If the engineering units are not supported by the meter or if the units are unknown, then the display shows no indication of units. Additional units are provided on stick-on labels.

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AI Block Diagram

Figure 8-3 is a block diagram showing the key components of the AI function block.

Figure 8-3 Analog Input Block Diagram

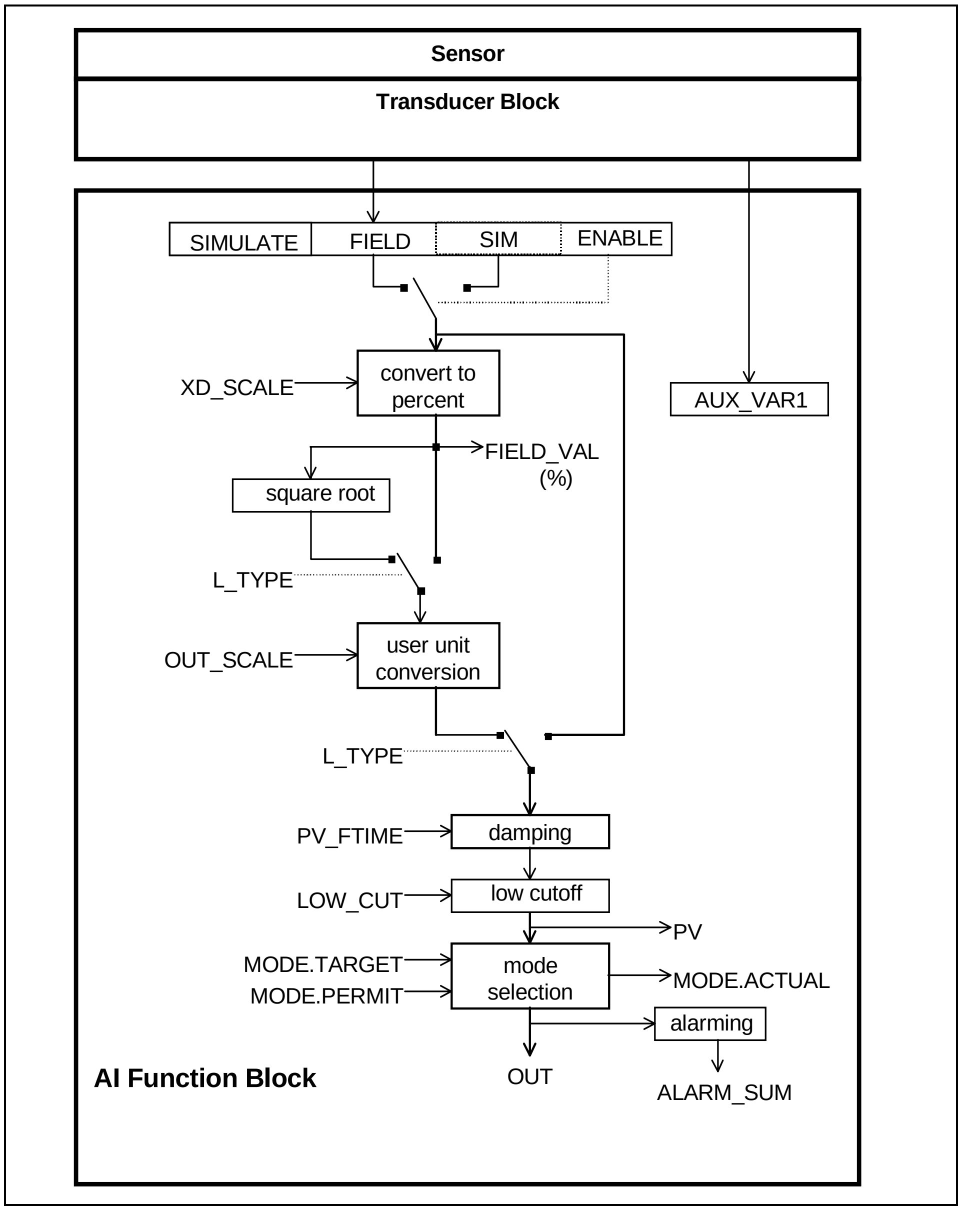

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Table 8-12 AI Block Parameters

This Parameter	Contains . . .
OUT	The status and value of output from the AI block.
OUT_SCALE	Elements used to display the OUT parameter. The elements are: • High and low scale values (EU_100 and EU_0). • Engineering units used to display the value (UNITS_INDEX). • Decimal places used to display the value (DECIMAL).
PV	The status and value of PV. This is usually the same as OUT and the same value as PRIMARY_VALUE in the transducer block.
XD_SCALE	Elements used to display the value obtained from the transducer block. The elements are: • High and low scale values (EU_100 and EU_0). • Engineering units to display the value (UNITS_INDEX) • Decimal places to display the value (DECIMAL). NOTE: XD_SCALE.UNITS_INDEX must contain the same units as PV_UNITS in the transducer block.
L_TYPE	The state (Direct or Indirect) which values are passed from the transducer block to the AI block. • When L_TYPE = Direct. Values are passed directly from the transducer block to the AI block. (No units conversion.) • When L_TYPE = Indirect. Values from the transducer block are in different units, and must be converted either linearly (Indirect) or in square root (Ind Sqr Root) using the range defined by the transducer and the OUT_SCALE range.

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XD_SCALE Range

In the AI block, XD_SCALE values are used when L_TYPE is set to Indirect which converts the signal to other units. (See L_TYPE in Table 8-12.) The high and low scale values of XD_SCALE (EU_100 and EU_0) define the range over which the AI OUT will show *Good* status.

- When L_TYPE is set to either Indirect or Direct, XD_SCALE units must match the transducer PV_UNITS units (CHANNEL = 1).
- When L_TYPE is set to Direct, it is recommended that XD_SCALE and OUT_SCALE should contain the same values

PV Value

The AI block PV value is the same as the transducer block PRIMARY_VALUE

AI OUT

AI in Manual Mode - When the AI block is in manual mode, OUT can be written as a fixed value between -10% and +110% of the OUT_SCALE range. OUT values between 0 and 100% will show a status of *Good*. OUT values outside the range will show a status of *Uncertain*. The "limited" field will be marked as *Constant* for all values.

PV shows the live temperature signal in manual mode.

AI in Auto Mode - L_TYPE determines whether the signal is taken directly from the transducer block and passed to the AI block output (L_TYPE = Direct) or converted into different units before it is passed to the AI block output (L_TYPE = Indirect or Ind Sqr Root). OUT_SCALE determines the units conversion of the signal presented to the output.

- When L_TYPE equals Direct, OUT is the same as the value passed from the transducer block.
- When L_TYPE equals Indirect, the PRIMARY_VALUE is converted to percent of XD_SCALE and that value is set equal to percent of OUT (FIELD_VAL = %). The OUT in % is re-ranged to a value using the OUT_SCALE.

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OUT Status

The following table provides the resulting status of AI block OUT for a given status of PRIMARY_VALUE in the transducer block.

If . . .	Then . . .
PRIMARY_VALUE status = *Good::[alarm status]:Not Limited*	OUT value is tested against OUT_SCALE range values: If OUT value is within the OUT_SCALE range, then OUT status = *Good Non Cascade::[alarm status]:Not Limited* If OUT exceeds OUT_SCALE range, then OUT status = *Uncertain:: Engineering Units Range Violation:& High or Low Limited*
PRIMARY_VALUE status = *Uncertain*	OUT status = *Uncertain*
2nd field in the PRIMARY_VALUE status = *Non Specific*	OUT status = *Non Specific*
PRIMARY_VALUE status = *High* or *Low*	OUT status = *High* or *Low*

Local Meter Display

The local meter display shows both the value and status of the AI block OUT parameter. Normally, the OUT parameter is shown in engineering units. If the engineering units are not supported by the meter or if the units are unknown, then the display shows no indication of units.

The bar graph is scaled from the high and low scale values of XD_SCALE.

- When L_TYPE equals Direct, the units indication will be the units of XD_SCALE.
- When L_TYPE equals Indirect the units indication will be the units of OUT_SCALE.

If the status is Bad, then an error condition is shown on the display. See Subsection 7.4 for more details of the local meter display option.

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Mode Restricted Writes to AI Parameters

Writing to the following AI block parameters are restricted by the block's ACTUAL mode. The MODE_BLK parameter must equal one of the modes in the mode column below before you can write values to the parameters listed in Table 8-13.

Table 8-13 AI Block Mode Restricted Parameters

Parameter	Mode Restricted
OUT	Man or O/S modes
XD_SCALE	Man or O/S modes
OUT_SCALE	Man or O/S modes
IO_OPTS	O/S mode only
STATUS_OPTS	O/S mode only
CHANNEL	O/S mode only
L_TYPE	Man or O/S modes

8.7 PID Function Block

PID Block Description

The PID Function block provides you with the choice of selecting either a standard PID control algorithm (Ideal) or a robust PID defined in Table 8-15.

PID Block Parameter List

Table 8-14 lists the block parameters and default values for the PID function block.

Table 8-14 PID Control Function Block Parameters

Index	Name	Data Type/Structure	Store	Default Value
1	ST_REV	Unsigned16	S	
2	TAG_DESC	Octet string	S	all blanks
3	STRATEGY	Unsigned16	S	0
4	ALERT_KEY	Unsigned8	S	0
5	MODE_BLK	Mode	mix	Target = O/S
6	BLOCK_ERR	Bit string	D	
7	PV	Value and Status - float	D	
8	SP	Value and Status - float	D	
9	OUT	Value and Status - float	N	
10	PV_SCALE	Scaling	S	0 - 100
11	OUT_SCALE	Scaling	S	0 - 100
12	GRANT_DENY	Access permissions	N	0
13	CONTROL_OPTS	Bit string	S	0
14	STATUS_OPTS	Bit string	S	0
15	IN	Value and Status - float	N	
16	PV_FTIME	Floating point	S	0
17	BYPASS	Unsigned8	S	0
18	CAS_IN	Value and Status - float	N	
19	SP_RATE_DN	Floating point	S	+INF
20	SP_RATE_UP	Floating point	S	+INF
21	SP_HI_LIM	Floating point	S	100
22	SP_LO_LIM	Floating point	S	0
23	GAIN	Floating point	S	0
24	RESET	Floating point	S	+INF
25	BAL_TIME	Floating point	S	0
26	RATE	Floating point	S	0
27	BKCAL_IN	Value and Status - float	N	
28	OUT_HI_LIM	Floating point	S	100
29	OUT_LO_LIM	Floating point	S	0

Continued on next page

Table 8-14 PID Control Function Block Parameters, continued

Index	Name	Data Type/Structure	Store	Default Value
30	BKCAL_HYS	Floating point	S	0.5
31	BKCAL_OUT	Value and Status - float	D	
32	RCAS_IN	Value and Status - float	N	
33	ROUT_IN	Value and Status - float	D	
34	SHED_OPT	Unsigned8	S	0
35	RCAS_OUT	Value and Status - float	D	
36	ROUT_OUT	Value and Status - float	D	
37	TRK_SCALE	Scaling	S	0 - 100
38	TRK_IN_D	Value and Status - discrete	N	
39	TRK_VAL	Value and Status - float	N	
40	FF_VAL	Value and Status - float	N	
41	FF_SCALE	Scaling	S	0 - 100
42	FF_GAIN	Floating point	S	0
43	UPDATE_EVT	Event - update	D	
44	BLOCK_ALM	Alarm - discrete	D	
45	ALARM_SUM	Alarm - summary	D	0
46	ACK_OPTION	Bit string	S	0
47	ALARM_HYS	Floating point	S	0.5
48	HI_HI_PRI	Unsigned8	S	0
49	HI_HI_LIM	Floating point	S	+INF
50	HI_PRI	Unsigned8	S	0
51	HI_LIM	Floating point	S	+INF
52	LO_PRI	Unsigned8	S	0
53	LO_LIM	Floating point	S	-INF
54	LO_LO_PRI	Unsigned8	S	0
55	LO_LO_LIM	Floating point	S	-INF
56	DV_HI_PRI	Unsigned8	S	0
57	DV_HI_LIM	Floating point	S	+INF
58	DV_LO_PRI	Unsigned8	S	0
59	DV_LO_LIM	Floating point	S	-INF
60	HI_HI_ALM	Alarm - float	D	
61	HI_ALM	Alarm - float	D	
62	LO_ALM	Alarm - float	D	
63	LO_LO_ALM	Alarm - float	D	
64	DV_HI_ALM	Alarm - float	D	
65	DV_LO_ALM	Alarm - float	D	

Continued on next page

Table 8-14 PID Control Function Block Parameters, continued

Honeywell Parameters				
Index	**Name**	**Data Type/Structure**	**Store**	**Default Value**
66	PID_FORM	Unsigned8	S	Ideal (1)
67	ALGO_TYPE	Unsigned8	S	0
68	OUT_LAG	Floating point	S	0
69	GAIN_NLIN	Floating point	S	0
70	GAIN_COMP	Floating point	D	
71	ERROR_ABS	Floating point	D	
72	WSP	Value and Status - float	D	
73	BLOCK_TEST	Unsigned8	D	

Honeywell-defined PID Parameters

The Honeywell defined parameters provide a robust PID algorithm. A description of these parameters is in Table 8-15.

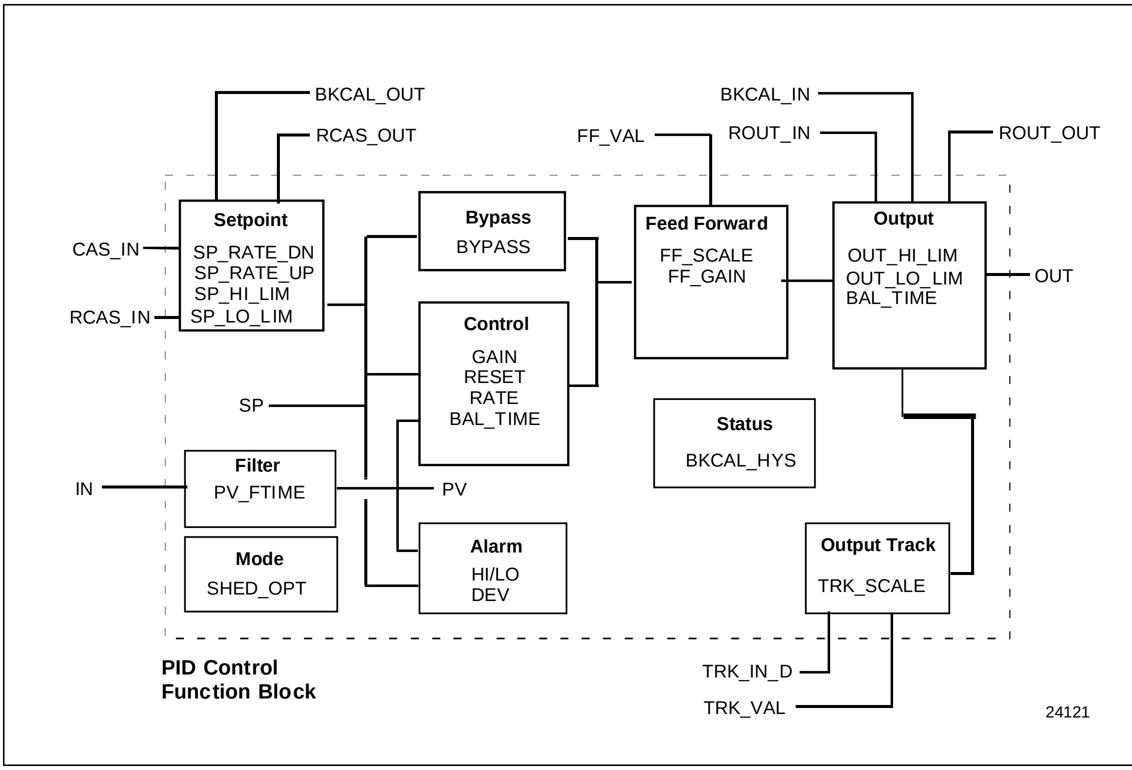
Table 8-15 Honeywell PID Parameters

Parameter Name	Description/Parameter Contents
PID_FORM	Configuration parameter specifies the IDEAL or ROBUST PID equation to be used: • IDEAL PID (default). Non-Interactive form of a three mode control equation that provides Proportional, Integral and Derivative control action. Linear and non-linear gain parameters are available. • ROBUST PID. The same as Ideal PID. Additionally, the equation supports a user-configurable lag filter applied to calculated output value. (See OUT_LAG parameter.) Linear and non-linear gain parameters are available.
ALGO_TYPE	Configuration parameter specifies algorithm type which can be A,B, or C: • Type “A” equation where Proportional, Integral and Derivative act on ERROR. • Type “B” equation where Proportional and Integral act on ERROR and Derivative acts on PV. • Type “C” equation where Integral acts on ERROR and Proportional and Derivative act on PV.
OUT_LAG	Time constant of single exponential LAG filter applied to the OUT parameter (primary output). Units (in seconds). For Ideal PID equation the lag filter is fixed at 1/16 and is not configurable.
GAIN_NLIN	Dimensionless gain factor. When the gain factor is multiplied by absolute value of the error and added to the linear GAIN, the result is a gain response which is proportional to the deviation. Default is zero resulting in no response due to non-linear gain action.
GAIN_COMP	The composite gain quantity including both linear and non-linear gain parameters. Read only parameter.
ERROR_ABS	Absolute value of the deviation between PV and working setpoint. Read only parameter.
WSP	Working setpoint. This is the setpoint value after absolute and rate limits have been applied. Deviation alarms are computed on this value. Read only parameter.
BLOCK_TEST	An internal Honeywell test parameter.

PID Block Diagram

Figure 8-4 is a block diagram showing the key components of the PID Control function block.

Figure 8-4 PID Control Block Diagram



PID Block Description

PID Control Function Block is an algorithm that produces an output signal in response to the measured variable and the setpoint. The PID function block allows you to choose either a standard PID control equation (Ideal) or a robust PID equation defined by Honeywell. This selection is defined in the PID_FORM parameter.

The output has three terms: Proportional, Integral and Derivative. The output is adjusted by tuning constants. There are three tuning constants in the Ideal PID equation. The robust PID uses four tuning constants.

1. GAIN is the tuning constant of the Proportional term.
2. RESET is the tuning constant of the Integral.
3. RATE is the tuning constant of the Derivative. RATE is usually modified by a lag, which is set at some fixed ratio higher than the rate time, to create a rate gain. There is no lag with the rate in this implementation.
4. OUT_LAG is the fourth tuning constant used in the robust PID, it adds roll off to the output response. The action is similar to PID with rate gain.

PID Ideal and PID Robust

The Ideal equation is a parallel or non-interacting implementation of PID control using three tuning constants. It automatically fixes OUT_LAG to 16 times the RATE time constant. This produces response characteristics equivalent to the algorithms used in TPS products.

The Robust equation is the same parallel implementation of ideal PID control but allows the engineer to set the OUT_LAG and effectively change the rate gain.

ALGO_TYPE is a configuration parameter that contains one of three selected algorithm types, A, B, or C.
Where:

- A - RATE, GAIN and RESET all act on the error between set point and measured variable.
- B - RATE acts on the measured variable only, GAIN and RESET use the error.
- C - RATE and GAIN act on the measured variable only, and RESET uses the error.

PID Tuning Parameters

Table 8-16 lists the valid ranges for the tuning parameters for the PID block. Note that OUT_LAG parameter is not configurable when Ideal PID is selected (PID_FORM = 1) and can be configured when Robust PID is selected (PID_FORM = 2).

The values given for these tuning parameters are valid under the following conditions:

- The values assume that the minimum configurable PID function block execution period (T_s) is 0.125 seconds.
- Algorithm type setting (i.e. A, B, or C) has no effect on the validation of these tuning parameters.
- The PID function block will reject all values outside these ranges.

Table 8-16 PID Tuning Parameter Values

Parameter	Initial Value	Minimum Value	Maximum Value	Comment
PV_FTIME	0	0	200	units: seconds.
GAIN	0	.004	250	
GAIN_NLIN	0	.004	250	
RATE (sec.)	0	32 • T_s	7500	The value of ZERO is permitted to turn off rate action.
RESET (sec.)	+INF	2 • T_s	7500	The value of +INF is permitted to turn off reset action. (Some versions of NI configurator program cannot set +/- INF)
OUT_LAG *Ideal PID*	N/A	N/A	N/A	Fixed for Ideal PID form - not configurable.
Robust PID	0	2 • T_s	7500	Zero permitted which implies no output lag.
BAL_TIME	0	N/A	N/A	Not used in Honeywell Implementation.

Mode Restricted Writes to PID Parameters

Writing to the following PID block parameters are restricted by the block's TARGET and/or ACTUAL mode. The MODE_BLK.TARGET or MODE_BLK.ACTUAL parameter must equal one of the modes in the TARGET or ACTUAL columns below before you can write values to the parameters listed in Table 8-17.

Table 8-17 PID Block Mode Restricted Parameters

Parameter	TARGET mode restricted	ACTUAL mode restricted	Notes and other Validation
SP	AUTO	n/a	+/- 10% of PV_SCALE, Tracking not operative. Note: For SP Mode restriction follows target mode. All cascades will be broken when SP is written.
OUT	MAN	MAN	ROUT cascade initialization cannot be in progress.
CONTROL_OPTS	O/S	O/S	
STATUS_OPTS	O/S	O/S	
BYPASS	O/S or MAN	O/S or MAN	Bypass must be enabled in control_opts to set ON.
PID_FORM ALGO-TYPE	n/a	O/S or MAN	Limited to range of respective enumeration.
FF_GAIN FF_SCALE TRK_SCALE OUT_SCALE PV_SCALE	n/a	O/S or MAN	
HI_HI_LIM HI_LIM LO_LIM LO_LO_LIM	n/a	O/S	Enforces implied rank order
OUT_HI_LIM OUT_LO_LIM	n/a	O/S	Enforces implied rank order. Note: OUT will be forced within range limits when limits changed

8.8 Block Parameter Summary

Table Description

Table 8-18 provides a description of the block parameter attributes which are listed in the Block Parameter Summary, Table 8-19.

Table 8-18 Table Description for Block Parameter Summary

Column Title Attribute	Meaning
Obj Type Object Type	Object type for the parameter value: **S** - Simple Variable **R** - Record **A** - Array of simple variables
Data Type/Structure	Data Type or Structure for the parameter value: 1. Data Types consist of a simple variable or array and are: **Unsigned8, Unsigned16, Unsigned32** - An unsigned variable of 8, 16 or 32 bits. **Float -** Floating point variable. 2. Data Structures consist of a record which may be: **Value and Status - float** - Value and status of a floating point parameter. **Scaling** - Static data used to scale floating point values for display purposes.
Use/Model Use and Model Reference (The letter for use is separated by a slash from the model name.)	The manner in which the parameter will participate in inter-device communications. Use is defined as: **I** - Function block Input. The input may be connected to a function block output or used as a constant. **O** - Function block Output. An output may be referenced by other function block inputs. **C** - Parameter value Contained in the block, available for interface (operation, diagnostic) and/or configuration. Model is: The name of the parameter. In this case, the attribute indicates that it is a contained parameter and may not be referenced by link objects for use as an input to function blocks.
Store	Indicates the type of memory where the parameter is stored: **S** - Static. Writing to the parameter changes the static revision counter ST_REV **N** - Non-volatile. Non-volatile parameters are stored internally to actual non-volatile memory on periodic basis to protect the life of the memory. This interval is set by the resource block parameter NV_CYCLE_T at 15 minutes (displayed as 28800000 in 1/32 milliseconds). It cannot be changed by the user. Parameter must be retained during a power cycle. **D** – Dynamic. The value is calculated by the block, or read from another block.
Size	The number of octets.

Continued on next page

Table 8-18 Table Description for Block Parameter Summary, continued

Column Title Attribute	Meaning
Valid Range	Range of valid values the parameter is restricted to for use in the function block. For bit strings: 0 (zero) is always valid as the state of a bit and is the inverse of the described value. For enumeration: 0 (zero) means that the value is invalid. This is required for initialization of an unconfigured block. Plus or minus infinity (+INF or -INF) may be included in the valid range to indicate that it is permissible to use them to turn off a limit comparison, such as an alarm limit.
Initial Value	The value inserted when the block is created. All limits are set to plus or minus infinity (+INF or -INF), which is the same as no limit. All dynamic values are initialized to zero as a result of a "clear memory" instruction.
Perm. Permission	Defines the setting of the GRANT_DENY parameter that allows write access to the parameter, for interface devices that obey this parameter.
Mode	Indicates the lowest priority target mode required to allow a change to the parameter. The actual mode must match the target mode, so that the block is not in another mode than that chosen by the operator. Scaling changes are protected by mode because the block may be using scaling to calculate its output.
Other	DD handling for: • Positive • Ordered and • Read only. NOTE: For parameters that are inputs: If it is linked, it is read only If it is not linked, it can be written to.
Range Check	Flag to check that the value is within the valid range given in the table.

Continued on next page

Parameter Summary

Tables 8-19 through 8-22 provide a summary of the Honeywell-defined block parameters contained in the STT35F. Table 8-18 gives the description of the parameter attributes listed here.
A summary of the Fieldbus Foundation-defined parameters can be found in FF-890 and FF-891 *Foundation Specification Function Block Application Process Parts 1 and 2* available from the Fieldbus Foundation.

Table 8-19 Transducer Block Parameter Summary

Parameter Mnemonic	Obj. Type	Data Type	Use/Model	Store	Size	Valid Range	Initial Value	
XD_DIAGNOSTICS	S	Unsigned8	C/Contained	D	1	0: No specific problem 1: Open input or high impedance 2: Measure resistance for one of the 2 sensors is drifting outside the specified limits 3: Redundant sensor in redundant wiring mode is active 4: Measured resistance for sensor is drifting outside the specified limits 5: Configuration alarm 6: Zero out of range 7: Ambiant T° is out of range 8: Bad cold junction 9: Input out of specification 10: Bad sensor type/sensor configuration combination 11: Bad units selected 12: Break detection should be enabled 13: External cold junction too low, limited value used. 14: Hardware failure	0 No specific problem	
PRIMARY_VALUE	R	DS - 65	C/Contained	N	5		NAN	⇒
PV_UNITS	S	Unsigned16	C/Contained	S	2	1000: °K 1001: °C 1002: °F 1003: °R 1281: Ohms 1243: mV	°C (1001)	⇒
CJT_INTERNAL	R	DS - 65	C/Contained	D	4		NAN	⇒
CJT_EXTERNAL	S	float	C/Contained	S	4			⇒

Continued on next page

Table 8-19 Transducer Block Parameter Summary, continued

Parameter Mnemonic	Obj. Type	Data Type	Use/Model	Store	Size	Valid Range	Initial Value	
CJT_UNITS	S	Unsigned 16	C/Contained	S	2	Temp. Units 1000: °K 1001: °C 1002: °F 1003: °R	°C (1001)	
CJT_TYPE	S	boolean	C/Contained	S	1	1: Internal Cold Junction 2: External Cold Junction	1	⇒
LIMITS_HIGHEST	S	float	C/Contained	D	4		+ INF	⇒
LIMITS_LOWEST	S	float	C/Contained	D	4		- INF	⇒
RESET_LIMITS	S	boolean	C/Contained	D	1	1: Do not reset the limits 2: Reset the limits	1	⇒
SENSOR_TYPE	S	Unsigned 16	C/Contained	S	2	Available sensors: 137: Thermocouple J, 138: Thermocouple K, 142: Thermocouple T, 141: Thermocouple S, 140: Thermocouple R, 136: Thermocouple E, 134: Thermocouple B, 139: Thermocouple N, 205: Thermocouple C W5W26, 206: Thermocouple D W3W25, 103: mV, 128: PT100, 129: JPT100, 130: PT200, 131: PT500, 202: Nickel - 500, 133: Cu10, 203: Cu25, 104: Ohms, 204: Radiamatic, 207: Ni/Nimo	TCJ	⇒
SENSOR_CONF	S	Unsigned 8	C/Contained	S	1	1: Differential sensor wiring 2: Redundant sensor wiring 3: Single sensor wired 4: 3 wires wiring 5: 4 wires wiring	3	⇒
BREAK_DETECT	S	boolean	C/Contained	S	1	1: Sensor fault detection DISABLED 2: Sensor fault detection ENABLED	2	⇒

Continued on next page

Table 8-19 Transducer Block Parameter Summary, continued

Parameter Mnemonic	Obj. Type	Data Type	Use/Model	Store	Size	Valid Range	Initial Value	
LATCHING	S	boolean	C/Contained	S	1	1: Latching DISABLED 2: Latching ENABLED	2	⇒
POWER_FILTER	S	boolean	C/Contained	S	1	1: 50 Hz filtering 2: 60 Hz filtering	1	⇒
EMISSIVITY	S	float	C/Contained	S	4	10		⇒
SERIAL_NUMBER	S	Unsigned32	C/Contained	N	4			⇒
MAN_LOCATION	S	Unsigned8	C/Contained	N	1			⇒
WEEK	S	Unsigned8	C/Contained	N	1			⇒
YEAR	S	Unsigned8	C/Contained	N	1			⇒
BATCH_NUMBER	A[24]	Unsigned8	C/Contained	N	24			⇒
COMMAND	A [5]	Unsigned8	C/Contained	D	5			⇒
CAL_VALUE	S	float	C/Contained	D	4			⇒
BLOCK_TEST	A [4]	Unsigned8	C/Contained	D	4			⇒

Parameter Mnemonic	Units	Perm.	Mode	Other	Range Check
XD_DIAGNOSTICS				Read only	
PRIMARY_VALUE	User select			Read only	
PV_UNITS	User select		O/S		
CJT_INTERNAL	User select			Read only	
CJT_EXTERNAL			O/S		
CJT_UNITS	User select		O/S		
CJT_TYPE			O/S		Yes
LIMITS_HIGHEST	User select			Read only	
LIMITS_LOWEST	User select			Read only	
RESET_LIMITS					Yes
SENSOR_TYPE			O/S		Yes
SENSOR_CONF			O/S		Yes
BREAK_DETECT			O/S		Yes
LATCHING			O/S		Yes
POWER_FILTER			O/S		Yes
EMISSIVITY			O/S		Yes
SERIAL_NUMBER				Read only	
MAN_LOCATION				Read only	
WEEK				Read only	
YEAR				Read only	
BATCH_NUMBER				Read only	
COMMAND			O/S		
CAL_VALUE			O/S		
BLOCK_TEST					

Continued on next page

8.8 Block Parameter Summary, Continued

Parameter Summary, Continued

Table 8-20 Resource Block Parameter Summary

Parameter Mnemonic	Obj. Type	Data Type	Use/Model	Store	Size	Valid Range	Initial Value	
DL_CMD1	S	Unsigned8	C/Contained	D	1	enum.		⇒
DL_CMD2	S	Unsigned8	C/Contained	D	1	enum.		⇒
DL_APPSTATE	S	Unsigned16	C/Contained	S	2	enum.		⇒
DL_SIZE	S	Unsigned32	C/Contained	S	4	enum.		⇒
DL_CHECKSUM	S	Unsigned16	C/Contained	S	2	enum.		⇒
REVISION_ARRAY	S	Unsigned32	C/Contained	S	2	enum.		
BLOCK_TEST	A [8]	Unsigned8	C/Contained	D	4			
ERROR_DETAIL	A [3]	Unsigned16	C/Contained	D	6		0,0,0	

Table 8-21 Analog Input Function Block Parameter Summary

Parameter Mnemonic	Obj. Type	Data Type	Use/Model	Store	Size	Valid Range	Initial Value	
AUX_VAR1	S	float	C/Contained	D	4			⇒
BLOCK_TEST	A [8]	Unsigned8	C/Contained	D	4			⇒

Table 8-22 PID Function Block Parameter Summary

Parameter Mnemonic	Obj. Type	Data Type	Use/Model	Store	Size	Valid Range	Initial Value	
PID_FORM	S	Unsigned8	C/Contained	S	2	1: Ideal 2: Robust	1	⇒
ALGO_TYPE	S	Unsigned8	C/Contained	S	2	1: A, 2: B 3: C	0	⇒
OUT_LAG	S	float	C/Contained	S	4	2xT_5* -7500	0	⇒
GAIN_NLIN	S	float	C/Contained	S	4	.004-250	0	⇒
GAIN_COMP	S	float	C/Contained	D	4		0	⇒
ERROR_ABS	S	float	C/Contained	D	4	PV Scale	0	⇒
WSP	R	DS-65	C/Contained	D	5	PV Scale	0	⇒
BLOCK_TEST	A [8]	Unsigned8	C/Contained	D	4			⇒

* T_5 = PID function block execution time

Continued on next page

Parameter Summary, Continued

Table 8-20 Resource Block Parameter Summary, continued

Parameter Mnemonic	Units	Perm.	Mode	Other	Range Check
DL_CMD1			O/S	written sequentially	
DL_CMD2			O/S	written sequentially	
DL_APPSTATE				Read-only	
DL_SIZE				Read-only	
DL_CHECKSUM				Read-only	
REVISION_ARRAY				Read-only	
BLOCK_TEST					
ERROR_DETAIL				Read-only	

Table 8-21 Analog Input Function Block Parameter Summary, continued

Parameter Mnemonic	Units	Perm.	Mode	Other	Range Check
AUX_VAR1	user-select				
BLOCK_TEST					

Table 8-22 PID Function Block Parameter Summary, continued

Parameter Mnemonic	Units	Perm.	Mode	Other	Range Check
PID_FORM	enum		MAN		
ALGO_TYPE	enum		MAN		
OUT_LAG	sec.	TUNE	MAN	Positive	
GAIN_NLIN		TUNE	MAN		
GAIN_COMP				Read only	
ERROR_ABS	PV			Read only	
WSP	PV			Read only	
BLOCK_TEST					

8.9 Link Objects

Background

The function blocks configured to control a process are linked, or connected by objects within the devices. These links allow you to transfer process and event data from one block to another. These links are defined through link objects.

Link Object Description

Link objects define Virtual Communication Relationships (VCRs) which are used to communicate between blocks. Link objects contain information needed to define communication links between function blocks and interface devices and other field devices. This information may be read by an interface device which will access information in field devices.

Example

For example, link objects may be used to link the output parameter of one function block to the input of another block, or a trend object, or alert object.

STT35F Link Objects

Link objects are used for alarms and events, function block linking and trending. In the STT35F there are link objects defined for:

- The PID block (6 input parameters)
- The PID and AI blocks (3 output parameters)
- Every alert object
- Every trend object

Table 8-23 lists the link objects defined in the STT35F

Table 8-23 Link Objects Defined for STT35F

Link Object for	Parameter or Number of Objects	
Input parameters	PID function block:	BKCAL_IN CAS_IN FF_VAL IN TRK_IN_D TRK_VAL
Output parameters	AI function block: PID function block:	OUT BKCAL_OUT OUT
Alert objects	3	
Trend objects	2	
TOTAL	14 objects	

8.10 View Objects

Description

View objects define a grouping of parameters that can be read over fieldbus using a single message. Typically, view objects are used by a host device to retrieve certain data efficiently for display, without loading down the network. Some host systems may be capable of being "tuned" during configuration by using the knowledge by which parameters may be accessed in the same view object group.

At least four view objects (View1, View2, View3 and View4) are defined for each resource block, function block, and transducer block in a device.
Block parameters can be grouped and displayed depending on how the data is to be used. Four standard view objects (groups) are defined for accessing the following types of information:

1. View1 - used to display dynamic operation data
2. View2 - used to display static operation data
3. View3 - used to display all dynamic data
4. View4 - used to display other static data.

STT35F View Objects

Tables 8-24 through 8-27 list all the parameter objects in the transmitter.

- A number in the View columns of the table indicates the view(s) in which a parameter is visible, (only if a number is shown in the column for that parameter.)
- The number indicates the number of bytes of data which is shown for that parameter in a view.
- The TOTAL line in each table shows the size of each view in bytes.

Table 8-24 View List for Resource Block Parameters

Index	Name	View1	View2	View3	View4
1	ST_REV	2	2	2	2
2	TAG_DESC				
3	STRATEGY				2
4	ALERT_KEY				1
5	MODE_BLK	4		4	
6	BLOCK_ERR	2		2	
7	RS_STATE	1		1	
8	TEST_RW				
9	DD_RESOURCE				
10	MANUFAC_ID				4
11	DEV_TYPE				2

Continued on next page

Table 8-24 View List for Resource Block Parameters, Continued

Index	Name	View1	View2	View3	View4
12	DEV_REV				1
13	DD_REV				1
14	GRANT_DENY		2		
15	HARD_TYPES				2
16	RESTART				
17	FEATURES				2
18	FEATURE_SEL		2		
19	CYCLE_TYPE				2
20	CYCLE_SEL		1		
21	MIN_CYCLE_T				4
22	MEMORY_SIZE				2
23	NV_CYCLE_T		4		
24	FREE_SPACE		4		
25	FREE_TIME	4		4	
26	SHED_RCAS		4		
27	SHED_ROUT		4		
28	FAULT_STATE	1		1	
29	SET_FSTATE				
30	CLR_FSTATE				
31	MAX_NOTIFY				1
32	LIM_NOTIFY		1		
33	CONFIRM_TIME		4		
34	WRITE_LOCK		1		
35	UPDATE_EVT				
36	BLOCK_ALM				
37	ALARM_SUM	8		8	
38	ACK_OPTION				2
39	WRITE_PRI				1
40	WRITE_ALM				
Honeywell Parameters					
41	DL_CMD1				
42	DL_CMD2				
43	DL_STATE			2	
44	DL_SIZE			4	
45	DL_CHECKSUM			2	
46	REVISION_ARRAY				6
47	BLOCK_TEST			8	
48	ERROR_DETAIL			6	
	TOTAL	22	29	44	35

Continued on next page

Table 8-25 View List for Transducer Block Parameters

Index	Name	View1	View2	View3	View4
1	ST_REV	2	2	2	2
2	TAG_DESC				
3	STRATEGY				2
4	ALERT_KEY				1
5	MODE_BLK	4		4	
6	BLOCK_ERR	2		2	
7	UPDATE_EVT				
8	ALARM_SUM	8		8	
9	BLOCK_ALARM			13	
Honeywell Parameters					
10	XD_DIAGNOSTICS		1		
11	PRIMARY_VALUE	5		5	
12	PV_UNITS		2		
13	CJT_INTERNAL	4		4	
14	CJT_EXTERNAL		4		
15	CJT_UNITS		2		
16	CJT_TYPE		1		
17	LIMITS_HIGHEST			4	
18	LIMITS_LOWEST			4	
19	RESET_LIMITS			1	
20	SENSOR_TYPE		1		
21	SENSOR_CONF		1		
22	BREAK_DETECT		1		
23	LATCHING		1		
24	POWER_FILTER		1		
25	EMISSIVITY		4		
26	SERIAL_NUMBER				
27	MAN_LOCATION				4
28	WEEK				1
29	YEAR				1
30	BATCH_NUMBER				1
31	COMMAND			5	
32	CAL_VALUE			4	
33	BLOCK_TEST			8	
	TOTAL	25	21	64	12

Continued on next page

Table 8-26 View List for AI Function Block Parameters

Index	Name	View1	View2	View3	View4
1	ST_REV	2	2	2	2
2	TAG_DESC				
3	STRATEGY				2
4	ALERT_KEY				1
5	MODE_BLK	4		4	
6	BLOCK_ERR	2		2	
7	PV	5		5	
8	OUT	5		5	
9	SIMULATE				
10	XD_SCALE		11		
11	OUT_SCALE		11		
12	GRANT_DENY		2		
13	IO_OPTS				2
14	STATUS_OPTS				2
15	CHANNEL				2
16	L_TYPE				1
17	LOW_CUT				4
18	PV_FTIME				4
19	FIELD_VAL	5		5	
20	UPDATE_EVT				
21	BLOCK_ALM				
22	ALARM_SUM	8		8	
23	ACK_OPTION				2
24	ALARM_HYS				4
25	HI_HI_PRI				1
26	HI_HI_LIM				4
27	HI_PRI				1
28	HI_LIM				4
29	LO_PRI				1
30	LO_LIM				4
31	LO_LO_PRI				1
32	LO_LO_LIM				4
33	HI_HI_ALM				
34	HI_ALM				
35	LO_ALM				
36	LO_LO_ALM				
Honeywell Parameters					
37	AUX_VAR1	4		4	
38	BLOCK_TEST			8	
	TOTAL	35	26	43	46

Table 8-27 View List for PID Control Function Block Parameters

Index	Name	View1	View2	View3	View4
1	ST_REV	2	2	2	2
2	TAG_DESC				
3	STRATEGY				2
4	ALERT_KEY				1
5	MODE_BLK	4		4	
6	BLOCK_ERR	2		2	
7	PV	5		5	
8	SP	5		5	
9	OUT	5		5	
10	PV_SCALE		11		
11	OUT_SCALE		11		
12	GRANT_DENY		2		
13	CONTROL_OPTS				2
14	STATUS_OPTS				2
15	IN			5	
16	PV_FTIME				4
17	BYPASS		1		
18	CAS_IN	5		5	
19	SP_RATE_DN				4
20	SP_RATE_UP				4
21	SP_HI_LIM		4		
22	SP_LO_LIM		4		
23	GAIN				4
24	RESET				4
25	BAL_TIME				4
26	RATE				4
27	BKCAL_IN			5	
28	OUT_HI_LIM		4		
29	OUT_LO_LIM		4		
30	BKCAL_HYS				4
31	BKCAL_OUT			5	
32	RCAS_IN			5	
33	ROUT_IN			5	
34	SHED_OPT				1
35	RCAS_OUT			5	
36	ROUT_OUT			5	
37	TRK_SCALE				11
38	TRK_IN_D	2		2	
39	TRK_VAL	5		5	

Continued on next page

Table 8-27 View List for PID Control Function Block Parameters, continued

Index	Name	View1	View2	View3	View4
40	FF_VAL			5	
41	FF_SCALE				11
42	FF_GAIN				4
43	UPDATE_EVT				
44	BLOCK_ALM				
45	ALARM_SUM	8		8	
46	ACK_OPTION				2
47	ALARM_HYS				4
48	HI_HI_PRI				1
49	HI_HI_LIM				4
50	HI_PRI				1
51	HI_LIM				4
52	LO_PRI				1
53	LO_LIM				4
54	LO_LO_PRI				1
55	LO_LO_LIM				4
56	DV_HI_PRI				1
57	DV_HI_LIM				4
58	DV_LO_PRI				1
59	DV_LO_LIM				4
60	HI_HI_ALM				
61	HI_ALM				
62	LO_ALM				
63	LO_LO_ALM				
64	DV_HI_ALM				
65	DV_LO_ALM				
Honeywell Parameters					
Index	**Name**	**View1**	**View2**	**View3**	**View4**
66	PID_FORM				
67	ALGO_TYPE				
68	OUT_LAG				
69	GAIN_NLIN				
70	GAIN_COMP				
71	ERROR_ABS				
72	WSP				
73	BLOCK_TEST				
	TOTAL	43	43	83	104

8.11 Alert Objects

Description

Alert objects support the reporting of alarms and update events to operator interface devices and other field devices. Alert objects are used to communicate notification messages when alarms or events are detected. These objects are defined in the function block application.

Alert objects contain:

- The value of the data
- Block index (a number)
- Alert key (parameter)
- Time stamp
- Priority

STT35F Alert Objects

Three alert objects are defined in the STT35F for event and alarm reporting.

- 1 for events (used for static parameter update events)
- 1 for discrete alarms (used for block alarms)
- 1 for analog alarms

8.12 Alarm and Event Reporting

Alarms, Events and Alert Objects

Alarms are generated when a block leaves or returns from a particular state. (A function block changes state and generates an alarm that indicates a broken sensor).

Events are instantaneous occurrences that are significant to block execution or operation of a process. (For example, a change in the state of a variable generates an event message).

Alarms and event messages are communicated to operator interfaces and other devices using alert objects.

Alarm Messages

- Alarm messages contain a:
  - Time stamp
  - Snapshot of the data
  - Specified priority
- Alarms must be confirmed, otherwise the block will continually report the alarm.
- Another alarm is generated when alarm conditions clear
- Acknowledgment of alarms may be necessary to satisfy operation requirements.

Event Messages

- Event messages contain a time stamp
- Events also must be confirmed, otherwise the block will continually report the event
- Acknowledgment of alarms may be necessary to satisfy operation requirements.

8.13 Trend Objects

Description

Trend objects support the management and control of function blocks by providing user access to history information. Trend objects provide for short term history data to be collected and stored within a resource. The collected data may be input and output parameters, and status information from selected function blocks. Trend objects are available anytime for you to view.

Trend Data Types

Trend record data may include one of these types of data:

- analog,
- discrete (not used in STT35F) or,
- bit string (not used in STT35F).

It is important that the proper trend data type be chosen to match the data type being recorded. Trend information may be used in support of trending in interface devices or by function block objects that require historical information.

Trend Objects

Trend objects:

- Provide short term history data
- Track both values and status
- Track and hold the last 16 values
- Allow user-defined sampling rate
- Allow efficient transfer of large amounts of data.

STT35F Trend Objects

The STT35F has two defined trend objects for analog data:
- one for the AI function block
- one for the PID function block.

8.14 Domain Objects

Description

Domain objects support download services which are used to download applications to a device. Standard generic download services (defined by Fieldbus Foundation) are used in the domain object of the STT35F.

8.15 Device Description (DD)

Overview

Standardized definitions are used to support and describe application process objects. Two of these standardized "tools" used to describe these objects are the Object Dictionary (OD) and the Device Description (DD).
The Object Dictionary and the Device Descriptions define and describe the network visible objects of a device, such as function blocks and block parameters. These “tools” try to provide a consistency in understanding and describing these objects in device applications.
See also Object Dictionary description in the following section.

Device Description Contents

A typical DD contains information about the device parameters and operation, such as:

- Attributes, like coding, name, engineering unit, write protection, how to display, etc.
- The menu structure for listing parameters, including names of menus and submenus.
- The relationship of one parameter to others.
- Information about help text and help procedures.
- Maintenance, calibration and other necessary operation information.

Standard and Device-Specific DD

Standard DD descriptions for function blocks and transducer blocks are maintained by the Fieldbus Foundation. These descriptions can be used as part of a field device DD by manufacturers to describe the standard features of their devices. Device-specific descriptions are developed by manufacturers to describe custom features which are unique to that particular device.
These two types of DDs (the standard and device-specific) can then be combined to provide a complete DD for the field device.

Device Descriptions and Ods

A Device Description provides a clear and structured text description of a field device. The descriptions found in a DD supplement the object dictionary definitions of device applications. So, an OD description used in conjunction with the DD will provide a complete detailed description of the device operation.

Access to Field Device DD	DDs can be loaded into the device that it describes, or stored on an external medium, such as a floppy disk or CD. You then can access this information through an operator station and read the DD directly from the device or from the floppy disk. You can use the DD to determine what information is available from the device, what rules must be applied when accessing the information and how the information can be displayed to you.
Standardized Descriptions and Interoperability	The use of standardized descriptions and definitions to describe device application processes promotes the interoperability of fieldbus devices.

8.16 Object Dictionary (OD)

Overview

The Object Dictionary (OD) is one of a number of standardized “tools” used to describe and define Application Process (AP) objects, (function blocks, block parameters, alert objects, etc.). The OD is used in conjunction with standard and device-specific Device Descriptions (DD) to provide a complete description of the device’s application process.

Device Descriptions contain standard and device-specific text descriptions of function blocks and block parameters in device applications. See Device Description also in the previous section.

Object Dictionary Description

AP objects are described in the Object Dictionary (OD). The OD comprises a series of entries, each describing an individual AP object and its message data. The message data may consist of a number of characteristics defined for that particular object.

The OD allows the FBAP of a device to be visible to the fieldbus communications system.

OD Entries

OD entries are assigned an index by the AP. The index serves as a means of identification and location of individual objects. The entries in the Application Process OD are organized as follows:

Index 0 - Object Dictionary Description - Describes overall structure of the OD.

Index 1-255 - Reserved for descriptions of data types and data structures used by the AP. (There are a number of standard data types and data structures already defined as part of fieldbus foundation specifications).

Index starting at 256 - Entries for AP objects defined by the application. These entries contain the records and parameters for the various blocks that make up the AP. Also included are alert, trend, view, link, and domain objects which are defined by the AP.

Continued on next page

STT35F Object Dictionary

Table 8-28 shows the indexes of object descriptions within the object dictionary for the STT35F.

Table 8-28 STT35F Object Dictionary

OD Index	Object(s)
0	OD Description (ODES)
1-255	Data types (standard)
256	Directory Object
257	AI block record
258-295	AI block parameters
296-299	*spare*
300	PID block record
301-374	PID block parameters
375-379	*spare*
380	Resource block record
381-428	Resource block parameters
429	*spare*
430	Transducer block record
431-463	Transducer block parameters
464-468	*spare*
469	Domain Object
470-472	Alert Objects (3)
473-474	*spare*
475-476	Trend Objects (2)
477-479	*spare*
480-493	Link Objects (14)
494	*spare*
495-498	AI View objects (4)
499-503	PID View objects (4)
504-506	Resource View objects (4)
507-510	Transducer View objects (4)

Continued on next page

To Calculate Index number of an Object

To calculate the index of any block parameter or object, add the index in the block's parameter (or object) list to the index of the block's record in the list above. For example:

OUT: Index of 8 in the AI block parameter list, (Table 8-7)
AI's block record is at index 257 in the OD (Table 8-28)
Therefore, OUT of the AI block is at index 257 + 8 = **265**
in the OD.

STT35F Block Parameter Index

Table 8-29 lists the index numbers for all block parameters defined in the FBAP for STT35F.

Table 8-29 Block Parameter Index Table

	AI Block		AI Block, (cont'd)		PID Block		PID Block, (cont'd)
258	ST_REV	281	ALARM_HYS	301	ST_REV	325	BAL_TIME
259	TAG_DESC	282	HI_HI_PRI	302	TAG_DESC	326	RATE
260	STRATEGY	283	HI_HI_LIM	303	STRATEGY	327	BKCAL_IN
261	ALERT_KEY	284	HI_PRI	304	ALERT_KEY	328	OUT_HI_LIM
262	MODE_BLK	285	HI_LIM	305	MODE_BLK	329	OUT_LO_LIM
263	BLOCK_ERR	286	LO_PRI	306	BLOCK_ERR	330	BKCAL_HYS
264	PV	287	LO_LIM	307	PV	331	BKCAL_OUT
265	OUT	288	LO_LO_PRI	308	SP	332	RCAS_IN
266	SIMULATE	289	LO_LO_LIM	309	OUT	333	ROUT_IN
267	XD_SCALE	290	HI_HI_ALM	310	PV_SCALE	334	SHED_OPT
268	OUT_SCALE	291	HI_ALM	311	OUT_SCALE	335	RCAS_OUT
269	GRANT_DENY	292	LO_ALM	312	GRANT_DENY	336	ROUT_OUT
270	IO_OPTS	293	LO_LO_ALM	313	CONTROL_OPTS	337	TRK_SCALE
271	STATUS_OPTS	294	AUX_VAR1	314	STATUS_OPTS	338	TRK_IN_D
272	CHANNEL	295	BLOCK_TEST	315	IN	339	TRK_VAL
273	L_TYPE			316	PV_FTIME	340	FF_VAL
274	LOW_CUT			317	BYPASS	341	FF_SCALE
275	PV_FTIME			318	CAS_IN	342	FF_GAIN
276	FIELD_VAL			319	SP_RATE_DN	343	UPDATE_EVT
277	UPDATE_EVT			320	SP_RATE_UP	344	BLOCK_ALM
278	BLOCK_ALM			321	SP_HI_LIM	345	ALARM_SUM
279	ALARM_SUM			322	SP_LO_LIM	346	ACK_OPTION
280	ACK_OPTION			323	GAIN	347	ALARM_HYS
				324	RESET	348	HI_HI_PRI

Continued next page

Table 8-29 Block Parameter Index Table, continued

PID Block (Cont'd)		Resource Block		Resource Block, (cont'd)		Transducer Block	
349	HI_HI_LIM	381	ST_REV	404	FREE_SPACE	431	ST_REV
350	HI_PRI	382	TAG_DESC	405	FREE_TIME	432	TAG_DESC
351	HI_LIM	383	STRATEGY	406	SHED_RCAS	433	STRATEGY
352	LO_PRI	384	ALERT_KEY	407	SHED_ROUT	434	ALERT_KEY
353	LO_LIM	385	MODE_BLK	408	FAULT_STATE	435	MODE_BLK
354	LO_LO_PRI	386	BLOCK_ERR	409	SET_FSTATE	436	BLOCK_ERR
355	LO_LO_LIM	387	RS_STATE	410	CLR_FSTATE	437	UPDATE_EVT
356	DV_HI_PRI	388	TEST_RW	411	MAX_NOTIFY	438	ALARM_SUM
357	DV_HI_LIM	389	DD_RESOURCE	412	LIM_NOTIFY	439	BLOCK_ALM
358	DV_LO_PRI	390	MANUFAC_ID	413	CONFIRM_TIME	440	XD_DIAGNOSTICS
359	DV_LO_LIM	391	DEV_TYPE	414	WRITE_LOCK	441	PRIMARY_VALUE
360	HI_HI_ALM	392	DEV_REV	415	UPDATE_EVT	442	PV_UNITS
361	HI_ALM	393	DD_REV	416	BLOCK_ALM	443	CJT_INTERNAL
362	LO_ALM	399	GRANT_DENY	417	ALARM_SUM	444	CJT_EXTERNAL
363	LO_LO_ALM	395	HARD_TYPES	418	ACK_OPTION	445	CJT_UNITS
364	DV_HI_ALM	396	RESTART	419	WRITE_PRI	446	CJT_TYPE
365	DV_LO_ALM	397	FEATURES	420	WRITE_ALM	447	LIMITS_HIGHEST
366	PID_FORM	398	FEATURE_SEL	421	DL_CMD1	448	LIMITS_LOWEST
367	ALGO_TYPE	399	CYCLE_TYPE	422	DL_CMD2	449	RESET_LIMITS
368	OUT_LAG	400	CYCLE_SEL	423	DL_APPSTATE	450	SENSOR_TYPE
369	GAIN_NLIN	401	MIN_CYCLE_T	424	DL_SIZE	451	SENSOR_CONF
370	GAIN_COMP	402	MEMORY_SIZE	425	DL_CHECKSUM	452	BREAK_DETECT
371	ERROR_ABS	403	NV_CYCLE_T	426	REVISION_ARRAY	453	LATCHING
372	WSP			427	BLOCK_TEST	454	POWER_FILTER
373	BLOCK_TEST			428	ERROR_DETAIL	455	EMISSIVITY
						456	SERIAL_NUMBER
						457	MAN_LOCATION
						458	WEEK
						459	YEAR
						460	BATCH_NUMBER
						461	COMMAND
						462	CAL_VALUE
						463	BLOCK_TEST

8.17 Management Virtual Field Device (VFD)

VFD Description There is one VFD for both System Management and Network Management. This is called the Management VFD.

VendorName:	Honeywell
ModelName:	STT35F
Revision:	as per revision
Profile number:	0x4D47 ('MG')

The VendorName, ModelName and Revision are defined by the manufacturer. The Profile number is a standard value defined by fieldbus specifications.

VFD Contents The VFD contains all objects and object descriptions which may be used by you. The VFD contains a single Object Dictionary.

8.18 System Management (SM)

Description

System Management (SM) operates on special objects in the System Management Information Base (SMIB) which is part of the Management Virtual Field Device (VFD).

System Management Key Features

The key features of system management operation:
- Provide system application clock time synchronization
- Provide scheduling of function blocks
- Manage automatic device address assignment
- Provide tag search service

System Management Information Base (SMIB)

The SMIB contains various objects that are associated with system management operation. Table 8-30 shows a listing of the SMIB object dictionary. Groups of objects (along with their starting index number) are included in the SMIB for the STT35F. The numbers in parenthesis (#) indicate the number of objects.

Table 8-30 STT35F SMIB Object Dictionary

Dictionary Index	Object
Header	Reserved
	Directory of Revision Number (1)
	Number of Directory Objects (1)
	Total Number of Directory Entries (5)
	Directory Index of First Composite List Reference (0)
	Number of Composite List References (0)
258	System Management Agent Starting OD Index
	Number of System Management Agent Objects (4)
262	Sync and Scheduling Starting OD Index
	Number of Sync and Scheduling Objects (8)
270	Address Assignment Starting OD Index
	Number of Address Assignment Objects (3)
273	VFD List Starting OD Index
	Number of VFD List Objects (2)
275	FB Schedule Starting OD Index
	Number of FB Schedule Objects (2)

Continued on next page

Supported Features

The features supported by system management include the key features listed above as well as the ones designated in Table 8-31. The object SM_SUPPORT indicates which features are supported by system management in the FBAP. The features are mapped to the bits in the bit string shown below.

Table 8-31 System Management Supported Features

SM_SUPPORT bit	Feature	Supported ?
0	Set physical device tag (agent)	yes
1	Set field device address (agent)	yes
2	Clear address (agent)	yes
3	Identify (agent)	yes
4	Locating function blocks (agent)	yes
5	Set physical device tag (mgr.)	no
6	Set field device address (mgr.)	no
7	Clear address (mgr.)	no
8	Identify (mgr.)	no
9	Locating function blocks (mgr.)	no
10	FMS server role	yes
11	Application clock synch (time slave)	yes
12	Scheduling function block	yes
13	Application clock synch (time publisher)	no
14 to 31	*Reserved for future use.*	no

SM_SUPPORT Bits

Any bit (of the object SM_SUPPORT) will be set which corresponds to a supported feature in the table above.
The resulting value in the object SM_SUPPORT is 1C1F (hex).

SM Agent Objects

Four SM agent objects are contained in the SMIB object dictionary. One object, SM_SUPPORT, was described previously. The three other objects are timers associated with SM operations. Table 8-32 identifies the SM Agent objects with their object directory index and default values.

Table 8-32 SM Agent Objects

Object	Description	OD Index	Default value
SM_SUPPORT	Variable which indicates the features supported by SM in this device. See Table 8-30.	258	0x1C1F
T1	Value of the SM step timer in 1/32 of a millisecond ticks.	259	96,000 * (3 seconds)
T2	Value of the SM set address sequence timer in 1/32 of a millisecond ticks.	260	1,920,000 * (60 seconds)
T3	Value of the SM set address wait timer in 1/32 of a millisecond ticks.	261	480,000 * (15 seconds)

* The default value is specified by the communications profile for the application area.

Continued on next page

System Application Clock Time Synchronization

Each link in a fieldbus network contains an Application Clock Time Publisher responsible for distributing Application Time on the link. A clock synchronization message is periodically sent by the time publisher to all fieldbus devices. The application clock time is independently maintained in each device based on its own internal crystal clock.

Clock synchronization provides the capability for devices to time stamp data (events and alarms when they occur).

Sync and Scheduling Objects

These objects are used by system management to provide application clock synchronization and macrocycle scheduling for the device.
Table 8-33 identifies the sync and scheduling objects with their object directory index and default values.

Table 8-33 SM Sync and Scheduling Objects

Object	Description	OD index	Default Value
CURRENT_TIME	The current application clock time.	262	Dynamic
LOCAL_TIME_DIFF	Used to calculate local time from CURRENT_TIME.	263	0
AP_CLOCK_SYNC_ INTERVAL	The interval in seconds between time messages on the link (bus).	264	Set by SM (mgr.) during address assignment
TIME_LAST_RCVD	The application clock time contained in the last clock message.	265	Dynamic
PRIMARY_AP_TIME_ PUBLISHER	The node address of the primary time publisher for the local link (bus).	266	Set by SM (mgr.) during address assignment
TIME_PUBLISHER_ ADDR	The node address of the device which sent the last clock message.	267	Dynamic
Unused		268	
MACROCYCLE_ DURATION	The length of the macrocycle in 1/32 of a millisecond ticks.	269	Set by SM (mgr.) during address assignment

Continued on next page

Device ID, Tag Name and Device Address

Each fieldbus device on the network is uniquely identified by:
- Device ID which is set by the manufacturer to identify the device.
- Device Name (Tag) - set by you to identify operation.
- Device Address - a unique numerical address on the fieldbus segment. Address may be set automatically by system management.

Automatic Device Address Management

Assignment of physical device addresses is performed automatically by system management.
1. The sequence for assigning a physical address to a new device is:
2. A physical device address is assigned to a new device. This may be done off-line before the device is installed on the fieldbus network.
   (The address can be preconfigured at the factory or set by you).
3. The device is connected to the bus and uses default address 248 to 251.
   If no physical device name is set, the manufacturer's device ID is used.
4. System management assigns an unused address to the new device. Assignment is done automatically or by you.

Address Assignment Objects

Table 8-34 is a description of the Address Assignment objects with their object directory index and default values.

Table 8-34 SM Address Assignment Objects

Object	Description	OD index	Default Value
DEV_ID	The device ID set by the manufacturer.	270	48574C0101-HWL-STT35F-xxxxxxx
PD_TAG	The physical device tag to be set using SET_PD_TAG service.	271	STT-xxxx
OPERATIONAL_POWERUP	Controls the state of SM of the device upon powerup.	272	TRUE (SM goes operational after powerup)

Tag Search Services

There are three SM services (functions) available to set the physical tag of the device, give it a permanent node address and search the network for a given tag name.

Continued on next page

Set Physical Tag

Using a configurator program, a request to set PD_TAG parameter is sent to the new device function block. If device tag is clear, then a device tag is assigned to the function block at the device address.

Set Permanent Address

After a physical tag has been assigned to a new device, a request can be made to give the device a permanent address using the configurator program.

Tag Locator

Also, a find tag query service searches for a given function block tag among the fieldbus devices and returns the device address and object dictionary index for that tag if found.

Virtual Field Device (VFD) List Objects

There are two (2) objects that identify the VFD's in the device.

OD Index	VFD_REF	VFD_TAG
273	1	'MIB'
274	2	'Resource'

Continued on next page

Function Block Scheduling

The SMIB contains a schedule, called the Function Block Schedule, that indicates when that device's function blocks are to be executed. System Management schedules the start of each function block relative to the macrocycle of the device. The macrocycle represents one complete cycle of the function block schedule in a device. The macrocycles of all devices on the link are synchronized so that function block executions and their corresponding data transfers are synchronized in time.

Using the configurator software, the device's function block schedule can be preconfigured.

Function Block Scheduling Objects

There are four scheduling objects defined in the STT35F, any function block can be configured in one or more scheduling objects. By default, the first scheduling object is assigned to the AI block and the second is assigned to the PID block. Table 8-35 lists the function block scheduling objects with their object directory index and default values.

Table 8-35 Function Block Scheduling Objects

Object	Description	OD Index	Default Value
VERSION_OF_SCHEDULE	The version number of the function block schedule.	275	0
FB Schedule Entry #1	By default, the entry which defines the AI function block execution schedule.	276	START_TIME_OFFSET - 0 FB_OBJECT_INDEX – 257 (AI) VFD_REF - 2
FB Schedule Entry #2, 3, 4	By default, the entry which defines the PID function block execution schedule.	277	START_TIME_OFFSET - 16000 FB_OBJECT_INDEX – 301 (PID) VFD_REF - 2
FB Schedule Entry #3, 4		278 - 279	START_TIME_OFFSET 0xFFFFFFFF FB_OBJECT_INDEX - 0 VFD_REF - 0

8.19 Network Management

Description

Network Management provides for the management of a device's communication system by an external network manager application.

Network Management operates on special objects in the Network Management Information Base (NMIB) which is part of the Management Virtual Field Device (VFD).

Network Management Features

Network Management provides the following features:

- Loading a Virtual Communication Relationship (VCR), which may be a list or a single entry. See VCR List Objects
- Loading/changing the communication stack configuration
- Loading the Link Active Schedule (LAS)
- Performance monitoring
- Fault detection monitoring

Network Management Objects

Normally, most of the network management objects appear transparent to you. In other words, the parameters and objects used for network management are not normally viewed or changed as part of device configuration.

ATTENTION

The network management objects in the STT35F FBAP are listed in the following paragraphs, although most, (if not all) of these objects are not directly user-configurable.

Continued on next page

Network Management Information Base (NMIB)

The NMIB contains various objects that are associated with network management operation. Table 8-36 lists the NMIB object dictionary. The groups of network management objects (along with their index starting numbers) are included in the NMIB for the STT35F. The numbers in parenthesis (#) indicate the number of objects.

Table 8-36 STT35F NMIB Object Dictionary

Dictionary Index	Object
Header	Reserved
	Directory of Revision Number
	Number of Directory Objects
	Total Number of Directory Entries
	Directory Index of First Composite List Reference
	Number of Composite List References
290	Stack Management OD Index
	Number of Objects in Stack Management (1)
291	VCR List OD Index
	Number of Objects in VCR List (5)
330	DLL Basic OD Index
	Number of Objects in DLL Basic (3)
332	DLL Link Master OD Index
	Number of Objects in DLL Link Master (7)
340	Link Schedule OD Index
	Number of Objects in Link Schedule
Not Used	DLL Bridge OD Index
	Number of Objects in DLL Bridge
337	Phy LME OD Index
	Number of Objects in Phy LME (2)

Virtual Communications Reference (VCR) Objects

The objects listed above contain parameters which define network management operations. These operations include communications between applications in different field devices (or field devices and operator interface). In order for this communication to take place, a “communications relationship” must be set up using the network management objects and parameters. The parameters for this communication relationship are stored in a Virtual Communications Reference (VCR) object.

9. MAINTENANCE AND TROUBLESHOOTING

9.1 Introduction

Section Contents

This section includes these topics:

About this section

This section provides information about preventive maintenance routines and identifies diagnostic messages that may appear on the host system and describes what they mean. An interpretation of diagnostic messages is given which suggests possible cause and corrective action for each message.

9.2 Maintaining Transmitters

Maintenance routines and schedules

The STT35F transmitter itself does not require any specific maintenance routine at regularly scheduled intervals. The transmitter module itself should never be opened. You may want to periodically check connections and mounting means to be sure they are secure.

9.3 Troubleshooting Overview

Device Status and Failures

STT35F transmitter is constantly running internal background diagnostics to monitor the functions and status of device operation. When errors and failures are detected, they are reported in the status bits of various parameters in each block object.

Device status and certain operational failures can be identified by viewing the status parameter section or values and interpreting their meaning using the table in this section.

ATTENTION

Additional diagnostics may be available through supervisory and control applications that monitor and control fieldbus networks. These diagnostics and messages are dependent upon the capabilities of the application and control system you are using.

Troubleshooting with the NI_FBUS Configuration Tool

The diagnostic messages generated by the STT35F transmitter and block parameters can be accessed and evaluated using the NI_FBUS configurator. Troubleshooting of some transmitter faults and corrective actions also can be performed using the configurator.

Fault Summary

Diagnostic messages can be grouped into one of these three categories.

1. **Non-Critical Failures** — Transmitter continues to calculate PV output.
2. **Critical Failures** — Transmitter drives PV output to failsafe state.
3. **Configuration Errors** — Incorrect parameter values may cause the transmitter to generate a fault. If the configuration error remains in the transducer block, it will be stuck in OOS mode.

A description of each condition in each category is given in the following tables. The condition is described, a probable cause is stated and a recommended corrective action is given for each fault.

9.4 Device Troubleshooting

Device Not Visible on Network

If you cannot see a device on the fieldbus network, the device may not be powered up or possibly the supervisory or control program is not looking for (or polling) the node address of that device. See Table 9-1 for possible causes and recommended actions.

Table 9-1 Device Troubleshooting Table A

Symptom		
• **Device not Visible on Network** ⇓		
Possible cause	**Things to check**	**Recommended Action**
Device may have an node address that is within the “unpolled range” of addresses.	Look at the following settings: • First Unpolled Node • Number of Unpolled Nodes	Set Number of Unpolled Nodes to “0”.
No power to the device.	Measure the DC voltage at the device’s SIGNAL terminals. Voltage must be within the limits as shown in Table 4-2.	If no voltage or voltage is out of operating limits, determine cause and correct.
Incorrect polarity at device terminals.	Check for proper voltage polarity to the device. • Fieldbus wire + to SIGNAL + • Fieldbus wire - to SIGNAL -	Correct the wiring to device terminals, if necessary.
Insufficient current to device	Measure DC current to device. It should be between 24 and 27 mA.	If current is insufficient, determine cause and correct.
More than two or less than two terminators wired to fieldbus link	Check to see that only two terminators are present on link.	Correct, if necessary.
Insufficient signal to device	Measure the peak-to-peak signal amplitude, it should be: • Output 0.75 to 1.0 Vp-p. • Input 0.15 to 1.0 Vp-p. Measure the signal on the + and - SIGNAL terminals and at a frequency of 31.25k Hz.	If signal amplitude is insufficient, determine the cause and correct.

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Incorrect or Non-Compatible Tools

If you are using non-compatible versions of fieldbus software tools, such as Standard Dictionary or Device Description (DD) files, or if you are using the incorrect revision level of device firmware, then device objects or some block objects may not be visible or identified by name.
See Table 9-2 for possible causes and recommended actions.

Table 9-2 Device Troubleshooting Table B

Symptom		
• **Device and/or block objects not identified (UNKnown), or,** • **Parameters are not visible or identified by name, or** • **Honeywell-defined parameters are not visible.** ⇓		
Possible cause	**Things to check**	**Recommended Action**
Incorrect Standard Dictionary, Device Description (DD) or Symbols on Host computer	Verify that the Standard Dictionary, the DD or symbols files are correct for the device.	Install the compatible version of Standard Dictionary and DD for the device on the host computer.
Incorrect pathnames to descriptions on host computer.	Check that the pathname to locations of the Standard Dictionary, and DD files on the host computer is correct.	Make sure that the pathname of the Standard Dictionary and DD are in the correct location for the fieldbus software application. (C:\. . . \release\48574C\0101)
Incorrect revision of Device Resource Block firmware	Read the following Resource block parameters: • DEV_REV (contains the revision level of the resource block). • DD_REV (contains the revision level of the resource block).	Perform a code download of the correct device firmware. See Section 9.11, Code Download.
Incorrect revision level of the device firmware.	Read the three elements of the REVISION_ARRAY parameter, which are: • Stack board firmware • Stack board boot code • Transducer board firmware NOTE: The numbers, when viewed as hexadecimal numbers, are in the format "MMmm". Where, MM is the major revision number and mm is the minor revision number.	Perform a code download of the correct device firmware. See Section 9.11, Code Download.

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Non-Functioning Blocks

Device block objects may not be running (executing their function block schedules) or the blocks may be in Out of Service O/S mode. For example, if the AI function block is in O/S mode, the block will not provide updated output values although the AI block may be running. When troubleshooting non-functioning block objects, start with the resource block. For example, if the resource block is in O/S mode all other blocks in the device will also be in O/S mode. See Table 9-3 for possible causes and recommended actions.

Table 9-3 Device Troubleshooting Table C

Symptom		
• **Device output is not updating.⇓**		
Possible cause	**Things to check**	**Recommended Action**
Resource block mode is OOS	Read MODE_BLOCK. ACTUAL of Resource block.	If necessary, Set MODE_BLOCK.TARGET to Auto.
Resource block is not running.	1. Read the first element of BLOCK_TEST. Number should be increasing indicating that block is running. If block is not running, check the 2nd element of BLOCK_TEST. 2. Check BLOCK_ERR for other errors. 3. If an error is present in BLOCK_ERR, then read ERROR_DETAIL.	If 2nd element of BLOCK_TEST is nonzero, write all zeroes to element. See Subsection 9.8 for details on BLOCK_ERR. See Subsection 9.8 for details on ERROR_DETAIL parameter. Set RESTART to Processor (or 4) to soft restart the device.
Incorrect revision of Resource block firmware.	Read DEV_TYPE , DEV_REV, and DD_REV.	See “Incorrect or non-compatible tools” above in Subsection 9.4.
Incorrect revision level of the device firmware.	Read REVISION_ARRAY.	See “Incorrect or non-compatible tools” above in Subsection 9.4.
Transducer block mode is OOS	Read MODE_BLK . ACTUAL.	Set MODE_BLK.TARGET to Auto. NOTE:Transducer block must be in Auto mode for the sensor signal to be passed to AI block.

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Non-Functioning Blocks, Continued

Table 9-3 Device Troubleshooting Table C, continued

Symptom		
• **Device output is not updating.** ⇓		
Possible cause	**Things to check**	**Recommended Action**
Transducer block is not producing valid primary data.	1. Read the 1st element of BLOCK_TEST. Number should be increasing indicating that block is running. If block is not running, check the 2nd element of BLOCK_TEST.	If 2nd element of BLOCK_TEST is nonzero, write all zeroes to element.
	2. Read BLOCK_ERR.	See Subsection 9.8 for details on BLOCK_ERR.
	3. Verify parameter PRIMARY_VALUE is not valid STATUS = *Good* or *Uncertain* VALUE = active	Isolate transmitter from process and check calibration.
Analog Input block mode is OOS.	Read MODE_BLK.ACTUAL of AI block.	Set MODE_BLK .TARGET to Auto.
	Read WRITE_LOCK parameter in resource block. Check if device is in Write Protect mode. If WRITE_LOCK = Locked (2)	1. Change Write Protect jumper to “W” position. (See Subsection 6.5.) 2. Reset the device. (Cycle power to transmitter of write Processor to RESTART parameter in Resource block.)
	Read CHANNEL parameter. If CHANNEL = 1, then read PV_UNITS = should contain the same units as XD_SCALE UNITS in the AI block.	

Continued on next page

Non-Functioning Blocks, Continued

Table 9-3 Device Troubleshooting Table C, continued

Symptom		
• **Device output is not updating.** ⇓		
Possible cause	**Things to check**	**Recommended Action**
Analog Input block mode is O/S. • AI block is not initialized.	Check the following parameters: • ALERT_KEY. Should ≠ 0 • CHANNEL. Should = 1 • L_TYPE. Should ≠ Uninitialized	The default values of these parameters are configuration errors and they must be set to a valid value. See "Clearing Block Configuration Errors", Subsection 9.10.
	Read parameters: • SIMULATE. ENABLE_DISABLE Should = Disable.	If SIMULATE.ENABLE_DISABLE = Enabled, write disable to parameter.
	Read parameters: • PV • FIELD_VAL Both parameter should be active and with a STATUS of *Good* or *Uncertain.*	?
Analog Input block is not running.	1. Read the first element of BLOCK_TEST. Number should be increasing indicating that block is running. If block is not running, check the 2nd element of BLOCK_TEST.	If 2nd element of BLOCK_TEST is nonzero, write all zeroes to element.
	2. Check if BLOCK_ERR bit 3 is set.	If bit 3 is set, verify that SIMULATE parameter in AI block is disabled. Verify that simulate jumper is not in simulate position.
	3. Read BLOCK_ERR	See Subsection 9.8 for details on BLOCK_ERR. Download a new function block schedule.

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Non-Functioning Blocks, Continued

Table 9-3 Device Troubleshooting Table C, continued

Symptom		
• **Device output is not updating.** ⇓		
Possible cause	**Things to check**	**Recommended Action**
PID block mode is O/S	Read MODE_BLK.ACTUAL of PID block.	Set MODE_BLK.TARGET to Auto
PID block is not running.	1. Read the first element of BLOCK_TEST. Number should be increasing indicating that block is running. If block is not running, check the 2nd element of BLOCK_TEST.	If 2nd element of BLOCK_TEST is nonzero, write all zeroes to element.
	2. Read BLOCK_ERR.	See Subsection 9.8 for details on BLOCK_ERR.
PID block is not initialized.	Read parameters: BYPASS SHED_OP	The default values of these parameters are configuration errors and they must be set to a valid range. See “Clearing Block Configuration Errors”, Subsection 9.9.
	Read parameters: IN.STATUS Should = *Good* OUT.STATUS Should =*Good*	

9.5 Transmitter Faults

Transmitter Diagnostics

Transmitter faults can be grouped into one of these three diagnostic categories and could cause the following results:

1. **Non-Critical Fault** — Transmitter continues to calculate PV output.
2. **Critical Fault** — Transmitter drives PV output to failsafe state.
3. **Block Configuration Errors** — Incorrect parameter values may cause the transmitter to generate a fault, (for example, BLOCK_ERR or MODE_BLK = OS.

A description of each condition in each category is given in the following tables. The condition is described, a probable cause is stated and a recommended corrective action is given for each fault.

XD_DIAGNOSTICS Parameter

The XD_DIAGNOSTICS parameter contains data indicating status of the transmitter's hardware and of the sensor. See Table 9-4 for more details of the parameter.

Table 9-4 XD_DIAGNOSTICS Possible values

Value	Status	Category	Meaning	Transducer Status
1	Open input or high impedance	Critical	The transmitter is seeing an open input.	Bad::sensor failure
2	Measured resistance for one of the 2 sensors is drifting outside the specified limits	Non critical	In redundant wiring mode, the resistance of one of the sensors connected to the transmitter will shortly fail.	Good::active advisory alarm
3	Redundant sensor in redundant wiring mode is active	Non critical	One of the 2 sensors in redundant wiring mode failed. The other is therefore active.	Good::active advisory alarm
4	Measured resistance for sensor is drifting outside the specified limits	Non critical	The resistance of the sensor connected to the transmitter is drifting, it will shortly fail, it should be changed.	Good::active advisory alarm
5	Configuration alarm	Critical	This message will prevent the transducer block from switching to Auto. The transducer block is not configured properly.	Bad::out of service
7	Ambient temperature is out of range	Non critical	The transmitter's temperature is outside its rated limits.	Good::active advisory alarm
8	Bad cold junction	Critical	The cold junction value measured by the transmitter is bad.	Bad::sensor failure
9	Input out of specification	Non critical	The measure is out of the rated limits for the sensor.	Good::active advisory alarm
10	Bad sensor type/sensor configuration combination	Critical	Bad configuration of the transducer block: SENSOR_TYPE and SENSOR_CONF parameters. (1)	Bad::out of service
11	Bad units selected	Critical	Incorrect units have been configured. (see table 9-8)	Bad::out of service

Possible configurations for the XD block

The following table shows the links that exist between the parameter in the XD block.

Table 9-5 Possible Configurations for the XD block

<table>
<tr><th>Sensor type</th><th>Differential wiring</th><th>Redundant wiring</th><th>Single sensor wiring</th><th>3 wires wiring</th><th>4 wires wiring</th></tr>
<tr><td>T/C J</td><td colspan="3" rowspan="11">°C, °K, °F, °R, mV</td><td colspan="2" rowspan="11">Impossible</td></tr>
<tr><td>T/C K</td></tr>
<tr><td>T/C T</td></tr>
<tr><td>T/C S</td></tr>
<tr><td>T/C R</td></tr>
<tr><td>T/C E</td></tr>
<tr><td>T/C B</td></tr>
<tr><td>T/C N</td></tr>
<tr><td>T/C C</td></tr>
<tr><td>T/C D</td></tr>
<tr><td>NiNimo</td></tr>
<tr><td>JPT 100</td><td rowspan="7">°C, °K, °F, °R, Ohms</td><td rowspan="7"></td><td colspan="3" rowspan="7">°C, °K, °F, °R, Ohms</td></tr>
<tr><td>PT100</td></tr>
<tr><td>PT200</td></tr>
<tr><td>PT500</td></tr>
<tr><td>NI500</td></tr>
<tr><td>Cu10</td></tr>
<tr><td>Cu25</td></tr>
<tr><td>Ohms</td><td colspan="2" rowspan="3">Impossible</td><td colspan="3">Units must be Ohms</td></tr>
<tr><td>mv</td><td>mV</td><td colspan="2" rowspan="2">Impossible</td></tr>
<tr><td>RH</td><td>°C, °K, °F, °R, mV</td></tr>
</table>

Identifying Device Faults

Checking the status and values of key block parameters you can identify the type of device fault (critical or non-critical). Table 9-6 helps you identify the type of device fault and provides corrective action to restore normal operation.

Table 9-6 Identifying Critical and Non-critical Device Faults.

Block.Parameter	Value or Message *	Fault Type	Action
AI.OUT = STATUS =	Bad/sensor failure	Critical	1. Look in AI.BLOCK_ERR for message. (See Subsection 9.8 for details on BLOCK_ERR.) 2. Look in BLOCK_ERR of all blocks in device for message. 3. See Table 9-8, "Summary of Critical Faults."
	Bad/device failure	Critical	1. Look in AI.BLOCK_ERR for message. (See Subsection 9.8 for details on BLOCK_ERR.) 2. Look in BLOCK_ERR of all blocks in device for message. 3. See Table 9-8, "Summary of Critical Faults."
	Good/constant Uncertain	Non-critical	See Table 9-7, "Summary of Non-critical Faults."
AI.ALARM_SUM CURRENT =	Block alarm	Critical/ Non-critical	Look in BLOCK_ERR of all blocks in the device. See Subsection 9.8 for details on BLOCK_ERR.)
	Process alarm	Non-critical	See Table 9-7, "Summary of Non-critical Faults."

* Depending on the fieldbus interface application, device operating status and parameter values may appear as text messages. The text in the table is typical of values or messages seen when using the NI-FBUS configurator.

Table 9-6 Identifying Critical and Non-critical Device Faults, continued

Block.Parameter	Value or Message * (Bit number)	Fault Type	Action
All Blocks **BLOCK_ERR =**	Block Configuration Error (1)	Non-critical	Check the value of all configurable parameters in the block and correct if necessary. See Subsection 9.10 “Clearing Block Configuration Errors.”
(See Table 9-10 for description of BLOCK_ERR messages)	Simulation Active (3)	Non-critical	Set "simulate jumper" to "N" on the electronics board, and set the ENABLE_DISABLE field to “1” of the SIMULATE parameter. (See Subsection 9.12)
	Input Failure/Process Variable has Bad Status (7)	Critical	Write Processor (or 4) to RESTART parameter of resource block. If failure is still present, replace meter body.
	Memory Failure (9)	Critical	Set Resource block to O/S
	Lost Static Data (10)	Critical	Write Processor (or 4) to RESTART parameter.
	Lost NV Data (11)	Critical	Wait 20 minutes.
	Readback Check Failed (12)	Critical	See Critical Fault NOTE.
	Out-of-Service (15)	Non-critical	Write proper mode to MODE_BLK parameter.
Unable to write values to valid device parameters		Configuration Error	See Subsection 9.10 “Clearing Block Configuration Errors” and Table 9-12, “Summary of Configuration Errors.”

* Depending on the fieldbus interface application, device operating status and parameter values may appear as text messages. The text in the table is typical of values or messages seen when using the NI-FBUS configurator.

Critical Fault NOTE In the case of a critical fault due to Memory Failure, Lost NV/Static data, or Readback check failure, you may need to write to the RESTART parameter twice for the transmitter to fully recover from the fault condition. Therefore:

1. Write “4” or “processor” to RESTART parameter of resource block.
2. Wait until communication is established. *
3. If the fault occurs again, Repeat the write to the RESTART parameter.
4. If the fault occurs again, Replace the transmitter electronics module.

* If a ROM error (Memory Failure) occurs in the resource block, it may take up to 20 minutes for the fault to reappear.

9.6 Non-Critical Fault Summary

Non-critical Failures

Table 9-7 summarizes the conditions that could cause a non-critical fault in the STT35F transmitter along with recommended actions to correct the fault.

Table 9-7 Summary of Non-critical Faults

Problem/Fault	Probable Cause	Recommended Action
AI block is executing, but status of OUT parameter is:		
Good::[alarm status]:Constant	AI block is in Manual mode.	Write Auto to MODE_BLK parameter of AI block.
One of the following AI alarms is active (in ALARM_SUM.CURRENT):	1. HI_HI, HI, LO, LO_LO - OUT has crossed the corresponding limit (HI_HI_LIM, HI_LIM, LO_LIM, LO_LO_LIM), and is either still past the limit or is in the hysteresis range. (ALARM_HYS is the percentage of OUT_SCALE that is used for alarm hysteresis.)	Reduce the value or increase limits.
	2. Block alarm.	Check BLOCK_ERR for status bit. See Subsection 9.8 for details of BLOCK_ERR parameter.

9.7 Critical Fault Summary

Non-critical Failures

Table 9-8 summarizes the conditions that could cause a critical fault in the STT35F transmitter along with recommended actions to correct the fault.

Table 9-8 Summary of Critical Faults

Problem/Fault	Probable Cause	Recommended Action
AI block is executing, but status of output is:		
Bad:[alarm status]: sensor failure	Sensor problems	See Section 9.5
Bad::[alarm status]: device failure	Transducer board has stopped communicating with the stack board.	Write "4" " or “processor” to RESTART parameter of resource block.
BLOCK_ALM of the Transducer Block is active	Check BLOCK_ERR for status message.	See Subsection 9.8 for details of BLOCK_ERR parameter.
BLOCK_ALM of the Resource Block is active	Check BLOCK_ERR for status message.	See Subsection 9.8 for details of BLOCK_ERR parameter.

9.8 Device Diagnostics

STT35F Memory

The STT35F contains a number of areas of memory. An EEPROM provides a non-volatile memory area for static and non-volatile parameter values. The transmitter also contains areas of RAM and ROM.

Background Diagnostics

Block objects (Resource, Transducer and Function blocks), the communications stack and other device objects each have a designated area of memory where their database resides. Diagnostic routines are performed in the background during device operation which check the integrity of these individual databases. When a failure is detected, a status bit is set in the BLOCK_ERR parameter in the appropriate block object.

Diagnostic checks are performed continuously on the device functional databases of the transmitter application shown in Table 9-9.

Table 9-9 Areas of Device Memory Where Data is Stored.

Device Functional Area	Location
Block object database (DB)	RAM and EEPROM
Communication stack database (DB)	EEPROM
Boot ROM	ROM
Program ROM	ROM
Trend and link object databases (DB)	EEPROM

BLOCK_ERR parameter

BLOCK_ERR parameter shows diagnostic faults of hardware and software components within the transmitter. Each block object in the transmitter device application contains a BLOCK_ERR parameter. BLOCK_ERR is actually a bit string which provides a means to show multiple status or error conditions. A status message identifying the fault can be viewed by accessing the parameter. Table 9-10 shows the bit mapping of the BLOCK_ERR parameter.

Background Diagnostics Execution, BLOCK_TEST parameter

To verify that block and background diagnostics are executing in a particular block:
View the BLOCK_TEST parameter of the block.

- If the first element of the parameter (BLOCK_TEST =) is incrementing, the block is executing and the diagnostics are active.
- If the first element value is not increasing, the block is not executing.

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Table 9-10 BLOCK_ERR Parameter Bit Mapping

BLOCK_ERR Bit	Value or Message *	Description
0	*Not used*	(least significant bit) (LSB)
1	Block configuration error	Invalid parameter value in block. See “Clearing Block configuration Errors.”
2	*Not used*	
3	Simulate parameter active	The SIMULATE parameter is being used as the input to the AI block. This occurs if the "simulate jumper" is set to "Y" on the electronics board, and the ENABLE_DISABLE field of the SIMULATE parameter is set to 2. See Subsection 9.12 also.
4	*Not used*	
5	*Not used*	
6	*Not used*	
7	Input failure/process variable has BAD status	Sensor failure
8	*Not used*	
9	Memory failure	• Block database (DB) error or • ROM failure (Resource block only)
10	Lost static data	• Block Non-Volatile (NV) memory failure • Stack NV memory failure • Link or Trend objects NV memory failure
11	Lost NV data	• EEPROM write to block DB failed • EEPROM write to Stack DB failed (Resource block only) • EEPROM write to Link or Trend DB failed (Resource block only)
12	Readback check failed (Checksum error)	Communication failure to serial EEPROM (Resource block only)
13	*Not used*	
14	*Not used*	
15	Out-of-service	Out of Service - The block's actual mode is O/S (most significant bit) (MSB)

***** Depending on the fieldbus interface application, device operating status and parameter values may appear as text messages. The text in the table is typical of values or messages seen when using the NI-FBUS configurator.

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ERROR_DETAIL parameter

ERROR_DETAIL parameter in the resource block contains data which describes the cause of any device-critical error. This category of error will cause the resource block to remain in O/S actual mode regardless of its target mode. This in turn causes all other blocks to remain in O/S actual mode.

ERROR_DETAIL is an array of three unsigned integers, each 16 bits in size. The three sub-elements are generally defined as follows:

1 - Error Type
2 - Location
3 - Sub-type

ERROR_DETAIL Enumeration

Table 9-11 lists the enumerated values for the Error Type element only. The Location and Sub-type elements have no significant meaning for users.

Table 9-11 ERROR_DETAIL Parameter Enumeration

ERROR_DETAIL	Message
0	No error
1	HC11 ROM checksum
2	HC16 boot ROM checksum
3	HC16 application ROM checksum
4	Interprocessor error (startup)
5	Interprocessor error (operation)
6	EEPROM corrupt (background diagnostics)
7	EEPROM driver error
8	EEPROM - fieldbus write
9	Sensor error
10	Internal software error
11	Other

Using ERROR_DETAIL for Troubleshooting

If there is a critical error in the resource block you should read and record the ERROR_DETAIL value. Then reset the device (Write RESTART parameter “Processor”). Wait 30 seconds after reset and read ERROR_DETAIL again to check if error cleared and then Call Honeywell Technical Assistance Center.

9.9 Block Configuration Errors

Configuration Errors

Block configuration errors prevent a device block from leaving O/S mode. The BLOCK_ERR parameter (bit 1) shows whether a block configuration error is present. Table 9-12 summarizes the conditions that may be the result of block configuration errors which in turn cause a device fault. Follow the recommended actions to correct these errors.

Table 9-12 Summary of Configuration Errors

Problem/Fault	Probable Cause	Recommended Action
Name of parameters are not visible	Missing or incorrect version of Device Description file on host computer.	1. Check path to Device Description. 2. Load correct version of DD.
Unable to write successfully to MODE_BLK of any block.	Mode not supported in TARGET and/or PERMITTED modes for the given block.	• Verify that the mode being written is supported by the block. • If writing TARGET mode only, then the desired mode must already be set in the PERMITTED field. • If writing the whole MODE_BLK record, then the mode set in TARGET must also be set in the PERMITTED field. Other modes may also be set in the PERMITTED field, but target mode must be set.
Unable to write to a parameter	1. Parameter is read-only. 2. Subindex of the parameter is read-only. Some parameters have fields that are not writeable individually (such as MODE_BLK.ACTUAL). 3. Write-locking is active. Resource block parameter WRITE_LOCK value is 2. 4. Corresponding block is in the wrong mode. Some parameters can only be written to in O/S mode only, or in O/S or Manual modes. 5. Data written to the parameter is out of the valid range for that parameter. 6. Subindex used is invalid for that parameter	1. None 2. None 3. Remove write protect jumper (see Subsection 6.5) 4. Write valid mode to MODE_BLK parameter of block (O/S or MAN modes). See “Mode Restricted Writes to Parameters” in Subsections 8.6 and 8.7. 5. Write valid range values to parameter. 6. Enter valid subindex for parameter.

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Table 9-12 Summary of Configuration Errors, continued

Problem/Fault	Probable Cause	Recommended Action
Unable to change Resource block to Auto mode	The second element of BLOCK_TEST is non-zero.	Write all zeroes to the second element of the BLOCK_TEST parameter.
Unable to change Transducer block to Auto mode	1. Resource block is in O/S mode 2. The second element of BLOCK_TEST is non-zero. 3. There is a configuration error in the block.	1. Write Auto mode to MODE_BLK.TARGET of the Resource block. 2. Write all zeroes to the second element of the BLOCK_TEST parameter. 3. Find and correct any configurable parameter outside its valid range. See “Clearing Block Configuration Errors” in Subsection 9.10.
Unable to change Analog Input block from O/S mode	1. The block has not been configured to execute. It is neither in the function block schedule in the System Management Information Base, nor is it linked to another executing block via the "next block to execute" field in the block record (relative parameter index "0"). 2. Resource block is in O/S mode. 3. Block configuration error.	1. Build and download an execution schedule for the block including links to and from AI block with other function blocks. 2. Write Auto mode to MODE_BLK of resource block. 3. a. Check the parameters ALERT_KEY, CHANNEL, and L_TYPE. All values must be non-zero. b. BLOCK_ERR for Bit 1 set. If set, check all configurable parameters for possible invalid values. See “Clearing Block Configuration Errors” in Subsection 9.10.

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Table 9-12 Summary of Configuration Errors, continued

Problem/Fault	Probable Cause	Recommended Action
Unable to change Analog Input block from O/S mode, *Continued*	5. XD_SCALE UNITS_INDEX is not equal to the Transducer block output units.	5. a. If CHANNEL value is 1, then XD_SCALE units must equal the units in transducer block parameter PRIMARY_ VALUE_RANGE. b. If CHANNEL value is 2, then the units must equal % (1342).
	6. The second element of BLOCK_TEST is non-zero.	6. Write all zeroes to the second element of the BLOCK_TEST parameter.
AI Block is in the correct mode but does not seem to be operating	1. Simulation active.	1. Disable simulation. See Subsection 9.12 for procedure.
	2. The block has not been configured to execute. It is neither in the function block schedule in the System Management Information Base, nor is it linked to another executing block via the "next block to execute" field in the block record (relative parameter index "0").	2. Build and download an execution schedule for the block including links to and from AI block with other function blocks.
	3. The second element of BLOCK_TEST is non-zero.	3. Write all zeroes to the second element of the BLOCK_TEST parameter.

9.10 Clearing Block Configuration Errors

Clearing Block Configuration Errors

Tables 9-13 and 9-14 list the parameters in the AI and PID blocks which can cause the status bit of Block Configuration Error to be set in their respective BLOCK_ERR parameters. The tables also provide the initial values and the valid range for the parameters.

NOTE: Block configuration errors can only be cleared if the function block is being executed (running). One way of determining block execution is by doing a series of two or three reads of the BLOCK_TEST parameter and confirming that the first byte of the parameter is incrementing. This will work if the execute rate is fast relative to the speed of reading BLOCK_TEST. A very slowly executing block may not *appear* to execute because block parameters are updated only when the block executes.

Table 9-13 AI Block Parameters

Parameter	Initial Value	Valid Range	Corrective Action
ALERT_KEY	0	non-zero	*Initial Value is a configuration error* Set value to non-zero number.
SIMULATE	1 (disabled)	1-2 (disabled - enabled)	Set value in valid range.
XD_SCALE	0 to 100 inches of water	EU_100 > EU_0, UNITS_INDEX matches output of transducer block	Set values to valid range(s).
OUT_SCALE	0 to 100 inches of water	EU_100 > EU_0	Set values to valid range.
CHANNEL	0	1-2	*Initial Value is a configuration error* Set value to valid range.
L_TYPE	0 (Uninitialized)	1,2,3 (direct, indirect, sq. root)	*Initial Value is a configuration error* Set value to valid range.
PV_FTIME	0	0-200	Set value to valid range.
ALARM_HYS	0.5 (%)	0-50 (%)	Set value to valid range.
HI_HI_PRI, HI_PRI, LO_LO_PRI, LO_PRI	0	0-15	Set value to valid range.
HI_HI_LIM, HI_LIM	+INF	+INF or within OUT_SCALE range	Set value to valid range.
LO_LIM, LO_LO_LIM	-INF	-INF or within OUT_SCALE range	Set value to valid range.

Table 9-14 PID Function Block Parameters

Parameter	Initial Value	Valid Range	Corrective Action
BYPASS	0	1:OFF, 2:ON	*Initial value is a configuration error*. Set value in valid range.
SHED_OPT	0	1-8 (see Shed Options in the FF specs.)	*Initial value is a configuration error*. Set value in valid range.
HI_HI_LIM HI_LIM	+INF +INF	PV_SCALE, +INF	Values must be set in rank order. e.g. LO_LIM > LO_LO_LIM but < HI_LIM etc.
LO_LIM LO_LO_LIM	-INF -INF	PV_SCALE, -INF	Values must be set in rank order.
OUT_HI_LIM OUT_LO_LIM	100 0	OUT_SCALE +/- 10%	Verify that OUT_HI_LIM > OUT_LO_LIM.
SP_HI_LIM SP_LO_LIM	100 0	PV_SCALE +/- 10%	Verify that SP_HI_LIM > SP_LO_LIM.

9.11 Code Download

Code Download Utility

A code download may be recommended to upgrade the transmitter firmware. A download utility program is used to perform the upgrade. A code download also updates other files necessary for proper operation; specifically, new versions of the Standard Dictionary and Device Description files are loaded on the host computer. These files are compatible with the "new" code.
Table 9-15 outlines the procedure for code download on a STT35F transmitter using the "Honeywell FF Products Download Application".

WARNING

A code download can be performed on an active live control loop. Prepare the control loop by setting the final control device to a safe state. The transmitter will be off-line for about 30 minutes. When the download is complete, the transmitter will revert to default settings, so before you download save the present configuration.

Table 9-15 Code Download Procedure

Step	Action
1	Save the current FBAP configuration of the device which you are going to perform a code download.
2	Start NIFB.exe and then DLOAD.exe (the Honeywell download application).
3	Select a device using the "Refresh" button.
4	Enter the code file name, including path, or use the "Browse" button.
5	Press the "Download" button to start the download.
6	After 6 to 8 minutes, a message box displays that the download is complete.
7	Verify the values of DL_SIZE and DL_CHECKSUM in the message box with those in the release guide accompanying the code software. • If both values match, you can choose to ACTIVATE the new software. • If either result does not match, DO NOT ACTIVATE and select "CANCEL". You can either retry the download or contact Honeywell Technical Assistance Center.
8	If you choose to activate the software, the transmitter will reset and after about 2 minutes reappear on the network.
9	Once the download is complete, the transmitter will contain a default database. You must then download the FBAP configuration saved in step 1 to the transmitter.

Continued on next page

The Effects of a Code Download on a Device

The effects on a device as a result of the download are that all configuration data in the device, with the exception of calibration data is cleared.
This includes:

- Device and block tags
- Block parameters
- The function block schedule
- Link object, trend object, and VCR configurations
- The network schedule

This requires you reconfigure the block tags and the control system and then download the configuration (FBAP file) to the device and other device on the network.

The device ID may appear differently on the network, due to differences between the new and older software versions. The device may appear as a new device since the NI Configuration system uses the device ID as the key identification variable for a device.

9.12 Simulation Mode

Simulation Mode Jumper

A simulation mode is available in the transmitter which is used to aid in system debug if the process is not running. The SIMULATE parameter in the AI block provides a user-selected value as the input to the AI block.

A hardware jumper on the terminal block is provided to enable the SIMULATE parameter. See Figure 9-1 for jumper location. Table 9-16 shows how to set the simulation jumper on the terminal block.

Figure 9-1 Simulation Jumper Location on Terminal Block

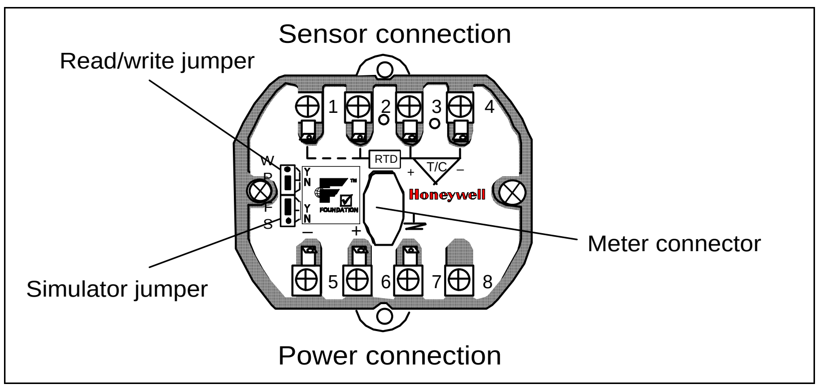
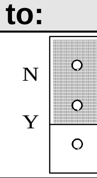
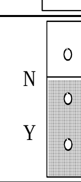


Table 9-16 Setting the Simulation Jumper

To	Set the Jumper to:	
Disable the SIMULATE parameter. (Set transmitter for normal operation)	"N" position on the Transducer board.	
Enable the SIMULATE parameter. (For testing or debugging purposes)	"Y" position on the Transducer board.	

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SIMULATE Parameter

The SIMULATE parameter is enabled by setting the simulation jumper to the “Y” position.

Additionally, AI block SIMULATE parameter must be set to the following values:

SIMULATE

STATUS =	Good, constant (*suggested setting*)
SIMULATE_VALUE =	(*supplied by user*)
ENABLE_DISABLE =	Active

The truth table in Table 9-17 shows the states of the simulation jumper and SIMULATE parameter to activate the simulation mode.

Table 9-17 Simulation Mode Truth Table

When the Simulation Jumper on Transducer board is set to:	**— and the SIMULATE Enable_Disable is set to:** 1 (Disabled)	2 (Active)
“N” Position	Simulation Disabled	Simulation Disabled
“Y” Position	Simulation Disabled	**Simulation Active**

AI Block Mode

To connect the AI block input to the output, the AI block must be in AUTO mode.

10. PARTS LIST

10.1 Replacement Parts

Recommended spare parts

Table 10-1 describes the recommended spares and their corresponding part numbers for the STT35F.

Table 10-1 Recommended Spares

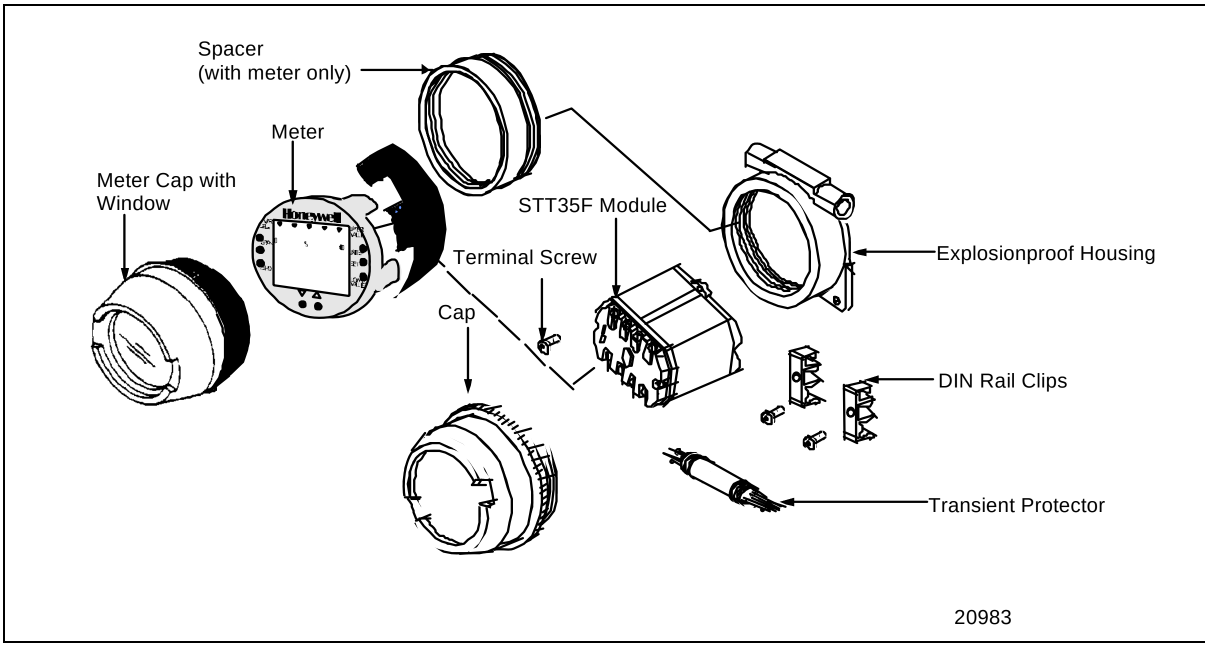
Part Number	Description
STT35F-00-00-0-00	STT35F Module
30755951-001	Explosionproof housing
30755905-001	Mounting Bracket Kit for 2-inch pipe (Carbon Steel)
30671907-001	Mounting Bracket Kit for 2-inch pipe (Stainless Steel)
30755970-001	Transient Protector (optional)
30752008-001	Cap, explosion-proof housing (No Window)
30755956-001	Cap, explosion-proof housing (Window)
30756334-002	Spacer
46188056-501	Meter mounting bracket
46188055-501	Accessory Kit (8 terminal screws, 2 jumpers, 1 plastic hole cover, 2 module retaining screws, 2 DIN rail clips)
46188055-502	2 DIN rail clips and 2 screws kit
51309389-002	Local Meter
51196567-001	1/2” NPT to 3/4”” NPT adapter (optional)
51196567-001	1/2” NPT to M10 adapter (optional)
46188074-901	Telematic surge protector

Continued on next page

STT Parts Diagram

Figure 10-1 shows an exploded view of the STT 3000 parts

Figure 10-1 STT Exploded Parts



11. APPENDIX A

11.1 External Wiring Diagram

DESCRIPTION	NUMBER
CSA: External wiring Diagram STT350 Fieldbus Foundation Smart Temperature Transmitter	46188114-201
FM: External Wiring Diagram STT350 Fieldbus Foundation Smart Temperature Transmitter	46188115-201

11.1.1 - IS Control Drawing, STT35F Smart Fieldbus Temperature transmitter – CSA Certified - 46188114-201

PRE REL		
ISS	REVISION & DATE	APPD
G	REVISED 10/06/09 ECO-0057276	AW

46188114-201 | A | CAD

(1) Resistance temperature detector (RTD) measurements uses the 3 or 4 wire approach. The transmitter determines by itself if a 3 or 4 wire RTD is connected when powered up. In case a 3 wire RTD is used, then current leading wires are connected between 2 and 4 the compensating wire to 3. In case a 4 wire RTD is used, the current carrying wires are connected between 1 and 4 and the compensating wires to 2 and 3.

(2) Differential T/C: a strap should be wired between terminal 4 and 1. T/C 1 should be wired between terminals 4 and 3, T/C 2 should be wired between 4 and 2. The output is T/C 1 - T/C2- Redundant T/C : T/C 1 should be wired between ternimals 4 and 3, T/c 2 (back-up) should be wired between 4 and 2.

(3) Barrier manufacturer's installation drawing must be followed when installing this equipment. STT350 Temperature Transmitter's Entity and FISCO parameters per table 1.

Ci < 2.5 nF
Li = 0
ENITITY Pi = 1.2 W, FISCO Pi = 5.32 W

(4) Non-galvanically isolated associated apparatus (zener barrier) must be connected to suitable ground electrode per CSA C22.1, Appendix F3.2. The resistance of the ground path must be less than 1 Ohm.

(5) Any CSA certified single or dual channel barrier with parameters listed below the STT35F temperature Transmitter and associated apparatus shall bear the mark of the same approval agency.

Voc < V max   Isc < I max
Ca > Ci + Ccable   La > Li + Lcable

(6) Shielded wire is required for CE conformity and recommanded for other applications. Ground shield at supply (barrier) end only.

Notes

CERTIFICATION DOCUMENT
ENGINEERING CHANGE ORDERS (ECO's) MUST BE AUTHORIZED BY APPROVALS ENGINEERING

PROJECTION	DRAWN	WF	10/22/08	Honeywell
	CHECKED			
LINEAR MEASURE INCH	DEV ENGR			IS CONTROL DRAWING STT35F SMART FIELDBUS TEMP. TRANSMITTER–CSA CERTIFIED
MATERIAL	MFG ENGR			
	QA ENGR MAT ENGR			
	TOLERANCE UNLESS NOTED			A4 46188114–201
FINISH	ANGULAR DIMENSION			SCALE NONE / USED ON / SHT 1 OF 5

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NOTES CONT.

(7) FIELDBUS power supply and control equipment connected to protective barrier must not use or generate more than 250 Vrms or Vdc.

(8) The following cable parameters for the sensor inputs connections must not be exceded :

Group	Capacitance (µf)	Inductance (mH)
A,B	Ca = 1.62	La = 14.7
C,D	Ca = 4.92	La = 56.2
E,F,G	Ca = 13.1	La = 117

(9) Associated apparatus manufacturer's installation drawing must be followed when installing this equipment.

(10) The FISCO associated apparatus must be fm approved.

(11) Control equipment connected to FISCO barrier must not use or generate more than 250Vrms or 250Vdc.

(12) Resistance between FISCO ground and earth ground must be less than 1Ω.

(13) Installation should be in accordance with ANSI/ISA-RP12.06.01 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the Canadian Electrical Code (CSA C22.1).

(14) The FISCO concept allows interconnection of Fieldbus Intrinsically safe apparatus with FISCO associated apparatus when the following is true:

Vmax or Ui $\geq$ Voc, Vt or Uo;

Imax or Ii $\geq$ It or Io;

Pmax or Pi $\geq$ Po

(15) Simple apparatus is a device that will neither generate nor store more than 1.2 V, 0.1 A, 0.25 mW or 20 uJ, such as switches thermocouples, light-emitting diodes, connectors and RTD's.

(16) STT35F Temperature Transmitter is also nonincendive for installation in Class I, Division2, Groups A,B,C,D; suitable for installation in Class II, III, Division 2, Groups F, G, FNICO perameters per Table 2 (if installed in EP or XC housing) and does not require connection to protective barrier when intalled per the National Electrical Code and when connected to power source not exceeding 42 Vdc.

(17) No revisions to drawing without prior CSA Approval.

(18) Dust tight seals must be used when installed in Class II or III environments.

(19) Installation should be in accordance with ANSI/ISA RP12.6 "Installation of Intrinsically safe System for Hazardous Locations" and the FIELDBUS FOUNDATION guidelines must also be followed.

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SCALE NONE | REV G | DATE10/06/09 | SHT 2 OF 5

DO NOT SCALE DRAWING

FISCO Concept

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 (Vmax or Ui), the current (Imax or Ii), and the power (Pi), which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal to or greater than the voltage (Uo, Voc, Vt), the current (Io, Isc, It,) 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 the terminators) connected to the Fieldbus must be less than or equal to 5nF and 10mH 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 (Uo, Voc, Vt) of the associated apparatus used to supply the bus must be limited to the range of 14Vd.c. to 17.5Vd.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 50mA 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 Rc: 15Ω/km ...150 W/km

Inductance per unit length Lc: 0.4mH/km...1mH/km

Capacitance per unit length Cc: 45nF/km ...200nF/km

Length of spur cable: 60m maximum

Length of trunk cable: 1km maximum

Terminators

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

R = 90Ω ...102Ω

C = 0 ...2,2 uF

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TABLE 1

Units	ENTITY CL I, Div 1, Gp A,B,C,D,E,F&G- Barrier where Po ≤ 1.2W	ENTITY CL I, Div 1, Gp C,D,E,F&G- Barrier where Po ≤ 1.2W	CL I, Div 1, Gp A,B,C,D,E,F&G- FISCO systems
Ui	30 VDC	24 VDC	17.5 VDC
Ii	100 mA DC	250 mA DC	380 mA DC
Pi	1.2 W	1.2 W	5.32 W
Li	0	0	0
Ci	2.5 nF	2.5 nF	2.5 nF
T5	Tamb. ≤ 65°C	Tamb. ≤ 65°C	Tamb. ≤ 55°C
T6	Tamb. ≤ 60°C	Tamb. ≤ 60°C	———

TABLE 2

Units	STT35F NI, Class I, Division 2, Groups A, B, C & D ENTITY / FINCO
Ui	No barrier
Ii	32 VDC
Ci	2.5 nF
T6	Tamb. ≤ 80°C

TERMINOLOGY
Ci: Max internal unprotected capacitance in STT35F temp transmitter
Li: Max internal unprotected inductance in STT35F temp transmitter
Voc: Open circuit voltage available from associated apparatus
Isc: Short circuit current available from associated apparatus
Pmax: Max power transferred from associated apparatus to transmitter
Ca: Maximum capacitance which can be connected to the transmitter
La: Maximum inductance which can be connected to the transmitter

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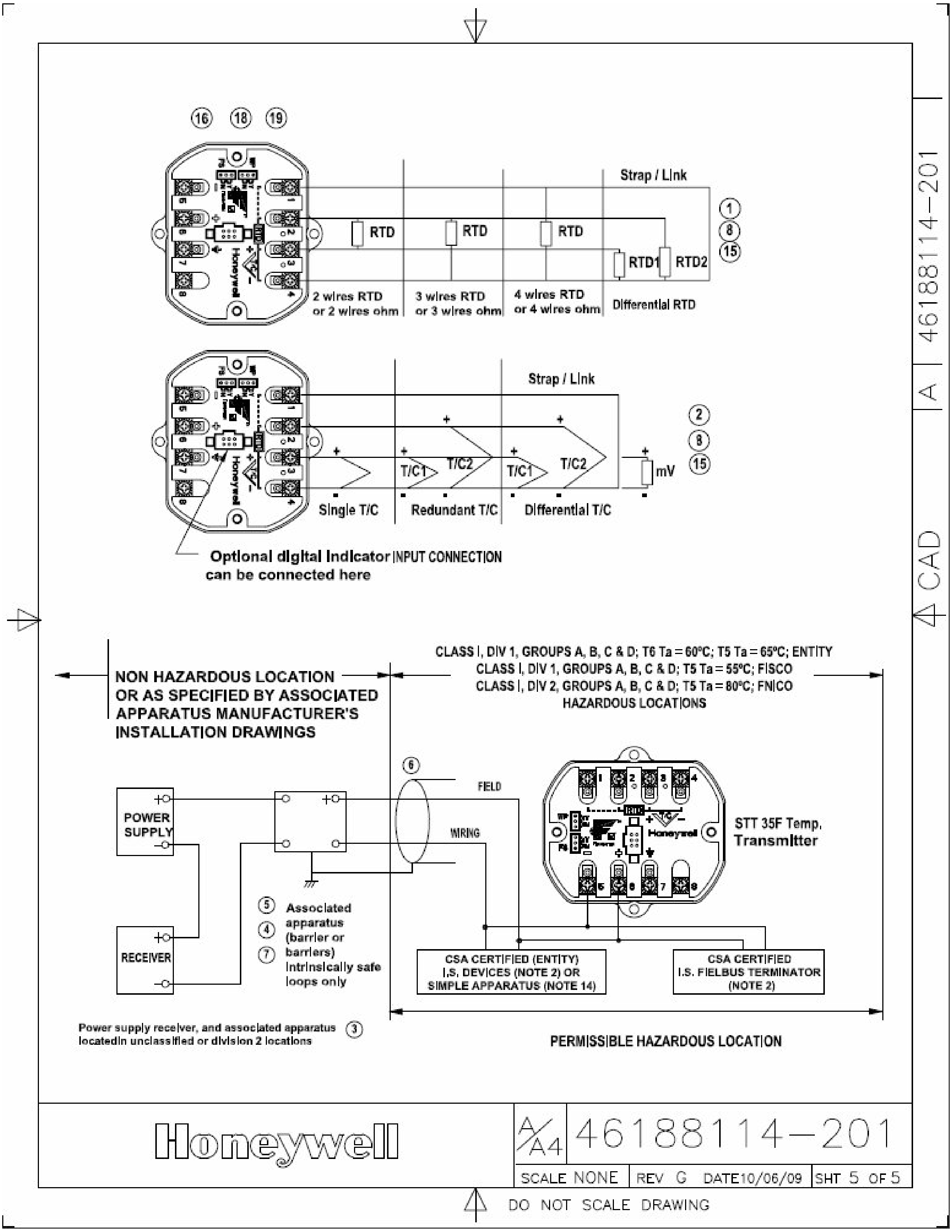

(16) (18) (19)
Strap / Link
RTD
RTD1
RTD2
2 wires RTD or 2 wires ohm
3 wires RTD or 3 wires ohm
4 wires RTD or 4 wires ohm
Differential RTD
(1) (8) (15)
Strap / Link
T/C1
T/C2
mV
(2) (8) (15)
Single T/C
Redundant T/C
Differential T/C
Optional digital Indicator INPUT CONNECTION can be connected here
NON HAZARDOUS LOCATION OR AS SPECIFIED BY ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWINGS
CLASS I, DIV 1, GROUPS A, B, C & D; T6 Ta = 60°C; T5 Ta = 65°C; ENTITY
CLASS I, DIV 1, GROUPS A, B, C & D; T5 Ta = 55°C; FISCO
CLASS I, DIV 2, GROUPS A, B, C & D; T5 Ta = 80°C; FNICO
HAZARDOUS LOCATIONS
(6)
FIELD
WIRING
POWER SUPPLY
RECEIVER
STT 35F Temp. Transmitter
(5) (4) (7) Associated apparatus (barrier or barriers) intrinsically safe loops only
CSA CERTIFIED (ENTITY) I.S. DEVICES (NOTE 2) OR SIMPLE APPARATUS (NOTE 14)
CSA CERTIFIED I.S. FIELBUS TERMINATOR (NOTE 2)
Power supply receiver, and associated apparatus located in unclassified or division 2 locations (3)
PERMISSIBLE HAZARDOUS LOCATION
46188114-201
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Honeywell
A/A4 46188114-201
SCALE NONE
REV G
DATE 10/06/09
SHT 5 OF 5
DO NOT SCALE DRAWING

11.1.2 - IS Control Drawing, STT35F Smart Fieldbus Temperature transmitter – FM Certified - 46188115-201

PRE REL		
ISS	REVISION & DATE	APPD
C	REVISED 0040935 6/18/08	BJD

46188115-201 | A | CAD

(1) Resistance temperature detector (RTD) measurements uses the 3 or 4 wire approach. The transmitter determines by itself if a 3 or 4 wire RTD is connected when powered up. In case a 3 wire RTD is used, then current leading wires are connected between 2 and 4 the compensating wire to 3. In case a 4 wire RTD is used, the current carrying wires are connected between 1 and 4 and the compensating wires to 2 and 3.

(2) Differential T/C: a strap should be wired between terminal 4 and 1. T/C 1 should be wired between terminals 4 and 3, T/C 2 should be wired between 4 and 2. The output is T/C 1 - T/C2- Redundant T/C : T/C 1 should be wired between ternimals 4 and 3, T/c 2 (back-up) should be wired between 4 and 2.

(3) Barrier manufacturer's installation drawing must be followed when installing this equipment.
STT350 Temperature Transmitter's Entity and FISCO parameters per table 1.

Ci < 21 nF
Li = 0
ENITITY Pi = 1.2 W, FISCO Pi = 5.32 W

(4) Non-galvanically isolated associated apparatus (zener barrier) must be connected to suitable ground electrode per NFPA 70, Article 504. The resistance of the ground path must be less than 1 Ohm.

(5) Any FMRC Approved single or dual channel barrier with parameters listed below the STT35F temperature Transmitter and associated apparatus shall bear the mark of the same approval agency.

Voc or Vt < V max   Isc or It < I max
Ca > Ci + Ccable   La > Li + Lcable

(6) Shielded wire is required for CE conformity and recommanded for other applications. Ground shield at supply (barrier) end only.

Notes

CERTIFICATION DOCUMENT
ENGINEERING CHANGE ORDERS (ECO's) MUST BE AUTHORIZED BY APPROVALS ENGINEERING

PROJECTION	DRAWN	BC	6/18/08
	CHECKED		
LINEAR MEASURE INCH	DEV ENGR		
MATERIAL	MFG ENGR		
	QA ENGR MAT ENGR		
FINISH	TOLERANCE UNLESS NOTED		
	ANGULAR DIMENSION		

Honeywell

IS CONTROL DRAWING
STT35F SMART FIELDBUS TEMP.
TEMP. TRANSMITTER–FM APPROVED

A/A4 46188115–201

SCALE NONE | USED ON | SHT 1 OF 5

MASTER FILE TYPE: AUTOCAD   DO NOT SCALE DRAWING

NOTES CONT.

(7) FIELDBUS power supply and control equipment connected to protective barrier must not use or generate more than 250 Vrms or Vdc.

(8) The following cable parameters for the sensor inputs connections must not be exceded :

Group	Capacitance (µf)	Inductance (mH)
A,B	Ca = 1.62	La = 14.7
C,E	Ca = 4.92	La = 56.2
D,F,G	Ca = 13.1	La = 117

(9) Associated apparatus manufacturer's installation drawing must be followed when installing this equipment.

(10) The FISCO associated apparatus must be fm approved.

(11) Control equipment connected to FISCO barrier must not use or generate more than 250Vrms or 250Vdc.

(12) Resistance between FISCO ground and earth ground must be less than 1 Ω.

(13) Installation should be in accordance with ANSI/ISA-RP12.06.01 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electrical Code (ANSI/NFPA 70).

(14) The FISCO concept allows interconnection of Fieldbus intrinsically safe apparatus with FISCO associated apparatus when the following is true:

Vmax or Ui Voc, Vt or Uo;

Imax or Ii Isc, It or Io;

Pmax or Pi Po;

(15) Simple apparatus is a device that will neither generate nor store more than 1.2 V, 0.1 A, 0.25 mW or 20 uJ, such as switches thermocouples, light-emitting diodes, connectors and RTD's.

(16) STT35F Temperature Transmitter is also nonincendive for installation in Class I, Division2, Groups A,B,C,D; suitable forinstallation in Class II, III, Division 2, Groups F, G and Class 1, Zone 2, AEx nA IIC FNICO perameters per Table 2 (if installed in EP or XC housing) and does not required connection to protective barrier when intalled perthe National Electrical Code and when connected to power source not exceeding 42 Vdc.

(17) No revisions to drawing without prior FM Approval.

(18) Dust tight seals must be used when installed in Class II or III environments.

(19) Installation should be in accordance with ANSI/ISA RP12.6 "Installation of Intrinsically safe System for Hazardous (clasified) Locations" and the National Electrical Code (ANSI/NFPA 70) FIELDBUS FOUNDATION guidelines must also be followed.

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SCALE NONE | REV C | DATE 6/18/08 | SHT 2 OF 5

DO NOT SCALE DRAWING

FISCO Concept

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 (Vmax or Ui), the current (Imax or Ii), and the power (Pi), which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal to or greater than the voltage (Uo, Voc, Vt), the current (Io, Isc, It,) 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 the terminators) connected to the Fieldbus must be less than or equal to 5nF and 10mH 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 (Uo, Voc, Vt) of the associated apparatus used to supply the bus must be limited to the range of 14Vd.c. to 17.5Vd.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 50mA 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 Rc: 15Ω/km ...150 W/km

Inductance per unit length Lc: 0.4mH/km...1mH/km

Capacitance per unit length Cc: 45nF/km ...200nF/km

Length of spur cable: 60m maximum

Length of trunk cable: 1km maximum

Terminators

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

R = 90Ω ...102Ω

C = 0 ...2,2 uF

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SCALE NONE | REV C | DATE 6/18/08 | SHT 3 OF 5

DO NOT SCALE DRAWING

TABLE 1

Units	STT35F FIELDBUS TRANSMITTER		
	CL I, AEx ia IIC ENTITY CL I, Div 1, Gp A,B,C,D,E,F&G – Barrier where Po ≤ 1.2 W	CL I, AEx ia IIB ENTITY CL I, Div 1, Gp C,D,E,F&G – Barrier where Po ≤ 1.2 W	CL I, AEx ia IIC; CL I, Div 1, Gp A,B,C,D,E,F&G – FISCO systems
Ui	30 VDC	24 VDC	17.5 VDC
Ii	100 mA DC	250 mA DC	380 mA DC
Pi	1.2 W	1.2 W	5.32 W
Li	0	0	0
Ci	2.1 nF	2.1 nF	2.1 nF
T5	Tamb. ≤ 65°C	Tamb. ≤ 65°C	Tamb. ≤ 55°C
T6	Tamb. ≤ 60°C	Tamb. ≤ 60°C	-----------

TABLE 2

Units	STT35F
	Class I, Zone 2, IIC, ENTITY / FNICO
	NI, Class I, Division 2, Groups A, B, C & D ENTITY / FNICO
	No barrier
Ui	32 VDC
Li	0
Ci	2.1 nF
T6	Tamb. ≤ 80°C

TERMINOLOGY

Ci:Max internal unprotected capacitance in STT350 temp transmitter
Li:Max internal unprotected inductance in STT350 temp transmetter
Voc:Open circuit voltage avaibable from associated apparatus
Vt:Max open circuit voltage available from multichannel associated apparatus (Factory Mutual only)
Isc: Short circuit current available from associated apparatus
It:Max current available from multichannel associated apparatus (Factory Mutual only)
Pmax:Max power transferred from associated apparatus to transmitter

Ca : Maximum capacitance which can be connected to the transmitter

La : Maximum inductance which can be connected to the transmitter

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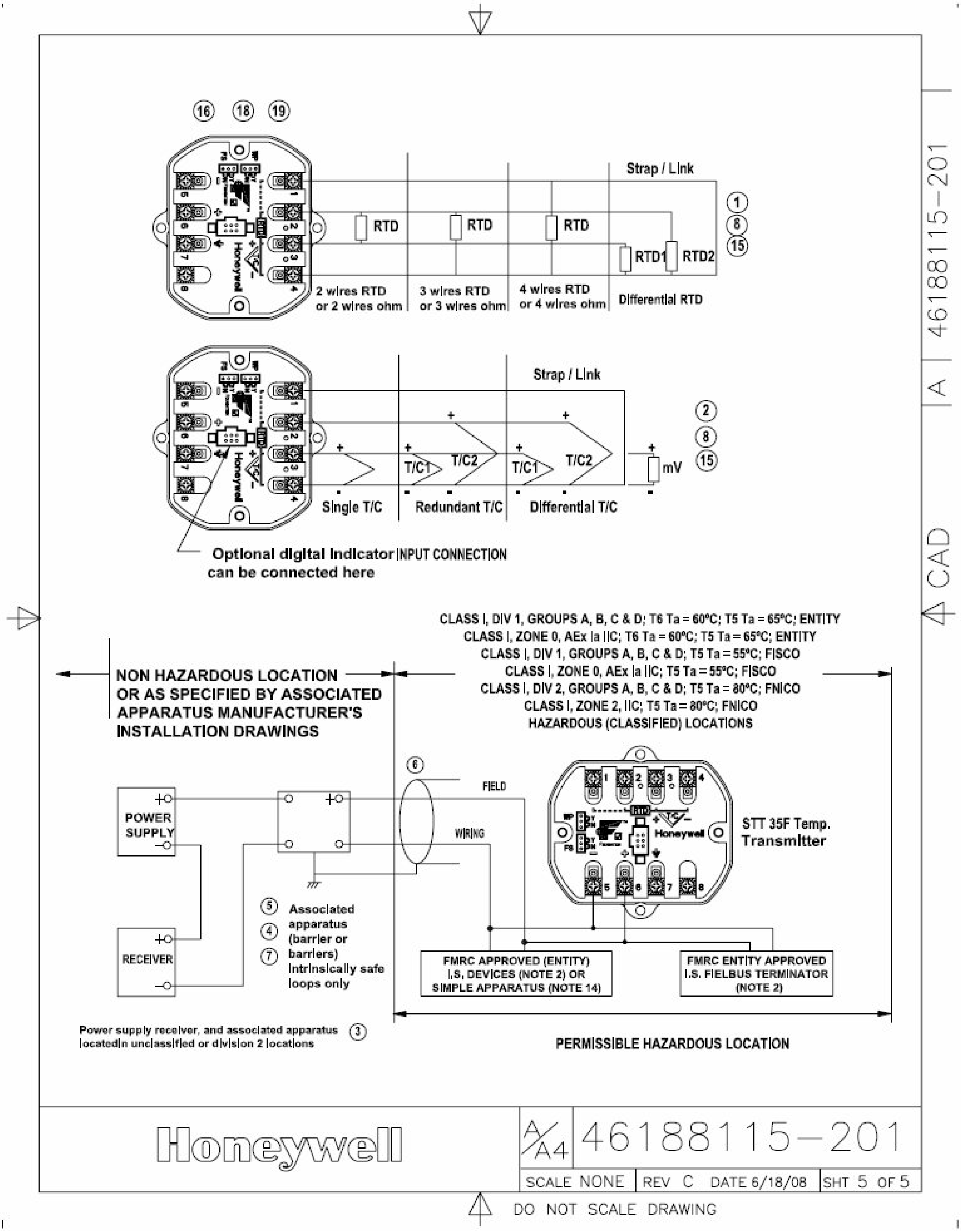
SCALE NONE | REV C | DATE 6/18/08 | SHT 4 OF 5

DO NOT SCALE DRAWING

46188115–201 A

CAD



Strap / Link
RTD
RTD
RTD
RTD1
RTD2
2 wires RTD
or 2 wires ohm
3 wires RTD
or 3 wires ohm
4 wires RTD
or 4 wires ohm
Differential RTD
Strap / Link
T/C1
T/C2
T/C1
T/C2
mV
Single T/C
Redundant T/C
Differential T/C
Optional digital Indicator INPUT CONNECTION
can be connected here
CLASS I, DIV 1, GROUPS A, B, C & D; T6 Ta = 60°C; T5 Ta = 65°C; ENTITY
CLASS I, ZONE 0, AEx ia IIC; T6 Ta = 60°C; T5 Ta = 65°C; ENTITY
CLASS I, DIV 1, GROUPS A, B, C & D; T5 Ta = 55°C; FISCO
CLASS I, ZONE 0, AEx ia IIC; T5 Ta = 55°C; FISCO
CLASS I, DIV 2, GROUPS A, B, C & D; T5 Ta = 80°C; FNICO
CLASS I, ZONE 2, IIC; T5 Ta = 80°C; FNICO
HAZARDOUS (CLASSIFIED) LOCATIONS
NON HAZARDOUS LOCATION
OR AS SPECIFIED BY ASSOCIATED
APPARATUS MANUFACTURER'S
INSTALLATION DRAWINGS
FIELD
WIRING
POWER
SUPPLY
RECEIVER
STT 35F Temp.
Transmitter
Associated
apparatus
(barrier or
barriers)
intrinsically safe
loops only
FMRC APPROVED (ENTITY)
I.S. DEVICES (NOTE 2) OR
SIMPLE APPARATUS (NOTE 14)
FMRC ENTITY APPROVED
I.S. FIELBUS TERMINATOR
(NOTE 2)
Power supply receiver, and associated apparatus
locatedin unclassified or division 2 locations
PERMISSIBLE HAZARDOUS LOCATION
46188115-201
A | CAD
Honeywell
A/A4 46188115-201
SCALE NONE
REV C
DATE 6/18/08
SHT 5 OF 5
DO NOT SCALE DRAWING

11.2 FISCO Concept

Overview

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 (Vmax or Ui), the current (Imax or Ii), and the power (Pi), which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal to or greater than the voltage (Uo, Voc, Vt), the current (Io, Isc, It,) 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 the terminators) connected to the Fieldbus must be less than or equal to 5nF and 10µH 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 (Uo, Voc, Vt) of the associated apparatus used to supply the bus must be limited to the range of 14Vd.c. to 17.5Vd.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 50µA 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 Rc: 15Ω/km ...150 /km
Inductance per unit length Lc: 0.4mH/km…1mH/km
Capacitance per unit length Cc: 45nF/km ...200nF/km
Length of spur cable: 60m maximum
Length of trunk cable: 1km maximum

Terminators At each end of the trunk cable a FM-approved line terminator with the following parameters is suitable:

R = 90Ω ...102Ω

C = 0 ...2.2 µF

1. No revision to drawing without prior fm approval.
2. Associated apparatus manufacturer's installation drawing must be followed when installing this equipment.
3. The FISCO associated apparatus must be fm approved.
4. Control equipment connected to FISCO barrier must not use or generate more than 250Vrms or 250Vdc.
5. Resistance between FISCO ground and earth ground must be less than 1Ω.
6. Installation should be in accordance with ANSI/ISA-RP12.06.01 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electrical Code (ANSI/NFPA 70).
7. The FISCO concept allows interconnection of Fieldbus intrinsically safe apparatus with FISCO associated apparatus when the following is true:

Vmax or Ui ≥ Voc, Vt or Uo;

Imax or Ii ≥ isc, It or Io;

Pmax or Pi ≥ Po;

Reference STT35F Control Drawing 46188115-201

Units	STT35F FIELDBUS TRANSMITTER		
	CL I, AEx ia IIC ENTITY CL I, Div 1, Gp A,B,C,D,E,F&G – Barrier where Po ≤ 1.2 W	CL I, AEx ia IIB ENTITY CL I, Div 1, Gp C,D,E,F&G – Barrier where Po ≤ 1.2 W	CL I, AEx ia IIC; CL I, Div 1, Gp A,B,C,D,E,F&G – FISCO systems
Ui	30 VDC	24 VDC	17.5 VDC
Ii	100 mA DC	250 mA DC	380 mA DC
Pi	1.2 W	1.2 W	5.32 W
Li	0	0	0
Ci	2.1 nF	2.1 nF	2.1 nF
T5	Tamb. ≤ 65ºC	Tamb. ≤ 65ºC	Tamb. ≤ 65ºC
T6	Tamb. ≤ 60ºC	Tamb. ≤ 60ºC	Tamb. ≤ 60ºC

Units	STT35F
	Class I, Zone 2, IIC, ENTITY / FNICO
	NI, Class I, Division 2, Groups A, B, C & D ENTITY / FNICO
	No barrier
Ui	32 VDC
Li	0
Ci	2.1 nF
T6	Tamb. ≤ 80ºC

11.3 PRODUCT CERTIFICATIONS

United States of America: FM Approvals
FM Approvals is accredited by OSHA as a Nationally Recognized Testing Laboratory (NRTL) to test and certify hazardous location equipment to applicable U.S. standards. FM Approvals certification assures customers that a product or service has been objectively tested and conforms to the highest national and international standards.

Canada: CSA Certification in North America
In Canada CSA is accredited by the Standards Council of Canada (SCC) to test and certify to applicable Canadian standards including the CSA C22.2 Series standards and the IEC based CSA E79 Series standards. In the U.S. CSA is accredited by OSHA as a Nationally Recognized Testing Laboratory (NRTL) to test and certify to applicable U.S. standards. The $CSA_{C/US}$ marking will be accompanied by specific hazardous locations markings.

European Union (EU): ATEX Directive 94/6/EC
The ATEX (ATmospheres EXplosibles) Directive 94/6/EC is a European CE Mark directive concerning products that are designed for use in potentially explosive environments. This “New Approach” directive is based on, and is an expansion of, European Norms (EN/IEC, CENELEC standards). Only products with the ATEX certification and with ATEX labeling will be approved for free movement in the EU (European Union) and EFTA (European Free Trade Association) countries. As defined in the directive, “free movement” refers to: placing a product on the market, and/or placing a product into service. The ATEX Directive 94/6/EC is a living (set of) document(s), subject to further change and refinement. Further information can be obtained in the Official Journal of the European Union.

International: IECEx Certification
IECEx is a single global certification Framework based on the International Electrotechnical Commission's international standards. It caters to countries whose national standards are either identical to those of the IEC or else very close to IEC standards. The IECEx is truly global in concept and practice, reduces trade barriers caused by different conformity assessment criteria in various countries, and helps industry to open up new markets. The goal is to help manufacturers reduce costs and time while developing and maintaining uniform product evaluation to protect users against products that are not in line with the required level of safety.
The aim of the IECEx Scheme and its Programs is to ease international trade of Explosion Protected Equipment (termed Ex equipment) by eliminating the need for duplication of testing and certification, while preserving safety. IECEx operates as an International Certification System covering products and services associated with the Ex industries.

South Africa: SAEx Certified Equipment
This Honeywell equipment is certified as Explosion Protected Apparatus (EPA) to be installed in South Africa and must be certified by a South African ATL (Approved Test Laboratory). In South Africa, all EPA used in Group II shall be covered by an IA certificate (certificate issued by an ATL). IA certificates based on overseas certification are valid for a period of one year.

Brazil: INMETRO Certification
The National Institute of Metrology, Standardization and Industrial Quality - INMETRO - is a federal agency under the Ministry of Development, Industry and Foreign Trade, which acts as Executive Secretary of the National Council of Metrology, Standardization and Industrial Quality (Conmetro), inter-collegiate, which is the regulatory body of the National System of Metrology, Standardization and Industrial Quality (Sinmetro). Compulsory Product Certifications for Equipment in Potentially Explosive Atmospheres to INMETRO requirements are performed by various accredited laboratories such as CERTUSP, Product Certification is based on the IEC 60601 family of standards and ATEX Product Certification is based on the IEC 60079 family of standards

STT35F EQUIPMENT: IECEx LCI 08.0042X

Equipment and systems covered by this certificate are as follows:

Temperature is measured with an externals sensor (thermocouple or resistor (RTD) sensor. The output from the transmitter is a Fieldbus protocol (IEC 61158-2 H1) signal via the two-wire field connections. The process variable can be observed locally when the FM indicator is installed. The transmitter module may also be installed in a stainless steel or aluminum enclosure.

CONDITIONS OF CERTIFICATION: YES as shown below:

- The temperature transmitter is an intrinsically safe apparatus; it can be placed in potentially explosive atmosphere.
- Connection of equipment:
  - the power terminal blocks(4 and5) shall only be connected to a certified associated intrinsically safe equipment
  - the sensor entry terminal blocks (1,2 , 3 and 4) shall only be connected to a certified intrinsically safe equipment or according to paragraph 5.7 of IEC 60079-1 (Ed.5) standard
- These combinations shall be compatible regarding the intrinsic safety rules
- The electrical parameters of the apparatus connected to the power terminal blocks (4 and 5) shall not exceed the following values :
  - Group IIC: $U_i \leq 30$ V ; $I_i \leq 100$m A; $P_i \leq 1.2$W; $C_i \leq 7$ nF; $L_i = 0$ mH
  - Group IIB: $U_i \leq 24$ V ; $I_i \leq 250$m A; $P_i \leq 1.2$W; $C_i \leq 7$ nF; $L_i = 0$ mH
- The electrical parameters of the apparatus connected to the sensor entry terminal blocks (1, 2, 3 and 4) shall not exceed the following values:
  - Group IIC: $U_o \leq 6{,}5$V; $I_o \leq 10$ mA; $P_o \leq 65$ mW; $C_o \leq 20$ µF; $L_o \leq 100$ mH
  - Group IIB: $U_o \leq 6{,}5$V; $I_o \leq 10$ mA; $P_o \leq 65$ mW; $C_o \leq 500$ µF; $L_o \leq 100$ mH
- The aluminum enclosure shall be protected against any impact or friction to be used in zone 0 (according to IEC 60079-0 requirements)

DECLARATION OF CONFORMITY

ATEX CE0344

We declare under our sole responsibility that the following products,

STT 3000 –Smart Temperature Transmitters, Models STT350 and STT35F

to which this declaration relates, are in conformity with the protection requirements of Council Directive: 94/9/EC (ATEX Directive) on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres, and 89/336/EEC (EMC Directive) as amended by 92/31/EEC, 93/68/EECand 2004/108/EC on the approximation of the laws of the Member States relating to Electromagnetic Compatibility.

The models covered by this Declaration and evidence of conformity with the ATEX Directive are listed below. Conformity to the ATEX Directive is in accordance with the following European standards.

EN 60079-0-2004 Electrical Apparatus for Potentially Explosive Atmospheres - General Requirements

EN 60079-1-2004 Electrical Apparatus for Potentially Explosive Atmospheres - Flameproof Enclosure "d"

EN 60079-11-2007 Electrical Apparatus for Potentially Explosive Atmospheres -Part11-Intrinsic Safety "i"

EN 60079-26-2004 Special Requirements for Construction, Test and Marking of Electrical Apparatus of Equipment Group II, Category 1 G

EN 61010-1-2001 Safety Requirements for Electrical Equipment for Measurement, Control & Laboratory Use, Part1: General Requirements

EN 61326-1997+A1+A2 Electrical Equipment for Measurement, Control and Laboratory Use – EMC Requirements

Notified Bodies:	EC Type Examination Certificates	11.3.1 Production Quality Assurance Notification
	LCIE – Groupe Bureau Veritas – 0081 33, Avenue du Général Leclerc 92260 Fontenay-aux-Roses France	KEMA Quality B. V. – 0344 Utrechtseweg 310 6812 AR Arnhem The Netherlands

Certificate	Protection	Description
LCIE 02 ATEX 6167 X	Ex II 2 G ,Ex d IIC, T6 or T5	Model STT350, 4-20 mA/DE & STT35F FOUNDATION™ Fieldbus
LCIE 02 ATEX 6168 X	Ex II 1 G , Ex ia IIC, T6 to T4	Model STT350, 4-20 mA/DE
LCIE 02 ATEX 6169 X	Ex II 1 G , Ex ia IIB or IIC, T6 to T4	Model STT35F FOUNDATION™ Fieldbus communications protocol

Manufacturer: **Honeywell International Inc.**
2500 West Union Hills Drive
Phoenix, Arizona 85027 USA

The authorized signatory to this declaration, on behalf of the manufacturer, and the Responsible Person is identified below.

Honeywell International Inc.

Industrial Measurement & Control
1100 Virginia Drive
Fort Washington, PA 19034 USA

Frederick M. Kent
Standards & Approvals Engineer,
(ATEX Authorized Person)

Issue Date: 28Sept 2007

Certificate of Manufacturer

II 3 G Ex nA IIC/IIB ATEX

This certificate applies to the following equipment:

STT 3000 – Smart Temperature Transmitters, Models STT350 and STT35F

This equipment has no arcing or sparking parts and no ignition-capable hot surfaces, and therefore conforms to Clause 6.3.1.3 of VDE 0165/2.91 and EN 60079-14 for operation in Zone 2 hazardous areas, providing that the following conditions are observed. The equipment contains no intrinsically safe or energy-limiting components. The Model STT350 is a 2-wire device that receives its power and signal carrier from the same 4-20 mA signal current. Model STT350 supports thermocouple and 2-, 3-, and 4-wire RTD sensor inputs. In normal operation, the maximum current is 23 mA. The STT35F is a 2-wire device that receives its power and signal carrier from the same Fieldbus™ circuit.

Conditions for the application of the above equipment in Zone 2 hazardous areas:

1. The installation of this equipment in Zone 2 hazardous areas must comply with VDE specification 0165, EN 60079-14, EN 60079-15 and/or valid national standards for installation and operation.
2. Before commissioning this equipment, it must be verified that the power supply voltage cannot exceed the 30 Vdc maximum for the STT350 transmitters, or 32 Vdc maximum for the STT35F transmitters.
3. The temperature transmitter is a non-repairable item, and if faulty, must be replaced. The electrical power supply must be switched off before any replacement and during any time that the wiring terminations are being connected or disconnected.
4. The technical data supplied by the manufacturer must be adhered to. Install per Operator manual EN1I-6162 for STT350 and EN1I-6169 for STT35F.
5. The temperature transmitter module shall be installed in enclosure IP 54 minimum.

Certificate	Protection	Description
LCIE 02 ATEX 6168 X	II 1 G, Ex ia IIC	Model STT350, 4-20 mA/DE
LCIE 02 ATEX 6169 X	II 1 G, Ex ia IIC	Model STT35F Fieldbus™ communications protocol

Specifications for Use in Zone 2			
Parameters	**STT350**	**STT35F, Ex nA IIC**	**STT35F, Ex nA IIB**
Supply Voltage:	11-30 Vdc	9-32 Vdc	9-24 Vdc
Supply Current:	≤23 mA	≤100 mA	≤250 mA
Ambient Temperate Limits:	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C
Temperature Classification:	T6 at Ta ≤ 80°C T5 at Ta ≤ 85°C	T6 at Ta ≤ 80°C T5 at Ta ≤ 85°C	T6 at Ta ≤ 80°C T5 at Ta ≤ 85°C

Manufacturer: **Honeywell International Inc.**
16404 Black Canyon Highway
Phoenix, Arizona 85053 USA

Honeywell International Inc.
Industrial Measurement & Control
1100 Virginia Drive
Fort Washington, PA 19034 USA

Frederick M. Kent
Standards & Approvals Engineer,
(ATEX Authorized Person)

Issue Date: 28 Sept 2007

STT 3000 Smart Temperature Transmitter Model STT35F	EN1I-6196-A3 3/08 **Addendum** (to Operator Manual EN1I-6196)

Overview

ATEX Directive 94/9/EC

The ATEX Directive 94/9/EC is a European CE Mark directive concerning products that are designed for use in potentially explosive environments. This "New Approach" directive is based on, and is an expansion of, European Norms (EN, CENELEC standards).

On June 30, 2003, the ATEX (ATmospheres EXplosibles) directive will replace directives currently in effect, and from that time, only products with the ATEX certification and with ATEX labeling will be approved for free movement in the EU (European Union) and EFTA (European Free Trade Association) countries. As defined in the directive, "free movement" refers to:

– placing a product on the market, and/or

– placing a product into service.

The ATEX Directive 94/9/EC is a living (set of) document(s), subject to further change and refinement, whose details are beyond the scope of this addendum. Further information can be obtained in the Official Journal of the European Communities No L100/1, and in related publications such as Guidelines on the Application of Directive 94/9/EC. Both of these items are available at:

http://europa.eu.int/comm/enterprise/atex/index.htm

Products that have been previously certified under the EN and CENELEC European Norms, and which comply fully with all standards in the New Approach directive have, by application, received certification under ATEX Directive 94/9/EC.

The Honeywell STT 3000, STT35F Smart Fieldbus Temperature Transmitter is now ATEX certified, and all units manufactured currently and in the future will include labeling that includes all markings required under the ATEX directive.

Inclusions

To ensure that all required information will be available to the user, the following items are included with this Addendum for reference:

1. Declaration of Conformity – ATEX CE0344 (Honeywell document number 51453795 Revision A).
2. Certificate of Manufacturer II 3 G Ex nA ATEX CE (Honeywell document number 51453789 Revision A).

Purpose and Content of this Addendum

This Addendum includes information required under the ATEX Directive regarding:

1. The appearance and meaning of each certification mark (CE Mark) that appears on the label(s) affixed to the product.
2. Instructions for installation and use of the product.

Information required for installation and use of this product is given in

EN1I-6196 STT 3000 Smart Temperature Transmitter Model STT35F Operator Manual, of which this Addendum is a part.

Details regarding certification marks that appear in labeling for this product are given in this addendum.

> **Attention**
>
> The publication cited above and the functioning and construction (except for labeling) of the devices described therein are essentially unchanged. The purpose of this addendum is to provide details on the purpose and appearance of the labels attached to each device under ATEX Directive 94/9/EC.

> **Attention**
>
> Before installing the equipment in a potentially explosive atmosphere, please read the information provided in this Addendum, which supports the ATEX certifications for this product.

CE Conformity

The STT 3000 Smart Fieldbus Temperature Transmitter, Model STT35F, is in conformity with the protection requirements of the following European Council Directives: 94/9/EC, the Explosive Atmospheres (ATEX) Directive, and 2004/108/EC, the Electromagnetic Compatibility (EMC) Directive.

In conformity with the ATEX directive, the CE mark on the certification nameplate includes the Notified Body identification number 0344 (KEMA 01ATEXQ3199) adjacent to the EC Type Examination Certificate number.

Deviation from the installation conditions in this manual may invalidate this product’s conformity with the Explosive Atmospheres, Pressure Equipment, and EMC Directives.

Conformity of this product with any other “CE Mark” Directive(s) shall not be assumed.

Marking, ATEX Directive

Honeywell's Model STT35F Smart Fieldbus Temperature Transmitter, with the following nameplates attached, has been certified to comply with Directive 94/9/EC of the European Parliament and the Council as published in the Official Journal of the European Communities No. L 100/1 on 19-April-1994.

The following information is provided as part of the labeling of the transmitter:

- Name and Address of the manufacturer: Honeywell, Phoenix, AZ 85053 USA.
- Notified Body identification: KEMA Quality B.V., Arnhem, the Netherlands

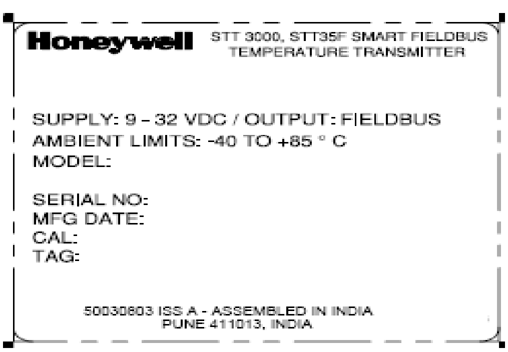
CE
0344

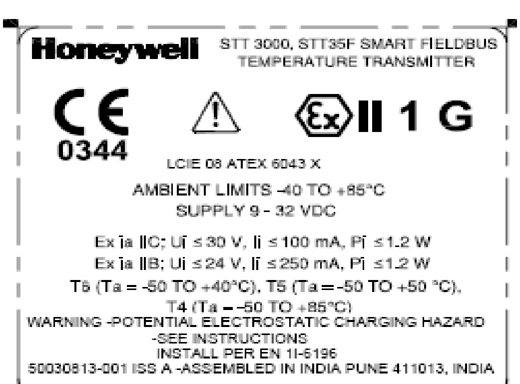
- For complete model number, see the Model Selection Guide 34-44-16-02 for the particular model of temperature transmitter.
- The serial number of the transmitter is located on the module label. For models STT35F, the serial number is 10 characters (0 through 9) long. The last two characters are fixed 37. The first character (0) is a B. Characters 2 and 3 are the week of manufacture and the single character 4 is the year of manufacture. The serial number consists of characters 1, 5, 6, and 7.

Apparatus Marked with Multiple Types of Protection

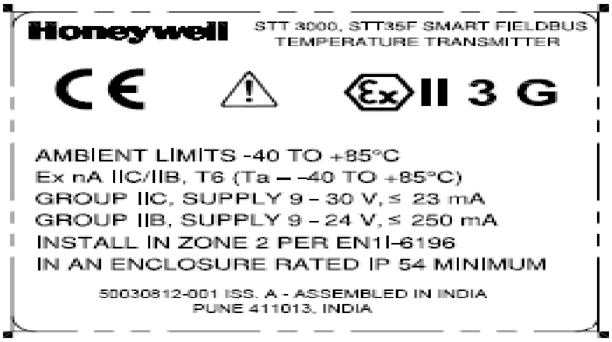
The user must determine the type of protection required for installation the equipment. The user shall then check the box [✔] adjacent to the type of protection used on the equipment certification nameplate. Once a type of protection has been checked on the nameplate, the equipment shall not then be reinstalled using any of the other certification types.

Labels 50030803-001and 50030813-001 are attached to the module.

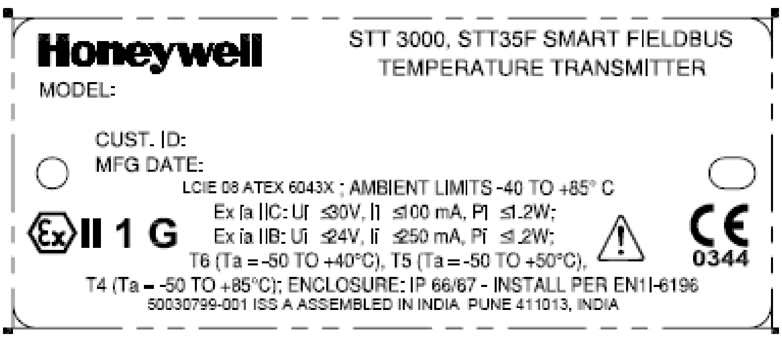




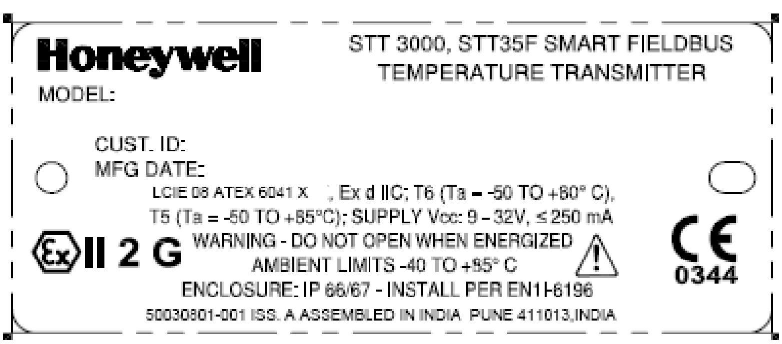
Label 50030812-001 is used for non-sparking (Ex nA) installations.



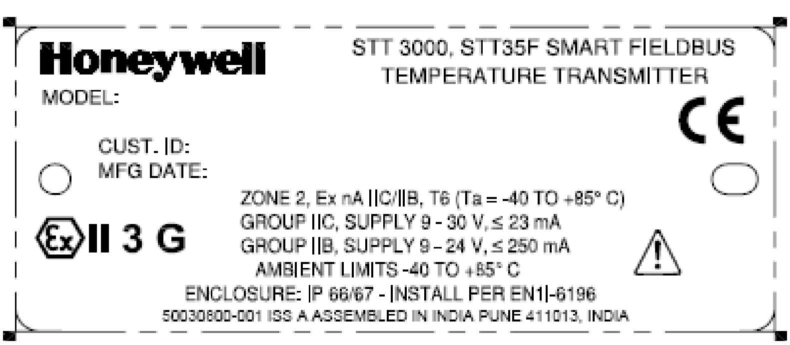
Nameplate 50030799-001 is used for intrinsically safe (Ex ia) 4–20 mA installations.



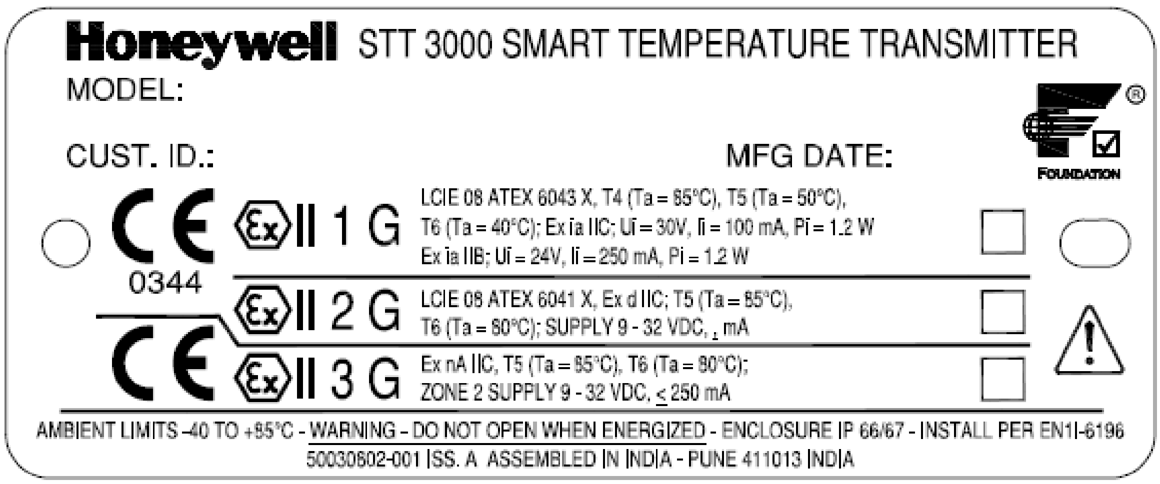
Nameplate 50030801-001 is used for flameproof (Ex d) 4–20 mA installations.



Nameplate 50030800-001 is used for non-sparking (Ex nA) installations.



Multiple certification nameplate 50030802-001, STT35F.



Specific Parameters for Intrinsic Safety	Supply Power (terminals 5 and 6), Group IIC:	Ui ≤ 30 V; Ii ≤ 100 mA; Pi ≤ 1.2 W
	Supply Power (terminals 5 and 6), Group IIB:	Ui ≤ 24 V; Ii ≤ 250 mA; Pi ≤ 1.2 W
	With or without local digital indicator	Ci ≤ 7 nF; Li ≈ 0 (negligible)
	Sensor terminals (1, 2, 3 & 4)	Uo ≤ 6.5 V; Io ≤ 10 mA ;Pi ≤ 65mW
		Co ≤ 20uF; Lo ≤ 100 mH Group IIC
		Co ≤500uF; Lo ≤ 100 mH Group IIB

Special conditions for safe use,

Intrinsic Safety (X)

The Smart Temperature Transmitter is an intrinsically safe apparatus that can be installed in potentially explosive atmospheres.

The supply terminals (5 and 6) must be connected only to a certified associated intrinsically safe apparatus.

The sensor entry terminals (1, 2, 3, and 4) must be connected only to certified intrinsically safe equipment or according to paragraph 5.4 of standard EN 50020.

The electrical parameters (U, I, and P) of the associated apparatus connected to the power terminals (5 and 6) must not exceed the following values:

Group IIC	Ui ≤ 30V	Ii ≤ 100 mA	Pi ≤ 1.2 W
Group IIB	Ui ≤ 24V	Ii ≤ 250 mA	Pi ≤ 1.2 W

The electrical parameters (L and C) of the apparatus connected to the sensor entry terminals (1, 2, 3, and 4) (cabling parameters included) must not exceed the following values:

Group IIC	Co ≤ 20 µF	Lo ≤ 100 mH
Group IIB	Co ≤ 500 µF	Lo ≤ 100 mH

Certification ambient operating temperature : –50°C to 85 °C

Standard specification ambient limits : –40°C to 85 °C.

Temperature classifications:

IS (ia) 4 – 20 mA / DE	Flameproof (d)
T6 up to Ta ≤ 40ºC	T6 up to Ta ≤ 80ºC
T5 up to Ta ≤ 50ºC	T5 up to Ta ≤ 85ºC
T4 up to Ta ≤ 85ºC	

Enclosure classification: IP 66/67, Type 4X

Specific Parameters for Flameproof Installation

Power supply to field wiring terminals, (5 and 6): Vcc 9 – 32 V; ≤ 250 mA

Output Signal: Fieldbus protocol (IEC 61158-2 low speed H1)

Ambient operating temperature –50 to +85°C.

Specific Parameters for Non-Sparking Zone 2 Installation

(Honeywell certified)

Supply:	Group IIC: 9 – 30 Vdc; ≤ 23 mA
	Group IIB: 9 – 24 Vdc; ≤ 250 mA
Ambient Temperate Limits:	-40°C to 85°C
Temperature Classification:	T6 at Ta ≤ 80°C
	T5 at Ta ≤ 85°C

Special Conditions for Safe Use, Non-Sparking Zone 2 Installation

(Honeywell certified)

- The installation of this equipment in Zone 2 hazardous areas must comply with VDE specification 0165, EN 60079-14, EN 60079-15 and/or valid national standards for installation and operation.
- Before commissioning of this equipment, it must be verified that the power supply voltage cannot exceed the 32 Vdc maximum for Fieldbus protocol equipment.
- The electronic assemblies in these units are non-repairable items, and if faulty, must be replaced. The electrical power supply must be switched off before any replacement and during any time that the wiring terminations are being connected or disconnected.

51453795, Revision A

DECLARATION OF CONFORMITY

Ex ATEX CE 0344

We declare under our sole responsibility that the following products,

STT 3000 –Smart Temperature Transmitters, Models STT350 and STT35F

to which this declaration relates, are in conformity with the protection requirements of Council Directive: 94/9/EC (ATEX Directive) on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres, and 89/336/EEC (EMC Directive) as amended by 92/31/EEC, 93/68/EECand 2004/108/EC on the approximation of the laws of the Member States relating to Electromagnetic Compatibility.

The models covered by this Declaration and evidence of conformity with the ATEX Directive are listed below. Conformity to the ATEX Directive is in accordance with the following European standards.

EN 60079-0-2004 Electrical Apparatus for Potentially Explosive Atmospheres - General Requirements

EN 60079-1-2004 Electrical Apparatus for Potentially Explosive Atmospheres - Flameproof Enclosure “d”

EN 60079-11-2007 Electrical Apparatus for Potentially Explosive Atmospheres -Part11-Intrinsic Safety "i"

EN 60079-26-2004 Special Requirements for Construction, Test and Marking of Electrical Apparatus of Equipment Group II, Category 1 G

EN 61010-1-2001 Safety Requirements for Electrical Equipment for Measurement, Control & Laboratory Use, Part1: General Requirements

EN 61326-1997+A1+A2 Electrical Equipment for Measurement, Control and Laboratory Use – EMC Requirements

Notified Bodies:	**EC Type Examination Certificates**	**Production Quality Assurance Notification**
	LCIE – Groupe Bureau Veritas – 0081 33, Avenue du Général Leclerc 92260 Fontenay-aux-Roses France	KEMA Quality B. V. – 0344 Utrechtseweg 310 6812 AR Arnhem The Netherlands

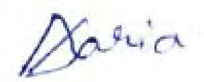
Certificate	Protection	Description
LCIE 08 ATEX 6041X	Ex II 2 G ,Ex d IIC, T6 or T5	Model STT350, 4-20 mA/DE & STT35F FOUNDATION™ Fieldbus
LCIE 08ATEX 6042 X	Ex II 1 G , Ex ia IIC, T6 to T4	Model STT350, 4-20 mA/DE
LCIE 08ATEX 6043 X	Ex II 1 G , Ex ia IIB or IIC, T6 to T4	Model STT35F FOUNDATION™ Fieldbus communications protocol

Manufacturer: **Honeywell Automation India Ltd.**
56&57 Hadapsar Industrial Estate
Pune 411013 India

The authorized signatory to this declaration, on behalf of the manufacturer, and the Responsible Person is identified below.

Honeywell Automation India Ltd.

56&57 Hadapsar Industrial Estate
Pune 411013 India



Bhavesh Varia

(Product Safety and Approval Engineer)

Issue Date: 30 April 2008

51453789, Revision A

Certificate of Manufacturer

⟨Ex⟩ II 3 G Ex nA IIC/IIB ATEX CE

This certificate applies to the following equipment:

STT 3000 – Smart Temperature Transmitters, Models STT350 and STT35F

This equipment has no arcing or sparking parts and no ignition-capable hot surfaces, and therefore conforms to Clause 6.3.1.3 of VDE 0165/2.91 and EN 60079-14 for operation in Zone 2 hazardous areas, providing that the following conditions are observed. The equipment contains no intrinsically safe or energy-limiting components. The Model STT350 is a 2-wire device that receives its power and signal carrier from the same 4-20 mA signal current. Model STT350 supports thermocouple and 2-, 3-, and 4-wire RTD sensor inputs. In normal operation, the maximum current is 23 mA. The STT35F is a 2-wire device that receives its power and signal carrier from the same Fieldbus™ circuit.

Conditions for the application of the above equipment in Zone 2 hazardous areas:

1. The installation of this equipment in Zone 2 hazardous areas must comply with VDE specification 0165, EN 60079-14, EN 60079-15 and/or valid national standards for installation and operation.
2. Before commissioning this equipment, it must be verified that the power supply voltage cannot exceed the 30 Vdc maximum for the STT350 transmitters, or 32 Vdc maximum for the STT35F transmitters.
3. The temperature transmitter is a non-repairable item, and if faulty, must be replaced. The electrical power supply must be switched off before any replacement and during any time that the wiring terminations are being connected or disconnected.
4. The technical data supplied by the manufacturer must be adhered to. Install per Operator manual EN1I-6162 for STT350 and EN1I-6169 for STT35F.
5. The temperature transmitter module shall be installed in enclosure IP 54 minimum.

Certificate	Protection	Description
LCIE 08ATEX 6042X	⟨Ex⟩ II 1 G, Ex ia IIC	Model STT350, 4-20 mA/DE
LCIE 08ATEX 6043X	⟨Ex⟩ II 1 G, Ex ia IIC	Model STT35F Fieldbus™ communications protocol

Specifications for Use in Zone 2

Parameters	STT350	STT35F, Ex nA IIC	STT35F, Ex nA IIB
Supply Voltage:	11-30 Vdc	9-32 Vdc	9-24 Vdc
Supply Current:	≤23 mA	≤100 mA	≤250 mA
Ambient Temperate Limits:	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C
Temperature Classification:	T6 at Ta ≤ 80°C T5 at Ta ≤ 85°C	T6 at Ta ≤ 80°C T5 at Ta ≤ 85°C	T6 at Ta ≤ 80°C T5 at Ta ≤ 85°C

Manufacturer: **Honeywell Automation India Ltd.**
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Honeywell Automation India Ltd.
56 & 57 Hadapsar Industrial Estate
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Bhavesh Varia
(Product Safety and Approval Engineer)

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For application assistance, current specifications, pricing, or name of the nearest Authorized Distributor, contact one of the offices below.

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