SECTION 1 - INTRODUCTION

OVERVIEW

The IMFEC12 High Level Analog Input (FEC) module inputs 15 channels of analog signals only to the multifunction processor (MFP) or multifunction controller (MFC) module.

The IMFEC11 High Level Analog Input (FEC) module inputs 15 channels of analog or frequency shift keyed (FSK) digital signals to the MFP or MFC module. The IMFEC11 module performs all the functions of the IMFEC12 module and also provides communication with the Bailey-Fischer & Porter line of FSK digital smart transmitters and other smart devices in a field bus or point-to-point configuration.

Figure 1-1 shows how the FEC module fits within the INFI 90 OPEN system.

INTENDED USER

Installation and application personnel should have a solid background in electronic instrumentation and process control. They should be familiar with proper grounding and safety procedures for electronic instrumentation. Operators should have a knowledge of the process and should read and understand this instruction before placing the module in operation.

HARDWARE DESCRIPTION

The FEC module is an intelligent module, with on-board microprocessor, memory, analog-to-digital converter and communication circuitry. The module is a single printed circuit board that occupies one slot in a module mounting unit (MMU). Two captive latches on the module faceplate secure it to the module mounting unit.

The module has three card edge connectors for external signals (transmitter inputs and communication), system communication (I/O expander bus) and power. The module receives input through a cable connection to a termination unit (TU) or termination module (TM). Wiring from the field devices connect to terminal blocks on the termination unit or termination module. The IMFEC11 circuit board has 18 jumpers; three jumpers that allow selecting the mode of operation and communication (J2, J3 and J4) and 15 jumpers that select voltage/current input (J6 through J20). A dipswitch setting (S1) holds the I/O expander bus address of the module.

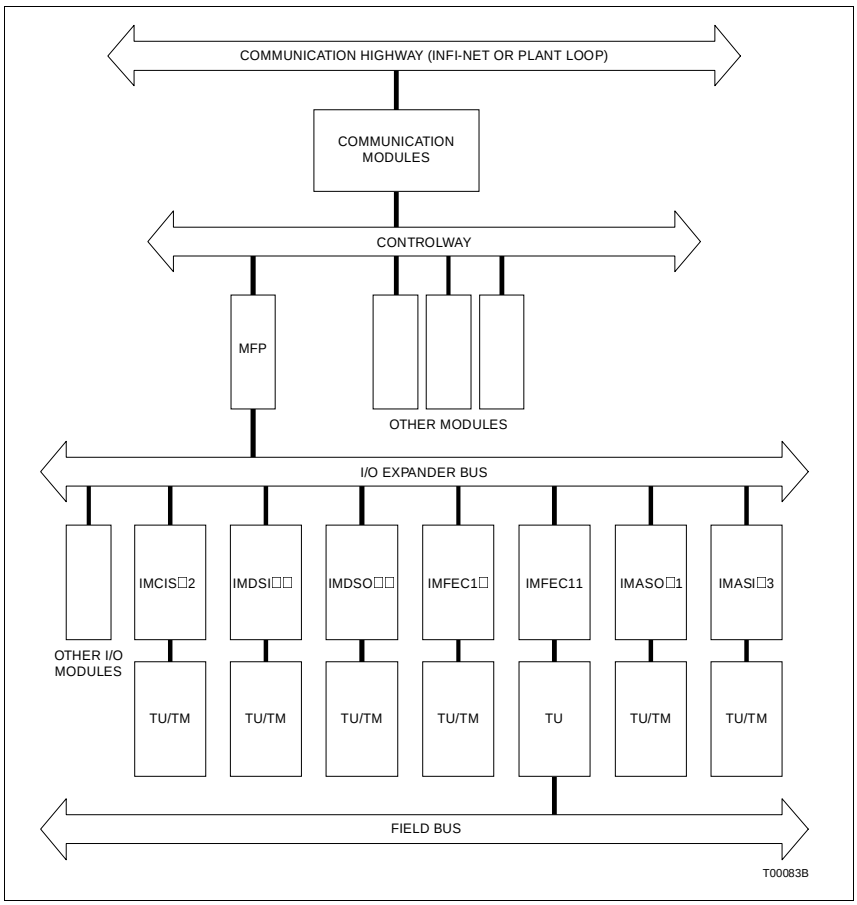

Figure 1-1. INFI 90 OPEN Communication Levels

The IMFEC12 circuit board only uses one working setting, dipswitch S1 that holds the I/O expander bus address of the module. Jumpers J2 through J4 and J6 through J20 are not used.

HARDWARE APPLICATION

The FEC module interfaces analog and digital signals from field devices to the MFP or MFC module. The IMFEC11 module can interface Bailey-Fischer & Porter FSK smart transmitters and other smart devices. The IMFEC12 is for use with conventional transmitters (BC, EQ and PT) and standard analog inputs.

The IMFEC11 module can operate in one of two modes: FSK field bus mode or FSK analog point-to-point mode. In the FSK field bus mode, a single two-wire input (bus) links a maximum of 15 FSK smart transmitters. All inputs (process data and module to transmitter communication) are in the frequency shift keyed format and share the field bus. Refer to the ***NTFB01 Field Bus Termination Unit*** instruction for specific limitations on field bus communications. All field devices must be Bailey-Fischer & Porter when using this mode.

In the FSK analog point-to-point mode, the IMFEC11 module can interface up to 15 discrete analog process inputs from FSK smart devices and communicate (digitally) with those devices. Additionally, the IMFEC11 module can interface a mixture of conventional transmitters and other external analog inputs while operating in this mode. These devices can input only process data to the FEC module; they cannot communicate to the module. In point-to-point operation, each device is individually wired to the analog input termination unit or module.

FEATURES

The design of the FEC module, as with all INFI 90 OPEN modules, allows for flexibility in creating a process management system. The module supports Bailey-Fischer & Porter FSK digital smart transmitters and other smart devices, conventional transmitters and standard voltage or current inputs.

The FSK digital capability (IMFEC11) eliminates conversion errors and increases process control accuracy. Access is always available to the real time process status. In the field bus mode, all information (including the process variable) is transmitted digitally between the FEC module and the field devices.

The FEC module stores process data, control commands and transmitter configuration data in memory. It works to restore communication with a transmitter if a communication failure occurs. Upon restoring communication with a failed transmitter, the FEC module checks the transmitter configuration before the control module (MFP/MFC) resumes updating the process control.

INSTRUCTION CONTENT

This instruction consists of eight sections and three appendices.

Introduction — Overviews the FEC module. It contains features, a description, reference documents and specifications.

Description and Operation — Explains the theory of module operation.

Installation — Covers handling precautions, switch and jumper settings, installing and checking the FEC inputs.

Operating Procedures — Explains how to start up and operate the FEC module.

Troubleshooting — Describes how to monitor transmitter errors from the status reports. It explains how to check for FEC errors and the corrective action to take.

Maintenance — Contains a maintenance schedule for the FEC module.

Repair and Replacement Procedures — Explains how to replace a module needing repair.

Support Services — Provides information about ordering parts from your local Elsag Bailey sales office. It also explains other areas of support that Elsag Bailey provides.

Appendix A — Shows the dipshunt settings, terminal wiring for the NTAI05 analog input termination unit and the required cabling.

Appendix B — Shows the dipswitch settings, terminal wiring for the NIAI04 analog input termination module and the required cabling.

Appendix C — Shows the jumper settings, terminal wiring for the NTFB01 field bus termination unit and the required cabling.

HOW TO USE THIS INSTRUCTION

Read this instruction before placing the FEC module in operation. Refer to the sections in this list as needed for more information.

1. Read Section 4 before placing the FEC module in operation.
2. Do the steps in Section 3.
3. Refer to Section 5 for what to do if a problem occurs.
4. Refer to Section 6 for the scheduled steps needed to maintain the FEC module.
5. Refer to Section 7 for how to replace a module.
6. Use Section 8 for parts ordering information. This section also tells of additional services that Elsag Bailey offers.

GLOSSARY OF TERMS AND ABBREVIATIONS

Table 1-1 contains those terms and abbreviations that are unique to Elsag Bailey or have a definition that is different from standard industry usage.

Table 1-1. Glossary of Terms and Abbreviations

Term	Definition
Control module	Directs field processes through an I/O module; the multifunction processor is an example.
Field bus	A signal line or set of signal lines used by an interface system to which many devices are connected and over which messages are carried.
Function code	An algorithm which manipulates specific functions. These functions are linked together to form the control strategy.
I/O expander bus	Parallel communication bus between the control and I/O modules.

Table 1-1. Glossary of Terms and Abbreviations (continued)

Term	Definition
MFC	Multifunction controller module. A multiple loop controller with data acquisition and information processing capabilities.
MFP	multifunction processor module. A multiple loop controller with data acquisition and information processing capabilities.
MMU	Module mounting unit. A card cage that provides electrical and communication support for INFI 90 OPEN/Network 90 modules.
OIS	Operator interface station. Integrated operator console with data acquisition and reporting capabilities. It provides a digital access into the process for flexible control and monitoring.
Smart transmitter	A field measuring device that uses digital communication to transmit information.
TM	Termination module; provides input/output connection between plant equipment and the INFI 90 OPEN/Network 90 modules.
TU	Termination unit; provides input/output connection between plant equipment and the INFI 90 OPEN/Network 90 modules.

REFERENCE DOCUMENTS

Table 1-2 lists Elsag Bailey instructions referenced in this instruction.

Table 1-2. Reference Documents

Number	Title
I-E21-56	SmartLink Transmitter Management Software
I-E92-501-2	Configuration and Tuning Terminal, Type CTT02
I-E96-192-1	Operation manual, Operator Interface Station (40 Series) IIOIS42
I-E96-200	Function Code Application Manual
I-E96-201	IMMFP01 Multifunction Processor
I-E96-202	IMMFP02 Multifunction Processor
I-E96-203	IMMFP03/03B Multifunction Processor
I-E96-211	IMMFC03 Multifunction Controller
I-E96-212	IMMFC04 Multifunction Controller
I-E96-213	IMMFC05 Multifunction Controller
I-E96-416	NTAI05 Analog Input Termination Unit
I-E96-432	NTFB01 Field Bus Termination Unit
I-E96-436	NIAI04 Analog Input Termination Module
P-E21-001	Installing a 4 to 20 mA Transmitter in a Hazardous Location
WBPEEUI110501A0	Smart Transmitter Terminal, Type STT03
WBPEEUI200501A0	Module Mounting Unit (IEMMU11/12/21/22)
WBPEEUI220756A0	Operation manual, Operator Interface Station (40 Series) IIOIS43

NOMENCLATURE

Table 1-3 contains the analog input module nomenclature used in this instruction.

Table 1-3. Nomenclature

Nomenclature	Description
IMFEC11	Analog input module with FSK communications for smart transmitter interface and standard analog inputs
IMFEC12	Analog input module for use with conventional transmitters and standard analog inputs

RELATED HARDWARE AND SOFTWARE

Table 1-4 contains the related hardware and software packages that can be used with an IMFEC1□ module.

Table 1-4. Related Hardware

Nomenclature	Hardware
AVS	Electro-pneumatic smart positioner
BC, BCN	Conventional and smart pressure transmitters
EQ, EQN	Conventional and smart temperature transmitters
EQS	Platinum Standard™ smart temperature transmitters
MFC	Multifunction controller module
MFP	Multifunction processor module
NIAI04	Analog input termination module
NTAI05	Analog inputs termination unit
NKTM01, NKTU02	Analog input termination module cable
NKTU01	Analog inputs/field bus termination unit cable
NTFB01	Field bus termination unit
PT	Platinum Standard conventional pressure transmitter
PTS	Platinum Standard smart pressure transmitters
SLNK011A0	SmartLink transmitter management software
SM, XM, XE	Smart magnetic flowmeter
STT02/03	Smart transmitter terminal
TBN	Smart pH transmitters

SPECIFICATIONS

Table 1-5 contains the specifications for the IMFEC module.

Table 1-5. Specifications

Property	Characteristic/Value
Power requirements	
Operating power	5 VDC, ±5% at 85 mA typical +15 VDC, ±5% at 25 mA typical -15 VDC, ±5% at 20 mA typical
Power dissipation	1.1 W typical
Overvoltage category	I for power per ANSI/ISA S82.01-1994
Operating	
Analog inputs	15 independently configured channels
Analog input ranges	4 to 20 mA, 1 to 5 VDC, 0 to 1 VDC, 0 to 5 VDC, 0 to 10 VDC, -10 to +10 VDC
Analog updates	A/D conversions 5 times/sec
FSK digital updates (IMFEC11 only)	3 to 10 times/sec (in field bus configuration)
A/D resolution	14 bits with polarity
Analog accuracy 4 to 20 mA 1 to 5 VDC 0 to 5 VDC 0 to 10 VDC -10 to +10 VDC 0 to 1 VDC	 0.1% 0.1% 0.1% 0.1% 0.1% 0.25%
FSK digital accuracy (IMFEC11 only)	Same as transmitter accuracy for each input
Common mode voltage	-12 VDC minimum, +15 VDC maximum ±12 VDC (±1 VDC) input span ±10 VDC (±5 VDC) input span ±5 VDC (±10 VDC) input span
Common mode rejection	90 dB minimum at 50/60 Hz
Normal mode rejection	70 dB minimum at 50/60 Hz
Input impedance	Greater than 1 MΩ (each channel)
Overvoltage category	III for inputs per ANSI/ISA S82.01-1994

Table 1-5. Specifications (continued)

<table>
<tr><th>Property</th><th>Characteristic/Value</th></tr>
<tr><td>Electromagnetic Compatibility

Conducted transients</td><td>
<table>
<tr><th>Test</th><th>Common Mode</th><th>Normal Mode</th></tr>
<tr><td>Pulse voltage test (1.2/50 µS) (IEC 801-5)</td><td>2 kVp</td><td>1 kVp</td></tr>
<tr><td>Line frequency wave (50 Hz)</td><td>50 Vp</td><td>N/A</td></tr>
<tr><td>Low voltage wave train (Sweep from 10 KHz to 1 MHz)</td><td>50 Vp</td><td>N/A</td></tr>
<tr><td>Damped 1 MHz oscillatory wave (IEC 1000-4-12)</td><td>1 kVp</td><td>0.5 kVp</td></tr>
<tr><td>Electrical fast transient/burst (IEC 801-4)</td><td>1 kVp</td><td>N/A</td></tr>
<tr><td>Conducted RF interferences (IEC 801-6 level 3)</td><td>10 V RMS</td><td>N/A</td></tr>
</table>
Keep cabinet doors closed. Do not use communication equipment closer than 2 m (6 ft.) from the cabinet.
</td></tr>
<tr><td>Communication baud rate</td><td>9600 baud</td></tr>
<tr><td>Environmental</td><td></td></tr>
<tr><td>Ambient temperature</td><td>0° to 55°C (0° to 131°F) (noncondensing)</td></tr>
<tr><td>Relative humidity</td><td>5% to 95% up to 55°C (131°F)
5% to 45% at 70°C (158°F) (noncondensing)</td></tr>
<tr><td>Atmospheric pressure</td><td>Sea level to 3 km (1.86 mi)</td></tr>
<tr><td>Air quality</td><td>Noncorrosive</td></tr>
<tr><td>Mounting</td><td>Occupies a single slot in a standard INFI 90 OPEN module mounting unit (MMU)</td></tr>
<tr><td>CE mark</td><td>This product, when installed in an INFI 90 OPEN cabinet, complies with the following Directives/Standards for CE marking.</td></tr>
<tr><td>EMC96 Directive 89/336/EEC</td><td>EN50082-2 Generic Immunity Standard - Part 2: Industrial Environment
EN50081-2 Generic Emission Standard - Part 2: Industrial Environment</td></tr>
<tr><td>Low Voltage Directive 73/23 /EEC</td><td>EN61010-1 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1: General Requirements</td></tr>
<tr><td>Certification</td><td></td></tr>
<tr><td>Canadian Standards Association (CSA)</td><td>Certified for use as process control equipment in an ordinary (nonhazardous) location</td></tr>
<tr><td>Factory Mutual (FM) (pending)</td><td>Approval for the following categories, nonincendive for:
Class I Division 2, Groups A,B,C,D
Class II, Division 2, Groups F,G</td></tr>
</table>

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.