Advantys FTM PROFIBUS IP67 Modular I/O Splitter Box User guide

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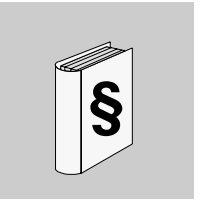
Safety Information



Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates an imminently hazardous situation, which, if not avoided, **will result** in death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation, which, if not avoided, **can result** in death, serious injury, or equipment damage.

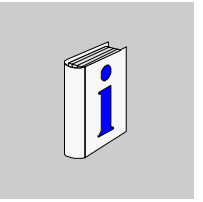
⚠ CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, **can result** in injury or equipment damage.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

About the Book



At a Glance

Document Scope

This user guide contains the information required to install an Advantys FTM PROFIBUS modular I/O splitter box. It has been designed to help system installers become rapidly familiar with the system, while optimizing the system's features with the most advanced technology available.

This equipment's installation requires prior knowledge of the relevant communication protocol and should only be carried out by qualified personnel. Special points and warnings regarding safety are highlighted in the different chapters.

The first chapters aim to provide information to those responsible for designing and fitting the mechanical and electrical components of the system. It details characteristics which are common to the whole Advantys FTM range and is not dependent on the selected communication protocol. The following chapters, from the section on "PROFIBUS network interface", are specific to the communications protocol. They contain information on specific wiring for the network interface and all the necessary information for the software application programmer, and for the end user (diagnostics).

Chapter	Subject covered
Introduction	General presentation of system components
Installation	Physical characteristics, wiring information
FTM splitter box characteristics and wiring	Wiring of the network section, communication protocol reminders, system behavior
FTM splitter box electrical characteristics and wiring	Discrete and analog splitter box diagnostics and connections
PROFIBUS network interface	PROFIBUS network operation and connection
Application functions	I/O and diagnostics channels operation
Software implementation	Help for installing Advantys FTM splitter boxes
Diagnostics	LED or software analysis of diagnostics information
Glossary	Definition of terms and abbreviations used.

Related Documents

Title of Documentation	Reference Number
Instruction sheet for the FTM 1DP10 coupling device	1693685
Instruction sheet for the FTM 1D• / FTM 1A• splitter box	1693687

User Comments

We welcome your comments about this document. You can reach us by e-mail at techpub@schneider-electric.com

Introduction

1

At a Glance

Introduction

This chapter provides a general overview of the Advantys FTM PROFIBUS range of IP67 modular I/O splitter boxes.

Note: The information in this manual is primarily intended for people with practical knowledge of the PROFIBUS standard. PROFIBUS equipment installers and users are advised to read the standard documentation before installing or handling any equipment.

What's in this Chapter?

This chapter contains the following topics:

System Architecture

At a Glance

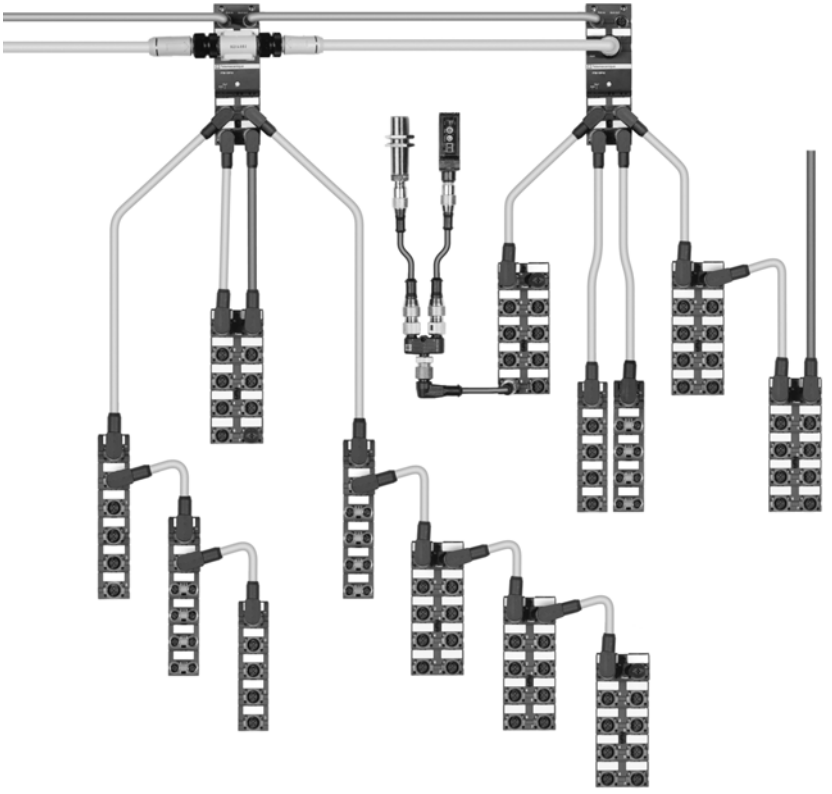
The Advantys FTM modular system enables you to connect a variable number of input/output splitter boxes, using a single communication interface (field bus module).

These splitter boxes are connected to the module using a hybrid cable which includes the internal bus and power supply (internal, sensor and actuator).

The input/output splitter boxes are independent of the field bus type, thus reducing the number of splitter box references. Once installed, the system is ready to begin operation.

Network Topology

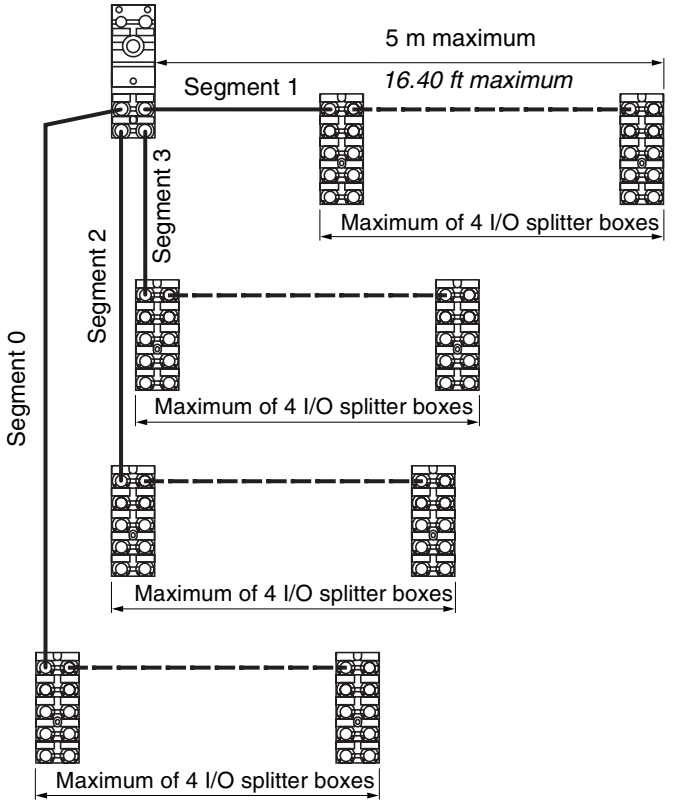
The system topology is a star/line architecture.



Each module is fitted with 4 M12-type connectors for connecting the Advantys FTM splitter boxes (star architecture).

Segment Structure

For each communication or node coupling device, up to 4 I/O splitter boxes may be connected in a daisy chain arrangement (line architecture):



⚠ WARNING

RISK OF UNINTENDED EQUIPMENT OPERATION

A segment length must not exceed 5 m *(16.4 ft)*. Failure to observe this length restriction may cause the internal bus to malfunction.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Discrete I/O Maximum Capacity

The system configuration and the number of I/O splitter boxes connected to the module depend on the type of splitter boxes used.

For a given connecting device, the maximum number of Discrete I/O splitter boxes is:

- 4 per segment, or 64 I/O.
- 16 for all of the 4 possible segments of the I/O splitter box module, or 256 Discrete I/O.

Maximum Configuration

The system configuration and the number of splitter boxes connected to the connecting device depend on the type of splitter boxes used.

The maximum configuration by splitter box type is defined in the following table:

Number of analog splitter boxes	Number of Discrete splitter boxes
4	4
3	8
2	12
1	15
0	16

Overview of the Product Range

Different Types of Splitter Boxes

Different types of Advantys FTM splitter boxes are available:
- Discrete I/O splitter boxes:
  - Compact
  - Extendable
- Analog I/O splitter boxes:
  - Compact.

Discrete I/O Splitter Boxes

These splitter boxes are available in compact or extendable versions.

Their properties are as follows:
- 24 VDC, IEC type 2 inputs,
- 24 VDC, 0.5 A transistor outputs.

Input splitter boxes

These are only used for connecting sensors.

The different types of input splitter boxes are as follows:
- 8 M8-type connector splitter boxes, for connecting up to 8 sensors.
- 4 M12-type connectors allow you to connect up to 8 sensors (4 in the case of sensors fitted with a diagnostics function).
- 8 M12-type connectors allow you to connect up to 16 sensors (8 in the case of sensors fitted with a diagnostics function).

Configurable Input/output splitter boxes

These are used for connecting sensors and/or actuators.

The different types of input/output splitter boxes are as follows:
- 8 M8-type connector splitter boxes, for connecting up to 8 sensors or actuators.
- 4 M12-type connectors allow you to connect up to 8 sensors or actuators (4 in the case of sensors or actuators fitted with a diagnostics function).
- 8 M12-type connectors allow you to connect up to 16 sensors or actuators (8 in the case of sensors or actuators fitted with a diagnostics function).

Note: Each channel can be configured as an input or output, or as a diagnostics input (pin 2). Standard diagnostics channels conform to the DESINA standard.

Analog I/O Splitter Boxes

These splitter boxes are only available in compact version.

They are used to connect analog sensors or actuators to an M12-type connector:

- 4-input analog splitter boxes (voltage or current),
- Analog 4-output splitter boxes (voltage or current).

Compact Splitter Boxes

A compact splitter box does not allow continuity from the internal bus to other splitter boxes on the same segment.

They are used in the following cases:

- 1 single splitter box on a segment (no daisy-chaining),
- Final splitter box on a segment.

Extendable Splitter Boxes

A Splitter Box Allows Continuity From The Internal Bus To Other Splitter Boxes (Daisy-chaining).

⚠ WARNING

RISK OF MALFUNCTION

If an extendable splitter box is used as the final splitter box for an internal bus segment, install a line terminator on the output bus connector.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING

RISK OF NON-COMPLIANCE WITH IP67

For IP67 protection:

- properly fit all connectors with cables or sealing plugs and tighten,
- install cover onto coupling device and tighten captive screws to specified torque.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Splitter Box References

The references for discrete splitter boxes are listed in the following table:

Reference	Connector	Discrete input	Discrete Output	Compact	Extendable	Configurable
FTM 1DD08C08	8 M8	0...8	0...8	x	-	x
FTM 1DD08C12	4 M12	0...8	0...8	x	-	x
FTM 1DD16C12	8 M12	0...16	0...16	x	-	x
FTM 1DD08C08E	8 M8	0...8	0...8	-	x	x
FTM 1DD08C12E	4 M12	0...8	0...8	-	x	x
FTM 1DD16C12E	8 M12	0...16	0...16	-	x	x
FTM 1DE08C08	8 M8	8	-	x	-	-
FTM 1DE08C12	4 M12	8	-	x	-	-
FTM 1DE16C12	8 M12	16	-	x	-	-
FTM 1DE08C08E	8 M8	8	-	-	x	-
FTM 1DE08C12E	4 M12	8	-	-	x	-
FTM 1DE16C12E	8 M12	16	-	-	x	-

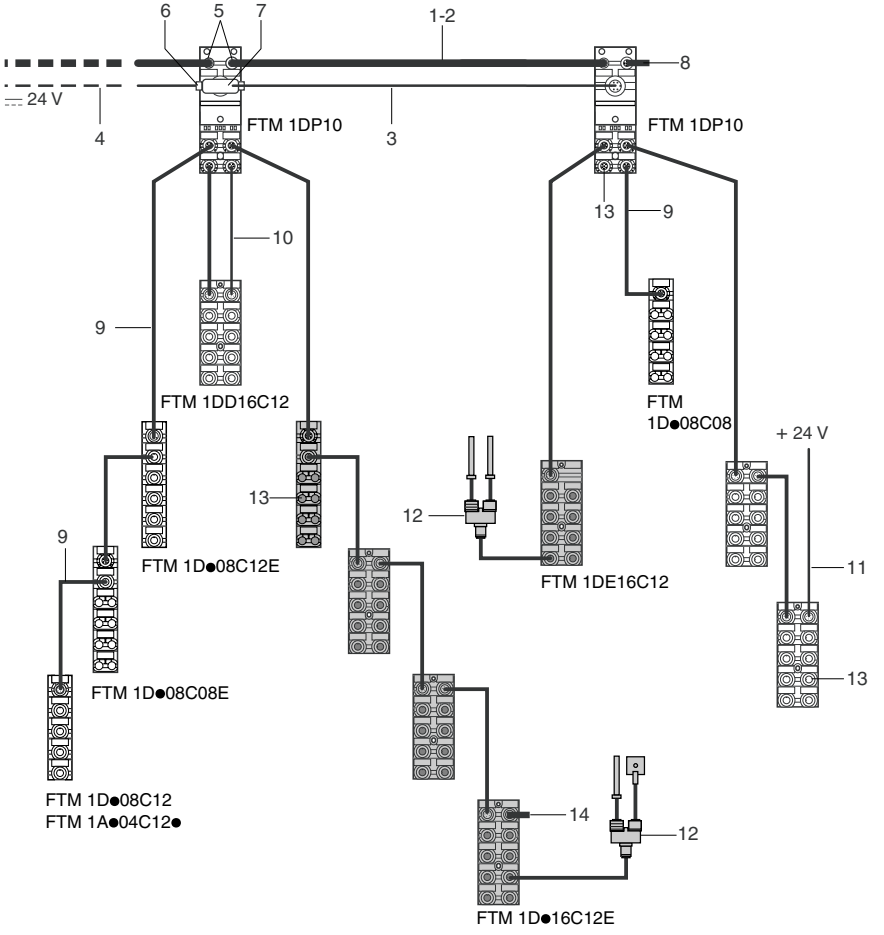
The references for analog splitter boxes are listed in the following table:

Reference	Connector	Analog Input		Analog output		Compact	Extendable
		Voltage	Current	Voltage	Current		
FTM 1AE04C12C	4 M12	-	4	-	-	x	-
FTM 1AE04C12T	4 M12	4	-	-	-	x	-
FTM 1AS04C12C	4 M12	-	-	-	4	x	-
FTM 1AS04C12T	4 M12	-	-	4	-	x	-

Presentation of the Accessories Range

Connection Cables from the Bus to the Module

Different cables can be used to connect the module to the field bus. These are available in different lengths.



Element	Reference	Function
1	FTX DP3203 FTX DP3206 FTX DP3210 FTX DP3220 FTX DP3230 FTX DP3250	Cables fitted with 2 M12-type elbow connectors, 5 pins, with two ends for connecting the bus to two modules. Available lengths: 0.3 m, 0.6 m, 1 m, 2 m, 3 m and 5 m *(0.98 ft, 1.97 ft, 3.28 ft, 6.56 ft, 9.84 ft, 16.4 ft)*.
2	FTX DP1203 FTX DP1206 FTX DP1210 FTX DP1220 FTX DP1230 FTX DP1250	Cables fitted with 2 M12-type straight connectors, 5 pins, with two ends for connecting the bus to two modules. Available lengths: 0.3 m, 0.6 m, 1 m, 2 m, 3 m and 5 m *(0.98 ft, 1.97 ft, 3.28 ft, 6.56 ft, 9.84 ft, 16.4 ft)*.
3	FTX DP2206 FTX DP2210 FTX DP2220 FTX DP2250	Cables fitted with 2 7/8-type connectors, 5 pins, with two ends for daisy-chaining 24 VDC supplies to two modules. Available lengths: 0.6 m, 1 m, 2 m and 5 m *(1.97 ft, 3.28 ft, 6.56 ft, 16.4 ft)*.
4	FTX DP2115 FTX DP2130 FTX DP2150	Cables fitted with 1 7/8-type connector, 5 pins, with one free end and the other for connecting 24 VDC supplies. Available lengths: 1.5 m, 3 m and 5 m *(4.92 ft, 9.84 ft, 16.4 ft)*.
5	FTX DP12M5	Male M12-type connectors, 5 pins, for PROFIBUS-DP bus cables (encoding B).
	FTX DP12F5	Female M12-type connectors, 5 pins, for PROFIBUS-DP bus cables (encoding B).
6	FTX C78M5	Male and female 7/8-type connectors, 5 pins, for 24 VDC supply cables.
	FTX C78F5	Female 7/8-type connectors, 5 pins, for 24 VDC supply cables.
7	FTX CNCT1	T-connector fitted with 2 7/8-type connectors, 5 pins, for supply cables.
8	FTX DPTL12	Line terminators fitted with 1 M12-type connector.
9	FTX CB3203 FTX CB3206 FTX CB3210 FTX CB3220 FTX CB3230 FTX CB3250	Cables fitted with 2 M12-type elbow connectors, 6 pins, with two ends for connecting the internal bus to the module and splitter box, or for daisy-chaining two splitter boxes. Available lengths: 0.3 m, 0.6 m, 1 m, 2 m, 3 m and 5 m *(0.98 ft, 1.97 ft, 3.28 ft, 6.56 ft, 9.84 ft, 16.4 ft)*.
10	FTX CA3203 FTX CA3206 FTX CA3210 FTX CA3220 FTX CA3230 FTX CA3250	Cables fitted with 2 M12-type connectors, 6 pins, with two ends for connecting 24 VDC supplies to the module and splitter box. Available lengths: 0.3 m, 0.6 m, 1 m, 2 m, 3 m and 5 m *(0.98 ft, 1.97 ft, 3.28 ft, 6.56 ft, 9.84 ft, 16.4 ft)*.

Element	Reference	Function
11	FTX CA3103 FTX CA3106 FTX CA3110 FTX CA3120 FTX CA3130 FTX CA3150	Cables fitted with 1 M12-type elbow connector, 6 pins, with one free end for connecting 24 VDC supplies. Available lengths: 0.3 m, 0.6 m, 1 m, 2 m, 3 m and 5 m *(0.98 ft, 1.97 ft, 3.28 ft, 6.56 ft, 9.84 ft, 16.4 ft)*.
12	FTX CY1208	Y-connector for connecting 2 M8-type connectors to an M12 connector.
	FTX CY1212	Y-connector for connecting 2 M12-type connectors to an M12 connector.
13	FTX CM08B	Sealing plugs for M8-type connectors.
	FTX CM12B	Sealing plugs for M12-type connectors.
14	FTX CBTL12	Line terminator of the internal bus fitted with 1 M12-type connector.

Use of the Diagnostics Function of Pin 2

Diagnostics Function

Advantys FTM splitter boxes enable the use of sensors and actuators fitted with a built-in diagnostics function (conforming to the DESINA standard).

When configured as a diagnostics input, the pin 2 of each M12-type connector can be used to detect external splitter box faults relating to sensors or actuators.

Types of Faults

This information is used to detect the following faults:

- Damage to the detection surface,
- Inoperative electronics,
- No load

Choice of Diagnostics Input

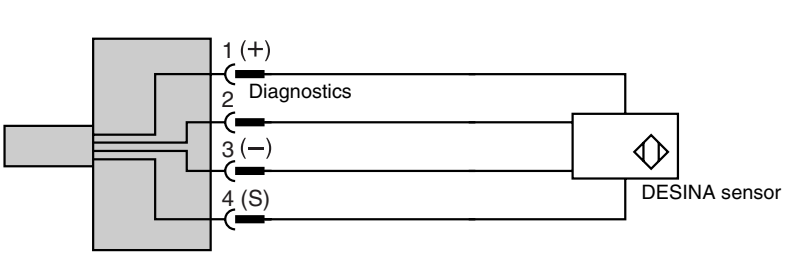
The choice between the sensor input function or diagnostics input function at pin 2 level is made for each channel and each setting, when configuring the splitter box.

Fault Display

Faults can be displayed by a red LED on each channel configured as a diagnostics input.

Example 1

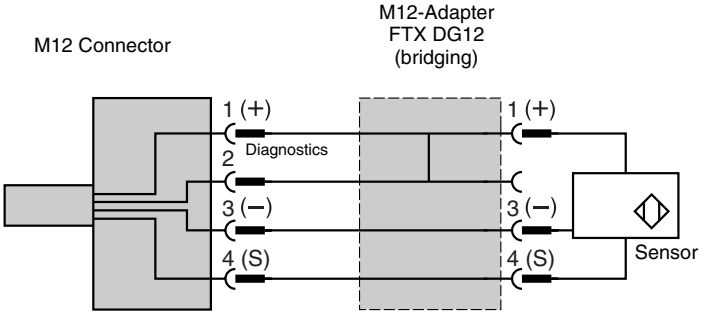
Connecting a sensor fitted with a diagnostics function:



Example 2

Using an FTX DG12 accessory, an M12-type diagnostics adaptor, it is possible to monitor breakages in cables leading to sensors or actuators not fitted with a built-in diagnostics function (only for splitter boxes fitted with M12-type connectors).

Connection of a standard sensor with diagnostics adapter:



Installation

2

At a Glance

Introduction

This chapter will take you through the stages involved in installing an FTM coupling device on a field bus, in compliance with the safety guidelines.

Note: The graphic representations of the coupling devices and splitter boxes in this chapter may not correspond to those really used. However, the dimensions are exact in any case.

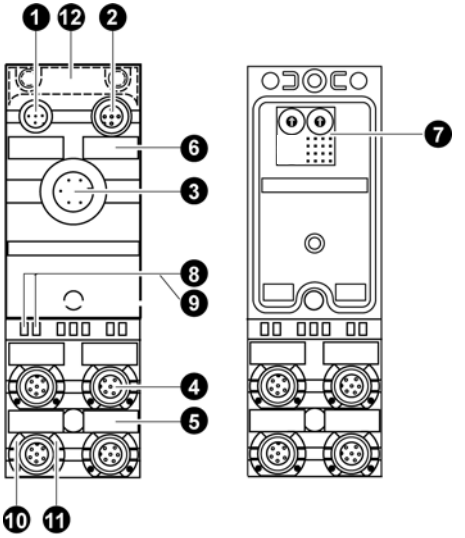
What's in this Chapter?

This chapter contains the following topics:

Overview

Module Description

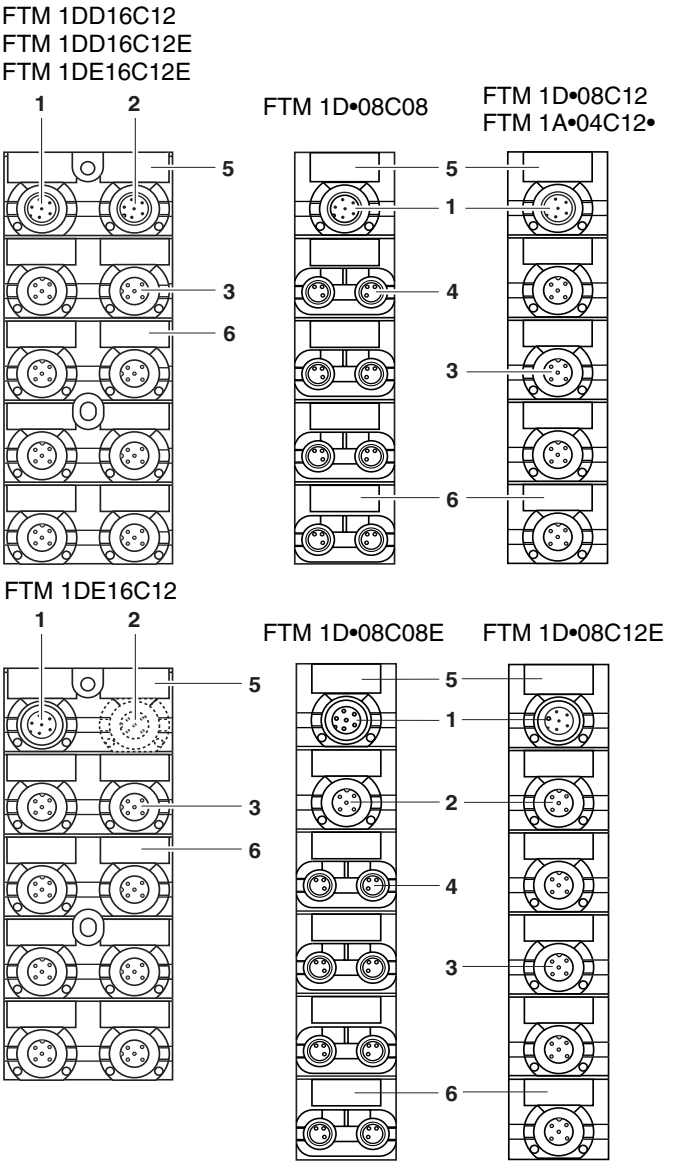
This is the front view of a coupling device (coupling device closed on the left, open on the right):



Element	Function
1	An M12-type male connector (IN bus) for bus connection
2	An M12-type (OUT bus) female connector for bus connection
3	7/8-type male connector for connecting the 24 VDC power supplies
4	Four M12-type female connectors for connecting the I/O splitter boxes via the internal bus
5	Four segment identification labels
6	Two module identification labels
7	Bus address and speed selection switches
8 and 9	Bus diagnostics LED
10	Sensor supply diagnostics LED
11	Actuator supply diagnostics and communication status LED
12	Module functional ground connection

Splitter box Description

Front view of a splitter box:



Element	Function
1	M12-type male connector for connection to the coupling device or previous splitter box.
2	M12-type female connector for daisy-chaining the internal bus to the next splitter box.
3	Four or eight M12-type female connectors (depending on model) for connecting sensors and actuators.
4	Eight M8-type female connectors for connecting sensors and actuators.
5	One or two splitter box identification labels (depending on model).
6	Four or eight channel identification labels.

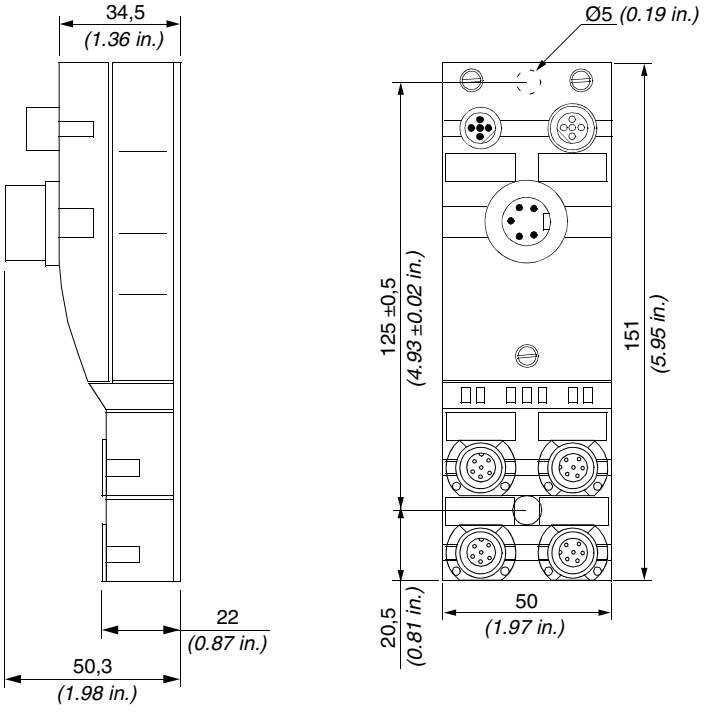
Installing the Coupling Device

Types of Screws and Tightening Torques

Coupling devices are mounted using two 4 mm *(0.15 in.)* diameter screws and two washers. The tightening torque is 2 Nm *(17.6 lb-in)*.

Module Dimensions

A coupling device has the following dimensions:



Note: When mounting the unit the support must be flat and smooth so as to prevent any undue stress on the unit which may lead to a loss of sealing.

Method

Follow the steps below:

Steps	Actions
1	Switch off the coupling device.
2	Remove the cover from the coupling device.
3	Attach the coupling device using screws.
4	*Splitter Box Address/Transmission Speed, p. 54*
5	*Grounding, p. 27*
6	Place the cover on the coupling device without trapping or damaging it.
7	Tighten the three captive screws built into the cover. **Note:** The three screws must be tightened correctly to respect the IP67 protection index.
8	Switch on the coupling device.

⚠ WARNING

RISK OF NON-COMPLIANCE WITH IP67

For IP67 protection:

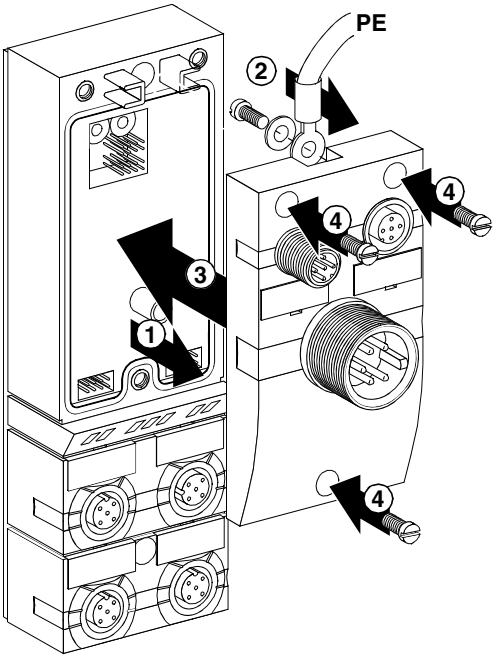
- Properly fit all connectors with cables or sealing plugs and tighten.
- Install cover onto coupling device and tighten captive screws to specified torque.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Grounding

Grounding the Coupling Device

The following figure shows the position of the ground electrode on the coupling device.



Note: Use a grounding strip or a conductor with a cross-section of 1 to 1.5 mm^2 *(AWG18, AWG16)* and length ≤ 3m *(9.84 ft)*. The maximum recommended length for the grounding strip is 3 m *(9.84 ft)*.

Method

Follow the steps below to connect the ground to the unit:

Step	Action
1	Remove the cover from the coupling device.
2	Crimp the terminal on the ground cable and screw it on the cap.
3	Place the cover on the coupling device.
4	Screw the three captive screws built into the cover.

Grounding the Splitter Boxes

The ground connection is connected internally to pin 1 of the M12 connector of the internal bus connector.

If the unit is not grounded properly, it will be sensitive to electromagnetic disturbances. This may lead to unexpected equipment operation.

⚠ WARNING

RISK OF IMPROPER GROUNDING

Connect unit to ground using a conductor with cross-section 1...1.5 mm² *(16...18 AWG)* and maximum length 3 m *(9.84 ft)*.See *EMC Compatibility, p. 29*.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

EMC Compatibility

Product Compliance

CE

This product complies with the European directive 89/336/CEE on "electromagnetic compatibility".

The products described in this manual meet all the conditions regarding electromagnetic compatibility and are compliant with the applicable standards. However, this does not mean that the electromagnetic compatibility of your installation is assured.

This is why it is strongly recommended to follow all indications concerning an EMC compliant installation. Only in these conditions and thanks to the exclusive use of CE approved components, will the devices used be deemed as compliant with the EMC directives.

When handling the products, ensure that all safety measures related to electromagnetic compatibility and all conditions for the use of the products are complied with by all persons concerned. This is especially important when handling products sensitive to electrostatic discharges.

The products described in this manual contain highly complex semiconductors that can be damaged or destroyed by electrostatic discharges (ESD). If, for example, they are used within the vicinity of devices rated as class A or B according to IEC 61000-4-4, the level of electromagnetic interference may be enough to cause the device to operate unexpectedly, and/or to damage it.

Damage may not necessarily cause a failure or malfunction that is immediately detectable. It may occur sporadically or in a delayed manner.

⚠ WARNING

RISK OF UNINTENDED EQUIPMENT OPERATION

Where there is a risk of electromagnetic interference, the system designer must implement the necessary protective measures.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Grounding

A low impedance connection with a maximum length of 3 m *(9.84 ft)* must be installed between the splitter box's ground electrode and the reference ground in order to discharge the noise voltages. The inductance of standard grounding cables (PE) presents a risk of high impedance when high frequency noise voltages are present. It is therefore advisable to use grounding strips. If this solution is not possible, use a ground conductor with a large cable cross-section and a ground connection that is as short as possible.

If the unit is not grounded properly, it will be sensitive to electromagnetic disturbances. This may lead to unexpected equipment operation.

⚠ WARNING

RISK OF IMPROPER GROUNDING

Connect unit to ground using a conductor with cross-section 1...1.5 mm^2 *(16...18 AWG)* and maximum length 3 m *(9.84 ft)*.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Cable Routing

Make sure that the following basic wiring rules are followed:

- Keep the data wire and the power cables apart from one another, in so far as is possible.
- Make sure there is a space of at least 10 cm *(3.94 in.)* between the data wires and the power cables.
- The data wires and power cables must only cross at a right angle to one another.
- It is advisable to route the data wires and power cables through separate shielded ducts.
- When laying the cables, the noise voltage from other devices or wires must be considered. This particularly applies to frequency converters, motors and other devices or cables generating high frequency disturbances. High frequency sources and the cables described in this manual must be as far apart from each other as possible.

⚠ WARNING

RISK OF UNINTENDED EQUIPMENT OPERATION

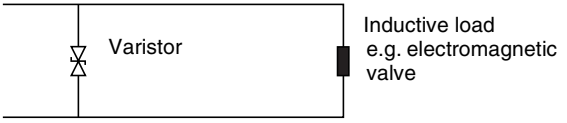
Please read and comply with the cabling rules listed above. Failure to comply with these wiring rules is a common cause of EMC problems.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Control of Inductive Loads

The outputs of the devices described in this manual are equipped with an integrated protective system against the high noise voltages that may be generated by inductive loads.

Integrated protective system against the high noise voltages generated by inductive loads



The varistor rapidly discharges the energy accumulated in the magnetic field of the inductive load.

The high voltages arising from the disconnection of inductive loads create large fields in the wires that may cause disturbances in nearby circuits or devices. It is advisable to provide an anti-interference device at the load level. In this way, the voltage peak generated by the inductive load is short-circuited directly at the point at which it occurs.

Installing a Splitter box

Types of Screws and Tightening Torques

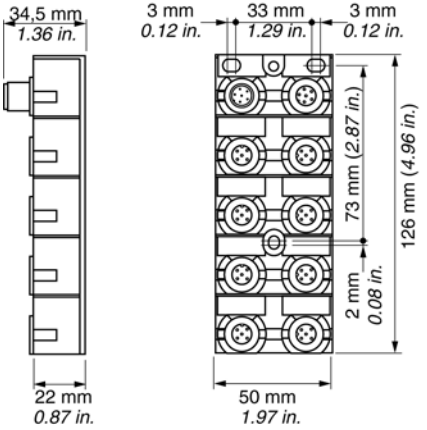
The splitter boxes are mounted using two 4 mm *(0.15 in.)* diameter screws and two washers. The tightening torque is 2 Nm *(17.6 lb-in)*.

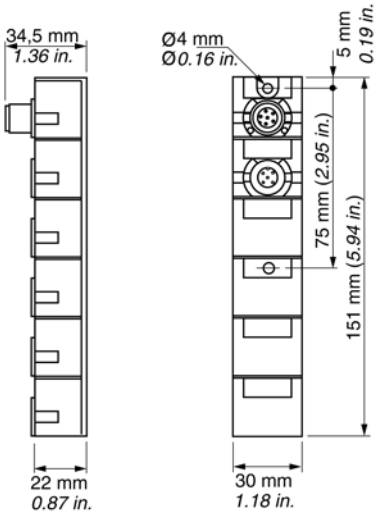
Dimensions of Extendable Splitter Boxes

The dimensions of the extendable splitter boxes are as follows:

Common view

FTM 1DD16C12E
FTM1DE16C12E





FTM 1D•08C12E
FTM 1D•08C08E

⚠ WARNING

RISK OF NON-COMPLIANCE WITH IP67

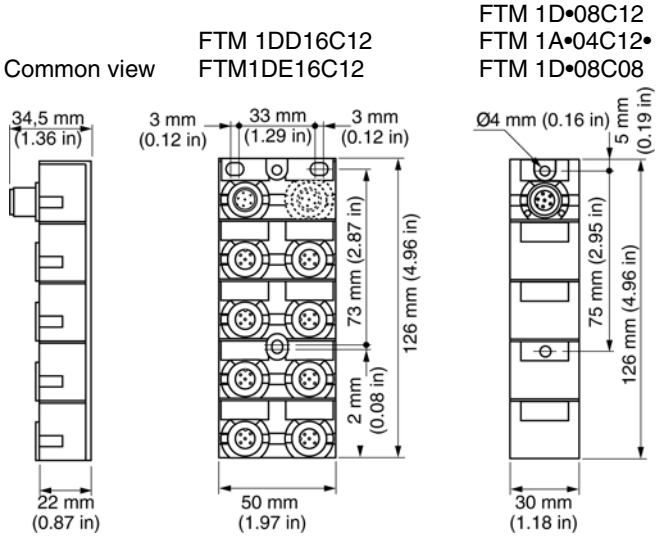
For IP67 protection:

- Properly fit all connectors with cables or sealing plugs and tighten.
- Install cover onto coupling device and tighten captive screws to specified torque.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Dimensions of Compact Splitter Boxes

The dimensions of the compact splitter boxes are as follows:



Operating Mode

Follow the steps below:

Steps	Actions
1	Remove the identification labels (see *Removing an Identification Label, p. 34*).
2	Attach the splitter box to the functional ground.
3	Mount the splitter box using the two screws.
4	Replace the identification labels in the corresponding module slots on the splitter box by pressing lightly.

Removing an Identification Label

Follow the steps below:

Steps	Actions
1	Insert a screwdriver under the open part of the label.
2	Remove the label by prising it off with the screwdriver .

⚠ WARNING

RISK OF NON-COMPLIANCE WITH IP67

For IP67 protection:

- Properly fit all connectors with cables or sealing plugs and tighten.
- Install cover onto coupling device and tighten captive screws to specified torque.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Properties and Wiring of FTM Coupling Devices

3

At a Glance

Introduction

This chapter provides an overview of FTM coupling devices.

What's in this Chapter?

This chapter contains the following topics:

FTM Splitter box Environment Properties

Environment Characteristics

Characteristics	Description	Reference standards
Product certifications	cULus	-
Operating temperature	0 °C *(32 °F)*... 55 °C *(131 °F)*	-
Storage temperature	- 25 °C *(-13 °F)* ... 70 °C *(158 °F)*	-
Degree of protection	IP67	-
Altitude	0 m *(0 ft)*...2000 m *(6561 ft)*	According to IEC 529
Resistance to vibrations	0.15 mm *(0.0059 in)*	According to IEC 68-2-6, Fc test
Shock resistance	50 gn, duration: 11 ms	According to IEC 68-2-27, Fc test
Withstand capacity for electrostatic discharges	• Contact: ± 4 kV • Air: ± 8kV	According to IEC 61000-4-2
Withstand capacity for radiated fields	10 V/m	According to IEC 61000-4-3
Withstand capacity for fast transients	• Power supply: ± 2 kV • Signal: ± 2 kV	According to IEC 61000-4-4
Withstand capacity for surge	• Power supply (symmetrical and asymmetrical): ± 500V • Signals (symmetrical and asymmetrical): ± 1000V • PE: ± 500 V	According to IEC 61000-4-5
Withstand capacity for conducted fields	10 VAC rms	According to IEC 61000-4-6
Withstand capacity for 50 Hz magnetic fields	30 A/m *(9.15 A/ft)*	According to IEC 61000-4-8
Mounting	In all positions	-

Electrical Properties of Module

Electrical Characteristics

Characteristic	Description
Operating voltage	24 VDC
Bus and I/O under-voltage detection	< 18 VDC
Maximum supply current	9 A
Internal current draw	70 mA

How to Connect the Power Supply

Description

The power supply is connected using a 5-pin 7/8" connector.

This connector is used to supply power to the following elements:

- Modules
- Splitter boxes
- Sensors
- Actuators

⚠ CAUTION

REVERSE POLARITY AND OVERCURRENT HAZARDS

- Do not supply 7/8” connector pins with more than 9A maximum current per pin.
- Do not reverse the polarity of the power supplied to the FTM coupling device.

Failure to follow these instructions can result in injury or equipment damage.

Power Supply for Coupling Devices, Splitter boxes and Sensors

The splitter boxes require a voltage supply of 24 VDC (class 2).

It must comply with directives applicable to industrial power supplies.

Power Supply for Coupling Device

We advise you to use a switch mode power supply for the coupling device, sensors and actuators.

⚠ CAUTION

RISK OF IMPROPER POWER SUPPLY

The coupling device's power must be taken from the sensor power supply.

Failure to follow these instructions can result in injury or equipment damage.

Power Supply Ratings

The rating of the power supplies depends on the number and respective ratings of the connected devices.

⚠ WARNING

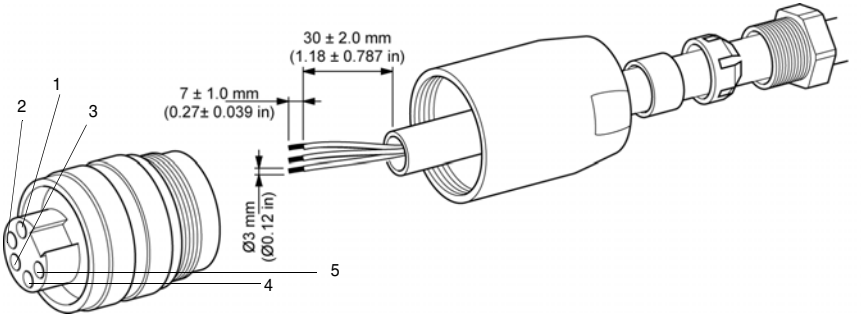
RISK OF UNINTENDED EQUIPMENT OPERATION

The system voltage must never be less than 18 VDC, regardless of the configuration.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

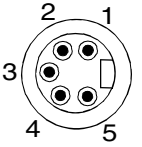
Assembling the Power Supply Cable

The following diagram describes the design characteristics and dimensions of the 7/8" power supply cable and the connector cable.



Pin Assignment

The following diagram shows a front view of the power supply connector for the coupling device:



Pin	Assignment
1	0 VDC
2	0 VDC
3	Ground (PE)
4	Bus sensor and power supply
5	Actuator power supply

Using the FTX DP21•• cable

Pin No.	Wire No.	Signal
1	1	0 VDC
2	2	0 VDC
3	Green yellow	Ground (PE)
4	3	Sensors 24 VDC
5	4	Actuators 24 VDC

Maximum Current per pin

The 7/8" connector is sized for a maximum current of 9 A per pin.

Phaseo Power Supply

A switch-mode power supply such as Phaseo (ABL 7•••) is particularly well-suited to supply automation systems. Its use is therefore highly recommended for FTB and FTM splitter boxes.

Internal Bus Connection

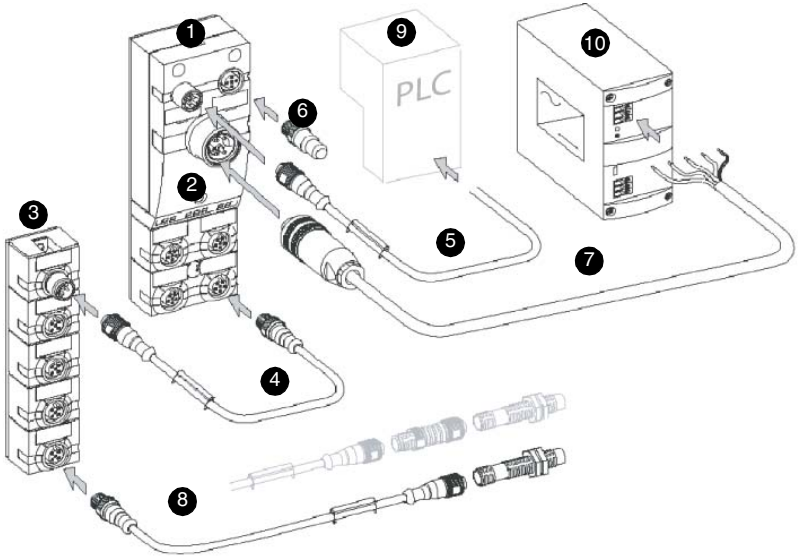
Internal Bus Connection

Internal bus connection fulfils two functions:

- Power supply for I/O FTM splitter boxes.
- Communication between the coupling device and the FTM I/O splitter boxes.

The internal bus between the coupling device and the I/O FTM splitter boxes must only be connected using pre-formed cables, available in different lengths (FTX CB32••).

Wiring Diagram



Element	Function
1	FTM Coupling Device
2	Coupling box cover
3	FTM splitter box
4	Internal bus cable
5	Incoming bus cable
6	Line terminator
7	Power supply wiring
8	M12 cable to detector or actuator
9	PLC
10	24 VDC Supply

Method

Using the wiring diagram shown above, follow the steps below:

Step	Action
1	Connect splitter box 3 to coupling device1 using internal bus cable 4.
2	Connect the M12 or M8 cables for the detectors or actuators to splitter box 3.
3	Connect incoming bus cable 5 to the "Bus In" connection point of cover 2.
4	Connect the outgoing bus cable to the following element or, if coupling device is the last element, connect a line terminator 6.
5	Connect the 24 VDC power supply 10 using the 7/8" connector.

Notes

Note: When tightening conductor screws, be careful to apply the recommended tightening torque of 0.5 Nm *(4.42 lb-in)*. Insufficient tightening of the field bus, internal bus, or I/O connections is a common cause of errors or malfunctions.

⚠ WARNING

RISK OF UNINTENDED EQUIPMENT OPERATION

- Do not exchange I/O modules within an installation.
- Identify and clearly mark the internal bus cables and the FTM I/O splitter boxes.
- In case of coupling device exchange for maintenance, keep the same network address.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Internal Bus Segment Terminator

Each segment of the internal bus must be terminated by a compact splitter box or an extendable splitter box with a line terminator. This line terminator is already built into each of the compact splitter boxes.

The connectors of all unused segments must have a line terminator.

FTM Splitter Box Properties and Wiring

4

At a Glance

Introduction

This chapter provides an overview of all FTM splitter boxes.

What's in this Chapter?

This chapter contains the following topics:

Electrical Properties of Discrete Splitter Boxes

Splitter Box Properties

Properties	Description
Splitter box's internal current draw	• 30 mA (M8) • 50 mA (M12)
Operating voltage	24 VDC
Maximum power current for the splitter box	4 A
Maximum auxiliary power current (only for FTM 1DD16C12)	4 A
Bus and I/O under-voltage detection	< 18 VDC

Input Characteristics

Characteristic	Description
Compliance with IEC 1131-2	Type 2
Compliance with P.D (Potential Difference) 2 wire/3 wire	Yes
Rated power voltage	24 VDC
Maximum current	200 mA
Sensor power supply	18...30 VDC
Logic	Positive
Filtering input	1 ms
Displaying channel status	Yellow LED, 1 LED per input
Reverse polarity protection	Yes

Output characteristics

Characteristic	Description
Output type	Transistors
Output voltage	24 VDC
Outgoing current	0.5 A
Response time	< 0.5 ms
Maximum switching cycle	• Resistive: 50 Hz • Inductive: 5 Hz
Maximum lamp load	10 W
Displaying channel status	Yellow LED, 1 LED per input
Connection for outputs / cable lengths	• 0.75mm^2 *(AWG 20)* / 10 m *(32.8 ft)* maximum • 0.34 mm^2 *(AWG 22)* / 5 m *(16.40 ft)* maximum

Connection of Actuators and Sensors to Discrete splitter boxes

Connection Properties

The sensors and actuators can be connected using either pre-formed cables or cables of your own making, provided they comply with the specifications for wires of cross-section < 0.75 mm^2 *(AWG 20)*.

⚠ WARNING

RISK OF NON-COMPLIANCE WITH IP67

For IP67 protection:

- Properly fit all connectors with cables or sealing plugs and tighten.
- Install cover onto coupling device and tighten captive screws to specified torque.

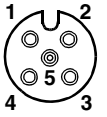
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Two sealing plugs are supplied with each splitter box and are available as accessories with the following product references:

- FTX CM12B (packet of 10 M12 sealing plugs).
- FTX CM08B (packet of 10 M8 sealing plugs).

Assignment of M12 Connector Pins

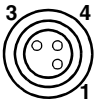
The following diagram shows the front view of a 5-pin M12 connector and the convention for numbering the pins:



Pin	Assignment
1	+24 VDC (detector power supply)
2	I/O signal
3	0 VDC (GND)
4	I/O signal
5	Functional ground (PE)

Assignment of the M8 Connector Pins

The following diagram shows the front view of a 3-pin M8 connector and the convention for numbering the pins:



Pin	Assignment
1	+24 VDC (detector power supply)
3	0 VDC (GND)
4	I/O signal

Connection of Y Connectors

Y connectors (FTX CY1212 and FTX CY1208) are only used with discrete input / output splitter boxes fitted with an M12 connector.

They can be used to connect two signals on each female connector (sensor/ actuator).

Electrical Characteristics of Analog Splitter Boxes

Splitter box Characteristics

Characteristic	Description
Splitter box's internal current draw	50 mA
Operating voltage	24 VDC
Maximum power current for the splitter box	4 A
Maximum power current per channel	• For inputs: ≤ 0.2 A • For outputs: ≤ 1.6 A
Bus and I/O under-voltage detection	< 18 VDC

Input Properties

Properties	Description of FTM 1AE04C12C	Description of FTM 1AE04C12T
Type	300 Ω differential	FTM 1AE04C12T: 1 MΩ differential
Measurement range	• 0...20 mA • 4...20 mA	• +/-10 VDC • 0...10 VDC
Resolution	15 Bits	15 Bits + sign
Conversion time	≤ 2 ms / channel	
Input filter	1 ms	
Displaying channel status	By LED	
Connection for inputs / cable lengths	30 m *(98.42 ft)* maximum	

Output Characteristics

Properties	Description of FTM 1AS04C12C	Description of FTM 1AS04C12T
Type	300 Ω differential	1 MΩ differential
Measurement range	• 0...20 mA • 4...20 mA	• +/-10 VDC • 0...10 VDC
Resolution	11 Bits	11 Bits + sign
Conversion time	≤ 1 ms / channel	
Displaying channel status	By LED	
Connection for outputs / cable lengths	30 m *(98.42 ft)* maximum	

Connection of Actuators and Sensors to Analog splitter boxes

Connection Properties

The sensors and actuators can be connected using either pre-formed cables or cables of your own making, provided they comply with the specifications for wires of cross-section ≤ 0.75 mm^2 *(AWG 20)*.

The shielding is provided by the metal thread of the female M12 connector. For this reason, we recommend that you only use female M12 connectors with metal threads. The shielding must be connected to connector's metal sleeve.

⚠ WARNING

RISK OF NON-COMPLIANCE WITH IP67

For IP67 protection:

- Properly fit all connectors with cables or sealing plugs and tighten.
- Install cover onto coupling device and tighten captive screws to specified torque.

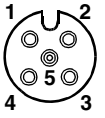
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Two sealing plugs are supplied with each splitter box and are available as accessories with the following product references:

- FTX CM12B (packet of 10 M12 sealing plugs).
- FTX CM08B (packet of 10 M8 sealing plugs).

Assignment of M12 Connector Pins

The following diagram shows the front view of a 5-pin M12 connector and the convention for numbering the pins:



Pin	Analog IN assignment	Analog OUT assignment
1	+24 VDC (detector power supply)	+24 VDC (detector power supply)
2	Analog input +	Not used
3	0 VDC (GND)	0 VDC (GND)
4	Analog input -	Analog output
5	Not used	Not used

PROFIBUS Network Interface

5

Presentation

Introduction

This chapter provides theoretical background on PROFIBUS field bus operation.

What's in this Chapter?

This chapter contains the following sections:

5.1 Wiring to the PROFIBUS bus

Presentation

Introduction

The following section describes the elements required for wiring the Advantys FTM splitter boxes to the PROFIBUS field bus.

What's in this Section?

This section contains the following topics:

Field Bus Connection

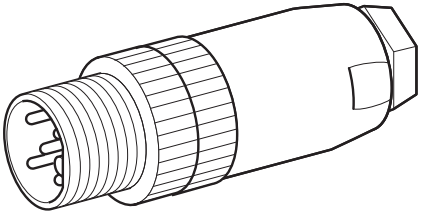
Description

The splitter box can either be in the middle of the chain connection or at line end.

The field bus is connected via a 5-pin M12 connector.

Illustration of Cable Connector Connection

The following diagram shows the characteristics of the connection cable connector:

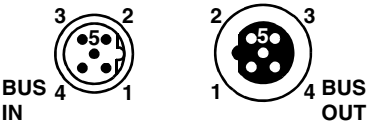


Assignment of M12 Connector Pins (encoding B)

The BUS IN connector is a 5-pin M12 male connector.

The BUS OUT connector is a 5-pin M12 female connector.

The following diagram shows a front view of the bus connectors (encoding B):



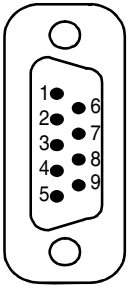
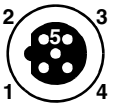
The following table gives the assignments of the bus connector pins:

Pin	Signal	Meaning
1	VP	Line terminator polarization voltage
2	RxD/TxD-N	Receive/transmit data - negative (red)
3	DGND	Discrete ground
4	RxD/TxD-P	Receive/transmit data - positive (green)
5	Shielding	Shielding or grounding
Connector housing	Shielding	Shielding or grounding

Note: It is preferable to connect the shielding to the connector housing. If this is not possible, the connection can also be made using pin 5. These two possibilities can also be combined.

Correspondence between 9-pin SUB-D Connectors and M12 5-pin Connectors

The following table shows the correspondence between pins on 9-pin SUB-D connectors and on 5-pin M12 connectors:

9-pin SUB-D connector	SUB-D pin	Signal	Meaning	M12 pin	5-pin M12 connector
	**1**	**Shielding**	**Shielding/grounding**	5	
	2	M24	24 V output ground	-	
	3	**RxD/TxD-P ***	**Receive/transmit data - positive (green)**	4	
	4	CNTR-P	Control signal for repeaters - positive (direction control): not used	-	
	5	**DGND ***	**Discrete ground**	3	
	6	**VP ***	**Line terminator polarization voltage**	1	
	7	P24	Output voltage, 24 V	-	
	8	**RxD/TxD-N ***	**Receive/transmit data - negative (red)**	2	
	9	CNTR-N	Control signal for repeaters - negative (direction control): not used	-	

Note: (*) Signals in bold and with an asterisk are compulsory and must be provided. Other signals are optional.

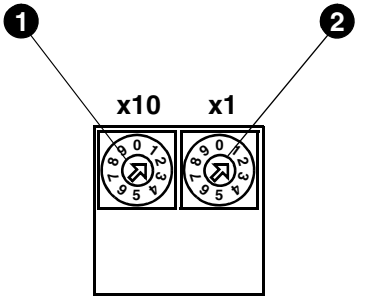
Operating Mode

Follow the steps below:

Step	Action
1	Connect the chaining cable to the BUS IN connector.
2	If the unit is at the end of the line, connect a line terminator to the BUS OUT connector. Otherwise, connect a connection cable to the BUS OUT connector.

Splitter Box Address/Transmission Speed

Rotary Switches Illustration



Element	Function
1	Node-ID x 10 switch
2	Node-ID x 1 switch

Method

Follow the steps described below:

Step	Action
1	Switch off the coupling device.
2	Unscrew the three screws on the cover.
3	Set the splitter box address.
4	Screw the cover back on.

Assignment of the Address on the Network

The PROFIBUS address is configured directly on the splitter box using two rotary switches.

The addresses can be configured from 0 to 99. However the following addresses are reserved:

- 0 to 2: for the DP masters
- 3 to 99: for the slaves

When assigning the addresses, each slave and/or master must be assigned to a specific and unique address. A configured address is acknowledged at boot-up. It cannot be modified if the cover is not removed.

Using the GSD File for Configuration

The GSD file is required to operate splitting devices.

The file extension indicates the corresponding language. GSD files are available in five languages.

For further information, see *GSD Files, p. 80*.

Automatic Transmission Speed

At power up, the distributor is in listening mode in order to adapt its transmission speed to the one used on the network. As soon as it is detected by the master, it receives its configuration and settings data. Once the configuration is over, it is operational and ready to exchange data.

Note: If a communication error is detected, fallback values, as defined later in this document, are applied on the outputs if they were configured beforehand.

Transmission Speed and Cable Length

Each transmission speed has a corresponding cable length.

The following data is indicated without a repeater and with a maximum of 32 slaves on the segment.

Transmission speed in Kbits/s	Maximum cable length in m *(ft)*
≤ 93.75	1200 *(3937 ft)*
187.5	1000 *(3280.83 ft)*
500	400 *(1312 ft)*
1500	200 *(656 ft)*
≥3000	100 *(328 ft)*

End of Line Terminator

Description

The PROFIBUS network or segment line terminator resistance power supply is provided by the detector and bus power supply with galvanic isolation. Each PROFIBUS segment start and end must have a line terminator resistance.

Reference

Command number	Designation
FTX DPTL12	Line terminator

Replacement Splitter Boxes

Replacing Splitter Boxes

A splitter box with a different reference may be used to replace the FTM splitter box, provided it can carry out all the functions of the FTM splitter box.

This characteristic can help to reduce maintenance stock. As a result, each discrete input splitter box can be replaced by a configurable discrete splitter box. A list of all the possible replacements is provided in the table below:

FTM splitter box	Replacement FTM splitter box
FTM 1DE16C12	FTM 1DD16C12
FTM 1DE08C12	FTM 1DD08C12
FTM 1DE08C08	FTM 1DD08C12
FTM 1DE16C12E	FTM 1DD08C08
FTM 1DE08C12E	FTM 1DD16C12E
FTM 1DE08C08E	FTM 1DD08C08E

5.2 General Principles

About PROFIBUS

At a Glance

PROFIBUS is an open and independent communication standard adapted to industrial applications.

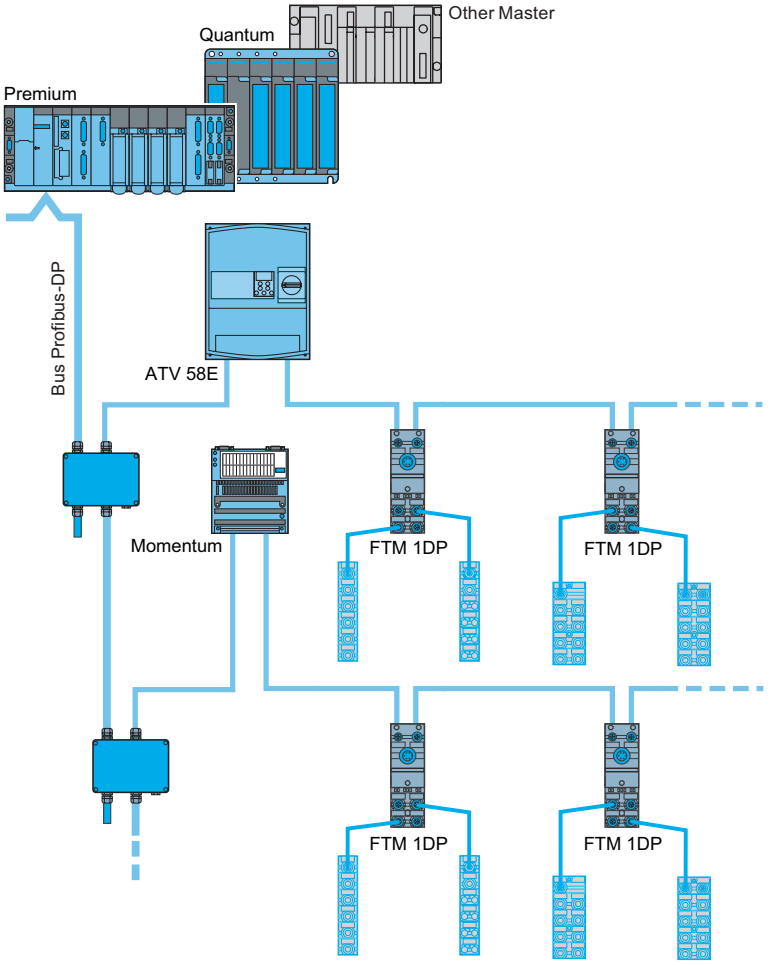
PROFIBUS-DP (Process Fieldbus Decentralized Peripheral) is the PROFIBUS version optimized for high speed data transmission within a decentralized I/O architecture. The physical link is a type A shielded twisted pair.

Advantages of PROFIBUS

PROFIBUS enables devices from different manufacturers to communicate without needing a specific interface.

PROFIBUS-DP is particularly adapted to applications for which the response time is a critical factor.

Operating Diagram



PROFIBUS Standards

Openness and independence are defined by following international standards IEC 61158 and IEC 61784. The PROFIBUS standard is detailed in standard EN 50170.

Master/Slave Communication

Compatibility between the physical equipment installed and the configuration expected by the application is controlled during master and slave communication establishment. The master sends the slave configuration and settings data as soon as it recognizes the equipment installed. The slave provides diagnostic information to the master about its operating state.

The data exchange between the Master (the processing unit) and the Slaves (decentralized devices) is carried out on a cyclical basis: the master sends the output data to the slaves, which respond with their input data.

Slaves and Repeaters

32 slaves in total can be connected to a bus segment. To increase the number of slaves, repeaters must be added to create new bus segments.

Repeaters are also used to physically isolated bus segments. In total, the number of slaves must not be greater than 126.

There must be a line terminator on the bus at the ends of each new segment.

5.3 Behavior

Behavior patterns of the Advantys FTM Modular Splitter Box

Behavior at Boot-up

When the Advantys FTM coupling device is powered up, it searches for the splitter boxes connected to it and initializes communication with them on its internal bus. Once the internal bus has been initialized, it switches to listening mode in order to adapt its transmission speed to the one used on the network. As soon as it is detected by the master, it receives its configuration and settings data. Once the configuration is complete, it is operational and ready to exchange data.

In the event of communication error:

The configured fallback modes (maintain or fallback) are applied on the outputs.

In the event of an internal bus fault:

The FTM coupling device switches to fault mode and stops communicating on the PROFIBUS network. After this problem has been resolved, the device must be switched off in order to reinitialize the system and communication with the PROFIBUS master.

If the PLC stops working (PLC switches to STOP):

The FTM coupling device responds in one of two ways:

- It deactivates the outputs, or
- It applies the configured fallback values

Application-Specific Functions

6

Presentation

Introduction

The Advantys FTM range offers a wide selection of discrete and analog I/O splitter boxes. The following chapter describes the operation of the I/Os and configuration data. Memory areas are assigned to the I/Os of splitter boxes as described in the chapter Software installation (see *Software Installation, p. 79*).

What's in this Chapter?

This chapter contains the following topics:

Discrete Application Functions

General

The Advantys FTM splitter boxes offer the following, according to their version:

- Discrete input channels
- Discrete output channels
- Channels that can be configured as inputs (by default) or outputs

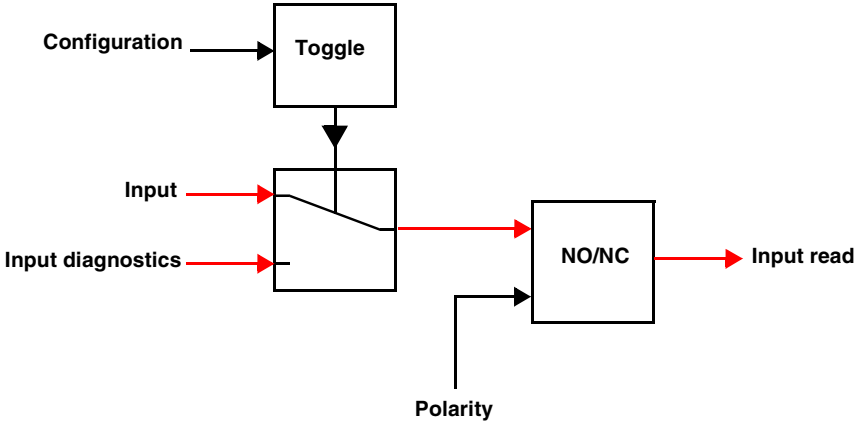
This chapter describes how the discrete inputs/outputs operate.

Discrete Inputs

The inputs can be used in NO or NC (reversed).

Channels 10 to 17 (pin 2 on M12 connectors) can also be configured as "diagnostics inputs".

The status read on the inputs is defined as described in the following diagram:



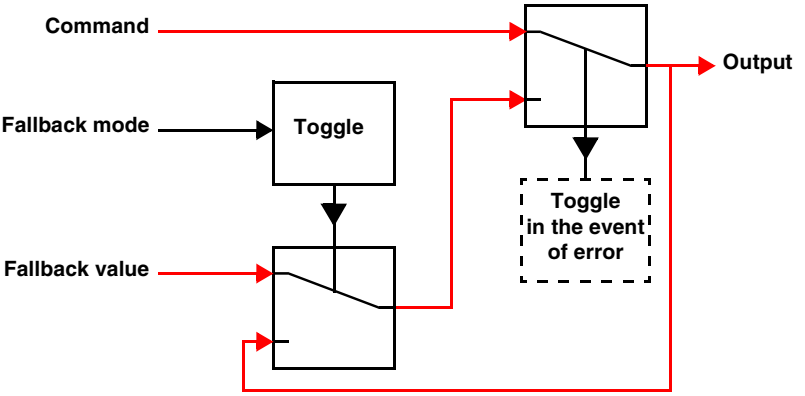
Note: Channels 00 to 07 are configured as "NO input" by default (no reversal). Channels 10 to 17 are configured as "diagnostics input" by default (no reversal).

Discrete Outputs

In the event of communication errors with the bus master, the Advantys FTM splitter box assigns the user-configured fallback mode to the outputs:

- Last value maintained
- Fallback to 0 (default value)
- Fallback to 1

The status read on the outputs is defined as described in the following diagram:



Splitter Box Channel Types

The table below shows the types of channels available for each distributor.

Splitter box	Discrete Inputs	Discrete configurable elements			
	Channels	Channels	Input	Output	Diagnostics
FTM 1DE16C12•	00...07	-	-	-	-
	10...17	-	-	-	-
FTM 1DE08C12•	00...03	-	-	-	-
	10...13	-	-	-	-
FTM 1DE08C08•	00...07	-	-	-	-
FTM 1DD16C12•	-	00...07	x	x	-
	-	10...17	x	x	x
FTM 1DD08C12•	-	00...03	x	x	-
	-	10...13	x	x	x
FTM 1DD08C08•	-	00...07	x	x	-

Configuring Discrete I/Os

Configuring the Slave

The table below presents the configuration data for FTM splitter box references and their I/O memory size:

Identifier	Reference	Size of input byte	Size of output byte	Configuration data (in hexadecimal)
56600	FTM 1DD16C12	2	2	C2 01 01 DD 18
56601	FTM1DD16C12E	2	2	C2 01 01 DD 19
56602	FTM 1DD16C12	2	-	42 01 DD 1A
56603	FTM 1DD16C12E	2	-	42 01 DD 1B
56610	FTM 1DD08C12	2	2	C2 01 01 DD 22
56611	FTM 1DD08C12E	2	2	C2 01 01 DD 23
56612	FTM 1DE08C12	2	-	42 01 DD 24
56613	FTM 1DE08C12E	2	-	42 01 DD 25
56620	FTM 1DD08C08	1	1	C2 00 00 DD 2C
56621	FTM 1DD08C08E	1	1	C2 00 00 DD 2D
56622	FTM 1DE08C08	1	-	42 01 DD 2E
56623	FTM 1DE08C08E	1	-	42 01 DD 2F

Configuration

The following chapter describes the configuration data sent to the coupling device by the master when communication is established. Bytes 0 to 10 have the same meaning regardless of the hardware configuration used. From byte 11 up, the data correspond to the I/O coupling devices, in the order of the internal bus. Where channels are not configurable, pay no attention to the written data: The corresponding bytes must be set to 0.

Settings Frame FTM 1DP10

Byte	Data	Notes
0	Status	Specific to IEC 61158
1	WatchDog factor 1	
2	WatchDog factor 2	
3	Min TSDR	
4	Ident Number high	
5	Ident Number low	
6	Group Ident	
7	General settings	Settings for the FTM 1DP10 coupling device
8	Reserved	
9	Reserved	
10	General settings	
11 and after	I/O coupling device setting	See description below

Coupling Device Settings Data

FTM 1DP10 (7 bytes) General Settings

Bit 2 determines the behavior of the PLC when it stops:

0: Outputs set to 0

1: Configured output fallback mode applied.

FTM 1DP10 (10 bytes) General Settings

Bit	Function	Notes
0	Global diagnostics	Authorizes or inhibits message transmission
1	Diagnostic per channel	Authorizes or inhibits message transmission
2	Under-voltage in detectors and bus/ coupling device	Authorizes or inhibits message transmission
3	Reserved	
4	Under-voltage in detectors and bus/ splitter boxes	Authorizes or inhibits message transmission
5	No power supply in detectors and bus/ splitter boxes	Authorizes or inhibits message transmission
6	Under-voltage in actuator supply	Authorizes or inhibits message transmission
7	No actuator power supply	Authorizes or inhibits message transmission

Discrete Splitter Box Setting Data

FTM 1D•16C12• splitter box settings

Byte	Function	Notes
0	Configuration of channels 00 to 03	Pin 4 on M12 connectors
1	Configuration of channels 04 to 07	Pin 4 on M12 connectors
2	Configuration of channels 10 to 13	Pin 2 on M12 connectors
3	Configuration of channels 14 to 17	Pin 2 on M12 connectors
4	Fallback mode of channels 00 to 03 outputs	Pin 4 on M12 connectors (if output)
5	Fallback mode of channels 04 to 07 outputs	Pin 4 on M12 connectors (if output)
6	Fallback mode of channels 10 to 13 outputs	Pin 2 on M12 connectors (if output)
7	Fallback mode of channels 14 to 17 outputs	Pin 2 on M12 connectors (if output)

FTM 1D•08C12• splitter box settings

Bit	Function	Notes
0	Configuration of channels 00 to 03	Pin 4 on M12 connectors
1	Configuration of channels 04 to 07	Pin 4 on M12 connectors
2	Fallback mode of channels 00 to 03 outputs	Pin 4 on M12 connectors (if output)
3	Fallback mode of channels 04 to 07 outputs	Pin 4 on M12 connectors (if output)

FTM 1D•08C08• splitter box settings

Bit	Function	Notes
0	Configuration of channels 00 to 03	Pin 4 on M12 connectors
1	Configuration of channels 04 to 07	Pin 4 on M12 connectors
2	Fallback mode of channels 00 to 03 outputs	Pin 4 on M12 connectors (if output)
3	Fallback mode of channels 04 to 07 outputs	Pin 4 on M12 connectors (if output)

Configuration of channels 00 to 07. Each channel is configured over two bits:

Bit	**7 and 6**	**5 and 4**	**3 and 2**	**1 and 0**
Channel	03 (or 07)	02 (or 06)	01 (or 05)	00 (or 04)
Meaning	0 = Input NO 1 = Input NC 2 = Input DIAG 3 = Output			

Configuration of channels 10 to 17. Each channel is configured over two bits:

Bit	**7 and 6**	**5 and 4**	**3 and 2**	**1 and 0**
Channel	13 (or 17)	12 (or 16)	11 (or 15)	10 (or 14)
Meaning	0 = Input NO 1 = Input NC 2 = Output 3 = Reserved			

Output fallback mode configuration Each fallback mode is configured over two bits:

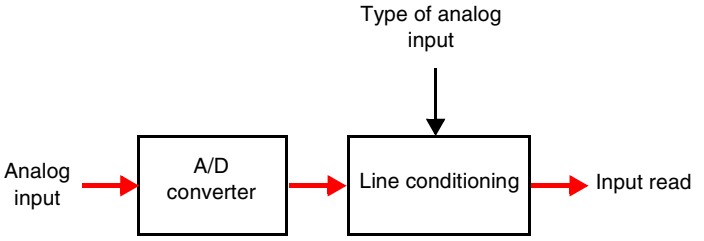
Bit	**7 and 6**	**5 and 4**	**3 and 2**	**1 and 0**
Channel	03 (or 13,07,17)	02 (or 12, 06,16)	01 (or 11,05, 15)	00 (or 10, 04 or 14)
Meaning	0 = Fallback to 0 1 = Fallback to 1 2 = Hold output 3 = Reserved			

Application-Specific Analog Functions

Analog Inputs and Outputs

Analog Inputs: Analog inputs are read by 16 bit words.

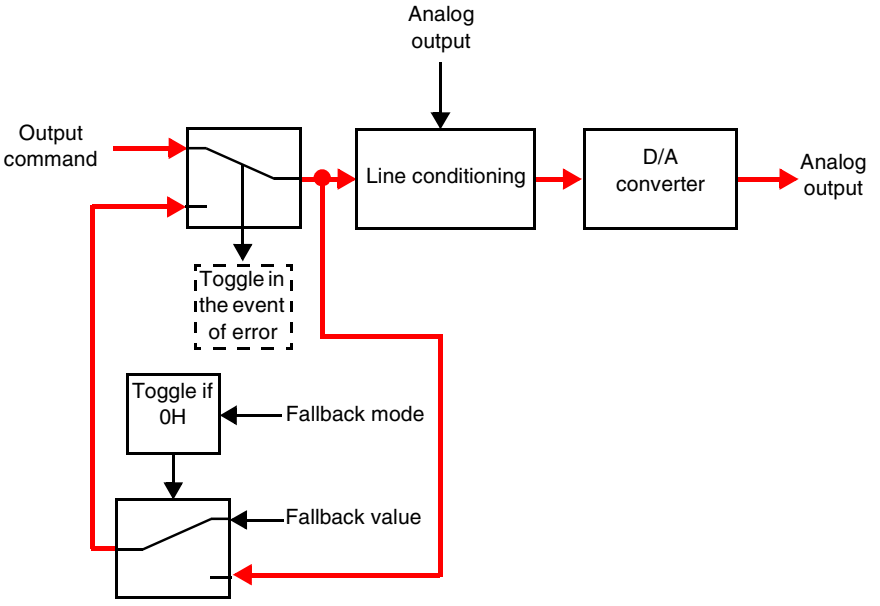
The status read on inputs is defined as follows:



Analog Outputs: In the event of communication errors with the bus master, the FTM assigns the user-configured status to the outputs:

- Last value maintained
- Fallback to a preset value

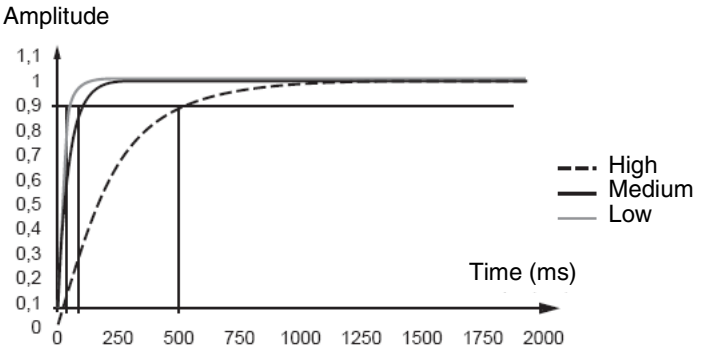
The status applied on the output is defined as follows:



Input Value Smoothing

The analog signal can be pre-filtered in the device, to reduce temporary measurement variations for example. The measurement time is 2 ms per channel. The total cycle time is the result of the measurement time for each channel + 2.5 ms. The following diagram shows the behavior of the splitter box in relation to the response time on an active channel.

Behavior patterns of the Splitter Box / Response Time



Use of the Delta Value

The delta value is used to define a deadband, within which the modifications of the input signal value are not indicated. Using the delta value can reduce load of the internal bus of the FTM.

Note: In the event where a large number of analog input channels are used, the FTM's internal bus may have a heavy load.

The delta value is expressed as a number of input points on a gross measurement scale. (See tables below for a view of the scales according to configuration).

Example: If the final measurement value was 1000 points. By adjusting the delta value to 100, a new measurement value can only be sent if it is less than 900 or greater than 1100.

The delta value must be between 0 and 32 767.

Splitter Box Channel Types

The table below shows the channel-type for each splitter box.

Splitter box	Analog Inputs	Analog Outputs
FTM 1AE04C12T	4 (Voltage)	
FTM 1AE04C12C	4 (current)	
FTM 1AS04C12T		4 (Voltage)
FTM 1AS04C12C		4 (current)

Configuring Analog I/Os

Configuring the Slave

The table below presents the configuration data that correspond to FTM splitter box references and their I/O memory size:

Identifier	Reference	Size of input byte	Size of output byte	Configuration data in hex
56700	FTM 1AE04C12T	4*2	-	42 4 3DD 7C
56710	FTM 1AS04C12T	-	4*2	82 43 DD 86
56720	FTM 1AS04C12C	-	4*2	82 43 DD 90
56730	FTM 1AE04C12C	4*2	-	42 43 DD 9A

Configuration

The following chapter describes the configuration data sent to the coupling device by the master when communication is established. Bytes 0 to 10 have the same meaning regardless of the hardware configuration used. From byte 11 up, the data correspond to the I/O coupling devices, in the order of the internal bus. Where channels are not configurable, pay no attention to the written data: The corresponding bytes must be set to 0.

Settings Frame

FTM 1DP10

Byte	Data	Notes
0	Status	Specific to IEC 61158
1	WatchDog factor 1	
2	WatchDog factor 2	
3	Min TSDR	
4	Ident Number High	
5	Ident Number low	
6	Group Ident	
7	General settings	Settings for the FTM 1DP10 module
8	Reserved	
9	Reserved	
10	General settings	
11 and after	I/O coupling device setting	See description below

Coupling Device Settings Data

FTM 1DP10 (7 bytes) General Settings

Bit 2 determines the behavior of the PLC when it stops:

0 : Outputs set to 0

1 : Configured output fallback mode applied.

FTM 1DP10 (10 bytes) General Settings

Bit	Function	Notes
0	Global diagnostics	Authorizes or inhibits message transmission
1	Diagnostic per channel	Authorizes or inhibits message transmission
2	Under-voltage in detectors and bus/ coupling device	Authorizes or inhibits message transmission
3	Reserved	
4	Under-voltage in detectors and bus/ splitter boxes	Authorizes or inhibits message transmission
5	No power supply in detectors and bus/ splitter boxes	Authorizes or inhibits message transmission
6	Under-voltage in actuator supply	Authorizes or inhibits message transmission
7	No actuator power supply	Authorizes or inhibits message transmission

Configuring Analog Input Splitter Boxes

The table below describes the configuration data of the analog splitter boxes:

FTM 1AE04C12• splitter box settings:

Byte	Function	Notes
0	Channel 0 settings	See below
1	Reserved	-
2	Channel 0: Delta	Allowable value: 0...32 767
3		
4	Channel 1 settings	See below
5	Reserved	-
6	Channel 1: Delta	Allowable value: 0...32 767
7		
8	Channel 2 settings	See below
9	Reserved	-
10	Channel 2: Delta	Allowable value: 0...32 767
11		
12	Channel 3 settings	See below
13	Reserved	-
14	Channel 3: Delta	Allowable value: 0...32 767
15		

Channel settings:

Bit	Function	Notes
0 (LSb)	Measurement range	00 : Inactive 01 : 4...20 mA or 0...10 V 10 : 0...20 mA or +/- 10 V 11 : Reserved
1		
2	Diagnostics	Authorizes or inhibits message transmission
3	Reserved	-
4	Smoothing	00 : None 01 : Low 10 : Medium 11 : High
5		
6	Reserved	-
7	Reserved	-

Configuring Analog Output Splitter Boxes

FTM 1AS04C12• splitter box settings:

Byte	Function	Notes
0	Channel 0 settings	See below
1	Reserved	
2	Fallback value of channel 0	
3		
4	Channel 1 settings	See below
5	Reserved	
6	Fallback value of channel 1	
7		
8	Channel 2 settings	See below
9	Reserved	
10	Fallback value of channel 2	
11		
12	Channel 3 settings	See below
13	Reserved	
14	Fallback value of channel 3	
15		

Channel settings:

Bit	Function	Notes
0 (LSb)	Measurement range	00 : Inactive 01 : 4...20 mA or 0...10 V 10 : 0...20 mA or +/- 10 V 11 : Reserved
1		
2	Diagnostics	Authorizes or inhibits message transmission
3	Reserved	
4	Fallback mode	0 : Fallback value 1 : Last value maintained
5	Reserved	
6	Reserved	
7	Reserved	

Measurement Ranges and Scales

Measurement Ranges and Scales

The analog inputs are coded on 15 bits + sign.

The analog outputs are coded on 11 bits + sign (bits 14 to 11 not significant). The tables below present the codes corresponding to the usable scales for the different analog splitter boxes.

FTM 1AE04C12T range 0...10 VDC

Measurement range for analog inputs (15 bits resolution):

Measurement range	Binary value	Hexadecimal value	Decimal value	Zone	Diagnostics
> 10 VDC	0111 1111 1111 1111	7FFF	32 767	Greater than	yes
10 VDC	0111 1111 1111 1111	7FFF	32 767	Nominal range	-
5 VDC	0011 1111 1111 1111	3FFF	16 383	Nominal range	-
0.305 mVDC	0000 0000 0000 0001	0001	1	Nominal range	-
0 VDC	0000 0000 0000 0000	0000	0	Nominal range	-
< 0 VDC	0000 0000 0000 0000	0000	0	Less than	-

FTM 1AE04C12T range +/-10 VDC

Measurement range for analog inputs (resolution : 15 bits + 1 sign bit):

Measurement range	Binary value	Hexadecimal value	Decimal value	Zone	Diagnostics
> 10 VDC	0111 1111 1111 1111	7FFF	32 767	Greater than	yes
10 VDC	0111 1111 1111 1111	7FFF	32 767	Nominal range	-
5 VDC	0011 1111 1111 1111	3FFF	16 383	Nominal range	-
0.305 mV	0000 0000 0000 0001	0001	1	Nominal range	-
0 VDC	0000 0000 0000 0000	0000	0	Nominal range	-
-0.305 mV	1111 1111 1111 1111	FFFF	-1	Nominal range	-
-5 VDC	1100 0000 0000 0001	C000	-16 383	Nominal range	-
-10 VDC	1000 0000 0000 0000	8000	-32 767	Nominal range	-
<-10 VDC	1000 0000 0000 0000	8000	-32 767	Less than	yes

FTM 1AE04C12C range 0...20 mA Measurement range for analog inputs (15 bits resolution):

Measurement range	Binary value	Hexadecimal value	Decimal value	Zone	Diagnostics
> 20mA	0111 1111 1111 1111	7FFF	32 767	Greater than	yes
20mA	0111 1111 1111 1111	7FFF	32 767	Nominal range	-
10 mA	0011 1111 1111 1111	3FFF	16 383	Nominal range	-
4 mA	0001 1001 1001 1001	1999	6553	Nominal range	-
0 mA	0000 0000 0000 0000	0000	0	Nominal range	-
< 0 mA	0000 0000 0000 0000	0000	0	Less than	-

FTM 1AE04C12C range 4...20 mA Measurement range for analog inputs (15 bits resolution):

Measurement range	Binary value	Hexadecimal value	Decimal value	Zone	Diagnostics
> 20mA	0111 1111 1111 1111	7FFF	32 767	Greater than	yes
20mA	0111 1111 1111 1111	7FFF	32 767	Nominal range	-
10 mA	0010 1111 1111 1010	2FFA	16 383	Nominal range	-
4 mA	0000 0000 0000 0000	0000	0	Nominal range	-
< 4 mA	0000 0000 0000 0000	0000	0	Less than	Break in cable < 2 mA and/ or Overrun of lower threshold < 4 mA

FTM 1AS04C12T range 0...10 VDC Measurement range for analog outputs (11 bits resolution):

Output range	Binary value	Hexadecimal value	Decimal value	Zone
10 VDC	0111 1111 1111 xxxx	7FFx	32 752...3 2767	Nominal range
5 VDC	0011 1111 1111 xxxx	3FFx	16 368...16 383	Nominal range
0.305 mVDC	0000 0000 0000 xxxx	000x	0...15	Nominal range
0 VDC	0000 0000 0000 xxxx	000x	0...15	Nominal range

x: insignificant bit

FTM 1AS04C12T range +/-10 VDC Measurement range for analog outputs (resolution: 11 bits + 1 sign bit):

Output range	Binary value	Hexadecimal value	Decimal value	Zone
10 VDC	0111 1111 1111 xxxx	7FFx	32 752 ... 32 767	Nominal range
5 VDC	0011 1111 1111 xxxx	3FFx	16 368 ... 16 383	Nominal range
0.305 mV	0000 0000 0000 xxxx	000x	1...15	Nominal range
0 VDC	0000 0000 0000 xxxx	000x	0	Nominal range
-0.305 mVDC	1111 1111 1111 xxxx	FFFx	-1...-15	Nominal range
-5 VDC	1100 0000 0000 xxxx	C00x	-16 383 ... -16 368	Nominal range
-10 VDC	1000 0000 0000 xxxx	800x	-32 767 ... -32 752	Nominal range

x: insignificant bit

FTM 1AS04C12C range 0...20 mA Measurement range for analog outputs (11 bits resolution):

Output range	Binary value	Hexadecimal value	Decimal value	Zone
20 mA	0111 1111 1111 xxxx	7FFx	32 752 ... 32 767	Nominal range
10 mA	0011 1111 1111 xxxx	3FFx	16 368 ... 16 383	Nominal range
4 mA	0001 1001 1001 xxxx	199x	6544 ... 6553	Nominal range
0 mA	0000 0000 0000 xxxx	000x	0 ... 15	Nominal range

x: insignificant bit

FTM 1AS04C12C range 0...20 mA Measurement range for analog outputs (11 bits resolution):

Output range	Binary value	Hexadecimal value	Decimal value	Zone
20 mA	0111 1111 1111 xxxx	7FFF	32 767	Nominal range
10 mA	0010 1111 1111 xxxx	2FFx	12 272 ... 12 287	Nominal range
4 mA	0000 0000 0000 xxxx	000x	0 ... 15	Nominal range

x: insignificant bit

Software Installation

7

Presentation

Introduction

This chapter provides all information required for the software installation of Advantys FTM splitter boxes.

What's in this Chapter?

This chapter contains the following topics:

GSD Files

GSD File Content

The GSD file is a configuration file created specifically for each device type. The Advantys FTB and FTM range of splitter boxes are supplied with a GSD file and a set of *.dib image files (icons). The configuration files are available on the FTX ES0• CD-ROM.

The GSD file contains all the important information regarding equipment, for example:

- the type of device (Device-Type),
- the manufacturer,
- the identification of the vendor (Vendor-ID),
- the item number,
- the software version,
- the hardware version,
- etc.

Together, these are used by the master for configuration and recognition on establishing communication.

GSD File Language

GSD files can be supplied in different languages. Here, the last letter of the file extension indicates the text language:

Language	Extension
Default (English)	*.gsd
English	*.gse
German	*.gsg
French	*.gsf
Italian	*.gsi
Spanish	*.gss
Portuguese	*.gsp

Installation with PL7 Pro/Unity

Pre-requisites

Below is a description of how to install FTM splitter boxes with a Premium PLC associated to the TSX PBY100 communication coupling device (PROFIBUS master), using the PL7 Pro or Unity software workshop.

The pre-requisites for installation are as follows:

- The GSD files have been imported in SyCon
- The PL7 or Unity and SyCon software have been installed.

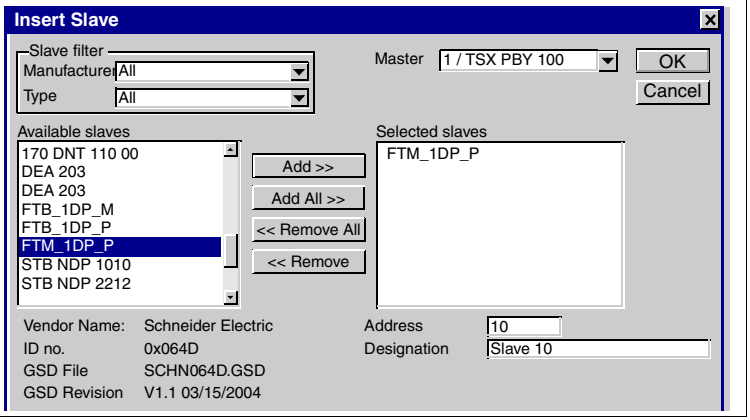
See documentation for the master used if system is installed in a different environment.

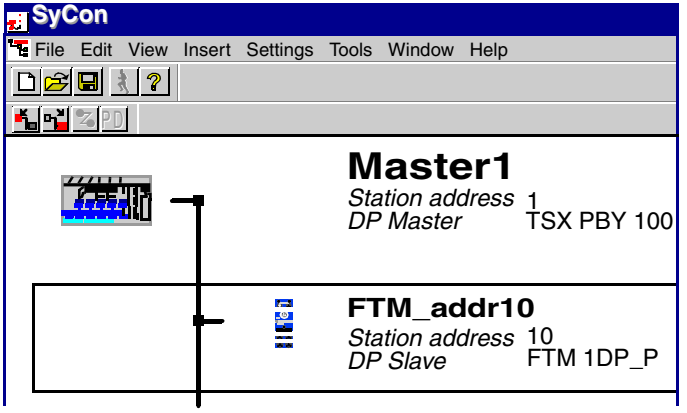
First Phase: Installation Using the SyCon Tool

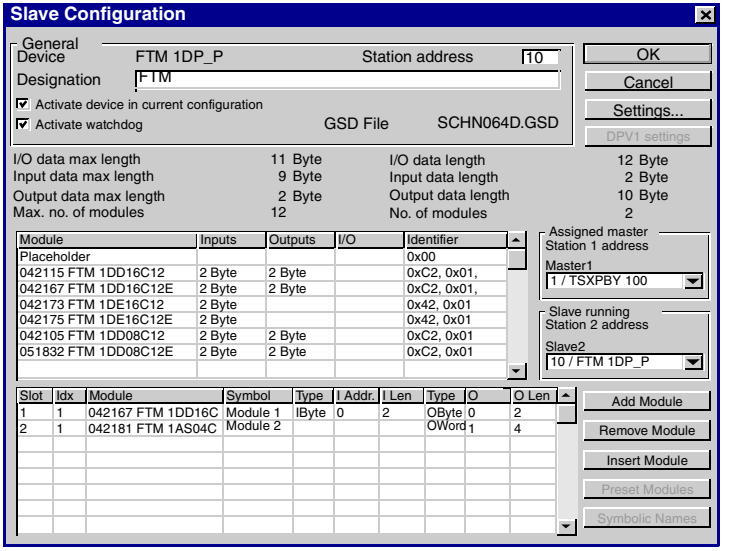
The first phase is performed using "SyCon", the PROFIBUS network configuration tool. This tool is used to define the bus architecture and its communication settings, as well as to configure and set the splitter boxes using their corresponding GSD files.

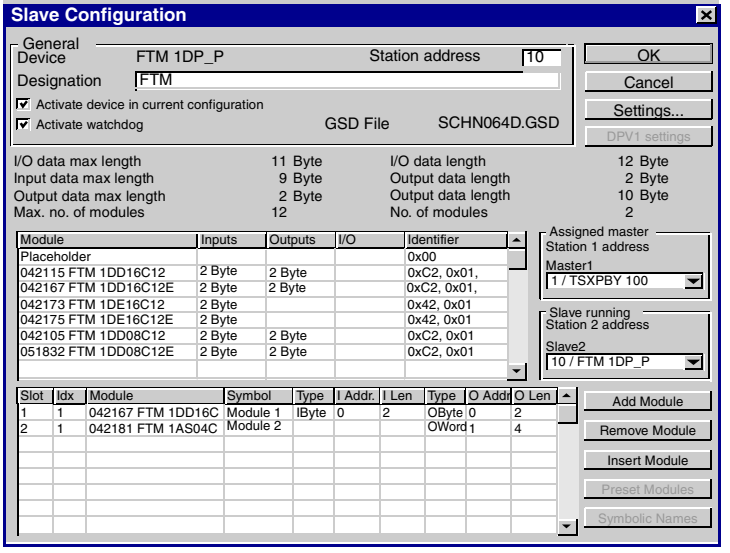
SyCon generates an ASCII file containing all the network management data required by the Schneider PROFIBUS master.

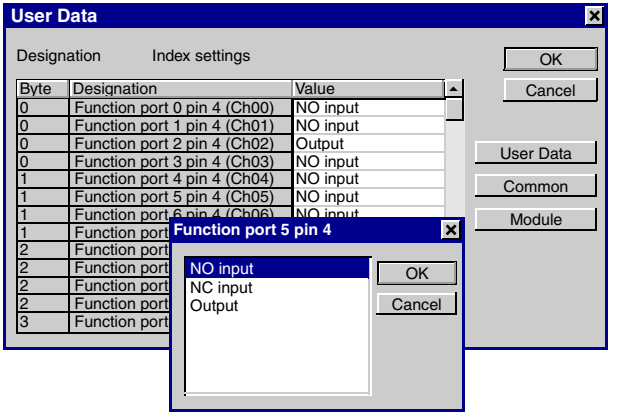
Perform the following steps to configure the splitter box:

Step	Action
1	Configuration is carried out by selecting the splitter box to be installed. In the following illustration, the FTM splitter boxes can be selected from the "Available slaves" list, which corresponds to the SyCon product catalog library. 

Step	Action
2	Access the configuration menu by double-clicking the product icon (see illustration below) or by selecting the "Configure slave DP" option in the **Settings** menu. 

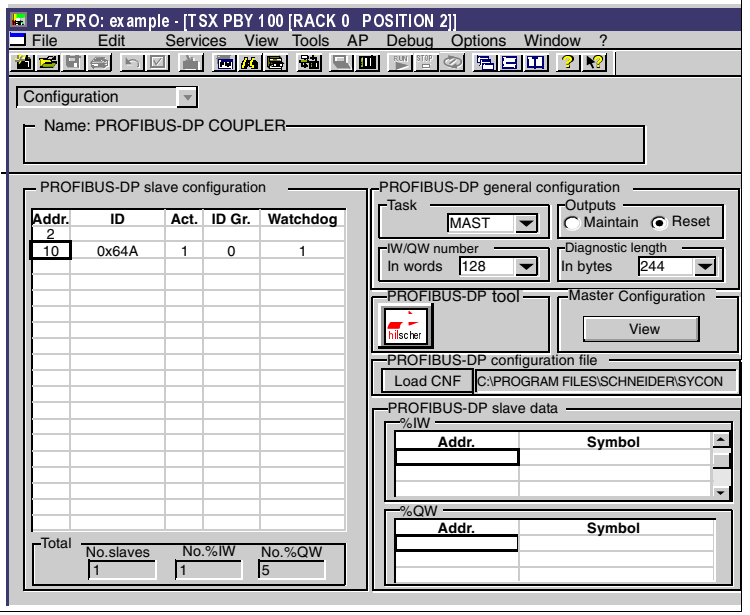
Step	Action
3	Select the distributor from its reference number in the list shown, then insert it into the second table. The first table displays the available distributors. The second table displays the distributors configured by the user. **Important:** The splitter boxes must be inserted in their order of connection (meaning, from the first splitter box connected to the first segment used to the last splitter box connected to the last segment used). The following is an illustration for a configurable 16-channel splitter box and an analog output splitter box: 

Step	Action
4	For each distributor, the length of the input or output data is indicated in the columns: ● "I Len": Input length ● "O Len": Output length The length also depends on the splitter box type ("Type" column): ● "IByte": Input byte ● "IWord": Input word ● "OByte": Output byte ● "OWord": Output word The address of the input or output data in the PLC memory is shown in the columns: ● "I Addr.": Input address ● "O Addr.": Output address The start address of the input or output data can be modified by the user if the "automatic addressing" function is deactivated in the SyCon software workshop. 

Step	Action
5	The **Settings...** button is used to access the settings frame sent by the master when the network is started. The FTM splitter box is set in this data setting window. The **Module** button is used to give a clear display of the FTM splitter box settings: channel configuration, diagnostics activation, output fallback mode settings, etc. To modify a setting, simply click on the corresponding line and select a new value in the list. 

Second Phase: PL7 Pro/Unity

The second phase is performed by PL7 Pro or Unity. Once the ASCII file is selected, the master initializes the network devices and gives them the start-up command. Proceed as follows:

Step	Action
1	In the TSX PBY100 card configuration screen, select the ASCII configuration file (*.cnf) generated by SyCon by clicking on the **Load CNF** button. The "PROFIBUS-DP slave configuration" area then shows all the configured slaves. In the following illustration, the master is at address 2 and the Advantys splitter box is at address 10. By clicking a line corresponding to a slave, you can see the address and length of the modules declared using SyCon. In the illustration below, the mnemonics were declared previously in PL7 Pro. The length of the PLC's diagnostic buffer is set to 32 bytes by default. However, it may be set to up to 244 bytes (maximum length) to prevent any overflow. 

Diagnostics

8

At a Glance

Introduction

Diagnostics information simplifies installation and accelerates error searching.

This chapter aims to help analyze LED or software diagnostics.

What's in this Chapter?

This chapter contains the following sections:

8.1 Display Diagnostics

Presentation

Display Diagnostics

The LEDs on the FTM distributor are used to provide information on the state of the system's power supply, communications and I/O channels.

What's in this Section?

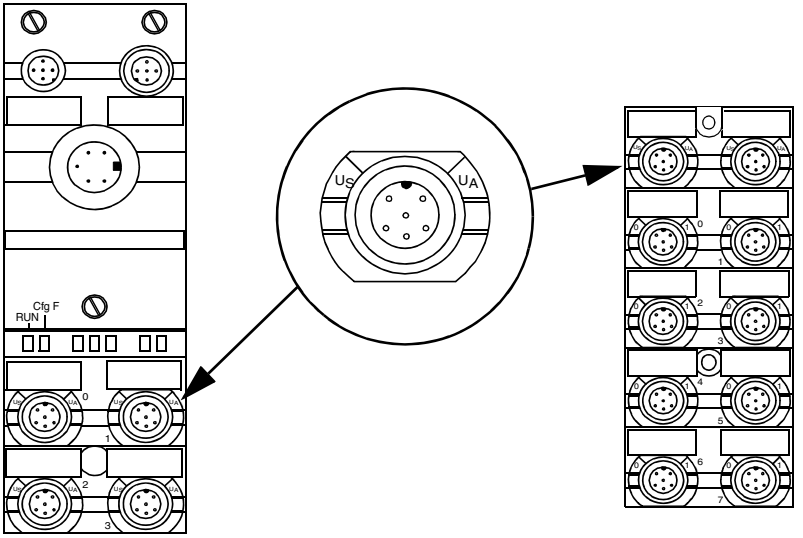
This section contains the following topics:

Power Supply Diagnostics

Description

The status of the power supply can be read from the internal bus connectors on the coupling device and on the splitter boxes.

Position of LEDs on the module and the splitter boxes:



LED	Meaning
U_A	Actuator power supply diagnostics LED
U_S	Detector power supply diagnostics LED

Note: The color of the LED depends on the power supply, as described in the following tables.

Detector Power Supply Status

The status of the detector power supply is specified in the following table:

LED description	LED status	Description
U_S	Green	Correct (> 18 VDC)
U_S	Red	Under-voltage or short-circuit on detector power supply
U_S	Off	No power supply or power supplied to detectors < 12.5 VDC

Actuator Power Supply Status

The status of the actuator power supply is specified in the following table:

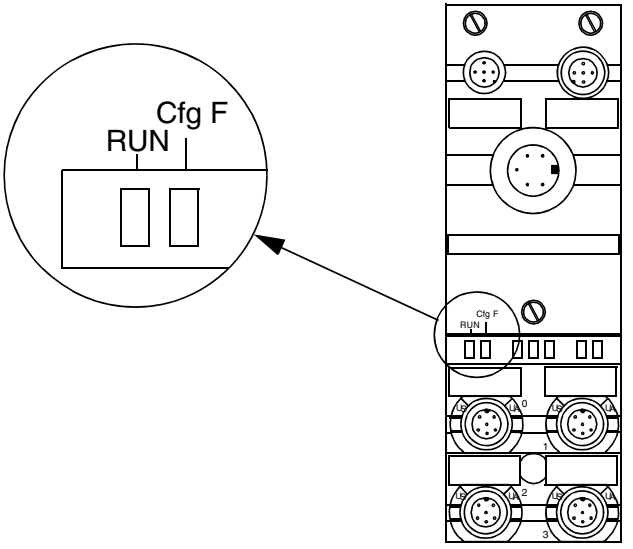
LED description	LED status	Description
U_A	Green	Correct (> 18 VDC)
U_A	Red	Under-voltage or short-circuit on actuator power supply
U_A	Off	No power supply or power supplied to actuators < 12.5 VDC

Note: The display for the power supply status of actuators external to the FTM 1DD16C12 is identical.

LED Diagnostics for Field Bus Status

Description of the Display

Position of RUN LED and Cfg F on the front panel:



Display and Communication

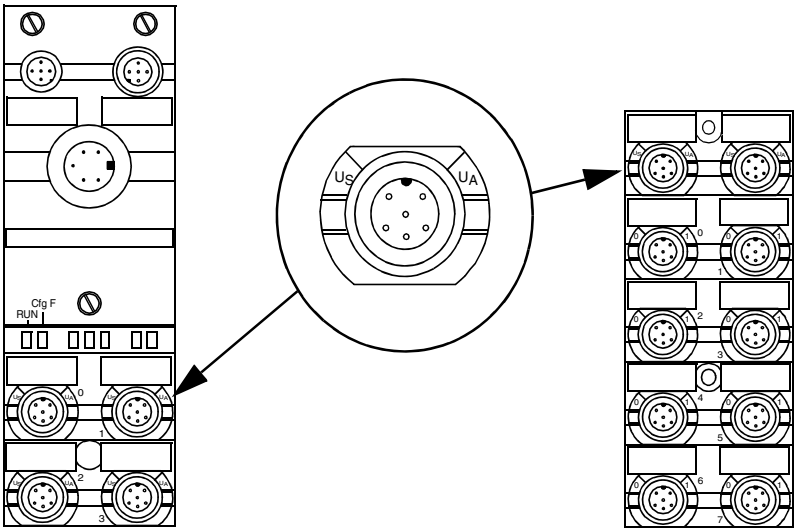
The PROFIBUS communication status is shown by the "RUN" LED and "Cfg F" ("Configuration Fault").

LED	Display	Communication status
RUN	Off	Initialization in Progress
	Green, flashing	No exchange on bus
	Green, permanent	Exchanges OK
Cfg F	Red	Setting or configuration error

Internal Bus Diagnostics LEDs

Position of LEDs

The position of the U_S and U_A LEDs are specified in the following diagram:



Internal Bus Communication Status

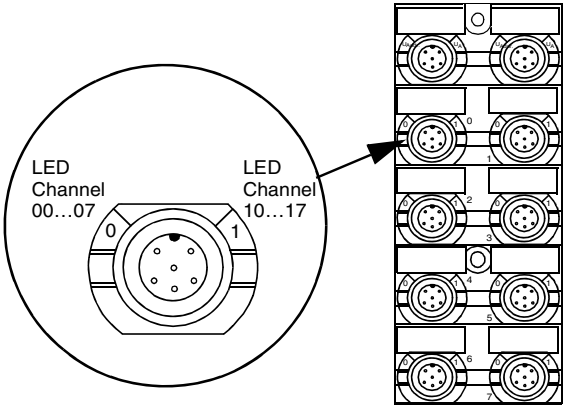
The status of system communication at the module is specified in the following table:

LED description	Display behavior	LED status
U_S	Permanently switched on	Data exchange
U_S	Flashing	No data exchange: communication has been interrupted on at least one branch.
U_S	Off	No communication: No splitter box is connected or the detector power supply has been cut off.

Discrete I/O Diagnostics LEDs

Position of LEDs

The position of the LEDs for each channel are specified in the following diagram:



LED Behavior

LED behavior according to settings and channel status:

Channel configuration	Input voltage	Logical value	LED status
Input closing function	0 VDC	0	Off
	24 VDC	1	Yellow
	Channel error	-	Red
Input opening function	0 VDC	1	Off
	24 VDC	0	Yellow
	Channel error	-	Red
Input diagnostics	0 VDC	1	Red
	24 VDC	0	Off
Output	0 VDC	0	Off
	24 VDC	1	Yellow
	Channel error	-	Red

Analog I/O Diagnostics LEDs

LED Behavior according to Settings and Channel Status

The LED behavior according to the channel settings and status is specified in the following table:

Value measured at input	Channel diagnostics	LED status
-	24VDC power supply short-circuit	Red
Greater than the set measurement range	Greater than the set measurement range	
Less than the measurement range	Less than the measurement range (Only in +/- 10 V or 4-20 mA operating mode)	
< 2 mA	Cable breakage (Only for FTM 1AE04C12C configured in 4-20 mA mode)	

Diagnostics Display for FTM 1AS04C12T and FTM 1AS04C12C

The LED behavior according to the channel settings and status is specified in the following table:

Value measured at input	Channel diagnostics	LED status
-	24VDC power supply short-circuit	Red
< 0.3 % of the threshold value of the measurement range	Short circuit (FTM 1AS04C12T only)	
< 2mA	Cable breakage (Only for FTM 1AS04C12C configured in 4-20 mA mode)	

Error Resolution

Errors and Solutions

Errors	Display	Possible causes	Solutions
Slave not accessible or communication disturbed	All LEDs off	No power	Check coupling device power supply.
	Flashing coupling device RUN LED	No address or wrong address.	Correct address.
		Assigned address already used by another device.	Each PROFIBUS unit must be assigned its own, unique address. Correct address.
		Line terminator resistance activated between the master and coupling device.	Check that line terminator resistance is only activated at the ends of the PROFIBUS segment.
		PROFIBUS segment end incorrect.	Each PROFIBUS segment requires a line terminator resistance at the start and end of the line. By selecting low transmission speeds, the network is able to operate despite the unsuitable ends. This can nevertheless lead to sporadic errors in the production process.
		Branch cables for transmission speeds greater than 1.5Mbit/s. Branch cables are not to be used.	If a branch cable is essential, you can use an "active" branch cable or a repeater.
		PROFIBUS segment extension too great or too many slaves.	Use repeaters to subdivide a segment into several segments, or lower bus speed (see table for maximum cable lengths).
Setting or configuration error	- Flashing coupling device RUN LED - Coupling device's Cfg F LED lights up red.	The configured splitting box does not correspond to the splitting box actually installed.	Check reference number of installed splitting box.
Link with master PROFIBUS interrupted when in service.	Flashing RUN LED	Short-circuit or break in PROFIBUS link	Check PROFIBUS link. Check which devices can still be accessed in order to pinpoint where the error occurred (by using a lower transmission speed, for example).

8.2 Software Diagnostics

Presentation

Software Diagnostics

Each diagnostic data is 1-byte long and is displayed in the input memory (provided it is supported by the FTM being used and is configured).

Below is a description of diagnostics data provided by the slave. The way data is accessed depends on the master used.

Refer to the master documentation for further information on reading the data.

Diagnostics information

There are 4 different diagnostics information available:

- Standard information (6 bytes)
- Module or device information (20 bytes)
- Extended diagnostics information (3 bytes)
- Channel information (3 bytes per channel)

Note: The "Diagnostic Length/in Bytes" field displayed during configuration of the TSX PBY100 card, must be adhered to.

Frame Format

The table below provides a view of the frame format.

Type of diagnostics	Standard	Device	Range	First default channel	...	Last default channel
Length in byte	6	20	3	3	...	3

What's in this Section?

This section contains the following topics:

Standard Diagnostics

Byte 0

Bit	Information	Note
0	No response from the slave	Forced to 0 by the slave if communication is OK
1	Not ready for data exchange	Diagnostics activated by the slave.
2	Configuration fault	Diagnostics activated by the slave
3	Extended diagnostics	Diagnostics activated by the slave
4	Request for a non supported function	Diagnostics activated by the slave
5	Invalid response	Activated by the master
6	Configuration error	Configuration telegram error
7	Slave locked by another master	Slave configured by another master

Byte 1

Bit	Information	Note
0	Configuration request	Slave is not configured
1	Diagnostics available	New diagnostics available
2	Diagnostics created by the slave	Set to 0 by the master if the slave diagnostics has not be obtained
3	Watchdog activated	Diagnostics activated by the slave
4	FREEZE mode	The inputs are frozen following the FREEZE command
5	SYNC mode	The outputs are frozen following the SYNC command
6	Missing	The slave is not on the master settings frame
7	Deactivated	The slave is excluded from processing

Byte 2

Bit	Note
MSb	Diagnostics overflow, for example, if the length of the diagnostics exceeds the slave transit memory buffer or the master receive memory buffer

Byte 3

The master address used to configure the slave. When there is no configuration, the value is FFH.

Bytes 4 and 5

PNO identifier	Designation
FTM	4D60H

Device Diagnostics

Byte 6

Header byte	Designation
Bits 0 to 5	Block length in bytes (header included) = 14H
Bits 6 to 7	Reserved = 0

Byte 7

Power supply for coupling device. The least significant bit indicates an under-voltage in the coupling device's power supply.

Byte 8

System's voltage readings:

Bit	Fault
0	Under-voltage in detector power supply, segment 0/2
1	No power supply in detectors, segment 0/2
2	Under-voltage in detector power supply, segment 1/3
3	No power supply in detectors, segment 1/3
4	Under-voltage in actuator power supply, segment 0/2
5	No power supply in actuators, segment 0/2
6	Under-voltage in actuator power supply, segment 1/3
7	No power supply in actuators, segment 1/3

Byte 9

System's short-circuit readings:

Bit	Fault
0	Detector short-circuit, segment 0
1	Detector short-circuit, segment 1
2	Detector short-circuit, segment 2
3	Detector short-circuit, segment 3
4	Actuator short-circuit, segment 0
5	Actuator short-circuit, segment 1
6	Actuator short-circuit, segment 2
7	Actuator short-circuit, segment 3

Bytes 10 to 25

Splitter box diagnostics:

Byte	Splitter box
10 to 25	Splitter boxes 0 to 15

Meaning of diagnostics bits:

Bit	Fault
0	Under-voltage in detector power supply
1	No power supply in detectors
2	Under-voltage in actuator power supply
3	No power supply in actuators
4	Under-voltage in external actuator power supply
5	No power supply in external actuators
6	Diagnostic per channel (1)
7	Communication error

(1)The "diagnostics per channel" bit is activated if at least one diagnostics per channel is indicated by the splitter box (within the first 16 indicated).

Extended Diagnostics

Presentation Indicates which splitter boxes present diagnostics.

Byte 26

Header Byte	Designation
Bits 0 to 5	Defines the block length in bytes (= 3)
Following bits	Reserved (= 1)

Bytes 27 and 28 Each splitter box being diagnosed is indicated by a bit.

Byte	Bit	Splitter box being diagnosed
27	0...7	Splitter boxes 0 to 7
28	0...7	Splitter boxes 8 to 15

Channel Diagnostics

Presentation

A diagnostics block of 3 bytes in length is generated for each detected channel fault (for up to 16 bytes indicated).

First Byte

Header Byte = 80H

Second Byte

Bit 0 to 5 = define the channel number

Bit 6 = 1 if the channel is an input

Bit 7 = 1 if the channel is an output.

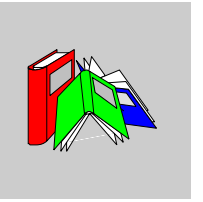
Third Byte

The byte contains the channel type (length) and an error code.

Code (hex): Bits 0 to 4	**Type of error**
01	Detector and bus power supply short-circuit
06	Cable breakage
07	Overrun of max threshold
08	Overrun of max threshold
17	Actuator supply warning
18	Actuator power supply disconnection
1A	External error

Bits 5 to 7	**Channel type**
000	Reserved
001	Bit
010	2 Bit
011	4 Bit
100	Byte
101	Word
110	Double word
111	Reserved

Glossary



A

Analog input
A module containing circuits that enable analog dc (direct current) input signals to be converted into discrete values that can be handled by the processor. This implies that the analog inputs are generally direct values — in other words: a value in the data table is a direct reflection of the analog signal value.

Analog output
A module containing circuits that transmit an analog dc (direct current) input signal proportional to a discrete input value to the processor module. This implies that the analog outputs are generally direct values — in other words: a value in the data table directly governs the analog signal value.

Automatic addressing
An address is assigned automatically to each preferred island bus I/O module and device.

Automatic speed selection
Automatic assignment and detection of a common baud rate, as well as a device's capacity to adapt to this rate.

D

DESINA
Standard relating to the connector technology of sensors and actuators, established by a German association of machine manufacturers.

Discrete Input/ Output Another expression used is discrete I/O. Designates an input or output featuring an individual circuit connection to the module corresponding directly to a bit or word of the data table storing the value of the signal on this I/O circuit. A discrete I/O gives the control logic discrete access to I/O values.

E

Electro-magnetic disturbance *Electro-magnetic Interference.* Electro-magnetic disturbances (EMI) are liable to cause interruptions, anomalies or interference in the performance of electronic hardware. They occur when a source electronically transmits a signal that interferes with other devices.

EMC *Electro-Magnetic Compatibility.* Devices that comply with EMC requirements are capable of error-free operation within the specified electro-magnetic limits of the system.

F

Fallback mode A mode to which any Advantys I/O module can revert should the communication connection fail.

Fallback value The value adopted by a device when it enters the fallback state. Generally, the fallback value is either configured, or is the device's last stored value.

G

GSD *Generic Slave Data* file. A GSD file is a device description file supplied by the manufacturer, which defines the functionality of the device concerned on a PROFIBUS-DP network.

I

I/O module In a programmable control system, an I/O module communicates directly with sensors or actuators used in the machine or process. This module is the component that is installed in the I/O connection base and establishes the electrical connections between the controller and the fieldbuses. The functionalities common to all I/O modules are offered in a range of signal capacities and levels.

IEC *International Electrotechnical Commission.* Commission officially founded in 1906 and devoted to the advancement of theory and practice in the following sciences: electrical engineering, electronic engineering, information technology and computer engineering. The IEC 1131 standard covers industrial automation equipment.

IEC type 1 input Type 1 discrete inputs support sensor signals from mechanical switching devices such as relay contacts and push-buttons operating under normal climatic conditions.

IEC type 1+ input Type 1+ discrete inputs support sensor signals from mechanical switching devices such as relay contacts and push-buttons (under normal to moderate climatic conditions), three-wire proximity switches and two-wire proximity switches with the following characteristics:

- a voltage drop of less than or equal to 8 V
- a minimum operating current capacity of less than or equal to 2 mA
- a maximum current in blocked state of less than or equal to 0.8 mA

IEC type 2 input Type 2 discrete inputs support sensor signals from solid-state devices and mechanical switching devices such as relay contacts, push-buttons (under normal to rigorous climatic conditions), and two or three-wire proximity switches.

Input filter The period for which a sensor must keep its signal activated/deactivated before the input module detects a change of state.

Input polarity The polarity of an input channel determines when the input module sends a 1 (one) and when it sends a 0 (zero) to the master controller. If the polarity is *normal*, an input channel will send a 1 (one) to the controller as soon as its fieldbus sensor is activated. If the polarity is *reversed*, an input channel will send a 0 (zero) to the controller as soon as its fieldbus sensor is activated.

Input response time The time required for an input channel to receive a signal from a fieldbus sensor and pass it on to the island bus.

L

LSB — *Least Significant Byte.* The part of a number, address or field that is written as the value furthest to the right in conventional hexadecimal or binary notation.

LSb — *Least Significant Bit.* The part of a number, address or field that is written as the value furthest to the right in conventional hexadecimal or binary notation.

M

Master/slave model — In a network using a master/slave model, the direction of control is always from the master to slave devices.

MSB — *Most Significant Byte*. The part of a number, address or field that is written as the value furthest to the left in conventional hexadecimal or binary notation.

MSb — *Most Significant Bit.* The part of a number, address or field that is written as the value furthest to the left in conventional hexadecimal or binary notation.

N

N.C. contact — Designates a *normally closed* contact. Also called break contacts. A pair of relay contacts that is closed when the relay coil is low and open when it is energized.

N.O. contact — *Normally Open contact* Also called make contacts. A pair of relay contacts that is open when the relay coil is low and closed when it is energized.

O

Object — The arrangement and connections made between the hardware components of a system, as well as the selected hardware and software options that determine the system's operating characteristics.

Output polarity The polarity of an output channel determines when the output module activates its fieldbus actuator and when it deactivates it. If the polarity is *normal*, an output channel will activate its actuator as soon as the master controller sends it the value 1. If the polarity is *reversed*, an output channel will activate its actuator as soon as the master controller sends it the value 0.

Output response time The time it takes for an output module to receive an output signal from the island bus and transmit it to its fieldbus actuator.

P

PE *Protective Earth* in English, Ground.

PLC *In English: PLC or Programmable Logic Controller.* The PLC is the nerve center of the industrial manufacturing process. Such a device is said to "automate a process", in contrast to a relay control system. These PLCs are in fact simply computers designed to survive under the sometimes harsh conditions of an industrial environment.

PROFIBUS-DP *PROFIBUS Decentralized Peripheral.* An open bus system that uses an electrical network based on a shielded two-wire cable or an optical network based on a fiber optic cable. DP transmission is designed to enable high-speed cyclical exchange of data between the PLC processor and distributed I/O devices.

R

Repeater A connection device that extends the authorized length of a bus.

Reverse polarity protection In a circuit, use of a diode to protect against damage and any inadvertent operations that may be caused if the polarity of the applied power is accidentally reversed.

S

Segment — Designates a group of I/O modules and power modules connected together on an island bus.

Sink load (or positive logic load) — Designates an output which, when activated, receives DC current from its load.

Source load — Also called a negative logic load. Designates a load with a directed input current. This load must come from a current source.

Suppression of over-voltage — Process consisting of absorbing and limiting transient over-voltage on an incoming AC line or a control circuit. Specially designed metal oxide limiters (varistors) and RC networks are frequently used as over-voltage suppression mechanisms.

V

Varistor — Also known as a limiter. This is a two-electrode semi-conductor device with a non-linear varistance that causes a considerable drop as the applied voltage gradually increases. A varistor is used to remove transient over-voltages.

W

Watchdog timer — Tracking clock that controls a cyclical process and which is cleared at the end of each cycle. The watchdog timer generates an error when it exceeds the assigned delay time.

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