MUX expansion module

FPE-7039

BOSCH

Installation manual

en english

es-AR español

pt-BR português

1 Notices

These instructions cover the installation of the FPE-7039 Multiplex Expansion Module in a fire system supervised by an FPD-7024 Fire Alarm Control Panel (FACP).

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Regulatory and safety

Before installing the module, become familiar with the *Installation and Operation Guide* for the control panel you are using.

Install, test and maintain the module according to these instructions, NFPA codes, local codes, and the authority having jurisdiction (AHJ). Failure to follow these instructions can result in failure of a detector to initiate an alarm event. Bosch Security Systems, Inc. is not responsible for improperly installed, tested or maintained devices.

> **Warning!**
> Follow these instructions to avoid personal injury and damage to equipment.

NFPA 72 requires that you perform a complete system wide functional test following any modifications, repair, upgrades or adjustments made to the system's components, hardware, wiring, programming and software/firmware.

2   Description

The FPE-7039 MUX expansion module is designed to enhance the conventional features of the D7024 or FPD-7024/DS9400 Fire alarm control panels (FACPs). The module connects directly to the FACP for either two Class B multiplex buses or one Class A multiplex bus. When installed as two Class B multiplex buses, you can program addresses 9 through 255. When installed as one Class A multiplex bus, you can program addresses 9 through 128.

The module also increases the number of relay outputs (to 58 on the D7024/DS9400 control panels and 59 on FPD-7024 control panels). It adds an additional 400 events to the history buffer for a total of 499 non-volatile events. It also allows for up to 100 system users (an addition of 84 PINs from the base system).

The module can be programmed remotely from a PC using RPS Remote programming software.

The module can be used with the Bosch Security Systems, Inc. control panels and modules indicated in the following table.

Control panels	
Active:	FPD-7024 Fire alarm control panels
Legacy:*	D7024 Fire alarm control panels
	DS9400 Control panels
Modules	
Active:	D7042 Multiplex eight-input remote module
	D7042B Multiplex eight-input remote module with enclosure
	D7044 Multiplex single-input module
	D7044M Multiplex mini single-input module

	D7050 Addressable photoelectric smoke detector
	D7050DH Addressable photoelectric duct smoke detector head
	D7050TH Addressable photoelectric smoke/ heat detector
	D7050-B6 Smoke detector base
	D7052 Multiplex dual-input module
	D7053 Multiplex Input-output module
	FLM-7024-ISO MUX bus isolator module
	FMM-7045 Multiplex addressable manual pull station
	FMM-7045-D dual-action multiplex addressable manual pull station
* Legacy products were investigated to comply only to UL864 8th edition	

3   Mounting

Danger!
Make sure all power is removed before making any electrical connections. Failure to do so may result in personal injury and/or damage to equipment.

Caution!
Static-sensitive components!
The FACP and modules contain static-sensitive components and must be handled with care. Follow proper antistatic handling procedures.

FPE-7039 board mounting
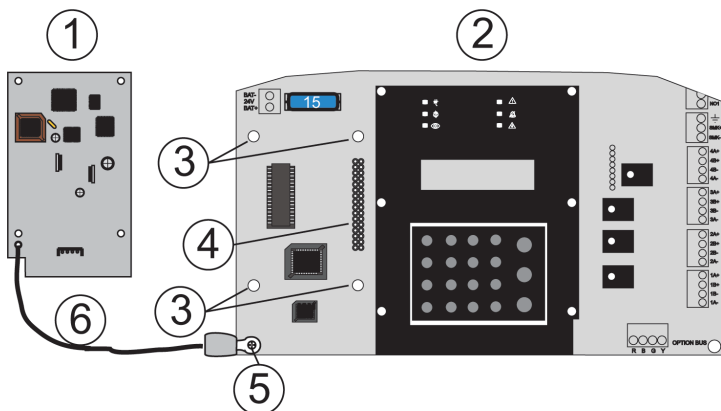
Figure 3.1: Mounting the FPE-7039

1	FPE-7039	2	FACP
3	Mounting holes (4) for plastic standoffs	4	FACP connector pins (align with FPE-7039)
5	Mounting screw	6	Ground wire

If the FACP (see callout 2 in above figure) is already installed in an enclosure, remove it.

1.   Place the FACP on a flat surface with the component side facing up.
2.   Insert the four plastic standoffs in the mounting holes (callout 3 above) without bending or flexing the FACP.
3.   Align the standoff tabs so they do not touch the module components.
4.   Firmly press the standoffs into the board, allowing the ears to expand out.
5.   Mount the board (callout 1 above) on the standoffs ensuring the connector pins (callout 4 above) are properly aligned.
6.   Install the FACP in the enclosure.
7.   Use the mounting screw (callout 5 above) to secure the FPE-7039's ground wire (callout 6 above) to the FACP.

I/O module mounting
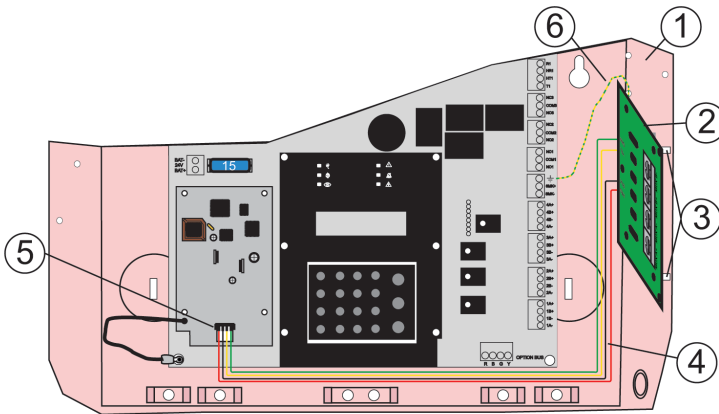
Figure 3.2: Mounting the FPE-7039 I/O module

1	FACP enclosure	2	FPE-7039 I/O module
3	Plastic standoffs (3)	4	4-wire (red, black, yellow, green) harness

5	Connector terminal plug	6	Yellow/green wire connecting the I/O module to the FACP ground terminal

If the FPE-7039 board is not mounted to the FACP board, mount it using the instructions above.

1. Insert the three plastic standoffs (see callout 3 in the above figure) in the mounting holes in the enclosure.
2. Mount the I/O module (callout 2 above) in the FACP enclosure (callout 1 above).
3. Connect the wire harness of the I/O module to the terminal on the FPE-7039 (callout 5 above).
4. Connect the yellow and green earth ground wire (callout 6 above) to the FACP 's earth ground terminal.

4   Wiring

You can configure the FPE-7039 with a single fault tolerant Class A loop or as a pair of supervised Class B branches. For programming information, see the *FPD-7024 Installation and Operation Guide (IOG)*.

4.1   Determining system limits

> **Notice!**
> Do **not** use shielded wire. Twisted-pair wire is not recommended, but is acceptable if wire length is reduced by 50%.
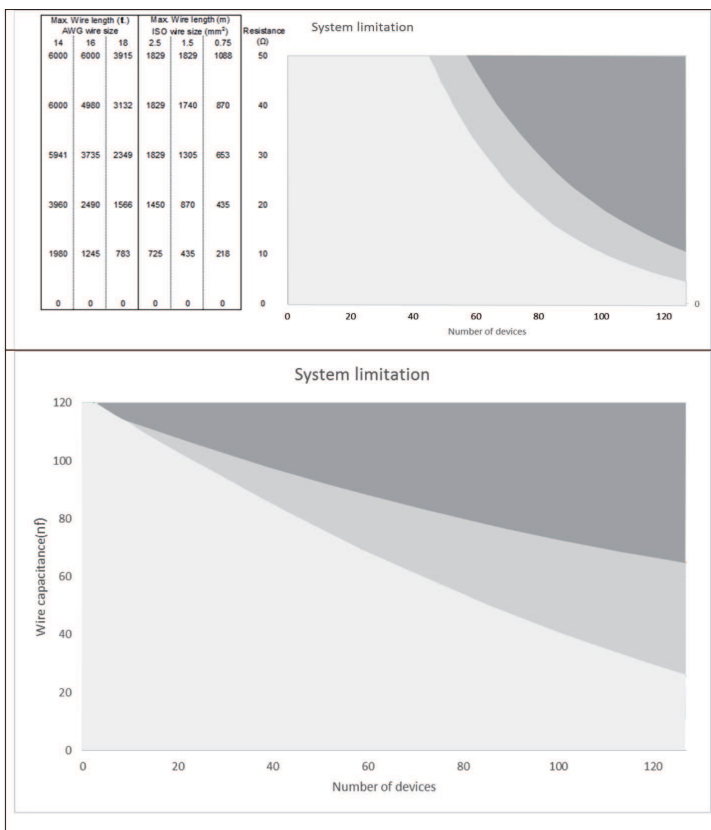
> **Notice!**
> In the following graphs,
> a) data points falling in the light area are acceptable.
> b) data points falling in the middle area depend on your configuration. They must be verified with the battery calc table.
> c) data points falling in the dark area require changes in wire length or size, number of devices, or configuration.

1. Find the intersection of the desired number of devices and wire length/resistance you want on the first graph below. If the data point falls in the light area, note the available wire sizes (AWG or ISO) for your installation. Then go to the next step.
    If it does not, see the Notice above.
2. Look up the capacitance for the specific wire size/length/type.
3. Check the intersection point of the capacitance and number of devices on the second chart below. If the data point falls in the light area, your choices are acceptable. If not, see the Notice above.

Max. Wire length (ft.) AWG wire size			Max. Wire length (m) ISO wire size (mm²)			Resistance (Ω)
14	16	18	2.5	1.5	0.75	
6000	6000	3915	1829	1829	1088	50
6000	4980	3132	1829	1740	870	40
5941	3735	2349	1829	1305	653	30
3960	2490	1566	1450	870	435	20
1980	1245	783	725	435	218	10
0	0	0	0	0	0	0

System limitation

Maximum wire length	
Maximum wire resistance	50 Ω at +20°F (+68°C), depends on method and wire size used
Wire length	5950 ft. (1810 m), depends on wire size and number of devices
Wire capacitance*	<0.12 µF (maximum per bus), depends on wire size and number of devices

Maximum wire length
* This table gives capacitance in microFarads (µF), but the graph gives it in nanoFarads (nF). For example, 0.12 µF = 120 nF.

4.2   Wiring the loops

Determine the appropriate configuration (number and type of devices and wire size and length).

1.   Run solid wire from the FACP to the device locations and connect the multiplex loop.
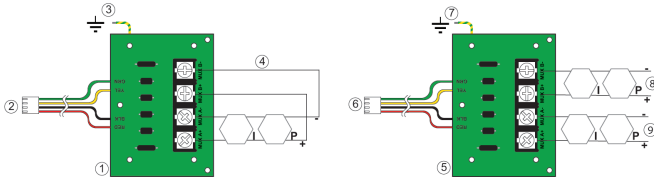
Figure 4.1: Wiring Class A loops and Class B branches

1	I/O module wired as Class A	2	Wiring harness
3	Ground wire	4	Class A loop (addresses 9 to 128)
5	I/O module wired as Class B	6	Wiring harness
7	Ground wire	8	Class B branch (addresses 129 to 255)
9	Class B branch (addresses 9 to 128)		
All MUX terminals are power-limited and supervised			

2.   Ensure the loop is disconnected from the FPE-7039 Module.
3.   Measure loop resistance by shorting:
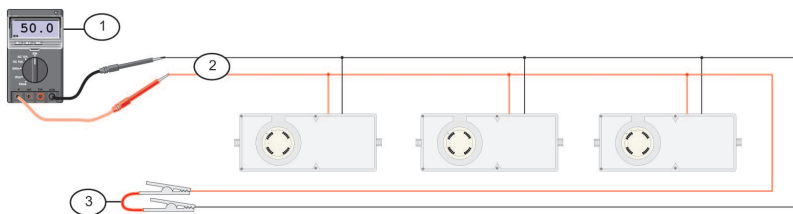   the end of the farthest device in Class B.

the return wire in Class A.
4. Read the total resistance of all wires associated with the loop.
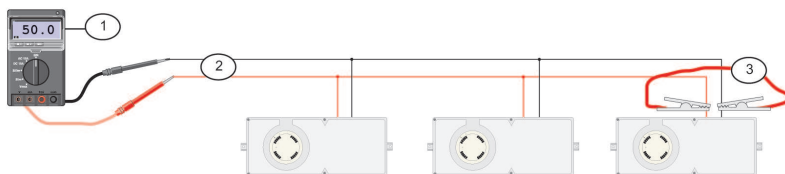
Figure 4.2: Measuring Class B loop resistance

1	50 Ω maximum	2	MUX bus wires
3	Clip lead		

Figure 4.3: Measuring Class A loop resistance

1	50 Ω maximum	2	MUX bus wires
3	Clip lead		

5   Specifications

Environmental

Environment	Indoor, dry

Power

Current Draw	
Alarm	190 mA maximum
Load, Class A	100 mA maximum
Load, Class B	100 mA maximum for each bus
Standby	190 mA maximum
Bus Voltage	8.5 V to 13 V
Wire Resistance (maximum)	50 Ω Class A or Class B

1   Avisos

Estas instrucciones abarcan la instalación del Módulo de
Expansión Multiplex FPE-7039, en un sistema contra incendios
supervisado por un Panel de Control de Alarma de Incendio
(FACP) FPD-7024.

Antes de instalar el módulo, familiarícese con la *Guía de
Instalación y Operación* para el panel de control que está
utilizando.

Instale, pruebe y mantenga el módulo de acuerdo con estas
instrucciones, los códigos de NFPA, los códigos locales y la
Autoridad con Jurisdicción (AHJ). En caso de no seguir estas
instrucciones, pueden producirse fallas en un detector que
inicie un evento de alarma. Bosch Security Systems, Inc. no se
hace responsable de la instalación, prueba o mantenimiento
incorrecto de los dispositivos.

⚠ **Aviso!**
Siga estas instrucciones para evitar daños personales y daños
al equipo.

Según la norma NFPA 72, es necesario usted lleve a cabo una
prueba de funcionamiento de todo el sistema luego de realizar
cualquier modificación, reparación, actualización o ajuste en los
componentes, hardware, cableado, programación, software o
firmware del sistema.

Información del software de código abierto

ℹ **Nota!**
Para obtener información general con respecto al software de
código abierto en Bosch Security Systems visite http://
www.boschsecurity.com/oss

2   Descripción

El Módulo de expansión FPE-7039 MUX está diseñado para mejorar las características convencionales de los paneles de control de alarma de incendio (FACP) D7024 o FPD-7024/DS9400 (FACP). El módulo se conecta directamente al FACP a dos bus múltiples clase B o un bus múltiple clase A. Cuando se instalan como dos bus múltiples de clase B, puede programar las direcciones 9 a 255. Cuando se instalan como un bus múltiple clase A, puede programar las direcciones 9 a 128.

El módulo además aumenta la cantidad de salidas de relé (a 58 en los paneles de control D7024/DS9400 y 59 en paneles de control FPD-7024). Agrega 400 eventos adicionales a la memoria intermedia histórica para un total de 499 eventos permanentes. Además permite hasta 100 usuarios de sistema (84 PIN adicionales del sistema base).

El módulo se puede programar de manera remota desde una PC que utilice el software de programación remota RPS.

El módulo se puede utilizar con los paneles de control y módulos de Bosch Security Systems, Inc. que se enumeran en la tabla siguiente.

Paneles de control	
Activo:	Paneles de control de alarma de incendio FPD-7024
Antiguo:*	Paneles de control de alarmas de incendio D7024
	Paneles de Control DS9400
Módulos	
Activo:	Módulo remoto de ocho entradas múltiples D7042
	Módulo múltiple de ocho entradas D7042B con carcasa contra incendios

	Módulo de una entrada múltiple D7044
	Módulo de una entrada mini múltiple D7044M
	Cabezal del detector de humo fotoeléctrico direccionable D7050
	Cabezal del detector de humo de Ducto fotoeléctrico direccionable D7050DH
	Cabezal del detector de humo/calor fotoeléctrico direccionable D7050TH
	Base del detector de Humo D7050-B6
	Módulo de entrada doble múltiple D7052
	Módulo de entrada-salida múltiple D7053
	Módulo aislador de bus MUX FLM-7024-ISO
	Estación analógica de aviso manual direccionable múltiple FMM-7045
	Estación analógica de aviso manual direccionable múltiple de acción dual FMM-7045-D
* Se investigan los productos antiguos solo con respecto al cumplimiento de la 8.ª edición UL864	

3   Montaje

⚡ **Peligro!**
Asegúrese de que antes de realizar cualquier conexión eléctrica, se haya eliminado la alimentación. No hacerlo puede producir daños personales y/o a los equipos.

⚠ **Precaución!**
¡Componentes sensibles a las cargas electrostáticas!
La FACP y los módulos tienen componentes sensibles a las cargas electrostáticas y deben manipularse con cuidado. Siga los procedimientos de manejo antiestática correspondientes.
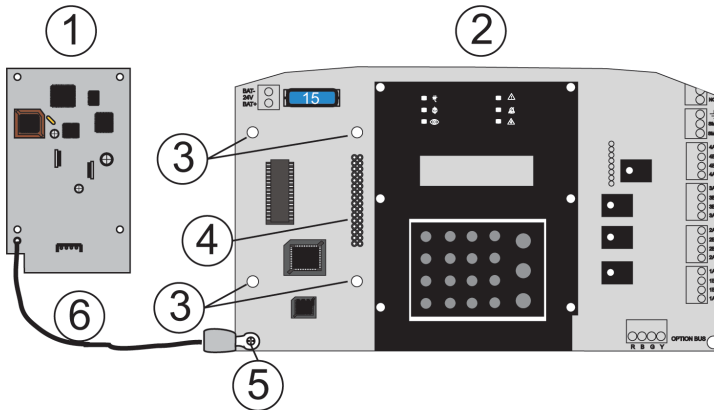
Montaje del panel FPE-7039

Figura 3.1: Montaje de FPE-7039

1	FPE-7039	2	FACP
3	Orificios de montaje (4) para separadores plásticos	4	Clavijas de conexión de FACP (alinear con FPE-7039)
5	Tornillo de montaje	6	Cable de conexión a tierra

Si el FACP (consulte la índice 2 en la figura anterior) ya está instalado en un gabinete, quítelo.

1. Coloque el FACP sobre una superficie plana con el componente hacia arriba.
2. Inserte cuatros separadores de plástico en los orificios de montaje (índice 3 arriba) sin doblar o flexionar el FACP.
3. Alinee las pestañas del separador para que no toquen los componentes del módulo.
4. Presione con firmeza los separadores en el panel, para que las orejas se expandan hacia afuera.
5. Monte el panel (índice 1 arriba) en los separadores para asegurar que las clavijas de conexión (índice 4 arriba) estén correctamente alineadas.
6. Instale el FACP en el gabinete
7. Use el tornillo de montaje (índice 5 arriba) para asegurar el cable a tierra de FPE-7039 (índice 6 arriba) al FACP.

Montaje del módulo E/S
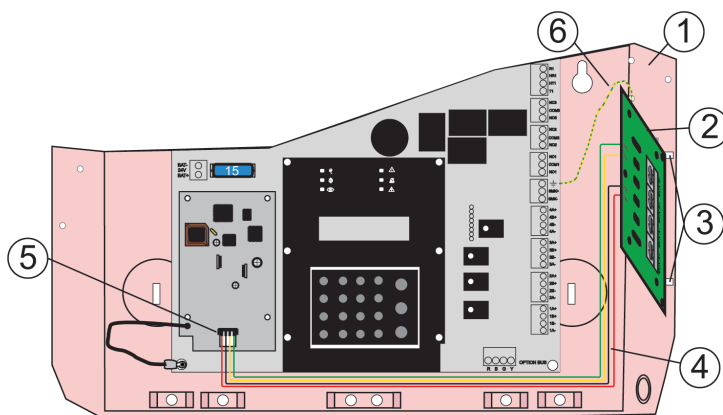
Figura 3.2: Montaje del módulo E/S FPE-7039

1	Gabinete de FACP	2	Módulo E/S FPE-7039

3	Separadores plásticos (3)	4	Cableado de 4 cables (rojo, negro, amarillo, verde)
5	Enchufe de terminal del conector	6	El cable amarillo/verde que conecta el módulo de E/S al terminal a tierra FACP

Si el panel FPE-7039 no está montado en el panel del FACP, montarlo siguiendo las instrucciones anteriores.

1. Inserte los tres separadores de plástico (consulte la índice 3 en la figura anterior) en los orificios de montaje en el gabinete.
2. Monte el módulo E/S (índice 2 arriba) en el gabinete del FACP (índice 1 arriba).
3. Conecte el cableado del módulo E/S al terminal en el FPE-7039 (índice 5 arriba).
4. Conecte el cable a tierra amarillo y verde (índice 6 arriba) al terminal a tierra de FACP.

4   Cableado

Puede configurar el FPE-7039 con un solo circuito tolerante a fallas Clase A o como un par de ramales supervisados Clase B. Para obtener información sobre programación, consulte la *Guía de Instalación y Operación FPD-7024 (IOG)*.

4.1   Determinación de los límites del sistema

Nota!
No utilice cables blindados. El cable de par trenzado no es recomendado, pero es aceptable si se reduce un 50% la longitud del cable.

Nota!
En los siguientes gráficos,

a) los puntos de datos del área clara son aceptables.

b) los puntos de datos del área del medio dependen de su configuración. Deben ser verificados con la tabla de cálculo de batería.

c) los puntos de datos del área oscura requieren cambios en la longitud o el tamaño del cable, la cantidad de dispositivos o la configuración.

1.   Encuentre la intersección de la cantidad deseada de dispositivos y la longitud/resistencia del cable que desea en el primer gráfico a continuación.
      Si los puntos de datos se encuentran en el área clara, tenga en cuenta los tamaños de cable (AWG o ISO) disponibles para su instalación. Luego, continúe al siguiente paso.
      De lo contrario, consulte la Notificación arriba.
2.   Busque la capacitancia para el calibre/longitud/tipo de cable específico.

3.   Controle el punto de intersección de la capacitancia y la
     cantidad de dispositivos en el segundo gráfico a
     continuación. Si los puntos de datos están en el área clara,
     sus opciones son aceptables. De lo contrario, consulte la
   Notificación arriba.
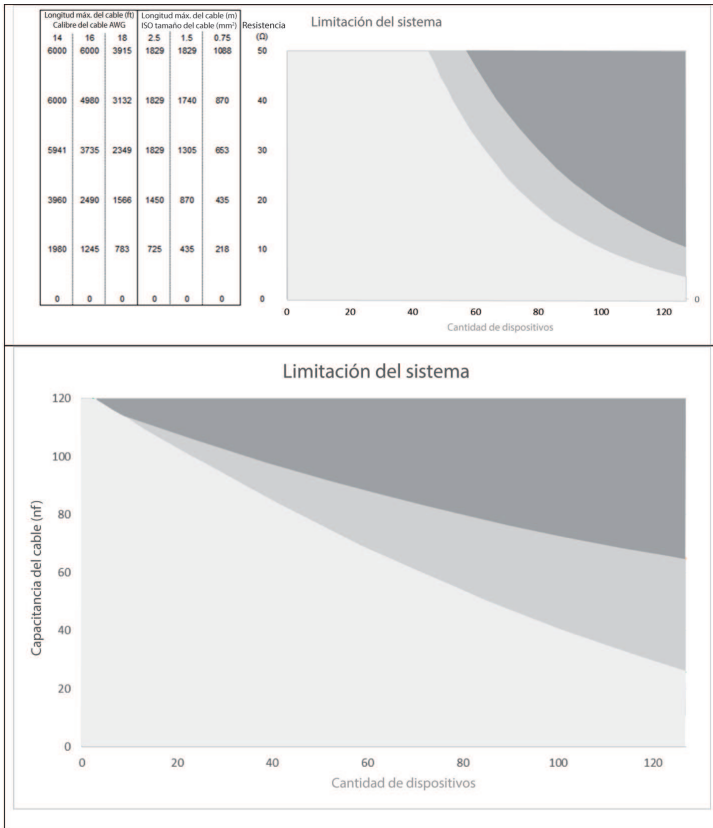
Longitud máxima del cable	
Resistencia máxima del cable	50 Ω a +20 °F (+68 °C), según el método y el tamaño del cable que se utilicen
Longitud del cable	5950 ft. (1810 m), según el calibre del cable y la cantidad de dispositivos

Longitud máxima del cable	
Capacitancia del cable*	<0,12 µF (máximo por bus), según el tamaño del cable y la cantidad de dispositivos
* Esta tabla muestra la capacitancia en microfaradios (µF), pero el gráfico provee nanofaradios (nF). Por ejemplo, 0,12 µF = 120 nF.	

4.2 Cableado de los lazos

Determine la configuración correspondiente (cantidad y tipo de dispositivos y tamaño y longitud del cable).

1. Coloque cables sólidos del FACP a las ubicaciones de los dispositivos y conecte el lazo múltiple.
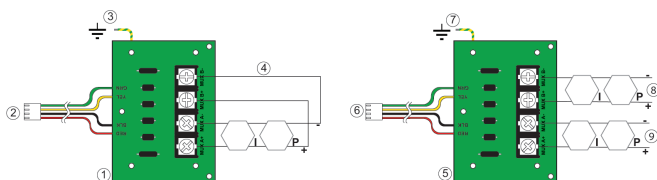
Figura 4.1: Cableado de lazos Clase A y ramales Clase B

| 1	Módulo E/S cableado como Clase A	2	Cableado
3	Cable de conexión a tierra	4	Lazo Clase A (direcciones 9 a 128)
5	Módulo E/S cableado como Clase B	6	Cableado
7	Cable de conexión a tierra	8	Ramal Clase B (direcciones 129 a 255)
9	Ramal Clase B (direcciones 9 a 128)		
todos los terminales MUX son de alimentación limitada y supervisadas			

2.   Asegúrese que el lazo esté desconectado del Módulo
      FPE-7039.
3.   Medición de la resistencia del lazo por circuito:
      el final del último dispositivo en la Clase B.
      el cable de retorno en la Clase A.
4.   Lea la resistencia total de todos los cables asociados al
      lazo.
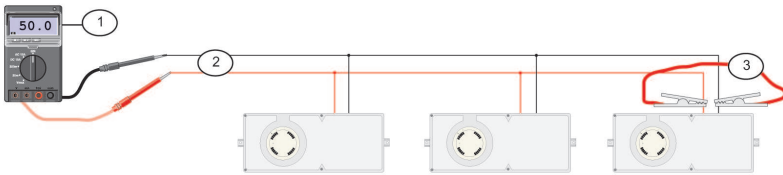
Figura 4.2: Medición de la resistencia del lazo de Clase B

1	50 Ω máximo	2	Cables del bus MUX
3	Pinza		
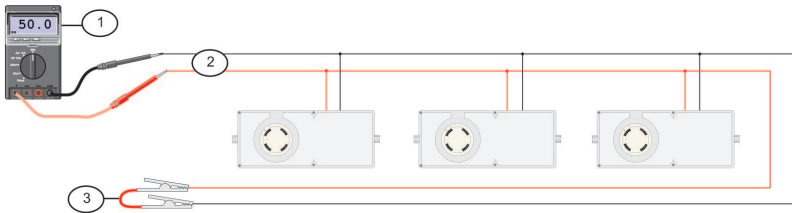
Figura 4.3: Medición de la resistencia del lazo de Clase A

1	50 Ω máximo	2	Cables del bus MUX
3	Pinza		

5   Especificaciones

Condiciones ambientales

Entorno	Interior, seco

Alimentación

Consumo de corriente	
Alarma	190 mA máximo
Carga, Clase A	100 mA máximo
Carga, Clase B	100 mA máximo para cada bus
En reposo	190 mA máximo
Tensión del bus	De 8.5 V a 13 V
Resistencia del cable (máxima)	50 Ω Clase A o Clase B

1 Avisos

Estas instruções abrangem a instalação do FPE-7039 Módulo de expansão multiplex em um sistema de incêndio supervisionado por um Painel de controle de alarmes de incêndio (FACP) FPD-7024.

Antes de instalar o módulo, leia o *Manual de instalação e operação* do painel de controle que você está usando.

Instale, teste e mantenha o módulo de acordo com estas instruções, os códigos NFPA, os códigos locais e a autoridade com jurisdição (AHJ). O não cumprimento destas instruções pode resultar no funcionamento incorreto do detector para iniciar um evento de alarme. A Bosch Security Systems, Inc. não se responsabiliza por dispositivos instalados, testados ou mantidos incorretamente.

> **Aviso!**
> Siga estas instruções para evitar danos pessoais e no equipamento.

O NFPA 72 exige que você faça um teste funcional completo, abrangendo todo o sistema após quaisquer modificações, reparos, upgrades ou ajustes efetuados nos componentes do sistema, hardware, cabeamento, programação e software/firmware.

Informações de softwares de código aberto

> **Nota!**
> Para obter informações gerais sobre softwares de código aberto na Bosch Security Systems, acesse http://www.boschsecurity.com/oss

2   Descrição

O FPE-7039 Módulo de expansão foi projetado para aprimorar os recursos convencionais dos Painéis de controle de alarme de incêndio (FACPs) D7024 ou FPD-7024/DS9400. O módulo se conecta diretamente ao FACP para dois barramentos multiplex Classe B ou um barramento multiplex Classe A. Quando instalado como dois barramentos multiplex classe B, você pode programar os endereços 9 a 255. Quando instalado como um barramento multiplex classe A, você pode programar os endereços 9 a 128.

O módulo também aumenta a quantidade de saídas de relé (para 58 nos painéis de controle D7024/DS9400 e 59 nos painéis de controle FPD-7024). Ele acrescenta 400 eventos adicionais ao buffer do histórico para um total de 499 eventos não voláteis. Ele também permite até 100 usuários no sistema (aumento de 84 PINs no sistema básico).

O módulo pode ser programado remotamente a partir de um PC usando o Software de programação remota RPS.

O módulo pode ser usado com os painéis de controle da Bosch Security Systems, Inc. e com os módulos indicados na tabela a seguir.

Painéis de controle	
Ativo:	Painéis de controle de alarmes de incêndio FPD-7024
Herdados:*	Painéis de controle de alarmes de incêndio D7024
	Painéis de controle DS9400
Módulos	
Ativo:	D7042 Módulo remoto de oito entradas Multiplex

	D7042B Módulo remoto de oito entradas Multiplex com gabinete
	D7044 Módulo monitor de uma entrada multiplex
	D7044M Minimódulo monitor de uma entrada multiplex
	D7050 Detector fotoelétrico de fumaça endereçável
	D7050DH Cabeça de detector de fumaça fotoelétrico para duto endereçável
	D7050TH Detector fotoelétrico de fumaça/ temperatura endereçável
	D7050-B6 Base do detector de fumaça
	D7052 Módulo monitor de entrada dupla multiplex
	D7053 Módulo de entrada-saída multiplex
	FLM-7024-ISO módulo isolador de barramento MUX
	FMM-7045 Acionador manual analógico endereçável multiplex
	FMM-7045-D Acionador manual analógico endereçável multiplex de ação dupla
* Os produtos herdados estão em conformidade somente com a UL864 8ª edição	

3   Instalação

Perigo!

Certifique-se de que toda a energia foi removida antes de fazer qualquer conexão elétrica. O contrário pode resultar em danos pessoais e/ou ao equipamento.

Cuidado!

Componentes sensíveis à estática!

O FACP e os módulos contêm componentes sensíveis à estática e devem ser manuseados com cuidado. Siga os procedimentos adequados de manuseio antiestático.
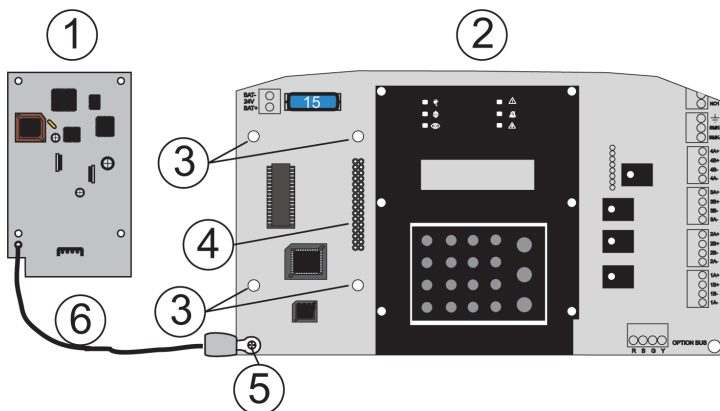
FPE-7039 instalação da placa

Figura 3.1: Montagem da FPE-7039

1	FPE-7039	2	FACP
3	Furos de montagem (4) para espaçadores de plástico	4	Pinos conectores do FACP (alinhar com FPE-7039)
5	Parafuso de montagem	6	Fio terra

Se o FACP (consulte a legenda 2 na figura acima) já estiver instalado em um gabinete, remova-o.

1. Coloque o FACP em uma superfície plana com o lado do componente voltado para cima.
2. Insira os quatro espaçadores de plástico nos furos de montagem (legenda 3 acima) sem dobrar ou flexionar o FACP.
3. Alinhe as guias dos espaçadores para que elas não toquem nos componentes do módulo.
4. Pressione os espaçadores com firmeza na placa, permitindo que as orelhas se expandam.
5. Monte a placa (legenda 1 acima) nos espaçadores, garantindo que os pinos do conector (legenda 4 acima) estejam devidamente alinhados.
6. Instale o FACP no gabinete.
7. Use o parafuso de montagem (legenda 5 acima) para proteger o fio de ligação à terra do FPE-7039 (legenda 6 acima) do FACP.
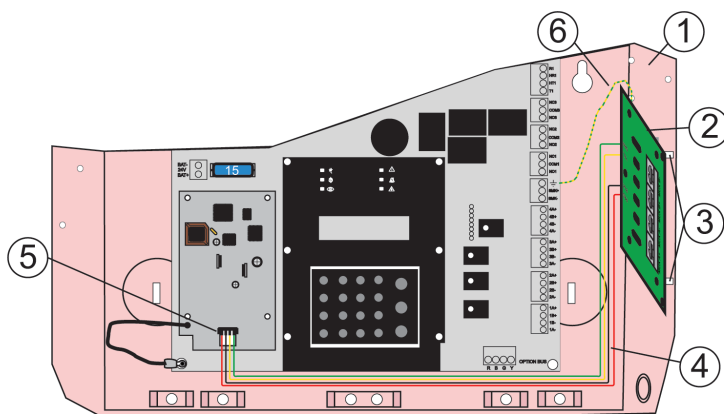
Montagem do módulo de E/S

Figura 3.2: Montagem do FPE-7039 módulo de E/S

1	Gabinete do FACP	2	FPE-7039 módulo de E/S

3	Espaçadores de plástico (3)	4	Harness de 4 fios (vermelho, preto, amarelo, verde)
5	Plugue do terminal do conector	6	Fio amarelo/verde conectado ao módulo de E/S no terminal de aterramento do FACP.

Se a placa do FPE-7039 não for montada na placa do FACP, monte-a usando as instruções acima.

1. Insira os três espaçadores de plástico (consulte a legenda 3 na figura acima) nos furos de montagem do gabinete.
2. Monte o módulo de E/S (legenda 2 acima) no gabinete do FACP (legenda 1 acima).
3. Conecte o harness de fios do módulo de E/S ao terminal no FPE-7039 (legenda 5 acima).
4. Conecte o fio terra amarelo/verde (legenda 6 acima) ao terminal de aterramento do FACP.

4   Cabeamento

Você pode configurar o FPE-7039 com um único loop Classe A tolerante a falhas ou como um par de ramificações Classe B supervisionadas. Consulte o *Manual de Instalação e Operação do FPD-7024 (IOG)* para obter instruções sobre programação.

## 4.1   Determinar os limites do sistema

> **Nota!**
> **Não** utilize cabo blindado. Não é recomendável usar cabo de par trançado, mas é aceitável se o comprimento do cabo for reduzido em 50%.

> **Nota!**
> Nos gráficos a seguir,
> a) os pontos de dados que incidem na área clara são aceitáveis.
> b) os pontos de dados que incidem na área intermédia dependem da sua configuração. Eles devem ser verificados com a tabela de cálculo de bateria.
> c) pontos de dados que incidem na área escura requerem mudanças na bitola ou comprimento do cabo, número de dispositivos, ou configuração.

1.   Localize a interseção entre o número desejado de dispositivos e o comprimento / resistência do cabo desejado no primeiro gráfico abaixo.
     se o ponto de dados incidir na área clara, observe as bitolas de cabos (AWG ou ISO) que estão disponíveis para a sua instalação. Em seguida, avance para a próxima etapa. caso contrário, consulte o Aviso acima.
2.   Procure a capacitância para a bitola, comprimento e tipo de cabo específico.
3.   Verifique o ponto de interseção entre a capacitância e o número de dispositivos no segundo gráfico abaixo. Se o ponto de dados incidir na área clara, as suas escolhas são aceitáveis. Caso contrário, consulte o Aviso acima.

Limitação do sistema

Limitação do sistema

Capacitância do cabo (nF)

Número de dispositivos
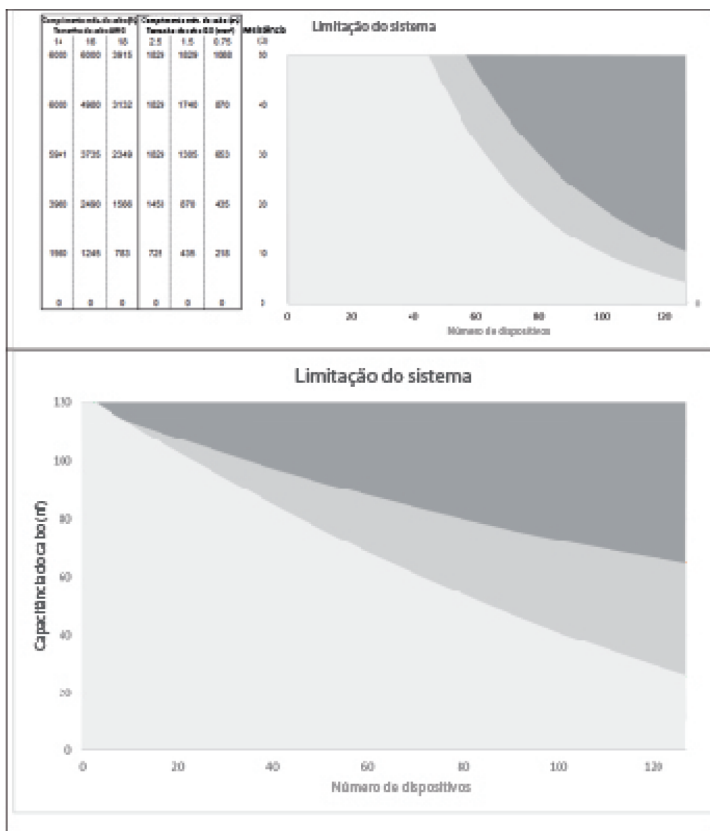
| Comprimento máximo do cabo	
Resistência máxima do cabo	50 Ω a +68 °C (+20 °F), depende do método e bitola de cabo usados
Comprimento do cabo	1810 m (5950 pés), depende da bitola do fio e número de dispositivos
Capacitância do cabo*	<0,12 µF (máximo por barramento), depende da bitola do cabo e número de dispositivos

Comprimento máximo do cabo
* Esta tabela apresenta a capacitância em microFarads (μF), mas o gráfico a informa em nanoFarads (nF). Por exemplo, 0,12 μF = 120 nF.

4.2 Cabeamento dos loops

Determinar a configuração adequada (número e tipo de dispositivos, bitola e comprimento do cabo).

1. Passar fio sólido do FACP até as localizações dos dispositivos e conectar o loop multiplex.
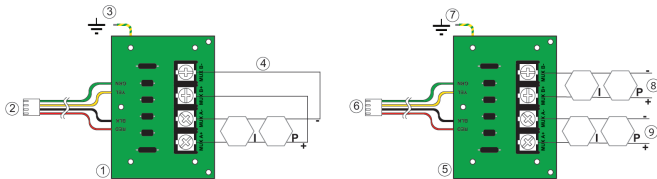
Figura 4.1: Loops Classe A e ramificações Classe B de cabeamento

1	Módulo E/S cabeado como Classe A	2	Chicote de cabos do cabeamento
3	Fio terra	4	Loop Classe A (endereços de 9 a 128)
5	Módulo E/S cabeado como Classe B	6	Chicote de cabos do cabeamento
7	Fio terra	8	Ramificação Classe B (endereços de 129 a 255)
9	Ramificação Classe B (endereços de 9 a 128)		
Todos os terminais MUX têm limitação de potência e são supervisionados.			

2. Assegure-se que o loop está desconectado do módulo FPE-7039.
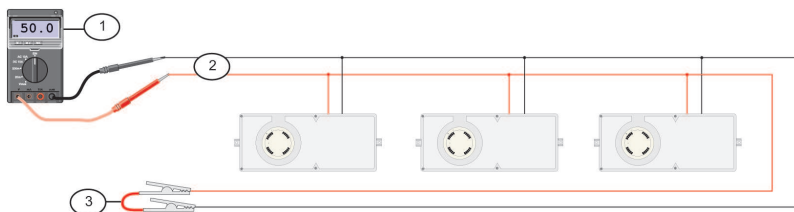3. Medição da resistência do loop através de curto-circuito:

a extremidade do dispositivo mais distante na Classe B.
o cabo de retorno na Classe A.
4.   Ler a resistência total de todos os cabos associados ao
      loop.
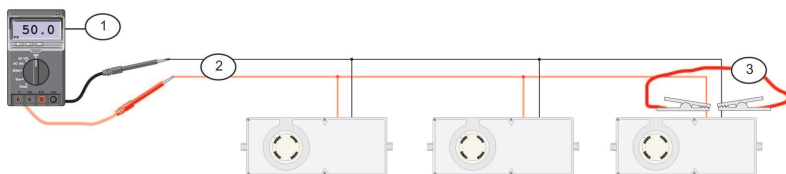
Figura 4.2: Medição da resistência do loop Classe B

1	Máximo de 50 Ω	2	Cabos de barramento MUX
3	Cabo-pinça		

Figura 4.3: Medição da resistência do loop Classe A

1	Máximo de 50 Ω	2	Cabos de barramento MUX
3	Cabo-pinça		

5 Especificações

Ambiental

Ambiente	Interno, seco

Alimentação

Carga de alarme do **consumo de corrente**, carga Classe A, em repouso Classe B	máximo de 190 mA máximo de 100 mA máximo de 100 mA para cada barramento máximo de 190 mA
Tensão do barramento	8,5 V a 13 V
Resistência do cabo (máxima)	50 Ω Classe A ou Classe B