Features

Autocall 4120 Fire Alarm Network communications are available for wired or fiber optic connections

- Wired communications are available on Network Interface Cards (NICs); available with either wired connections only, or as a modular design allowing selection of either wired or fiber optic media modules
- Fiber optic communications are available with fiber media modules on the NIC or when using the higher performance multiple signal fiber optic modems
- Fiber optic links are point-to-point continuous (unswitched) connections between Fire Alarm Network nodes
- LED status indicators assist with system setup and servicing

Modular Network Interface cards details

Class B or Class X network communications using wired or fiber optic media modules; selectable separately to match media requirements

Wired media module details

- Provides isolated earth detection
- Compatible with Autocall isolated loop and over-voltage protectors
- Electrical characteristics are similar to RS-485

Duplex fiber optic media module details

- Fiber optic links provide immunity to electrical transients, short circuits, and ground conditions
- Laser based fiber optic media modules use one multi-mode or one single-mode fiber to communicate; includes a single type SC connector compatible with 62.5/125µm or 50/125µm multi-mode fiber, or 9/125µm single-mode fiber
- On-board diagnostics provide information regarding the performance and health of the fiber link.

Multiple signal fiber modem details

- Laser based half-duplex communications for a varieity of signal combinations over a single fiber connection
- Available for single mode or multi-mode fiber
- Increased transmission distances compared to copper wiring (over 20 miles (32 km) may be possible with low-loss single-mode fiber)
- Multiple signal modems can be mounted within the cabinet for 4100 series control units. For other compatible fire alarm control units external cabinets are available. Please refer to data sheet *AC4100-0049* for details.

Physical Bridge Modules connect multiple Network loops and provide Star topology connections

- Physical Bridge Modules connect to Network communications using wired or fiber optic media and interconnect using modem media modules. Refer to data sheet *AC4100-0057* for details.
- TCP/IP Physical Bridge Modules are similar but provide LAN (Local Area Network) compatible interconnections. Refer to data sheet *AC4100-0029* for details.

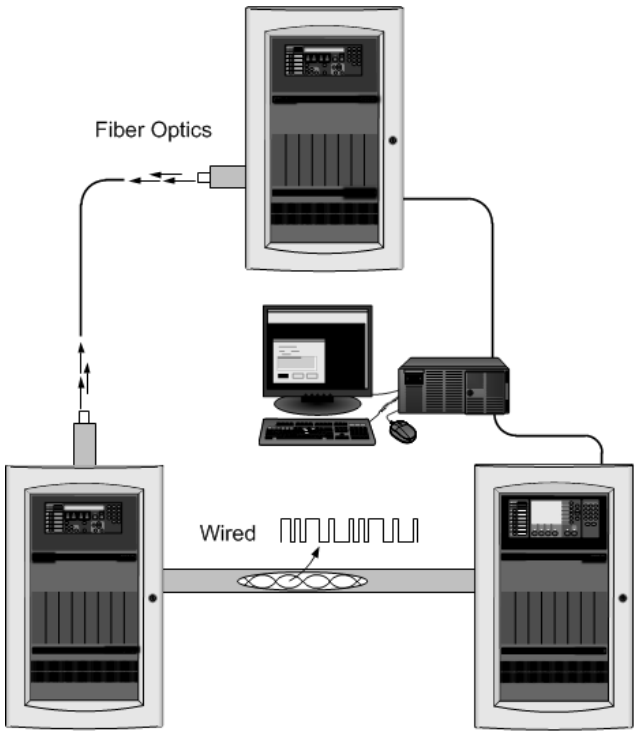

Figure 1: Fire Alarm Network Communications, Wired or Fiber Optic

Network Panel List

Network nodes include the following Autocall fire alarm products:

- 4100ES, 4007ES, 4010ES Series Fire Alarm Control Panels and 4100ES Network Display Units (NDU)
- 4190 Series TrueSite Workstations (TSW)
- 4190 Series Network System Integrators

Refer to individual product data sheets for specific product listing details.

Network Communications Equipment Selection Reference

Table 1: Fire alarm control panels and TrueSite Workstation interface compatibility

Product	Model	Description	Notes
4100ES	A100-6078	Modular network interface for master controller	Requires up to two media cards (ordered separately, see below)
	A100-6061	Modular network interface for redundant master controller	
TrueSite Workstation	A190-6061	Modular network interface, PCI slot card	
4007ES	A007-9810	Modular network interface	
4010ES	A010-9922	Modular network interface	

Table 2: Network Interface Cards and Media Cards

Product	Model	Description	Transmission Mode	Port	Notes
4007ES fiber media cards	A007-6301	4120 duplex fiber media card for the 4007ES	Single-mode	Left	Mounts on modular network interface cards listed above. Maximum of 1 left port and 1 right port duplex fiber media card per modular network interface card. Field connections require left port to right port pairing. Order fiber media service kits for retrofit jobs where ST connectors are already installed (see below for service kit ordering information, see install document 579-1238AC for additional installation details).
	A007-6302			Right	
	A007-6303		Multi-mode	Left	
	A007-6304			Right	
4010ES fiber media cards	A010-6301	4120 duplex fiber media card for the 4010ES	Single-mode	Left	
	A010-6302			Right	
	A010-6303		Multi-mode	Left	
	A010-6304			Right	
4100ES fiber media cards	A100-6301	4120 duplex fiber media card for the 4100ES	Single-mode	Left	
	A100-6302			Right	
	A100-6303		Multi-mode	Left	
	A100-6304			Right	
TrueSite Workstation fiber media cards	A190-6301	4120 duplex fiber media card for the TrueSite Workstation	Single-mode	Left	
	A190-6302			Right	
	A190-6303		Multi-mode	Left	
	A190-6304			Right	
Wired media cards	A100-6056	Wired media card for 4100ES/NSI			Mounts on A100-6078 or A100-6061 modular network interface; also used with network system integrator
	A190-6036	Wired media card for the TrueSite Workstation			Mounts on A190-6061 modular network interface
	A010-9818	Wired media card for the 4010ES			Mounts on A010-9922 modular network interface
	A007-9813	Wired media card for 4007ES			Mounts on A007-9810 modular network Interface

Table 3: Duplex Fiber Media Card Service Kits

Install type	Order number	Description
62.5/125 µm installations	650-2013	For retrofit jobs where multimode fibers with ST connectors are already installed. Includes (1) left port and (1) right port 4120 multi-mode duplex fiber media cards, (2) ST to SC multi-mode fiber media patch cords, (2) ST-ST couplers, (2) wire clamps, and (2) insulating sleeves.
50/125 µm installations	650-2014	

Note: Fiber optic media cards must be of the same type on each end of the fiber link. When replacing a media card with a different type, the card on the other side of the link should be replaced as well.

Table 4: Network Multiple Signal Modems Reference

Model	Fiber type	Description	Application
A100-6072	Single-Mode	Left-Port Fiber Modem Assembly	For direct mounting onto a 4100ES expansion bay; Fiber Modems are required to be ordered in pairs (Left-Port Fiber Modems communicate only to Right-Port Fiber Modems)
A100-6074	Multi-Mode		
A100-6073	Single-Mode	Right-Port Fiber Modem Assembly	
A100-6075	Multi-Mode		

Multiple Signal Fiber Optic Modem Specifications

Table 5: Multiple Signal Fiber Optic Modem Specifications

Specification		Rating	
Compatible Fiber	Single-Mode	Nominal 9/125 µm	
	Multi-Mode	50/125 µm or 62.5/125 µm graded index	
Fiber Connector		Type ST	
Allowed Fiber Connections	Single Mode Fiber	No Limit	
	Multi-Mode Fiber	Three (3) external connections maximum per link (does not include connectors on modems)	
Transmit and Receive Wavelengths	Left-Port Modems	Transmit = 1310 nm; Receive = 1550 nm	Launch power: -9.5dBm (112 µmW) +/- 10 µmW Range: -9.91dBm (102 µmW) to 9.14dBm (122µmW)
	Right-Port Modems	Transmit = 1550 nm; Receive = 1310 nm	
Transmission Distances for Single-Mode Fiber (preferred fiber type; Modules A100-6073, and A190-9023)		Maximum total attenuation = 15 dB	
		Example 1 (low loss fiber): Assume fiber with attenuation of 0.34 db/km; a target distance of 35,000 ft (10.7 km); connector loss totaling 6 dB attenuation; calculate the safety margin: (10.7 km) x (0.34 db/km) = 3.68 dB fiber loss 15 dB - 3.68 dB - 6 dB = > 5 dB safety margin	
		Example 2 (higher loss fiber): Assume fiber with attenuation of 0.6 db/km; a target distance of 25,000 ft (7.7 km); and connector loss totaling 5 dB attenuation; calculate the safety margin: (7.7 km) x (0.6 db/km) = 4.62 dB fiber loss 15 dB - 4.62 dB - 5 dB = > 5 dB safety margin	
Transmission Distances for Multi-Mode Fiber (Modules A100-6074, A100-6075, and A190-9026)		5000 ft (1.6 km) maximum distance Maximum total attenuation = 6 dB 50 µm or 62.5 µm GRIN (graded-index fiber)	

Note: Transmission distance examples above provide a safety margin of 5 dB or greater; a 3 dB safety margin is generally acceptable.

Modular Network Interface Card Duplex Fiber Media Module Specifications

Table 6: Modular Network Interface Card Duplex Fiber Media Module Specifications

Specification		Rating	
Compatible Fiber	Single-mode	Nominal 9/125 µm	
	Multi-mode	50/125 µm or 62.5/125 µm graded index	
Power		5 VDC at 220 mA max or 24VDC at 55mA max.	
Fiber Connector		Type SC	
Allowed Fiber Connections		No limit	
Transmit and Receive Wavelengths	Single/multi mode left-port media	Transmit = 1550 nm; Receive = 1310 nm	Launch power = 126 - 501 µmW (min -9, max -3 dBm)
	Single/multi mode right-port media	Transmit = 1310 nm; Receive = 1550 nm	Launch power = 126 – 501 µmW (min -9, max 0 dBm)
Transmission Distances for Single-Mode Fiber		Maximum distance = 82,000 ft (25km) Maximum total attenuation = 22dB	
Transmission Distances for Multi-Mode Fiber		Maximum distance = 16,400 ft (5km) Maximum total attenuation = 18dB	

Modular Network Interface Card Media Module Distance Specifications

The wired media module distance specifications in Table 7 are for media modules A010-9818, A100-6056, A190-6036, or A007-9813.

Table 7: Wired media module distance specifications

Wire Size and Specifications	Data Rate (baud)	Distance	Distance Note
18 AWG Unshielded Twisted Pair (UTP); maximum of 58 pF/ft, (190 pF/m) between conductors; shielded cable is allowed; see note below.	9600	17,000 ft (5.4 km)	Distance is with or without isolated loop protector or over-voltage protectors.
	57.6 k	10,000 ft (3 km)	
24 AWG Telephone cable Unshielded Twisted Pair (UTP); maximum of 22 pF/ft (72.2 pF/m) between conductors; overall shielded cable is allowed; see note below.	9600	12,000 ft (3.65 km)	
	57.6 k	7,000 ft (2.13 km)	

Note: Shielded cable and circuit protection is required when wiring leaves the building.

The **duplex fiber optic media module distance specifications** in Table 8 are for media modules A007-6301, A007-6302, A007-6303, A007-6304, A010-6301, A010-6302, A010-6303, A010-6304, A100-6301, A100-6302, A100-6303, A100-6304, A190-6301, A190-6302, A190-6303, and A190-6304.

Table 8: Duplex fiber optic media module distance specifications

Fiber Type*	MIFL	Power Margin	Maximum Distance	Power Budget	Coupler/Splice Loss
Multi-mode 50/125 or 62.5/125 numerical aperture = 0.275	1.5 dB/km @ 1300nm	3 dB	16400 ft (5 km)	18 dB	.75dB max for each mated pair connection .30dB max for each fusion splice
Single-mode 9/125 numerical aperture = 0.2	1 dB/km @ 1310nm	3 dB	82000 ft (25 km)	22 dB	

Note:

1. **Fiber type for duplex fiber optic**: Cable specifications are for 50 or 62.5 micron core with 125 micron cladding multi-mode graded index fiber or 9 micron core with 125 micron cladding single-mode fiber
2. **MIFL**: maximum individual fiber loss. Numbers shown are industry standard reference; refer to specific cable for exact specifications.
3. **Distance**: The maximum distance between nodes is determined by the total loss from the transmitter to the associated receiver (fiber loss, connector loss, splice loss and power margin), or the maximum distance listed, whichever is smaller.
4. **Power Budget**: Use attenuation measurements at the following wavelengths: Multi-mode @ 1300nm, Single-mode @ 1310nm

Acceptance Test Requirements for Fiber Optic Installations

An initial acceptance test of each fiber link shall be performed in accordance with NFPA 72, Chapter 14 Inspection, Testing, and Maintenance requirements. A fiber link is defined as all fiber segments, including patch cords, which create a fiber path from one fiber media board to another. Test result data must meet or exceed ANSI/TIA 568-C.3 Optical Fiber Cabling Components Standard related to fiber optic lines and connection/splice losses and the manufacturer's published specifications.

1. OTDR Launch and Receive cables of appropriate length shall be used. If a single cable is used, each link shall be tested in both directions.
2. Multi-mode fiber links shall be measured at 850 nm and 1300 nm.
3. Single-mode fiber links shall be measured at 1310 nm and 1550 nm.

Fire Alarm Network Example with Multiple Communication Media

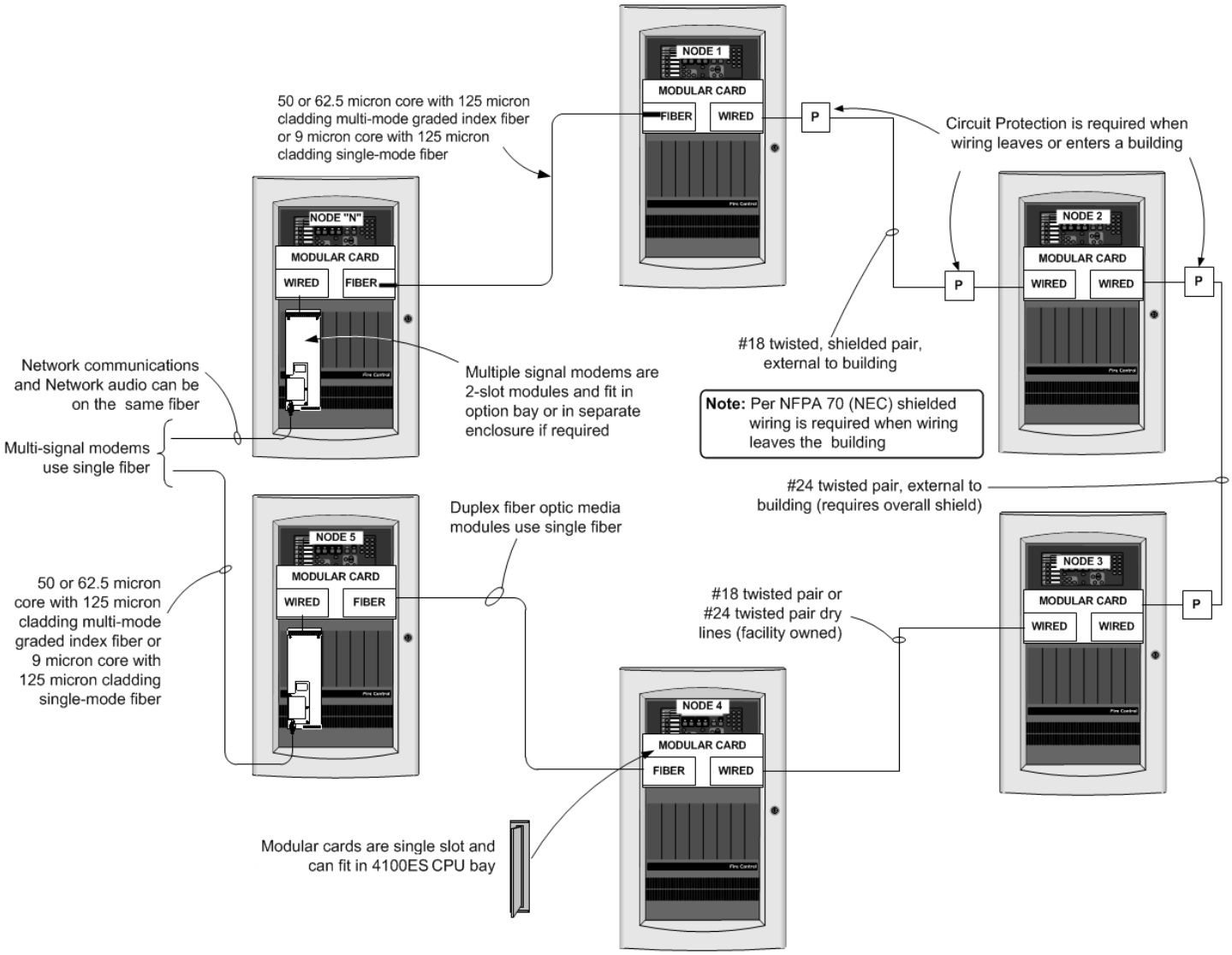

Figure 2: Fire Alarm Network Example with Multiple Communication Media

Additional Network Product Reference

Table 9: Additional Network Product Reference

Subject	Data Sheet
Multiple Signal Fiber Optic Modems and Accessories	*AC4100-0049*
Basic 4100ES Reference	*AC4100-0031*
4100ES Network Display Unit (NDU)	*AC4100-0036*
TrueSite Workstations	*AC4190-0016*
4010ES Fire Alarm Control Panel	*AC4010-0004*
4010ES Fire Alarm Control Panel (International)	*AC4010-0006*
4007ES Hybrid Fire Alarm Control Panel	*AC4007-0001*
4007ES Fire Alarm Control Panel	*AC4007-0002*
Network Systems Integrator	*AC4190-0017*
Physical Bridge Reference	*AC4100-0057*
TCP/IP Physical Bridge Modules	*AC4100-0029*
ESNet Network Communications, Options and Specifications	*AC4100-0076*