

PRODUCT PROFILE

FLEX EX I/O

FLEX EX I/O IN-CABINET MODULAR I/O PLATFORM

BENEFITS

Low Life Cycle Costs: The distribution of intrinsically safe I/O eliminates standalone barriers and isolators, expensive enclosures, long wiring runs and cable trays – resulting in approximately 40% savings to you.

Always the Right Solution: A broad selection of FLEX Ex configurations allows you to meet your application needs – flexibility in size and communications.

Advanced Diagnostics: FLEX Ex provides real-time status reports including wire-off and short-circuit conditions, Removal and Insertion Under Power (RIUP), and LED lights indicate faults on a per-channel basis. It's all about quicker and easier troubleshooting.

Installation Ease: Modular I/O interface coupled with separate terminal strips provides you with a single, easy-to-use package that's a snap to expand.

Faster Commissioning: Simplified engineering drawings, documentation and site certification coupled with reduction in mis-wiring opportunities result in faster commissioning.



FLEX Ex™ I/O takes advantage of the modular FLEX™ I/O platform and combines it with Intrinsic Safety (IS) technology. In this way FLEX Ex can be distributed throughout hazardous areas, along with a single or redundant fiber or coax cable to accommodate for communication with the control system in the safe area. The end result is optimum performance and more cost savings to the end user.

Expand into hazardous areas with FLEX Ex, the intrinsically safe FLEX I/O line extension.

Traditional methods of hazardous area protection have made it difficult to distribute control system I/O into potentially explosive environments. Bulky explosion proof or purged enclosures were expensive and difficult to maintain. Plus, standalone zener barriers and galvanic isolators required multiple terminations and large cabinets. This resulted in long runs of multiple cables, hardened conduit and messy sealing. Now, Rockwell Automation offers Allen-Bradley® FLEX Ex I/O, providing a safe and easy way of distributing I/O into hazardous environments, Class I, II and III/Division 1 and Zone 1 or 22.

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Differences from Existing Barriers

Distribution of I/O provides numerous benefits to control system users, both in terms of lower costs and more effective maintainability. However, traditional methods of hazardous environment protection have made it difficult to distribute control system I/O in potentially explosive environments.

Intrinsic Safety is one of the most universally accepted methods of protection in hazardous environments. IS prevents sensors, human-machine interfaces (HMI), actuators, and other low-voltage instruments from releasing enough energy into a hazardous area to cause ignition. The fundamental principle of this technique is energy limitation, in which the inherent energy of an electrical circuit is restricted to such low levels that any electrical discharge occurring does not contain sufficient energy to ignite an explosive mixture. FLEX Ex incorporates this technology. This I/O product line provides functional galvanic isolation between the I/O backplane, input circuitry, and power supply.

I/O Choices

Digital modules:

- 1797-IBN16, 16-point digital modules provide compatibility with NAMUR proximity sensors, limit switches, contact closures, push buttons, and other simple apparatus
- 1797-OB4D, 4-point source output module is compatible with IS solenoid valves, audible alarms, and other associated apparatus

Analog modules:

- 1797-IE8, -IE8NF and -IE8H, 8-point, 16-bit, single-ended, non-isolated, analog input modules capture signals from differential pressure and temperature transmitters, level detectors, flow meters, and other associated apparatus, designed to interface to positioners current to pneumatic converters and control valves; IE8NF is for moderately changing processes and has additional filtering to damp out spurious signals whereas IE8 is for high-speed applications. IE8H is similar to IE8NF and supports HART pass-through connectivity.
- 1797-OE8, 8-point, 13-bit, single-ended, non-isolated, analog output module. Also has discrete mode for low-power pilot lights, LEDs and other simple apparatus.

Specialty modules:

- 1797-IJ2, Two-channel high-resolution frequency input module with magnetic contact inputs providing accurate shaft position information
- 1797-IRT8, 8-point, 16 bit, single-ended, non-isolated, 4-wire RTD, thermocouple and millivolt input module can connect thermocouples, (2-, 3-, 4-wire) RTDs, strain gauge bridges, and potentiometers

Network Choices

The diagnostic capabilities and determinism of the ControlNet™ network make it an ideal choice for hazardous area applications. A redundant media ControlNet Ex communications adapter features a high speed, intrinsically safe, control level communications network capable of communicating to eight I/O modules for up to 128 I/O points.

The ControlNet Ex segment in the hazardous area must be isolated from other ControlNet segments in safe areas. Isolation can be achieved via two approaches: by converting coax to fiber with a pair of fiber hubs/repeaters or by using a coax barrier. The fiber hubs facilitate the mixing of IS and non-IS systems and provide for effective communication between hazardous and safe areas. The fiber hub architecture is best for longer distances and the largest number of adapters and I/O points. The fiber repeater extends communications up to three kilometers.

The redundant media ControlNet coax barrier isolates the ControlNet segment in the safe area from that in the hazardous area. It allows connection into the hazardous area without converting to/from fiber media. The barrier can support up to 20 adapters and distances up to 500 meters. Thus, it addresses intermediate size applications in a highly cost-effective manner.

The FLEX Bus Isolator (1797-CEC & -BIC) is used for the configuration where FLEX and FLEX Ex I/O modules are all attached to the same adapter and are grouped together on appropriate sides of the bus isolator so as to allow combination of non-IS and IS systems. This provides for a cost-effective means to use FLEX Ex in lower point count systems and to allow for connection to FLEX I/O adapters and alternative networks. This scenario is common in many hazardous applications.

Termination Choices

Two types of terminal bases are available:

- 1797-TB3, Terminal base with screw clamps
- 1797-TB3S, Terminal base with spring clamps

Power Supply Choices

- 1797-PS1N, 85-264VAC In Power Supply-Conduit Pipe Thread
- 1797-PS1E, 85-264VAC In Power Supply-Increased Safety Terminations
- 1797-PS2N2, 24VDC In Power Supply-Conduit Pipe Thread
- 1797-PS2E2, 24VDC In Power Supply-Increased Safety Terminations

Industrial Applications

Some applications of explosion protection/prevention include:

Petrochemicals

- Petrochemical applications include offshore platforms, pipelines, tank farms and refineries.

Food & Beverage

- Food and beverage applications deal primarily with alcohol manufacturing and grain mills. Includes raw material handling, grain feeders and elevators, brewing, distillation, and bottling.

Fine Chemicals and Pharmaceuticals

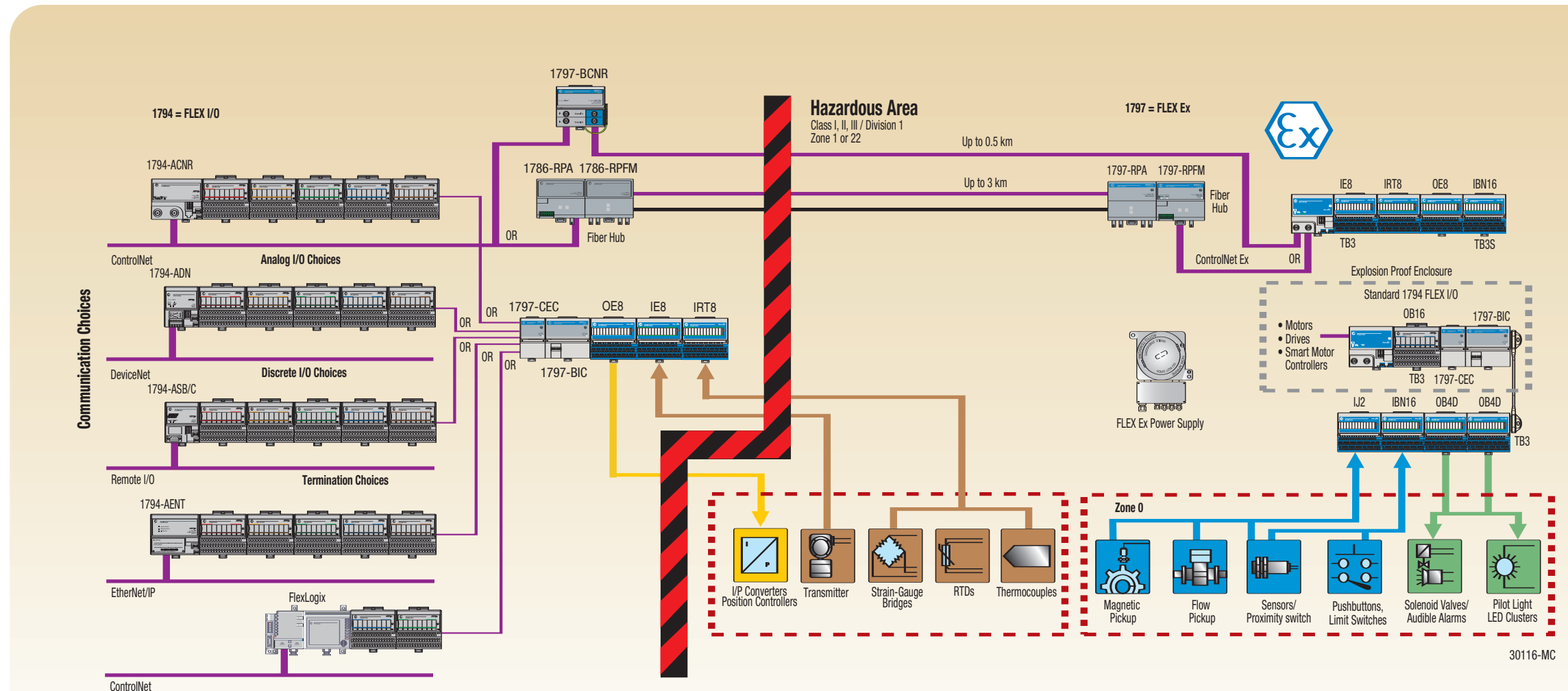
- Solvent-based paint manufacturing includes several hazardous areas. FLEX Ex may be applied to mixing/blending, filling containers, and palletizing.
- Paint-spray booth manufacturers require intrinsic safety on I/O points located in the paint zone.
- Manufacturing munitions, cosmetics, and pharmaceuticals require intrinsically safe I/O points.

Semiconductor /Electronics

- Applications include doping stations, chemical dispensing, and gas handling.

Pulp and Paper

- Pulp and paper applications include bleaching, digestion, and make-up water/liquor recovery.
- Printing press applications where volatile inks may exist.



Technical Specifications

FLEX Ex I/O Modules and I/O Communication Modules

Modules	Dimensions (HxWxD)	Weight	Shock	Vibration	Conformal Coating
FLEX Ex	46x94x75mm (1.8x3.7x3.0in)	0.2kg (0.4lb)			
1797-ACNR15 1797-RPA	94x94x91mm (3.7x3.7x3.6in)	0.2kg (0.4lb)	Operating: 15g peak acceleration, 11 (±1) ms pulse width Non-Operating: 15g peak acceleration, 11 (±1) ms pulse width	Tested 2g @ 10-500Hz per IEC 68-2-6	Tested & meets ISA-571.04-1995 for noxious gases, severity level 3
1797-RPFM	94x94x91mm (3.7x3.7x3.6in)	0.1kg (0.2lb)			
1797-BIC	87x94x75mm (3.4x3.7x3.0in)	0.2kg (0.4lb)	Operating: 30g peak acceleration, 11 (±1) ms pulse width Non-Operating: 30g peak acceleration, 11 (±1) ms pulse width	Tested 5g @ 10-500Hz per IEC 68-2-6	Tested & meets ISA-571.04-1995 for noxious gases, severity level 3
1797-CEC	80x55x69mm (3.2x2.2x2.7in)	0.1kg (0.2lb)			
1797-BCNR	70x100x90mm (2.76x3.94x3.55in)	0.2kg (0.4lb)	Operating: 30g peak acceleration, 11 (±1) ms pulse width Non-Operating: 50g peak acceleration, 11 (±1) ms pulse width	Tested 5g @ 10-500Hz per IEC 68-2-6	N/A

Environmental Specifications

Operating Temperature:	-20° C...+70° C (-4° F...+158° F)
Storage Temperature:	-40° C...+85° C (-4° F...+158° F)
Relative Humidity:	5 ... 95% non-condensing
Terminal Screw Torque:	0.79 ... 1.02 N•m (7 ... 9 lb•in)
Conformal Coating	ANSI/ISA-571.04-1985; Class G1 & 2 CEI IEC-6065A-4; Class 1 & 2

Publications

Publication Number	Description
1794-SG002B-EN-P	FLEX Selection Guide
1797-6.5.6	FLEX Ex System Certification Reference Manual
1797-6.2.1	ControlNet Ex Coax Media System Planning and Installation Manual

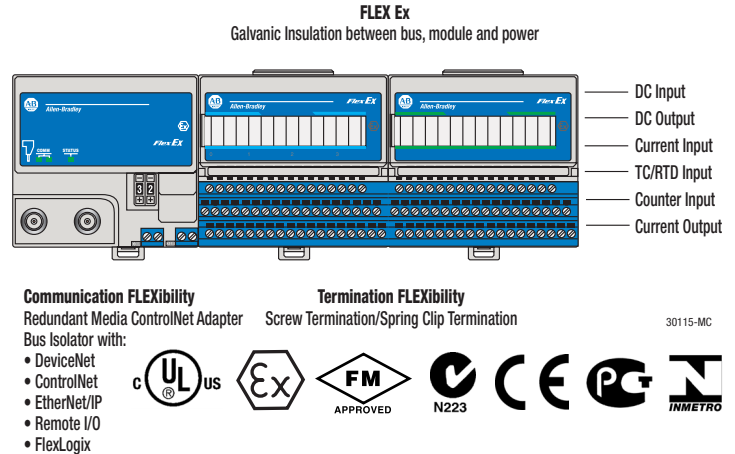


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FLEX Ex system components are certified to meet the following regulations for devices intended for installation and use in potentially explosive atmospheres:

- EU directive 94/9/EC (ATEX 100a)
- CENELEC EN50014, 18, 19, 20, 21, 39, 281, 284, EEx ia/ib IIB/IIC T4, Zone 1 and 22
- UL 913, 1203 and 2279 Class I, Division 1 and Zone 1
- FM NO. 3600, 3610 and 3615 Class I, Division 1 and Zone 1
- Brazilian INMETRO, BR Ex ia/ib 11B/11C T4
- Russian GOST 51330.x

For more information on certifications see FLEX/FLEX Ex Selection Guide (Publication 1794-SG002B) and FLEX Ex System Certification Reference Manual (Publication 1797-6.5.6).