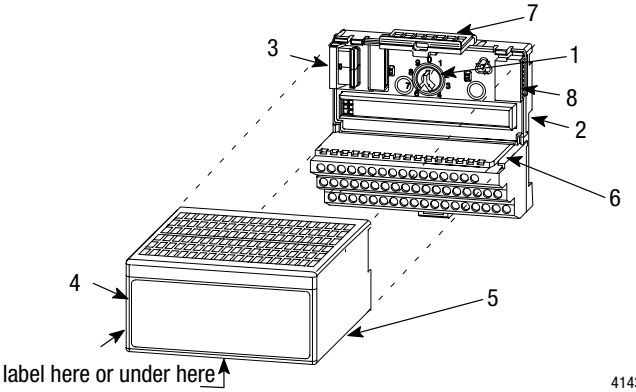
Installation Instructions

FLEX Ex 8 Output Analog Module

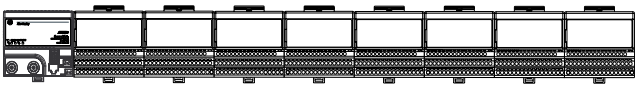
(Cat. No. 1797-OE8)



Module Installation

This module must be used with a 1797-TB3 or -TB3S intrinsically safe terminal base unit.

1. Rotate keyswitch (1) on terminal base unit (2) clockwise to position 4 as required for this type of module. **Do not change the position of the keyswitch after wiring the terminal base unit.**
2. Make certain the flexbus connector (3) is pushed all the way to the left to connect with the neighboring terminal base/adapter. You cannot install the module unless the connector is fully extended.
3. Make sure the pins on the bottom of the module are straight so they will align properly with the connector in the terminal base unit.
4. Position the module (4) with its alignment bar (5) aligned with the groove (6) on the terminal base.
5. Press firmly and evenly to seat the module in the terminal base unit. The module is seated when the latching mechanism (7) is locked into the module.
6. Make certain that you only connect terminal base units to other intrinsically safe system modules or adapters to maintain the integrity of the intrinsically safe backplane.



7. Remove cap plug (8) and attach another intrinsically safe terminal base unit to the right of this terminal base unit if required.

Installation in Zone 1

This module must not be exposed to the environment. Provide a suitable metal enclosure. This module has a protection factor of IP20.

ATTENTION: This module cannot be used in an intrinsically safe environment after it has been exposed to non-intrinsically safe signals.

Electrostatic Charge

Protect the system against electrostatic charge. Post a sign near this module: **Attention! Avoid electrostatic charge.** For your convenience, a sign which can be cut out and posted is included in this installation instruction.

Removal and Insertion Under Power

ATTENTION: This module is designed so you can **remove and insert it under power**. However, take special care when removing or inserting this module in an active process. I/O attached to any module being removed or inserted can change states due to its input/output signal changing conditions.

European Communities (EC) Directive Compliance

If this product has the CE mark it is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

EMC Directive

This product is tested to meet the Council Directive 89/336/EC Electromagnetic Compatibility (EMC) by applying the following standards, in whole or in part, documented in a technical construction file:

- EN 50081-2 EMC - Generic Emission Standard, Part 2 - Industrial Environment
- EN 50082-2 EMC - Generic Immunity Standard, Part 2 - Industrial Environment

This product is intended for use in an industrial environment.

Ex Directive

This product is tested to meet the Council Directive 94/9/EC (ATEX 100a) Equipment and Protective systems Intended for Use in Potentially Explosive Atmospheres by applying the following standards:

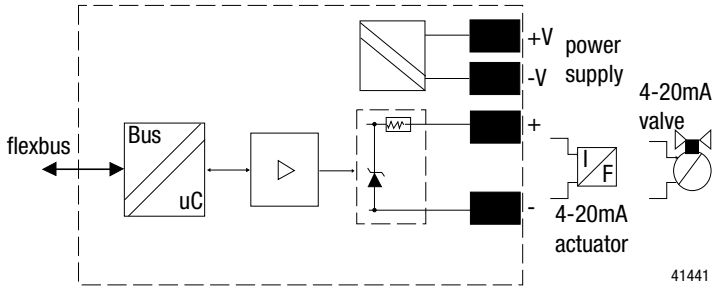
- EN50014:1992, Electrical Apparatus for Potentially Explosive Atmospheres
- EN50020:1994, Electrical Apparatus for Potentially Explosive Atmospheres - Intrinsic Safety “i”
- prEN50284:1997, Special requirements for construction, test and marking of electrical apparatus of equipment group II, category 1G

Outputs

Each output channel can operate an analog field device. **Do not apply any non-intrinsically safe signals to this module.**

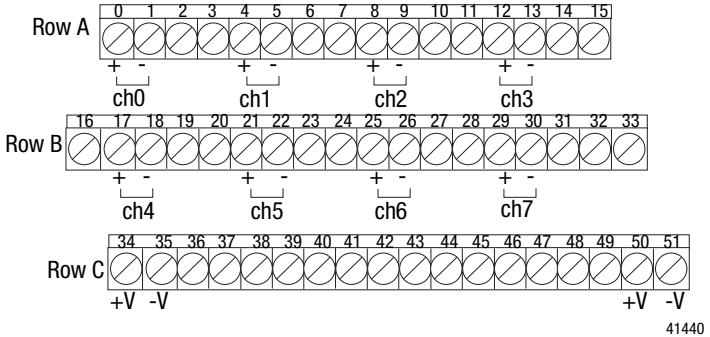
When using an intrinsically safe electrical apparatus according to EN50020, the European Community directives and regulations must be followed.

The channels in this module are electrically connected to each other.



Wiring to a 1797-TB3 or -TB3S Terminal Base Unit

Connect wiring to the terminal base as shown below.



No connections allowed to terminals 2, 3, 6, 7, 10, 11, 14, 15, 19, 20, 23, 24, 27, 28, 31, 32, 36, 37, 38, 39, 46, 47, 48, 49

1. Connect the individual output wiring to (+) terminals (0, 4, 8, 12) on the 0-15 row (A) and on the 16-33 row (B) (terminals 17, 21, 25, 29) as indicated in the table below.
2. Connect the associated output to the corresponding (-) terminal (1, 5, 9, 13) on the 0-15 row (A), and on the 16-33 row (B) (terminals 18, 22, 26, 30) for each input as indicated in the following table.
3. Connect +V dc power to terminal 34 on the 34-51 row (C).
4. Connect -V to terminal 35 on the 34-51 row (C).

ATTENTION: Make certain that you power this module with an intrinsically safe power supply. Do not exceed the values listed in the specifications for this module.

5. If continuing power to the next terminal base unit, connect a jumper from terminal 50 (+V) on this base unit to terminal 34 on the next base unit.
6. If continuing common to the next terminal base unit, connect a jumper from terminal 51 (-V) on this base unit to terminal 35 on the next base unit.

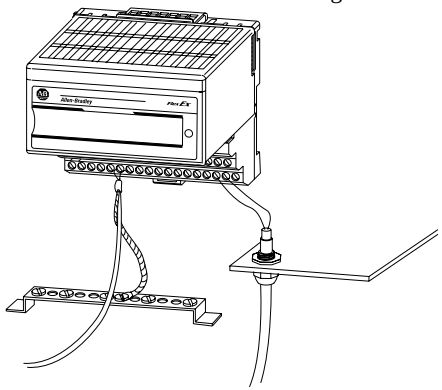
Wiring

Output	Output +	Output -	Output	Output +	Output -
Output 0	A-0	A-1	Output 4	B-17	B-18
Output 1	A-4	A-5	Output 5	B-21	B-22
Output 2	A-8	A-9	Output 6	B-25	B-26
Output 3	A-12	A-13	Output 7	B-29	B-30
+V	Terminals 34 and 50				
-V	Terminals 35 and 51				

ATTENTION: Do not use the unused terminals on this terminal base unit. Using these terminals as supporting terminals can result in damage to the module and/or unintended operation of your system.

Grounding

All I/O wiring must use shielded wire. Shields must be terminated external to the module, such as bus bars and shield-terminating feed throughs.



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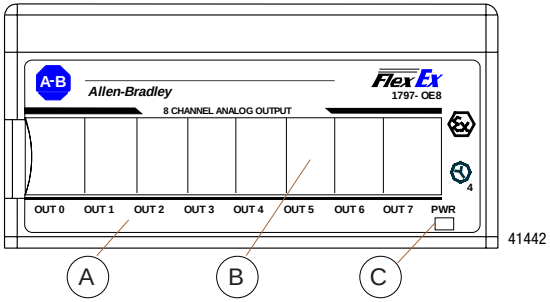
Indicators



A = Status Indicators - flashing red = channel fault; Channel 0 indicator will turn red while power-up check is running

B = Insertable labels for writing individual input designations

C = Power Indicator = green indicates power applied to the module

Input Map (Read Words)

Bit⇒	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Word ⇓																
0	Flt Alm ch7	Flt Alm ch6	Flt Alm ch5	Flt Alm ch4	Flt Alm ch3	Flt Alm ch2	Flt Alm ch1	Flt Alm ch0					Diagnostic Status			
1	Res Flg	MODULE Command Response							MODULE Response Data							

Where: ch = channel
Flt Alm = Fault Alarm
Res Flg = Response Flag

Output Map (Write Words)

Bit⇒	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Word ⇓																
0	Out Enb	Glbl Rst	RESERVED						Dig Out ch7	Dig Out ch6	Dig Out ch5	Dig Out ch4	Dig Out ch3	Dig Out ch2	Dig Out ch1	Dig Out ch0
1	Channel 0 Output Data															
2	Channel 1 Output Data															
3	Channel 2 Output Data															
4	Channel 3 Output Data															
5	Channel 4 Output Data															
6	Channel 5 Output Data															
7	Channel 6 Output Data															
8	Channel 7 Output Data															
9	Lo Flt Md		Flt Md ch 2-3		Flt Md ch 0-1		Alg Flt Ste ch2-3		Alg Flt Ste ch0-1		Data Format ch2-3		Data Format ch0-1			
10	Lth Md 4-7	Lth Md 0-3	Flt Md ch 6-7		Flt Md ch 4-5		Alg Flt Ste ch6-7		Alg Flt Ste ch4-5		Data Format ch6-7		Data Format ch4-5			
11	Dig Flt Ste ch7	Dig Flt Ste ch6	Dig Flt Ste ch5		Dig Flt Ste ch4		Dig Flt Ste ch3		Dig Flt Ste ch2		Dig Flt Ste ch1		Dig Flt Ste ch0		Alg Dig Md ch7	Alg Dig Md ch6
12	Cd Flg	MODULE Command							MODULE Command Data							

Where:
ch = channel
Dig Out = Digital Output
Lo Flt Md = Local Fault Mode
Flt Md = Fault Mode
Alg Flt Ste = Analog Fault State
Lth Md = Latch Mode
Dig Flt Ste = Digital Fault State
Alg Dig Md = Analog/Digital Mode
Out Enb = Output Enable
Glbl Rst = Global Reset

Data Format Control

Data Format				Range	Resolution	Full Range	Interpretation	Data Table Value	Count per mA
0	0	0	0	0-20mA	0.1% of 0-20mA	0-22mA	0-22mA	0-22000	1000
0	0	0	1	0-20mA	0.2% of 0-20mA	0-22mA	0-110%	0-11000	500
0	0	1	0	0-20mA		0-20mA	not assigned		
0	0	1	1	0-20mA	0.03% of 0-20mA	0-20mA	unsigned integer	0-65,535	3276
0	1	0	0	4-20mA	0.1% of 4-20mA	2-22mA	2-22mA	2000-22000	1000
0	1	0	1	4-20mA		4-20mA	not assigned		
0	1	1	0	4-20mA		4-20mA	not assigned		
0	1	1	1	4-20mA	0.03% of 4-20mA	4-20mA	unsigned integer	0-65,535	4095
1	0	0	0	0-20mA		0-20mA	not assigned		
1	0	0	1	0-20mA		0-20mA	not assigned		
1	0	1	0	0-20mA		0-20mA	not assigned		
1	0	1	1	0-20mA	0.28% of 0-20mA	0-22mA	D/A count	0-8000	363
1	1	0	0	4-20mA			not assigned		
1	1	0	1	4-20mA	0.16% of 4-20mA	3-21mA	-6.25 to +106.25%	-625 to +10625	625
1	1	1	0	4-20mA	0.16% of 4-20mA	2-22mA	-12.5 to +112.5%	-1250 to +11250	625
1	1	1	1	4-20mA		4-20mA	not assigned		

Repair

This module is not field repairable. Any attempt to open this module will void the warranty and IS certification. If repair is necessary, return this module to the factory.

Specifications - 1797-OE8	
Number of Outputs	8 single-ended, non-isolated
IS Output Type	EEx ia IIB/IIC T4, Aex ia IIC T4, Class I, II, III Division 1 & 2 Groups A-G T4
IS Module Type	EEx ib IIB/IIC T4, AEx ib IIC T4, Class I Division 1 & 2 Groups A-D T4
Resolution	13 bit
Transfer Characteristics Accuracy at 20ºC (68ºF) Temperature Drift	 0.1% of output signal range 0.010%/C of output signal range
Load Range Current Voltage Available at 22mA Load	 0-22mA >11V 0-500Ω @ 22mA
Data Format	Configurable
Step Response to 99% of FS	4ms
Indicators	8 red fault indicators 1 green power
Output (Intrinsically Safe) (16 pin male and female flexbus connector)	$U_i \leq$ 5.8V dc $I_i \leq$ 400mA L_i = Negligible $C_i = \leq$ 1.35µF
Isolation Path Output to Power Supply Output to Flexbus Output to Output Power Supply to Flexbus	Isolation Type Galvanic to DIN EN50020 Galvanic to DIN EN50020 None Galvanic to DIN EN50020
Power Supply (+V, -V Intrinsically Safe)	$U_i \leq$ 9.5V dc $I_i \leq$ 1A L_i = Negligible C_i = Negligible
Module Field-Side Power Consumption	6.3W
Power Dissipation	5.4W
Thermal Dissipation	18.4 BTU/hr
Module Location	Cat. No. 1797-TB3 or -TB3S Terminal Base Unit
Conductors Wire Size	12 gauge (4mm^2) stranded maximum 1.2mm (3/64in) insulation maximum
Dimensions	46 x 94 x 75mm (1.8 x 3.7 x 2.95in)
Weight	200g (approximately)
Keyswitch Position	4

Specifications - 1797-OE8 (Continued)	
Environmental Conditions Operational Temperature Storage Temperature Relative Humidity Shock Operating Non-Operating Vibration	 -20 to +70°C (-4 to +158°F) -40 to +85°C (-40 to +185°F) 5 to 95% noncondensing Tested to 15g peak acceleration, 11(+1)ms pulse width Tested to 15g peak acceleration, 11(+1)ms pulse width Tested 2g @ 10-500Hz per IEC68-2-6
Agency Certification	II (1) 2G EEx ia/ib IIB/IIC T4 Class I Division 1 & 2 Groups A-D T4 Class I Zone 1 & 2 AEx ib/[ia] IIC T4
Certification of Conformity	DMT 99 ATEX E 051X

CE, CENELEC I/O Entity Parameters

Signal output (+ to -) for ch 0 to ch 7
(terminals: 0-1; 4-5; 8-9; 12-13; 17-18; 21-22; 25-26; 29-30)

	Protection	Group	Allowed Capacitance	Allowed Inductance
U_0 = 21V	EEx ia	IIB	1.27µF	8mH
I_0 = 100mA P_0 = 150mW		IIC	188nF	2mH
If concentrated capacitance and/or inductance are available, use the following values.	EEx ia	IIB	400nF	10mH
		IIC	80nF	2mH

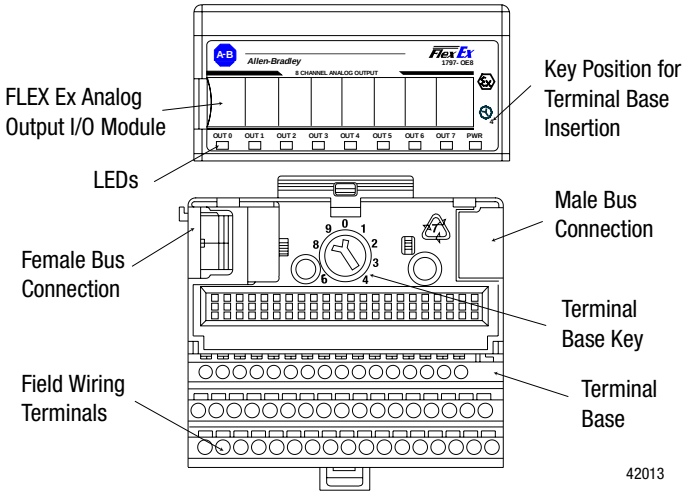
UL, cUL I/O Entity Parameters

Wiring Methods

- Wiring method 1 - Each channel is wired separately.
- Wiring method 2 - Multiple channels in one cable, providing each channel is separated in accordance with the National Electric Code (NEC) or Canadian Electric Code (CEC).

Table 1

Wiring Method	Channel	Terminals	V_{oc} (V)	I_{sc} (mA)	V_t (V)	I_t (mA)	Groups	C_a (µF)	L_a (mH)
1 and 2	Any one channel e.g. ch0	0(+), 1(-)	21.0	93.0	-	-	A, B	0.08	2.0
							C, E	0.24	8.0
							D, F, G	0.64	16.0



Important: A terminal base may or may not have an I/O module installed.

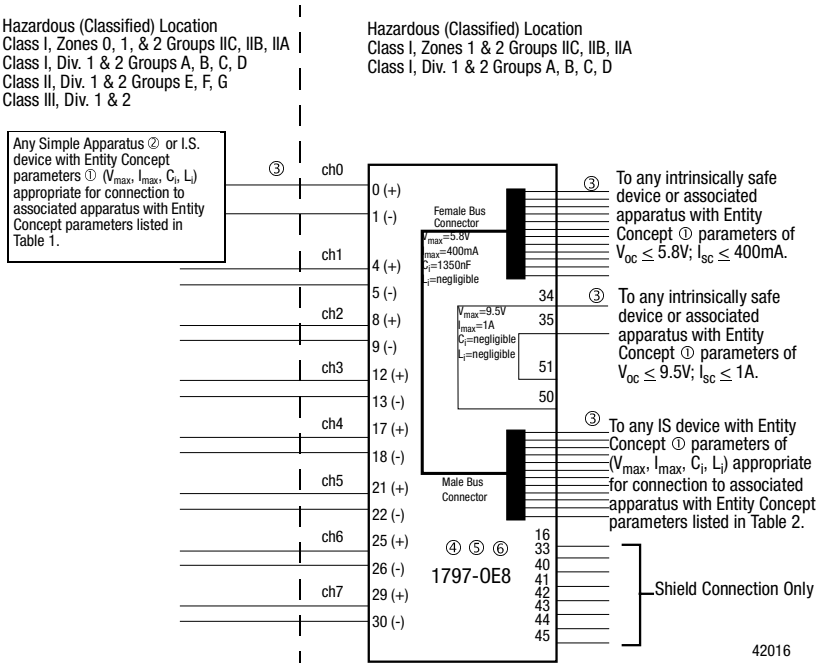


Table 2

Terminals	V_t (V)	I_t (mA)	Groups	C_a (μF)	L_a (μH)
Male Bus Connector	5.8	400	A-G	3.0	3.0

① The entity concept allows interconnection of intrinsically safe apparatus with associated apparatus not specifically examined in combination as a system when the approved values of V_{oc} and I_{sc} or V_t and I_t of the associated apparatus are less than or equal to V_{max} and I_{max} of the intrinsically safe apparatus and the approved values of C_a and L_a of the associated apparatus are greater than $C_i + C_{cable}$ and $L_i + L_{cable}$ respectively for the intrinsically safe apparatus.

② Simple apparatus is defined as a device which neither generates nor stores more than 1.2V, 0.1A, 20μJ, or 25mW.

③ Wiring methods must be in accordance with the National Electric Code, ANSI/NFPA 70, Article 504 and 505 or the Canadian Electric Code CSA C22.1, Part 1, Appendix F. For additional information refer to ANSI/ISA RP12.6.

④ This module, 1797-OE8, must be used with terminal base 1797-TB3 or 1797-TB3S.

⑤ Terminals 2, 3, 6, 7, 10, 11, 14, 15, 19, 20, 23, 24, 27, 28, 31, 32, 36-39, and 46-49 shall not be connected.

⑥ WARNING: Substitution of components may impair intrinsic safety. AVERTISSEMENT: La substitution de composant peut compromettre la securite intrinseque.

Important: For detailed certification information, refer to the FLEX Ex System Certification Reference Manual, publication 1797-6.5.6.

Attention: Avoid electrostatic charge.

Notes:

Notes:

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