Installation Instructions

FLEX Ex 8 Output and HART Analog Modules

Catalog Numbers 1797-OE8, 1797-OE8H

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Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (Publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://literature.rockwellautomation.com) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual we use notes to make you aware of safety considerations.

WARNING	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
ATTENTION	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you: identify a hazard, avoid a hazard, and recognize the consequence
SHOCK HAZARD	Labels may be located on or inside the equipment to alert people that dangerous voltage may be present.
BURN HAZARD	Labels may be located on or inside the equipment to alert people that surfaces may be dangerous temperatures.

Environment and Enclosure

ATTENTION

This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC 60664-1), at altitudes up to 2000 m (6562 ft) without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR 11. Without appropriate precautions, there may be difficulties with electromagnetic compatibility in residential and other environments due to conducted and radiated disturbances.

This equipment is supplied as open-type equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The enclosure must have suitable flame-retardant properties to prevent or minimize the spread of flame, complying with a flame spread rating of 5VA, V2, V1, V0 (or equivalent) if non-metallic. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

In addition to this publication, see:

- Industrial Automation Wiring and Grounding Guidelines, for additional installation requirements, Allen-Bradley publication 1770-4.1.
- NEMA Standards 250 and IEC 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure.

ATTENTION

This product is grounded through the DIN rail to chassis ground. Use zinc plated yellow-chromate steel DIN rail to assure proper grounding. The use of other DIN rail materials (for example, aluminum or plastic) that can corrode, oxidize, or are poor conductors, can result in improper or intermittent grounding. Secure DIN rail to mounting surface approximately every 200 mm (7.8 in.) and use end-anchors appropriately.

Prevent Electrostatic Discharge

ATTENTION

This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- Use a static-safe workstation, if available.
- Store the equipment in appropriate static-safe packaging when not in use.
- Post a sign near these modules:
  Attention! Avoid electrostatic charging.
  ATENÇÃO! PREVENIR CONTRA O ACÚMULO DE CARGA ELETROSTÁTICA
  For your convenience, a sign that can be cut out and posted is included in this publication.

Removal and Insertion Under Power

WARNING

These modules are designed so you can **remove and insert them under power**. However, take special care when removing or inserting modules 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.
If you insert or remove the terminal base while backplane power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations.
Be sure that power is removed or the area is nonhazardous before proceeding.

European Communities (EC) Directive Compliance

If these products have the CE mark they are approved for installation within the European Union and EEA regions. They have been designed and tested to meet the following directives.

EMC Directive

These products are tested to meet the Council Directive 2014/30/EU by applying the following standards:

- EN 61000-6-4:2007, Electromagnetic Compatibility (EMC) - Part 6-4: Generic Standard for Industrial Environments (Class A)
- EN 61000-6-2:2005, Electromagnetic Compatibility (EMC) - Part 6-2: Generic Standards - Immunity for Industrial Environments
- EN 61326-1:2013 (Industrial), Electrical Equipment For Measurement, Control, and Laboratory Use - Industrial EMC Requirements

European Hazardous Location Approval

The following applies to products marked CE Ex II (1)2 G and CE Ex II (1) D

- Are Equipment Group II, Equipment Category (1)2, and comply with the Essential Health and Safety Requirements relating to the design and construction of such equipment given in Annex II to Directive 2014/34/EU. See the EC Declaration of Conformity at http://www.rockwellautomation.com/products/certification for details.
- The type of protection is “Ex ib[ia] IIC T4” and “[Ex iaD]” according to EN 60079-11.
- Comply to Standards EN 60079-0:2006, EN 60079-11:2007, EN 60079-26:2004, EN 61241-0:2006, and EN 61241-11:2006, reference certificate number DMT 00 ATEX E 042 X.

- Are intended for use in areas in which explosive atmospheres caused by gases, vapors, mists, or air are likely to occur occasionally. Such locations correspond to Zone 1 or 2 classification according to ATEX directive 2014/34/EU.

IEC Hazardous Location Approval

The following applies to products with the IECEx certification:

- Are intended for use in areas in which explosive atmospheres caused by gases, vapors, mists, or air are likely to occur only infrequently and for short periods. Such locations correspond to Zone 1 or 2 classification to IEC 60079-0.
- The type of protection is "[Zone 0] Ex ib[ia] IIC T4" according to IEC 60079-11 and "[Ex iaD]" according to IEC 60079-11.
- Comply to Standards IEC 60079-0:2004, IEC 60079-11:2006, IEC 60079-26:2004, IEC 61241-0:2004, and IEC 61241-11:2005, reference IECEx certificate number IECEx BVS 09.0023X.

Special Conditions for Safe Use:

The intrinsically safe circuits (ch0 to ch7) may extend into areas with combustible dust. However it shall be ensured that the apparatus, connected to these intrinsically safe circuits, meet the requirements for category 1D respectively 2D and are marked accordingly.

All the other intrinsically safe circuits may also extend into areas with combustible dust. However it shall be ensured that the apparatus, connected to these intrinsically safe circuits, meet the requirements for category 2D and are marked accordingly.

The module may only be used with the terminal base type 1797-TB3/* or type 1797-TB3S/* (DMT 98 ATEX E012U)

A warning label shall be installed in immediate proximity of these apparatus: **ATTENTION! Avoid electrostatic charging**.

Installation in Zone 1

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

WARNING

These modules cannot be used in an intrinsically safe environment after they have been exposed to nonintrinsically safe signals.

Installation in Zone 22

When the module is installed in Zone 22, the following cabinets must be used: IVK-ISRPI-V16LC; IVK-ISRPI-V8HYW; or IVK-ISRPI-V8LC. These cabinets can be purchased from:

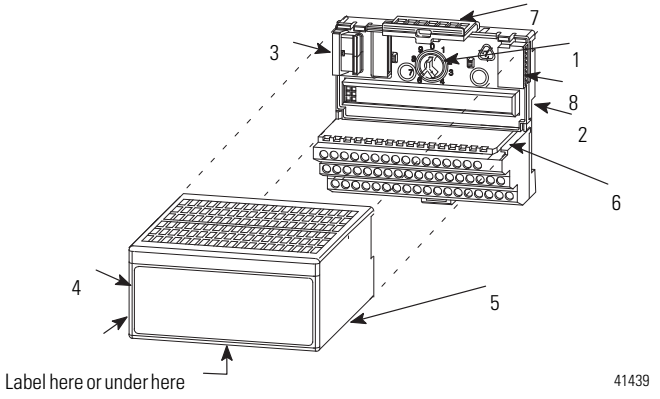
Pepperl+Fuchs GmbH
Konigsberger Allee 85-87, D-68307
Mannheim, Germany
Attn: PA Sales Dept.
Kirsten Becker
Telephone +49 776 1298
www.pepperl-fuchs.com

The IS-RPI cabinets (type IVK2-ISRPI-V8LC, IVK2-ISRPI-V8HYW, or IVK2-ISPRI-V16LC) ensures the basic protection for the intrinsically safe apparatus of the FLEX Ex system for use in Zone 22. It corresponds with category 3D according to RL 94/9 EG and with the type label marked with the following information:

Pepperl+Fuchs GmbH
68307 Mannheim
IVK2-ISRPI-V8LC (or IVK2-ISRPI-V8HYW or IVK2-ISRPI-V16LC)
Ex II 3 D Ex tD A22 IP54 T70 °C
CE
Serial (manufacturing) number
Model year

Install the Module

Read this for information about how to install the module which must be used with a 1797-TB3 or 1797-TB3S intrinsically safe terminal base unit.



ATTENTION

This equipmment is considered Group 1, Class A industrial equipement according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.
This equipment is supplied as open-type equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessiblity to live parts. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional infromation regarding specific enclosure type ratings that are required to comply with certain productsafety certifications.

ATTENTION

During mounting of all devices, be sure that all debris (such as metal chips or wire strands) is kept from falling into the module. Debris that falls into the module could cause damage on power up.

ATTENTION

Do not remove or replace a Terminal Base unit while power is applied. Interruption of the backplane can result in unintentional operation or machine motion.

To install the module on a 1797 terminal base, see the figure and complete the following.

1. Rotate the keyswitch (1) on the terminal base (2) clockwise to position 4 as required for this type of module.

IMPORTANT

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 or adapter.

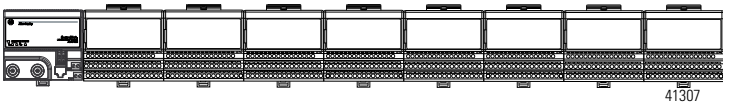
IMPORTANT

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 align properly with the connector in the terminal base.
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, noting that the module is seated when the latching mechanism (7) is locked into the module.
6. Remove cap plug (8) and attach another intrinsically safe terminal base unit to the right of this terminal base unit if required.

IMPORTANT

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.

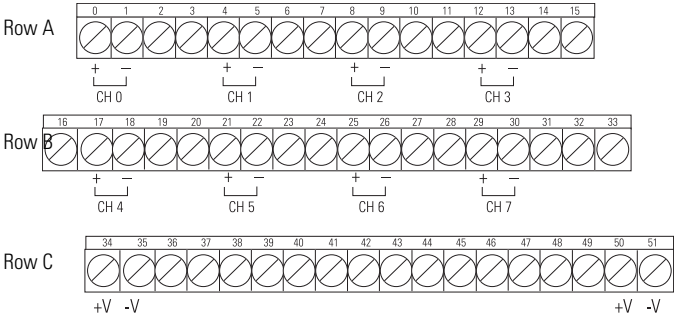


Wire the Module to a 1797-TB3 or 1797-TB3S Terminal Base Unit

WARNING

If you connect or disconnect wiring while the field-side power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

Module Wiring



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, Wire Connections.

1. 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 output as indicated in the table, Wire Connections.

2. Connect +V DC power to terminal 34 on the 34…51 row (C).

3. Connect -V to terminal 35 on the 34…51 row (C).

WARNING

Make certain that you power these modules with an intrinsically safe power supply. Do not exceed the values listed in the specifications for these modules. If you connect or disconnect wiring while the field-side power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

4. 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.

5. 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.

ATTENTION

To reduce susceptibility to noise, power analog modules and digital modules from separate power supplies.

Wire Connections

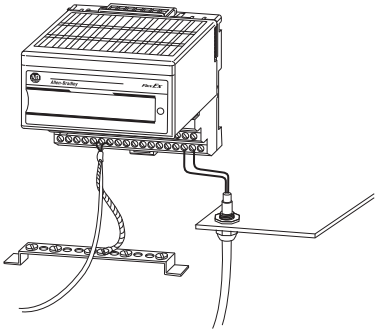
Output	Output +	Output -	Output	Output +	Output -
Output 0	A-0	A-1	Output 4	B-17	B-18
Output 1	A-4	A-5	Output 5	B-21	B-22
Output 2	A-8	A-9	Output 6	B-25	B-26
Output 3	A-12	A-13	Output 7	B-29	B-30
+V	Terminals 34 and 50				
-V	Terminals 35 and 51				

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, or unintended operation of your system, or both.

Ground the Module

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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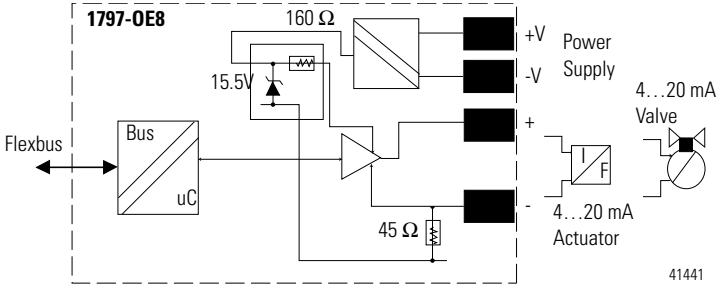
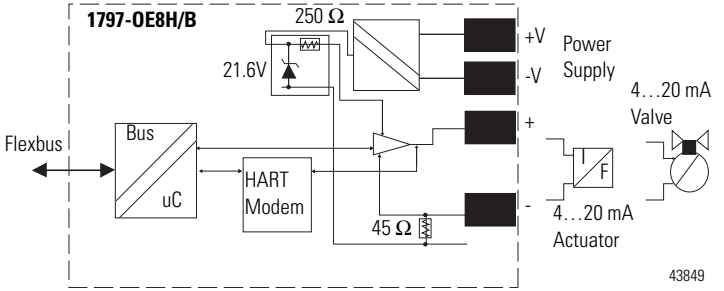
Outputs

Each output channel can operate an analog field device. **Do not apply any nonintrinsically safe signals to these modules.**

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

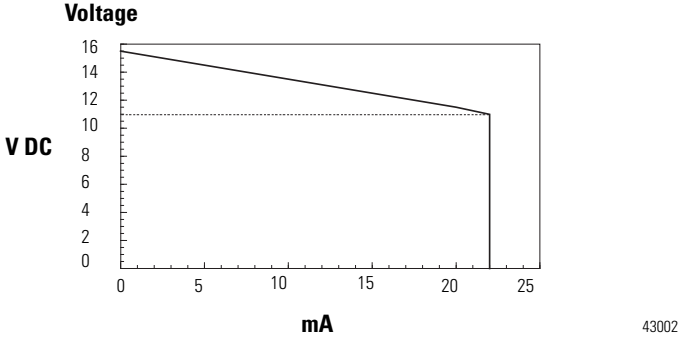
The channels in these modules are electrically connected to each other.



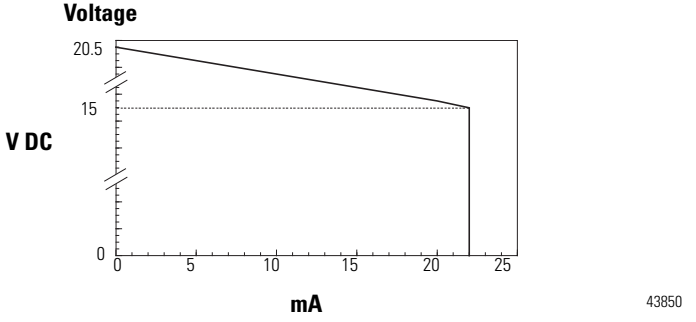


Output Voltage versus Current Capability

Output Voltage versus Current Capability for the 1797-OE8 Module



Output Voltage versus Current Capability for the 1797-OE8H Module



1797-OE8 Input Map (Read Words)

	Bit															
Word	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
0	FA Ch7	FA Ch6	FA Ch5	FA Ch4	FA Ch3	FA Ch2	FA Ch1	FA Ch0	Reserved				Diagnostic Status			
1	Res	Module Command Response							Module Response Data							

Where: Ch = channel
FA = fault
Res = Reserved

1797-OE8H Input Map (Read Words)

	Bit															
Word	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
0	FA Ch7	FA Ch6	FA Ch5	FA Ch4	FA Ch3	FA Ch2	FA Ch1	FA Ch0	HR	Reserved			Diagnostic Status			
1	Reserved															
2	HCF Ch7	HCF Ch6	HCF Ch5	HCF Ch4	HCF Ch3	HCF Ch2	HCF Ch1	HCF Ch0	HF Ch7	HF Ch6	HF Ch5	HF Ch4	HF Ch3	HF Ch2	HF Ch1	HF Ch0
3	HP Ch7	HP Ch6	HP Ch5	HP Ch4	HP Ch3	HP Ch2	HP Ch1	HP Ch0	HC Ch7	HC Ch6	HC Ch5	HC Ch4	HC Ch3	HC Ch2	HC Ch1	HC Ch0

Where: Ch = channel
FA = fault
HR = HART rebuilding
HCF = HART current fault
HF = HART communication fault
HP = HART present
HC = HART communication

1797-OE8 Output Map (Write Words)

	Bit															
Word	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
0	OE	FR	Reserved						DD Ch7	DD Ch6	DD Ch5	DD Ch4	DD Ch3	DD Ch2	DD Ch1	DD 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															
Where:	Res = reserved, Ch = channel DD = digital data, FR = fault reset OE = output enable															

1797-OE8H Output Map (Write Words)

	Bit															
Word	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
0	Res	FR	Reserved						DD Ch7	DD Ch6	DD Ch5	DD Ch4	DD Ch3	DD Ch2	DD Ch1	DD 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															
Where:	Res = reserved, Ch = channel DD = digital data, FR = fault reset															

1797-OE8H Configuration Map

	Bit															
Word	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
0	LFM	VR	FE Ch7	FE Ch6	FE Ch5	FE Ch4	Byte Order Group B		HS LEDs	HSI	FE Ch3	FE Ch2	FE Ch1	FE Ch0	Byte Order Group A	
1	HD Ch7	HD Ch6	HD Ch5	HD Ch4	HD Ch3	HD Ch2	HD Ch1	HD Ch0	HHE Ch7	HHE Ch6	HHE Ch5	HHE Ch4	HHE Ch3	HHE Ch2	HHE Ch1	HHE Ch0
2	Data Format Ch3				Data Format Ch2				Data Format Ch1				Data Format Ch0			
3	Data Format Ch7				Data Format Ch6				Data Format Ch5				Data Format Ch4			
4	HART Read Back Threshold Ch1					FLE Ch1	AFM Ch1		HART Read Back Threshold Ch0					FLE Ch0	AFM Ch0	
5	HART Read Back Threshold Ch3					FLE Ch3	AFM Ch3		HART Read Back Threshold Ch2					FLE Ch2	AFM Ch2	
6	HART Read Back Threshold Ch5					FLE Ch5	AFM Ch5		HART Read Back Threshold Ch4					FLE Ch4	AFM Ch04	
7	HART Read Back Threshold Ch7					FLE Ch7	AFM Ch7		HART Read Back Threshold Ch6					FLE Ch6	AFM Ch06	
8	DF Ch7	DF Ch6	DF Ch5	DF Ch4	DF Ch3	DF Ch2	DF Ch1	DF Ch0	DM Ch7	DM Ch6	DM Ch5	DM Ch4	DM Ch3	DM Ch2	DM Ch1	DM Ch0
9	Fault Value Ch0															
10	Fault Value Ch1															
11	Fault Value Ch2															
12	Fault Value Ch3															
13	Fault Value Ch4															
14	Fault Value Ch5															
15	Fault Value Ch6															
16	Fault Value Ch7															
17	HR Ch7	HR Ch6	HR Ch5	HR Ch4	HR Ch3	HR Ch2	HR Ch1	HR Ch0	HC Ch7	HC Ch6	HC Ch5	HC Ch4	HC Ch3	HC Ch2	HC Ch1	HC Ch0

Where
LFM = local fault mode
FE = fault enable
HHE = HART handheld enable
AFM = analog fault mode
DM = digital mode
HC = HART CMD3 disable
VR = verify replacement
HD = HART disable
FLE = fault latch enabled
DF = digital fault mode
HR = HART rebuild

Data Format - Write Words 2 and 3

Data Format	Bits				Format	Signal Range		User Range		Resolution
	15	14	13	12						
	11	10	9	8						
	7	6	5	4		LO	HI	LO	HI	
	3	2	1	0						
0	0	0	0	0	0…20 mA as Milliamps	0.00	22.00	0 (0.000 mA)	22000 (22.000 mA)	0.1% of 0...20 mA
1	0	0	0	1	0…20 mA as %	0.00	22.00	0 (0%)	11000 (110.00%)	0.2% of 0...20 mA
2	0	0	1	0	Not assigned					
3	0	0	1	1	0…20 mA as unsigned integer	0.00	20.00	0 (0.000 mA)	65535 (22.000 mA)	0.03% of 0...20 mA
4	0	1	0	0	4…20 mA as mA	2.00	22.00	2000 (2.000 mA)	22000 (22.000 mA)	0.01% of 4...20 mA
5	0	1	0	1	Not assigned					
6	0	1	1	0						
7	0	1	1	1	4…20 mA as unsigned integer	4.00	20.00	0 (4 mA)	65535 (20 mA)	0.03% of 4...20 mA
8	1	0	0	0	Not assigned					
9	1	0	0	1						
10	1	0	1	0						
11	1	0	1	1	0...20 mA as D/A count	0.00	22.00	0 (0 mA)	8000 (22 mA)	0.28% of 0...20 mA
12	1	1	0	0	Not assigned					
13	1	1	0	1	4...20 mA as %	3.00	21.00	-625 (-6.25%)	10625 (106.25%)	0.16% of 4...20 mA
14	1	1	1	0	4...20 mA as %	2.00	22.00	-1250 (-12.50%)	11250 (112.50%)	0.16% of 4...20 mA
15	1	1	1	1	Not assigned					

Cyclic HART Input Data

The HART input data holds the primary variables for the "live" HART device, and other information gathered during the normal HART scan. Additional "documentary" data is available through the pass through message interface in the device information tables. Pass through messages are defined in detail in the User Manual.

IMPORTANT The HART Input Data for a channel may be zeroes if HART communications is disabled for that channel. For more information on disabling HART communications, refer to the Disable HART communications and HART CMD 3 Disable functions in the Configuration Map table.

HART Input Data

Word	Bit 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	Reserved								Ch7 (HART Communications Status)	Ch6	Ch5	Ch4	Ch3	Ch2	Ch1	Ch0
1	Reserved															
2	Ch0 HART Field Device Status								Ch0 HART Comm Status							
3	Reserved								Ch0 HART Loop Status							
4	Ch0 HART Primary Value (IEEE 754-1985 Single-Precision 32 bit floating point)															
5																
6	Ch0 HART Secondary Value (IEEE 754-1985 Single-Precision 32 bit floating point)															
7																
8	Ch0 HART Tertiary Value (IEEE 754-1985 Single-Precision 32 bit floating point)															
9																
10	Ch0 HART Fourth (Quaternary) Value (IEEE 754-1985 Single-Precision 32 bit floating point)															
11																
12	Ch0 Secondary Value Units Code								Ch0 Primary Value Units Code							
13	Ch0 Fourth Value Units Code								Ch0 Tertiary Value Units Code							
14	Ch1 HART Field Device Status								Ch1 HART Communication Status							
15	Reserved								Ch1 HART Loop Status							
16	Ch1 HART Primary Value															
17																

HART Input Data

Word	Bit 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
18	Ch1 HART Secondary Value															
19																
20	Ch1 HART Teritiary Value															
21																
22	Ch1 HART Fourth Value															
23																
24	Ch1 HART Secondary Value Units Code								Ch1 HART Primary Value Units Code							
25	Ch1 HART Fourth Value								Ch1 HART Tertiary Value Units Code							
26	Ch2 HART Field Device Status								Ch2 HART Communication Status							
27	Reserved								Ch2 HART Loop Status							
28	Ch2 HART Primary Value															
29																
30	Ch2 HART Secondary Value															
31																
32	Ch 2 HART Tertiary Value															
33																
34	Ch2 HART Fourth Value															
35																
36	Ch2 HART Secondary Value Units Code								Ch2 HART Primary Value Units Code							
37	Ch2 HART Fourth Value								Ch2 HART Tertiary Value Units Code							
38	Ch3 HART Field Device Status								Ch3 HART Communication Status							
39	Reserved								Ch0 HART Loop Status							
40	Ch3 HART Primary Value															
41																
42	Ch3 HART Secondary Value															
43																
44	Ch3 HART Tertiary Value															
45																
46	Ch3 HART Fourth Value															
47																

HART Input Data

Word	Bit 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
48	Ch3 HART Secondary Value Units Code								Ch3 HART Primary Value Units Code							
49	Ch3 HART Fourth Value								Ch3 HART Tertiary Value Units Code							
50	Ch4 HART Field Device Status								Ch4 HART Communication Status							
51	Reserved								Ch4 HART Loop Status							
52	Ch4 HART Primary Value															
53																
54	Ch4 HART Secondary Value															
55																
56	Ch4 HART Tertiary Value															
57																
58	Ch4 HART Fourth Value															
59																
60	Ch4 HART Secondary Value Units Code								Ch4 HART Primary Value Units Code							
61	Ch4 HART Fourth Value								Ch4 HART Tertiary Value Units Code							
62	Ch5 HART Field Device Status								Ch5 HART Communication Status							
63	Reserved								Ch5 HART Loop Status							
64	Ch5 HART Primary Value															
65																
66	Ch5 Secondary Value															
67																
68	Ch5 Tertiary Value															
69																
70	Ch5 Fourth Value															
71																
72	Ch5 HART Secondary Value Units Code								Ch5 HART Primary Value Units Code							
73	Ch5 HART Fourth Value								Ch5 HART Tertiary Value Units Code							
74	Ch6 HART Field Device Status								CH6 HART Communication Status							
75	Reserved								Ch6 HART Loop Status							
76	Ch6 HART Primary Value															
77																

HART Input Data

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
78	Ch6 Secondary Value															
79																
80	Ch6 Tertiary Value															
81																
82	Ch6 Fourth Value															
83																
84	Ch6 HART Secondary Value Units Code								Ch6 HART Primary Value Units Code							
85	Ch6 HART Fourth Value								Ch6 HART Tertiary Value Units Code							
86	Ch7 HART Field Device Status								CH7 HART Communication Status							
87	Reserved								Ch7 HART Loop Status							
88	Ch7 HART Primary Value															
89																
90	Ch7 Secondary Value															
91																
92	Ch7 Tertiary Value															
93																
94	Ch7 Fourth Value															
95																
96	Ch7 HART Secondary Value Units Code								Ch7 HART Primary Value Units Code							
97	Ch7 HART Fourth Value								Ch7 HART Tertiary Value Units Code							

HART Input Data Descriptions

Chn: HART CMD 3 Communication Status	0: HART CMD3 Communication Disabled or No Error	1: HART CMD3 Communication Error between Adapter & Module
Chn: HART Comm Status (HART CMD3 Response first status byte):	Refer to User Manual	
Chn: HART Field Device Status (HART CMD3 Response second status byte):	Refer to User Manual	
Chn: HART Loop Status:		
Bit 0: HART enable	0: Disabled	1: Enabled
Bit 1: Device Connected	0: Not Connected	1: Connected
Bit 2: Response Error	0: No HART message failure	1: Response ended in error
Bit 3: CMD 48 Update	0: CMD 48 not updated	1: CMD 48 updated
Bit 4: HART Loop Tolerance Error	0: No HART Current Fault	1:HART Current Fault
Bit 5: HART Update	0: HART Device information not updated	1: HART Device information updated since last read
Bit 6: HART message	0: No new message	1: HART user message queue has completed a message
Bit 7:		Reserved
Where	PVA = The primary variable for this channel has been acquired. SVA = The secondary variable for this channel has been acquired. TVA = The tertiary variable for this channel has been acquired. FVA = The fourth (quaternary) variable for this channel has been acquired.	

HART Read Back Threshold

HART Read Back	Decimal Value	Bits				
		7	6	5	4	3
		15	14	13	12	11
Disabled	0	0	0	0	0	0
Not applicable[1]	1	0	0	0	0	1
Not applicable	2	0	0	0	1	0
Not applicable	3	0	0	0	1	1
Not applicable	4	0	0	1	0	0
5%	5	0	0	1	0	1
6%	6	0	0	1	1	0
7%	7	0	0	1	1	1
8%	8	0	1	0	0	0
9%	9	0	1	0	0	1
10%	10	0	1	0	1	0
…	…	…	…	…	…	…
30%	30	1	1	1	1	0
31%	31	1	1	1	1	1

(1) 1, 2, 3, and 4 are not applicable. Values between 1 and 4 will lead the IOM to automatically use an internal value of 5%.

1797-OE8 Configuration Map

Config Word	Bit 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	LFM	Res	FM Ch2...3	FM Ch0...1	AFState Ch2...3		AFState Ch0...1		Data Format Ch2...3				Data Format Ch0...1			
1	LM Ch4...7	LM Ch0...3	FM Ch6...7	FM Ch4...5	AFState Ch6...7		AFState Ch4...5		Data Format Ch6...7				Data Format Ch4...5			
2	DFS Ch7	DFS Ch6	DFS Ch5	DFS Ch4	DFS Ch3	DFS Ch2	DFS Ch1	DFS Ch0	ADM Ch7	ADM Ch6	ADM Ch5	ADM Ch4	ADM Ch3	ADM Ch2	ADM Ch1	ADM Ch0
3	Analog Fault State Value Channel 0															
4	Analog Fault State Value Channel 1															
5	Analog Fault State Value Channel 2															
6	Analog Fault State Value Channel 3															
7	Analog Fault State Value Channel 4															
8	Analog Fault State Value Channel 5															
9	Analog Fault State Value Channel 6															
10	Analog Fault State Value Channel 7															

Where: LFM = Local Fault Mode
FM = Fault Mode
AFState = Analog Fault State
DFS = Digital Fault State
Res = Reserved
Ch = Channel
LM = Latch Mode
ADM = Analog/Digital Mode

The extended configuration data table is accessed (read/write) by using a MSG or CIO instruction. See the table, Field Descriptions on page 28 for more information.

1797-OE8H Extended Configuration Data Table

Config Word	Bit 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	PM Ch7	PM Ch6	PM Ch5	PM Ch4	PM Ch3	PM Ch2	PM Ch1	PM Ch0	SME Ch7	SME Ch6	SME Ch5	SME Ch4	SME Ch3	SME Ch2	SME Ch1	SME Ch0
1	Reserved			HART Read Back Threshold Ch4...7					HS LED	HS Inht	50/60 Hz	HART Read Back Threshold Ch0...3				

Where: Ch = Channel
SME = Secondary Master Enable
HS Inht = HART Status Inhibit
PM = Primary Master Inhibit
HS LED = HART Status LEDs

The SME and PMI bits control a few module internal functions individually for channels 0…7.

1797-OE8H Secondary Master Enable (SME)/ Primary Master Inhibit (PMI)

	Bits[1]	1 (Default)	2	3	4
PMI	8, 9, 10, 11, 12, 13, 14, 15	0	0	1	1
SME	0, 1, 2, 3, 4, 5, 6, 7	0	1	0	1
HART Smooth Filter		Pulsed	On	Off	On
Rebuild		On	On	Off	Off
HART Read Back		On	On	Off	Off
Primary Master		On	On	Off	Off
Secondary Master		Off	On	Off	On

(1) Where:
Ch 0 - bits 0 and 8; Ch 1 - bits 1 and 9; Ch 2 - bits 2 and 10; Ch 3 - bits 3 and 11; Ch 4 - bits 4 and 12; Ch 5 - bits 5 and 13; Ch 6 - bits 6 and 14; Ch 7 - bits 7 and 15

Field Descriptions

Analog/Digital Output Mode	Selects if the channel acts as a normal analog output or as a switched digital output. Analog Output mode will follow the Analog Data Format selected. Digital Output mode will output 0 mA = OFF, 22 mA = ON if the Fault mode is 0 = disable. Digital Output mode will output 2 mA = OFF, 22 mA = ON if the Fault mode is 1 = wire off fault detection enabled. Range: 0 = normal analog output, 1 = switched digital output.
Analog Output Data	Specifies the value of the analog output data to the module. Specific format is controlled by Module Data Format Control parameter. This data is used when the channel is in Analog Output mode.
Digital Output Data	Specifies the value of the digital output data to the module. This data is used when the channel is in digital output mode. Range: 0 = output, 0 mA = OFF, 1 = 22 mA = ON if the Fault mode is 0 = disable. 0 = output, 2 mA = OFF, 1 = 22 mA = ON if the Fault mode is 1 = wire-off fault detection enabled.
Global Reset	This bit acts to reset all outputs to accept normal system output data. It acts in conjunction with the Latch Retry parameter. If any channel faults occur, the Latch Retry parameter can be set to cause the fault to be latched and the output to go to its safe state value. This is an edge-triggered signal. It must first be set (1). Reset will then occur on the set-to-reset transition.
Output Enable	Signals module that communications has been interrupted to the network. Output modules should execute their fault routine or go to safe state. On power-up, the module remains OFF, 0 mA out. After normal power-up, this bit must be set (1) by the user program to begin normal module functioning. If the bit is reset to 0 by a communication fault, the module should use the information contained in the Module Safe State data until the value is set to 1, when normal function continues.
Analog Fault State	Determines how module reacts to faults when channel is used in Analog Normal mode. Range: 0 = go to minimum value of data range, 1 = go to maximum value of data range, 2 = hold last state, 3 = 50% of data range (1797-OE8) or use analog fault state value (1797-OE8H).

Field Descriptions

Analog Fault State Value	Specifies the fault state value of the analog output data to the module. Specific format is controlled by Module Data Format Control parameter. This data is used when the channel is in Analog Output mode and the analog fault state is configured to use analog fault state value.
Digital Fault State	Determines how module reacts to faults when channel is used in digital mode. Range: 0 = reset, 1 = hold last state.
Fault Mode	Selects whether the channel pair fault detection is enabled or disabled. There is a 100 Hz (10 ms) filter for wire-off/lead-break detection. Range: 0 = disable, 1 = wire-off fault detection enabled.
Latch Retry Mode	Latch Retry determines channel operation under wire-off fault conditions. These bits control the action of two channel groups - channels 0…3 and channels 4…7. When a channel fault occurs, the channel fault alarm will be set (if enabled) and the safe state mode will be enabled. If retry is selected, the channel will periodically try to reestablish proper output. If latch is selected, the fault will be latched until a Global Reset is issued. Range: 0 = retry, 1 = latch.
Local Fault Mode	This parameter determines how the Module Safe State will be used for bus communication and internal module faults. This parameter sets this characteristic for the module. Range: 0 = fault states activated by bus communication faults, 1 = fault states activated by any failure (for example, bus communications).
Fault Alarm (8 or 1 Bit Each)	Alarm signal for open wire channel fault, detected at < 2 mA. This alarm is disabled when a data format is selected which includes 0 mA. Range: 0 = normal, 1 = wire-off fault detected.
HART Rebuild Flag (1 of 1 Bit) (1797-OE8H)	During the time the system is rebuilding the HART table, the HART rebuild flag is set. Range: 0 = normal, 1 = HART rebuilding.

Field Descriptions

HART Read Back (1797-OE8H)	The HART Read Back bits show deviations between the analog measured current value on a loop (by the 1797-OE8H) and the digital (real) current (sensed by the HART device on its own) received by the 1797-OE8H during HART communication in the background. When this bit is set (1), it indicates that HART communications are failing on the associated channel. Range: 0 = normal, 1 = HART communication failure.
HART Communication (1797-OE8H)	Range: 0 = normal, 1 = HART communication is currently occurring.
HART Transmitter List (1797-OE8H)	When this bit is set (1), it indicates that a HART field device was found during the rebuild sequence on the associated channel. Range: 0 = transmitter was not found, 1 = HART transmitter was found.
Extended Configuration (1797-OE8H)	Configuration additions are needed for HART communications. An extended configuration area is provided. This Extended Configuration table is configured by writing a CIO or MSG instruction with the following: Class = 0x7D Instance = Product location on flexbus (Use 1 for the module located next to the adapter.) Attribute = 0x65 Service = Set Attribute Single (0x10). See on page 32.
HART Status Indicators (1797-OE8H)	When this bit is set (1), the indicators are used for HART diagnostic. Indicator behavior changes to show communication on HART. Each status indicator represents a HART loop. Flashing yellow indicates that communication is currently being processed. Solid yellow means that this device is in the transmitter list.

Field Descriptions

HART Status Inhibit (1797-OE8H)	When this bit is set (1), the HART communication status is not shown in the realtime data table. The appropriate areas are cleared with zeroes. Range: 0 = normal, 1 = inhibit HART.
50/60 Hz Filter (1797-OE8H)	Range: 0 = 50 Hz, 1 = 60 Hz.
HART Read Back Threshold (1797-OE8H)	Delivers the percentage value (in steps of 1%) of the threshold for forcing the HART read back indication (input signal deviation HART/Analog) with a 31% maximum deviation. If there is no HART transmitter on the loop or the loop is not in the transmitter list, the function is switched off internally in the I/O module. Range: 0 = disabled, 1…4 = not supported from I/O module (set to 5 internally), 5…31 = percentage threshold data (5…31%).

Cooperative Operation of the ControlNet Ex Adapter and the 1797-OE8 Output Module

The ControlNet Ex adapter (1797-ACNR15) combined with the 1797-OE8 output module provides a two-tier fault state mechanism. It is important to consider and understand the operation of this mechanism when designing your system.

Two sets of programmable fault states are available, one each in the adapter and 1797-OE8 module. This two-tier method is meant to give you a wider fault coverage compared with normal methods.

Adapter Operation with the 1797-OE8 Module

Network Communication Monitoring

The adapter is the primary monitor of network activity. If it detects loss of network communication, it can be configured to:

- continue writing the last valid received data to the module (hold last state).
- apply local module safe states.[1]
- write a programmable fault state value to the module, depending upon the module type.[2]

This mechanism primarily targets fault behavior for loss of network communication.

[1] This selection could be shown as Reset Outputs but its action is Apply Local Module Safe States.

[2] This option is only available in some adapters.

Program Mode Behavior

The adapter also monitors the state of the controlling processor or scanner. Two states can be detected: run mode and program mode (idle).

When program mode is detected, the adapter can be configured to:

- continue writing the last valid received data to the module (hold last state).
- apply local module safe states.[1]
- write a programmable fault state value to the module, depending upon the module type.[2]

1797-OE8 FLEX Ex Output Module Operation

Flexbus Communication Monitoring

The module monitors flexbus communication activity and the state of its Output Enable bit. If it detects loss of flexbus communication activity or the Output Enable bit transitioning to 0, it can be programmed to:

- continue writing the last valid received data to the outputs (hold last state).
- reset the outputs.
- write the local module fault state value to the output, depending upon the module type.

This mechanism primarily targets fault behavior for loss of backplane communication.

(1) This selection could be shown as Reset Outputs but its action is Apply Local Module Safe States.

(2) This option is only available in some adapters.

Power-up State Behavior

The system and modules use the Output Enable bit at system power-up. The power-up state of the Output Enable bit is 0 and must be transitioned to 1 through application program control to initialize activity of a module's outputs.

Before the Output Enable bit is transitioned to 1, module outputs remain off. Once the initial power-up and application-program control transitions the Output Enable bit to 1, and module output activity begins, subsequent transitions of the Output Enable bit by any source will cause the output module to apply the local module fault state.

Cooperative Operation of the Adapter and the 1797-OE8H Output Module

The 1797-OE8H module has more intelligence than the 1797-OE8 module. The ControlNet adapter, the EtherNet adapter, and the FlexLogix controller are aware of this. These adapters convey the Run/Program (Idle) Mode and Communication Fault status directly to the 1797-OE8H module. The 1797-OE8H module monitors this information and determines its own fault state actions according to your configuration. This allows for a more simplified approach to your connections. With regard to the Program Mode Behavior and Network Communication Fault, the 1797-OE8H module can be configured to provide the following:

- Set Analog Output to Minimum Value
- Set Analog Output to Maximum Value
- Hold Last Analog Value
- Go to User Programmable Analog Value
- Set Digital Output to Minimum Value
- Hold Last Digital Value

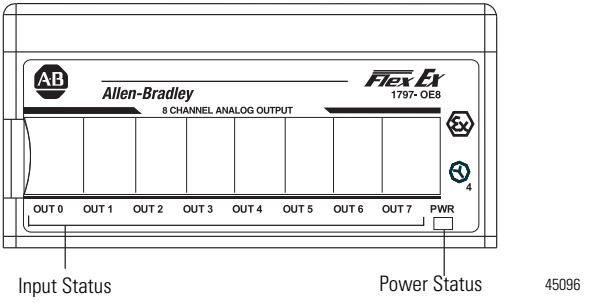
IMPORTANT After the 1797-OE8H module is powered up and prior to it receiving its configuration information from the network, the 1797-OE8H will default its fault states to Set Analog Output to Minimum Value and Set Digital Output to Minimum Value.

Repair

ATTENTION

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

Status Indicators



Interpret the Status Indicators

Status	Description
Flashing red	Channel fault - Channel 0 indicator will turn red while power-up check is running
Solid green	Power applied to module

Specifications

Specifications - 1797-OE8	
Number of Outputs	8 single-ended, nonisolated
IS input type	Ex ia IIB/IIC T4 AEx ia IIC T4 Class I, II, III Division 1 Group A-G T4

IS module type	Ex ib IIB/IIC T4 AEx ib IIC T4 Class I, II, III Division 1 Groups A-D T4
Resolution	13 bit
Transfer Characteristics Accuracy at 20 °C (68 °F) Temperature Drift	 0.1% of output signal range 0.010%/°C of output signal range
Load Range Current Voltage Available at 22 mA Load	 0…22 mA >11V 0…500 Ω @ 22 mA
Data Format	Configurable
Step Response to 99% of FS	4 ms
Module from Adapter Best/Worst Update Time	200 ms/1600 µs
Indicators	8 red fault indicators 1 green power
Output Ch0…Ch 7 (Intrinsically Safe) (Terminals: 0…1; 4…5; 8…9; 12…13; 17…18; 21…22; 25…26; 29…30)	$U_o \leq 21V$ $I_o \leq 100$ mA $P_o \leq 520$ mW
Isolation Path Output to Power Supply Output to Flexbus Output to Output Power Supply to Flexbus	Isolation Type Galvanic to DIN EN60079-11 Galvanic to DIN EN60079-11 None Galvanic to DIN EN60079-11
Power Supply (+V, -V Intrinsically Safe) (Terminals: 34/50 (+); 35/51 (-))	$U_i \leq 9.5V$ dc $I_i \leq 1$ A L_i = Negligible C_i = Negligible
Module Field-side Power Consumption	6.3 W
Power Dissipation	5.4 W
Thermal Dissipation	18.4 BTU/hr
Module Location	Cat. No. 1797-TB3 or 1797-TB3S Terminal Base Unit
Conductors Wire Size	4 mm^2 (12 gauge) stranded max 1.2 mm (3/64 in.) insulation max
Dimensions Metric Imperial	46 mm x 94 mm x 75 mm (1.8 in. x 3.7 in. x 2.95 in.)

Weight	200 g (approximately)
Keyswitch Position	4
Environmental Conditions	
Operational Temperature	-20…+70 °C (-4…+158 °F)
Storage Temperature	-40…+85 °C (-40…+185 °F)
Relative Humidity	5…95% noncondensing
Shock Operating	Tested to 15 g peak acceleration, 11(+1) ms pulse width
Nonoperating	Tested to 15 g peak acceleration, 11(+1) ms pulse width
Vibration	Tested 2 g @ 10…500 Hz per IEC68-2-6
Agency Certification	
CENELEC	II (1) 2G Ex ib[ia] IIC T4 II (1) D [Ex iaD]
UL, C-UL	Class I, Groups A, B, C and D; Class II, Groups E, F and G; Class III Hazardous Locations Class I, Zone 1, AEx ib[ia] IIC T4
FM	Intrinsically safe Class I, Div 1, Groups A, B, C, D, T4. Associated Apparatus with intrinsically safe Connections Class I, II, III, Div 1, Groups A--G Intrinsically safe Class I, Zone 1, AEx ib[ia] IIC T4.
IECEx	[Zone 0] Ex ib[ia] IIC T4 [Ex iaD]
INMETRO	BR-Ex ia/ib IIB/IIC T4

Certificates	
CENELEC	DMT 00 ATEX E 042 X
UL, C-UL	File No.: E197983
	Class I Division 1 Hazardous
FM	FM Certificate Number 3009806
IECEx	IECEx BVS 09.0023X
INMETRO	05/UL-BRAE-0017X

Specifications - 1797-OE8H	
Number of Outputs	8 single-ended, non-isolated
IS Input type	Ex ia IIB/IIC T4 AEx ia IIC T4 Class I, Division I Groups A-G T4 (FM only)
IS Module type	Ex ib IIB/IIC T4 AEx ib IIC T4 Class I, Division I Groups A-D T4 (FM only)
Resolution	13 bits
Transfer Characteristics Accuracy at 20 °C (68 °F) Temperature Drift	 0.1% of output signal range 0.010%/°C of output signal range
Load Range Current Voltage Available at 22 mA Load	 0…22 mA > 15V 0…680 Ω @ 22 mA, 0…770 Ω @ 20 mA
Data Format	Configurable
Step Response to 99% of FS	4 ms
Module from Adapter Best/Worst Update Time	200 ms/1600 µs
Indicators	8 red fault indicators 1 green power 8 yellow HART comm indicators
Output Ch0…Ch 7 (Intrinsically Safe) (Terminals: 0…1; 4…5; 8…9; 12…13; 17…18; 21…22; 25…26; 29…30)	$U_0 \leq 21.6V$ $I_0 \leq 92$ mA $P_0 \leq 500$ mW
Isolation Path Output to Power Supply Output to Flexbus Output to Output Power Supply to Flexbus	Isolation Type Galvanic to DIN EN60079-11 Galvanic to DIN EN60079-11 None Galvanic to DIN EN60079-11
Power Supply (+V, -V Intrinsically Safe) (Terminals: 34 and 50 (+); 35 and 51 (-))	$U_i \leq 9.5V$ dc $I_i \leq 1$ A L_i = Negligible C_i = 120 nF
Module Field-side Power Consumption	6.1 W
Power Dissipation	5.4 W

Thermal Dissipation	20.8 BTU/hr
Module Location	Cat. No. 1797-TB3 or 1797-TB3S Terminal Base Unit
Conductors Wire Size	4 mm^2 (12 gauge) stranded max 1.2 mm (3/64 in.) insulation max
Dimensions Metric Imperial	46 mm x 94 mm x 75 mm (1.8 in. x 3.7 in. x 2.95 in.)
Weight	200 g (approximately)
Keyswitch Position	4
Environmental Conditions	
Operational Temperature	-20…+70 °C (-4…+158 °F)
Storage Temperature	-40…+85 °C (-40…+185 °F)
Relative Humidity	5…95% noncondensing
ShockOperating	Tested to 15 g peak acceleration, 11(+1) ms pulse width
Nonoperating	Tested to 15 g peak acceleration, 11(+1) ms pulse width
Vibration	Tested 2 g @ 10…500 Hz per IEC68-2-6
Agency Certification	
CENELEC	II (1) 2G Ex ib[ia] IIC T4 II (1) D [Ex iaD]
FM	Intrinsically safe Class I, Div 1, Groups A, B, C, D, T4. Associated Apparatus with intrinsically safe Connection Class I, II, III, Div 1, Groups A--G Intrinsically safe Class I, Zone 1, AEx ib[ia] IIC T4.
IECEx	II (1) 2G Ex ib[ia] IIC T4 II (1) D [Ex iaD]
Certificates	
CENELEC	DMT 00 ATEX E 042 X
FM	FM Certificate Number 3009806
IECEx	IECEx BVS 09.0023X

Entity Parameters

CE, CENELEC I/O Entity Parameters (1797-OE8)

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

	Protection	Group	Allowed Capacitance	Allowed Inductance
U_0 = 21V I_0 = 100 mA P_0 = 520 mW	EEx ia	IIB	1.27 µF	8 mH
		IIC	188 nF	2 mH
If concentrated capacitance and/or inductance are available, use the following values.	EEx ia	IIB	295 nF	10 mH
		IIC	70 nF	2 mH

CE, CENELEC I/O Entity Parameters (1797-OE8H)

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

	Protection	Group	Allowed Capacitance	Allowed Capacitance	Internal Capacitance	Internal Inductance
U_0 = 21.6V I_0 = 92 mA P_0 = 500 mW	EEx ia	IIB	1.18 µF	1.18 µF	10 nF	0 mH
		IIC	164 nF	164 nF	10 nF	0 mH

UL, C-UL I/O Entity Parameters (1797-OE8 Only)

If this product has the UL/C-UL mark, it has been designed, evaluated, tested, and certified to meet the following standards:

- UL 913, 1988, Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III Division 1, Hazardous (Classified) Locations

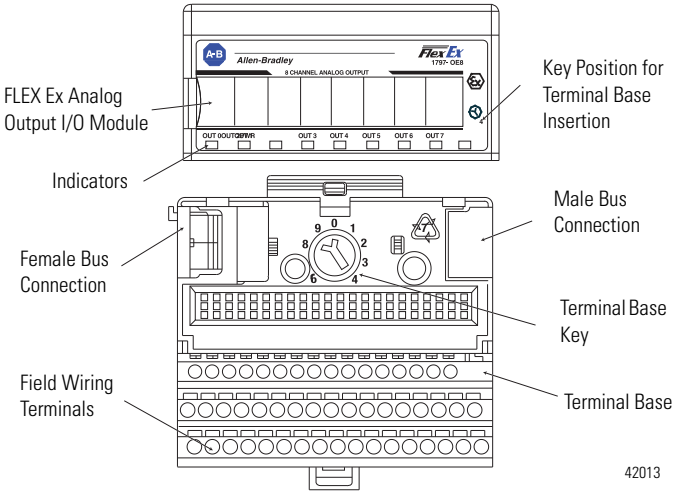
- UL 1203, Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
- UL 2279, Electrical Equipment for Use in Class I, Zone 0, 1, and 2 Hazardous (Classified) Locations
- UL 61010, UL Standard for Safety Electrical Equipment For Measurement, Control, and Laboratory Use; Part 1: General Requirements
- CSA C22.2 No. 157-92, Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations
- CSA C22.2 No. 30-M1986, Explosion-Proof Enclosures for Use in Class I Hazardous Locations
- CSA-E79-0-95, Electrical Apparatus for Explosive Gas Atmospheres, Part 0: General Requirements
- CSA-E79-11-95, Electrical Apparatus for Explosive Gas Atmospheres, Part 11: Intrinsic Safety "i"
- CSA C22.2 No. 14-95, Industrial Control Equipment

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 (for example, ch0)	0(+), 1(-)	21.0	100.0	-	-	A, B, IIC	0.08	2.0
							C, E, IIB	0.24	8.0
							D, F, G, IIA	0.64	16.0



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

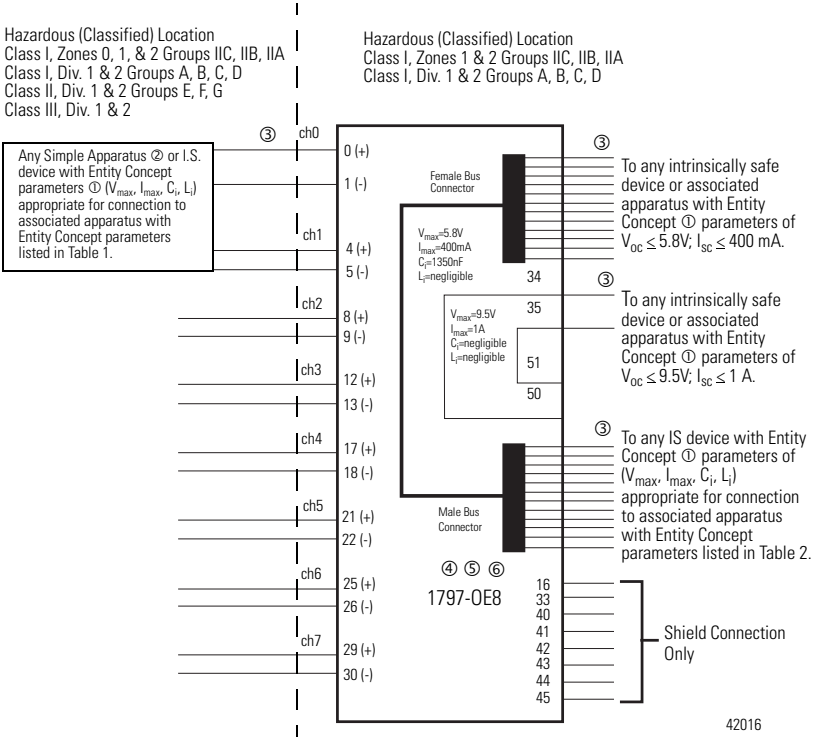

Hazardous (Classified) Location
Class I, Zones 0, 1, & 2 Groups IIC, IIB, IIA
Class I, Div. 1 & 2 Groups A, B, C, D
Class II, Div. 1 & 2 Groups E, F, G
Class III, Div. 1 & 2
Hazardous (Classified) Location
Class I, Zones 1 & 2 Groups IIC, IIB, IIA
Class I, Div. 1 & 2 Groups A, B, C, D
Any Simple Apparatus ② or I.S. device with Entity Concept parameters ① (V_{max}, I_{max}, C_i, L_i) appropriate for connection to associated apparatus with Entity Concept parameters listed in Table 1.
③
ch0
0 (+)
1 (-)
ch1
4 (+)
5 (-)
ch2
8 (+)
9 (-)
ch3
12 (+)
13 (-)
ch4
17 (+)
18 (-)
ch5
21 (+)
22 (-)
ch6
25 (+)
26 (-)
ch7
29 (+)
30 (-)
Female Bus Connector
V_{max}=5.8V
I_{max}=400mA
C_i=1350nF
L_i=negligible
34
35
V_{max}=9.5V
I_{max}=1A
C_i=negligible
L_i=negligible
51
50
Male Bus Connector
④ ⑤ ⑥
1797-OE8
16
33
40
41
42
43
44
45
③
To any intrinsically safe device or associated apparatus with Entity Concept ① parameters of $V_{oc} \leq 5.8V$; $I_{sc} \leq 400$ mA.
③
To any intrinsically safe device or associated apparatus with Entity Concept ① parameters of $V_{oc} \leq 9.5V$; $I_{sc} \leq 1$ A.
③
To any IS device with Entity Concept ① parameters of (V_{max}, I_{max}, C_i, L_i) appropriate for connection to associated apparatus with Entity Concept parameters listed in Table 2.
Shield Connection Only
42016

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, 0.1 A, 20 μJ, or 25 mW.

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 to 39, and 46 to 49 shall not be connected.

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

FM I/O Entity Parameters

If this product has the FM mark, it has been designed, evaluated, tested, and certified to meet the following standards:

- FM C1. No.3600:1998, Electrical Equipment for Use in Hazardous (Classified) Locations General Requirements
- FM C1. No.3610:1999, Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III Division 1 Hazardous (Classified) Locations
- FM C1. No.3615:1989, Explosionproof Electrical Equipment General Requirements
- FM C1. No.3810:1989, 1995, Electrical and Electronic Test, Measuring and Process Control Equipment
- ANSI/NEMA 250, 1991, Enclosures for Electrical Equipment

Wiring Methods

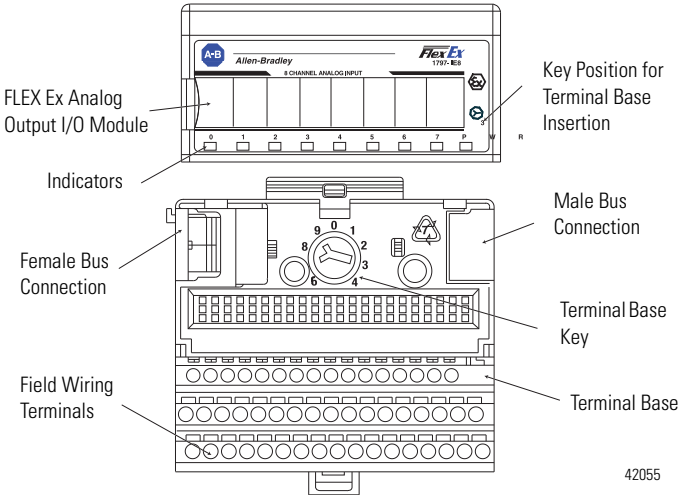
- Wiring method 1 - Each channel is wired separately.
- Wiring method 2 - Multiple channels in one cable, providing each channel is separated in accordance with the National Electric Code (NEC).

FM I/O Entity Parameters for 1797-OE8

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 (for example, ch0)	0(+), 1(sig)	21.0	100.0	-	-	A, B	0.20	3.5
							C, E	0.60	10.5
							D, F, G	1.60	28.0

FM I/O Entity Parameters for 1797-OE8H

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 (for example, ch0)	0(+), 1(sig)	21.6	92	-	-	A, B	0.164	3.5
							C, E	0.49	10.5
							D, F, G	1.31	28.0



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

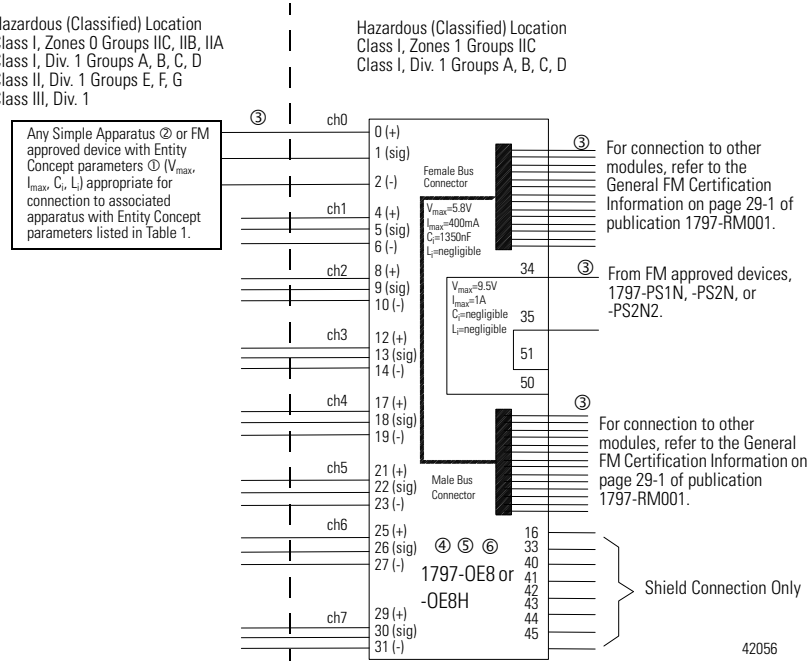


Table 2

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

Table 3: Flexbus Entity Values for this Module

Any combination of up to eight FLEX Ex I/O modules may be attached on a flexbus.

Terminals	V_{max} (V)	I_{max} (mA)	Groups	C_i (µF)	L_i (µH)
Female Bus Connector	5.8	400	A to D	1.35	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. The internal capacitances Ci of the terminal base must be taken into account to verify the intrinsic safety.

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

③ Wiring methods must be in accordance with the National Electric Code, ANSI/NFPA 70, Article 504 and 505. For additional information refer to ANSI/ISA RP12.6.

④ This module, 1797-OE8 or 1797-OE8H, 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 to 39, and 46 to 49 shall not be connected.

⑥ **WARNING:** Substitution of components may impair intrinsic safety.

IMPORTANT For detailed certification information, refer to the FLEX Ex System Certification Reference Manual, publication 1797-RM001.

Attention: Avoid electrostatic charging.
ATENÇÃO! PREVENIR CONTRA O ACÚMULO DE CARGA ELETROSTÁTICA.

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For an additional level of technical phone support for installation, configuration, and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://support.rockwellautomation.com.

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United States	1.440.646.3434 Monday – Friday, 8 a.m. – 5 p.m. EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

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Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

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Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

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www.rockwellautomation.com

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