

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.

| | |
|--|--|
| <p>WARNING</p>  | <p>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.</p> |
| <p>IMPORTANT</p> | <p>Identifies information that is critical for successful application and understanding of the product.</p> |
| <p>ATTENTION</p>  | <p>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</p> |
| <p>SHOCK HAZARD</p>  | <p>Labels may be located on or inside the equipment to alert people that dangerous voltage may be present.</p> |
| <p>BURN HAZARD</p>  | <p>Labels may be located on or inside the equipment to alert people that surfaces may be dangerous temperatures.</p> |

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:

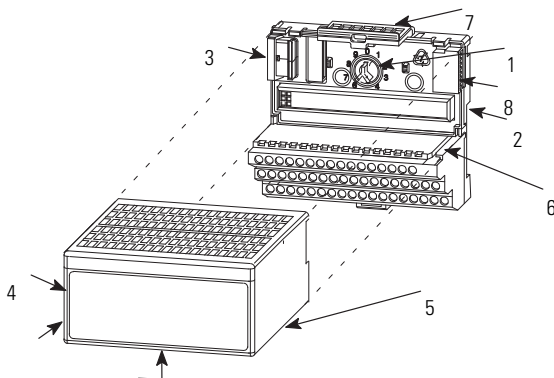
Pepperl+Fuchs GmbH
Königsberger Allee 85-87, D-68307
Mannheim, Germany
Attn: PA Sales Dept.
Kirsten Becker
Telephone +49 776 1298
www.pepperl-fuchs.com

The IS-RPI cabinets (type IVK2-ISRPI-V8LC, IVK2-ISRPI-V8HYW, or IVK2-ISRPI-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)
⊕ 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.



Label here or under here

41439

ATTENTION



This equipment is considered Group 1, Class A industrial equipment 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 accessibility 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 information 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.

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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.
-

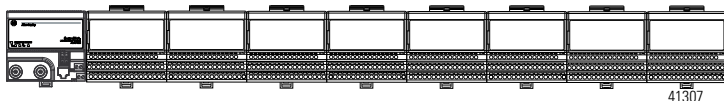
IMPORTANT

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.



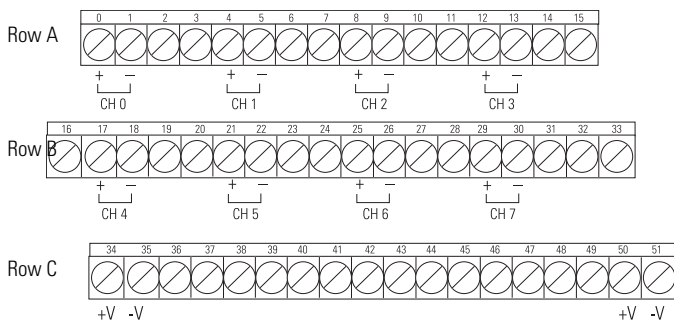
Wire the Module to a 1797-TB3 or 1797-TB3S Terminal Base Unit

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.

41440B

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](#).

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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 | | | | |

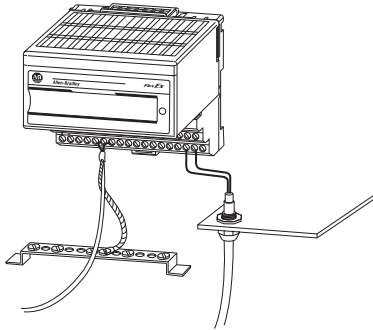
ATTENTION



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.



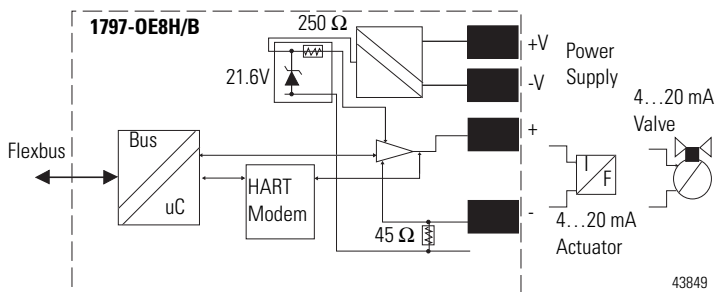
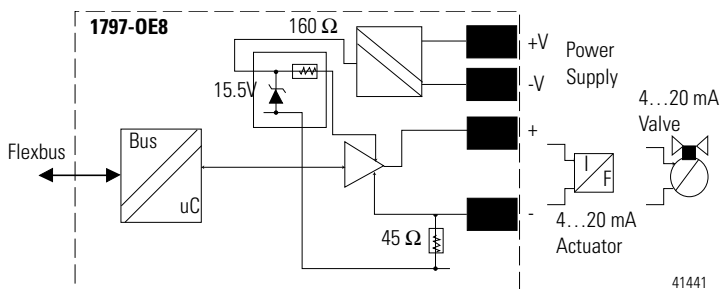
44862

Outputs

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

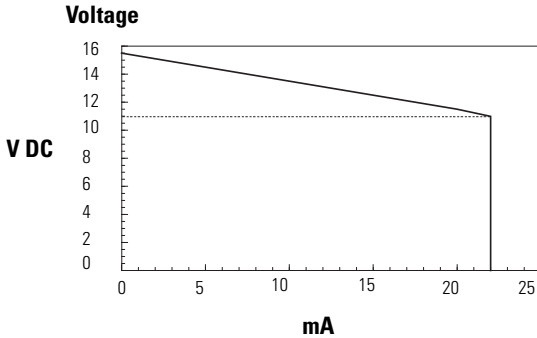
When using an intrinsically safe electrical apparatus according to EN50020, the European Community directives and regulations must be followed.

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



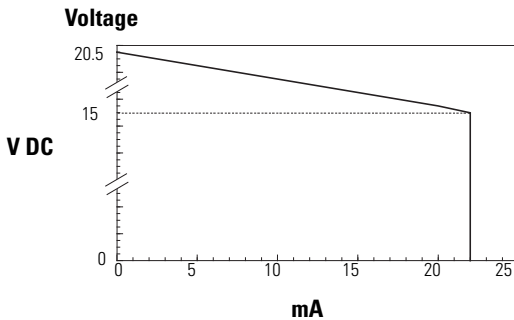
Output Voltage versus Current Capability

Output Voltage versus Current Capability for the 1797-OE8 Module



43002

Output Voltage versus Current Capability for the 1797-OE8H Module



43850

1797-0E8 Input Map (Read Words)

| Word | Bit | | | | | | | | | | | | | | | |
|------|-----------|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|----------------------|---|---|---|-------------------|---|---|---|
| | 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

1797-0E8H Input Map (Read Words)

| Word | Bit | | | | | | | | | | | | | | | | |
|------|------------|------------|------------|------------|------------|------------|------------|------------|-----------|-----------|-----------|-----------|-----------|-------------------|-----------|-----------|--|
| | 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)

| Word | Bit | | | | | | | | | | | | | | | | |
|------|-----------------------|----|----------|----|----|----|---|-----|-----|-----|-----|-----|-----|-----|-----|----|----|
| | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
| 0 | OE | FR | Reserved | | | | | | DD | DD | DD | DD | DD | DD | DD | DD | DD |
| | | | | | | | | Ch7 | Ch6 | Ch5 | Ch4 | Ch3 | Ch2 | Ch1 | 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)

| Word | Bit | | | | | | | | | | | | | | | | |
|------|-----------------------|----|----------|----|----|----|---|-----|-----|-----|-----|-----|-----|-----|-----|----|----|
| | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
| 0 | Res | FR | Reserved | | | | | | DD | DD | DD | DD | DD | DD | DD | DD | DD |
| | | | | | | | | Ch7 | Ch6 | Ch5 | Ch4 | Ch3 | Ch2 | Ch1 | 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

| Word | Bit | | | | | | | | | | | | | | | |
|------|---------------------------------|-----------|-----------|-----------|-----------------|------------|--------------------------|---------------------------------|-----------------|------------|------------|------------|-----------------|-------------|--------------------------|------------|
| | 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 | | LO | HI | LO | HI | |
| | 11 | 10 | 9 | 8 | | | | | | |
| | 7 | 6 | 5 | 4 | | | | | | |
| 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 | Not assigned | | | | | |
| 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 | Not assigned | | | | | |
| 10 | 1 | 0 | 1 | 0 | Not assigned | | | | | |
| 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 | Ch6 | Ch5 | Ch4 | Ch3 | Ch2 | Ch1 | Ch0 (HART Communications Status) |
| 1 | Reserved | | | | | | | | | | | | | | | |
| 2 | Ch0 HART Field Device Status | | | | | | | | Ch0 HART Comm Status | | | | | | | |
| 3 | Reserved | | | | | | | | Ch0 HART Loop Status | | | | | | | |
| 4 | Ch0 HART Primary Value | | | | | | | | | | | | | | | |
| 5 | (IEEE 754-1985 Single-Precision 32 bit floating point) | | | | | | | | | | | | | | | |
| 6 | Ch0 HART Secondary Value | | | | | | | | | | | | | | | |
| 7 | (IEEE 754-1985 Single-Precision 32 bit floating point) | | | | | | | | | | | | | | | |
| 8 | Ch0 HART Tertiary Value | | | | | | | | | | | | | | | |
| 9 | (IEEE 754-1985 Single-Precision 32 bit floating point) | | | | | | | | | | | | | | | |
| 10 | Ch0 HART Fourth (Quaternary) Value | | | | | | | | | | | | | | | |
| 11 | (IEEE 754-1985 Single-Precision 32 bit floating point) | | | | | | | | | | | | | | | |
| 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 Tertiary 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 Bit | | | | | | | | | | | | | | | | |
|------------|------------------------------------|---------------|---------------|---------------|--------------------|--------------------|------------------------|------------|----------------|----------------|------------------------|----------------|----------------|----------------|----------------|----------------|
| Word | 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 | AD M Ch7 | AD M Ch6 | AD M Ch5 | AD M Ch4 | AD M Ch3 | AD M Ch2 | AD M Ch1 | AD M 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.

1797-0E8H Extended Configuration Data Table

| Config Bit | | | | | | | | | | | | | | | | | |
|------------|-----------|-----------|-----------|-------------------------------------|-----------|-----------|-----------|-----------|------------|-------------|-------------------------------------|------------|------------|------------|------------|------------|--|
| Word | 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

PM = Primary Master Inhibit

SME = Secondary Master Enable

HS LED = HART Status LEDs

HS Inht = HART Status Inhibit

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

1797-0E8H 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 | <p>Selects if the channel acts as a normal analog output or as a switched digital output.</p> <p>Analog Output mode will follow the Analog Data Format selected.</p> <p>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.</p> <p>Range: 0 = normal analog output, 1 = switched digital output.</p> |
| Analog Output Data | <p>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.</p> |
| Digital Output Data | <p>Specifies the value of the digital output data to the module. This data is used when the channel is in digital output mode.</p> <p>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.</p> |
| Global Reset | <p>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.</p> <p>This is an edge-triggered signal. It must first be set (1). Reset will then occur on the set-to-reset transition.</p> |
| Output Enable | <p>Signals module that communications has been interrupted to the network. Output modules should execute their fault routine or go to safe state.</p> <p>On power-up, the module remains OFF, 0 mA out.</p> <p>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.</p> |
| Analog Fault State | <p>Determines how module reacts to faults when channel is used in Analog Normal mode.</p> <p>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 (1797-0E8) or use analog fault state value (1797-0E8H).</p> |

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 List (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.

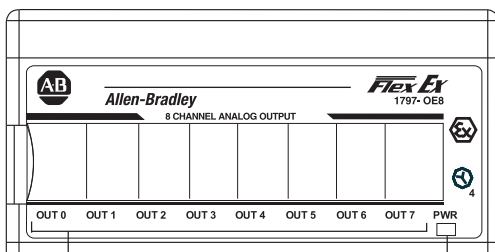
Repair

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



Input Status

Power Status

45096

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 |

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| | |
|--|--|
| 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) | 0.1% of output signal range |
| Temperature Drift | 0.010%/°C of output signal range |
| Load Range | |
| Current | 0...22 mA |
| Voltage Available at 22 mA | >11V |
| Load | 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) | $U_o \leq 21V$ $I_o \leq 100\text{ mA}$ $P_o \leq 520\text{ mW}$ |
| Isolation Path | Isolation Type |
| Output to Power Supply | Galvanic to DIN EN60079-11 |
| Output to Flexbus | Galvanic to DIN EN60079-11 |
| Output to Output | None |
| Power Supply to Flexbus | Galvanic to DIN EN60079-11 |
| Power Supply (+V, -V Intrinsically Safe) (Terminals: 34/50 (+); 35/51 (-)) | $U_i \leq 9.5V\text{ dc}$ $I_i \leq 1\text{ A}$ $L_i = \text{Negligible}$ $C_i = \text{Negligible}$ |
| 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 |
| | 46 mm x 94 mm x 75 mm |
| | Imperial |
| | (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 | Tested to 15 g peak acceleration, 11(+1) ms pulse width |
| Operating | |
| 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 |
| FM | Class I, Zone 1, AEx ib[ia] IIC T4 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 |
| IECEx | Intrinsically safe Class I, Zone 1, AEx ib[ia] IIC T4. [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 - 1797-0E8H

| | |
|--|--|
| 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) | 0.1% of output signal range |
| Temperature Drift | 0.010%/°C of output signal range |
| Load Range | |
| Current | 0...22 mA |
| Voltage Available at 22 mA Load | > 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) | $U_o \leq 21.6V$ $I_o \leq 92 mA$ $P_o \leq 500 mW$ |
| Isolation Path | Isolation Type |
| Output to Power Supply | Galvanic to DIN EN60079-11 |
| Output to Flexbus | Galvanic to DIN EN60079-11 |
| Output to Output | None |
| Power Supply to Flexbus | 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 |

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| | |
|--------------------------|--|
| 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 46 mm x 94 mm x 75 mm Imperial (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

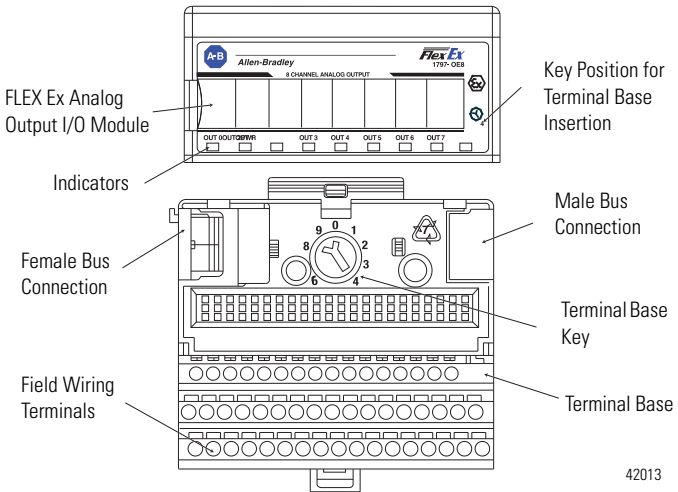
- UL 1203, Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
- UL 2279, Electrical Equipment for Use in Class I, Zone 0, 1, and 2 Hazardous (Classified) Locations
- UL 61010, UL Standard for Safety Electrical Equipment For Measurement, Control, and 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 (μ F) | 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 |



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IMPORTANT

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

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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

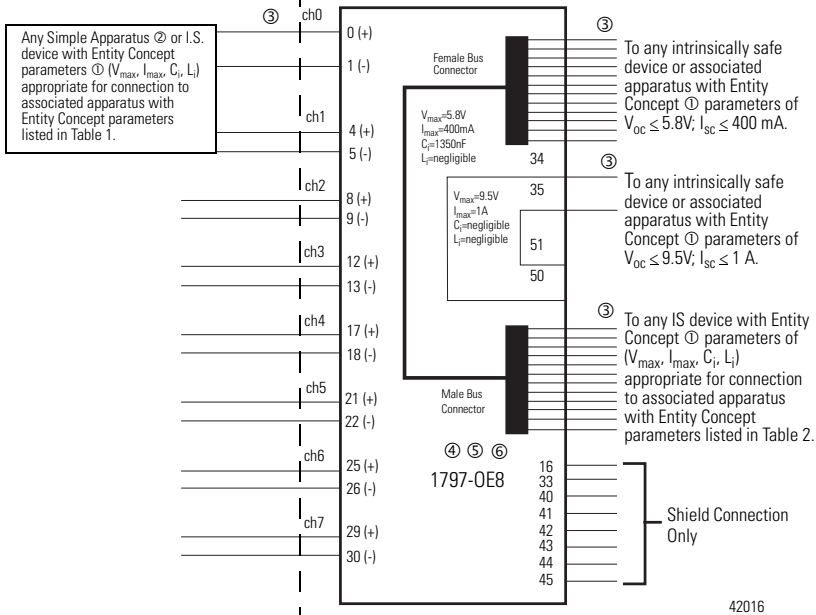


Table 2

| Terminals | V_t (V) | I_t (mA) | Groups | C_a (μ F) | L_a (μ H) |
|--------------------|-----------|------------|--------|------------------|------------------|
| 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 μ J, 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

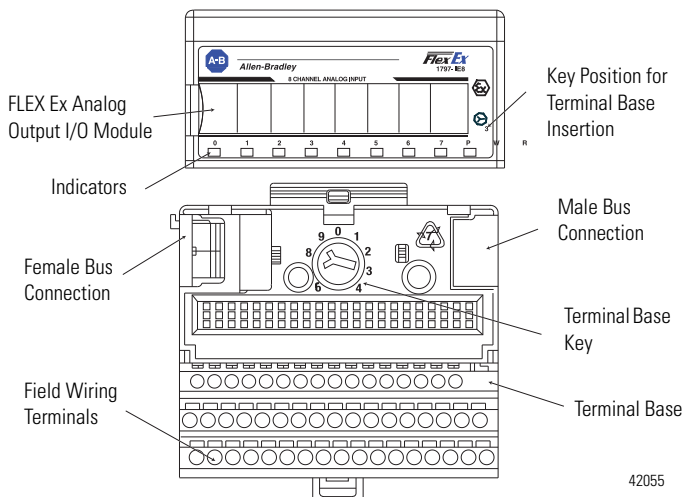
- Wiring method 1 - Each channel is wired separately.
- Wiring method 2 - Multiple channels in one cable, providing each channel is separated in accordance with the National Electric Code (NEC).

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 |



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IMPORTANT

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

Hazardous (Classified) Location
 Class I, Zones 0 Groups IIC, IIB, IIA
 Class I, Div. 1 Groups A, B, C, D
 Class II, Div. 1 Groups E, F, G
 Class III, Div. 1

Hazardous (Classified) Location
 Class I, Zones 1 Groups IIC
 Class I, Div. 1 Groups A, B, C, D

Any Simple Apparatus ② or FM approved 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.

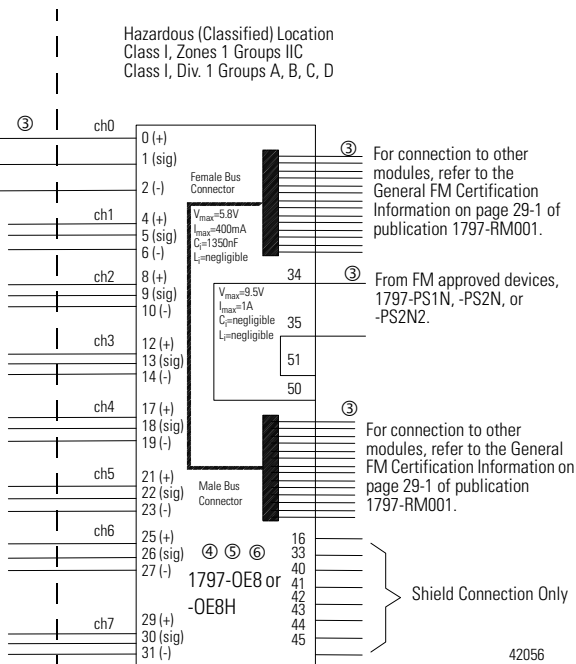


Table 2

| 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 (μ F) | L_i (μ H) |
|----------------------|----------------|-----------------|--------|------------------|------------------|
| 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_i and I_i 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 C_i 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 μ J, 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.**

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At <http://support.rockwellautomation.com>, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

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>.

Installation Assistance

If you experience a problem within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your product up and running.

| | |
|-----------------------|--|
| 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. |

New Product Satisfaction Return

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.

| | |
|-----------------------|---|
| United States | Contact your distributor. You must provide a Customer Support case number (see phone number above to obtain one) to your distributor in order to complete the return process. |
| 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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