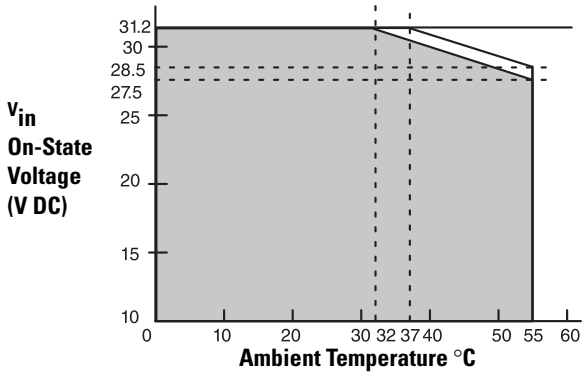
### Digital DC Protected Output Comparison

| Specification | 1794-OB16P, 1794-OB16PXT | 1794-OB8EP, 1794-OB8EPXT | 1794-OB32P | 1794-OV16P |
|---|---|---|---|---|
| Current, on-state output, max | 500 mA per channel, 8 A per module | 2.0 A per channel, 10 A per module | 500 mA per channel, 14 A per module(2) | 500 mA per channel, 8 A per module |
| Leakage current, off-state output, max | 0.5 mA | | | |
| Output surge current, max | 1.5 A for 50 ms, repeatable every 2 s | 4 A for 50 ms, repeatable every 3 s | 2 A for 50 ms, repeatable every 2 s | |
| Output delay time, OFF to ON, max | 0.5 ms | 0.1 ms | 0.5 ms | |
| Output delay time, ON to OFF, max | 1.0 ms | 0.1 ms | 1.0 ms | |
| External DC supply voltage range | 10…31.2V DC (5% AC ripple) | 19.2…31.2V DC (5% AC ripple) | 10…31.2V DC (5% AC ripple) | |
| External DC supply current range | 25…75 mA | 20…35 mA | 103…273 mA | 20…65 mA |
| Power dissipation, max | 5.0 W @ 31.2V DC | 5.5 W @ 31.2V DC | 5.3 W @ 31.2V DC | 4.2 W @ 31.2V DC |
| Thermal dissipation, max | 17.0 BTU/hr @ 31.2V DC | 18.8 BTU/hr @ 31.2V DC | 18.1 BTU/hr @ 31.2V DC | 14.3 BTU/hr @ 31.2V DC |
| Dimensions (HxWxD), approx | 46 x 94 x 53 mm (1.8 x 3.7 x 2.1 in.) 94 x 94 x 69 mm (3.7 x 3.7 x 2.7 in.) installed | | | |
| Isolation voltage | 50V (continuous), Basic Insulation Type Type tested at 2121V DC for 60 s, between field side and system No isolation between individual channels | 50V (continuous), Basic Insulation Type Type tested at 850V DC for 60 s, between field side and system **1794-OB8EPXT:** Type tested at 1500V AC for 60 s, between field side and system No isolation between individual channels | | 50V (continuous), Basic Insulation Type Type tested at 1770V DC for 60 s, between field side and system No isolation between individual channels |

(1) See 1794-OB16P Derating Curve.

(2) 6.0 A total for channels 0…15; 8.0 A total for channels 16…31.

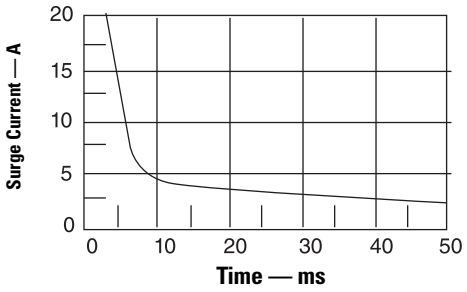
**1794-OB16P Derating Curve**




The area within the curve represents the safe operating range for the module under various conditions of user supplied 24V DC supply voltages and ambient temperatures.

□ = Normal mounting safe operating range ▭ included
▭ = Other mounting positions (including inverted horizontal, vertical) safe operating range

**1794-OB8EP Output Minimum Surge**




## FLEX I/O Digital DC Diagnostic Modules

1794-IB16D is the diagnostic version of the 1794-IB16.

1794-OB16D is the diagnostic version of the 1794-OB16.

The modules can detect open wire, short circuit, and reverse polarity of external power. When the module detects a fault, the module fault LED status indicator lights up, the corresponding red channel LED status indicator lights up, and the corresponding module error bit (open wire, short circuit, or reverse power bit) is set. The reporting function provides results of the diagnostics as bits in its data table.

The modules have 16-bi-color channel LED status indicators and one red module status indicator. These indicators are driven from the customer field side power.

**Digital DC Diagnostic Input Module**

| Specification | 1794-IB16D |
|---|---|
| Voltage, on-state input, min | 10V DC, sinking |
| Voltage, on-state input, nom | 24V DC |
| Voltage, on-state input, max | 31.2 DC(1) |
| Voltage, off-state input, max | 5.0V DC |
| Current, on-state input, nom | 8.2 mA @ 24V DC |
| Current, on-state input, max | 12.1 mA @ 31.2V DC |
| Terminal base unit | 1794-TB32, 1794-TB32S |
| Input impedance, max. | 3.1 kΩ |
| Current, on-state input, min | 2.0 mA @ 10V DC |
| Current, off-state input, max | 1.5 mA |
| Power dissipation, max | 8.5 W @ 31.2V DC |
| Thermal dissipation, max | 29 BTU/hr @ 31.2V DC |
| Detected reverse polarity voltage | 10V min(2) |
| Sensor voltage drop, max | 2.2V DC |

## FLEX I/O Analog, Thermocouple and RTD Modules

Choose analog, thermocouple, or RTD I/O modules when you need:

- **Individually configurable channels** allow the module to be used with a variety of sensors.
- **On-line configuration**. Modules can be configured in RUN mode using programming software or the control program. This allows you to change configuration while the system is operating.
- **Selectable input filters** on many modules allow you to select from several different filter frequencies for each channel that best meets the performance needs of your application. Lower filter settings provide greater noise rejection and resolution. Higher filter settings provide faster performance. *Note: Isolated analog modules have four filter selections; the thermocouple module has ten; and the combined RTD/thermocouple module has eight.*
- **Ability to direct output device operation during an abnormal condition.**
  Each channel of the output module can be individually configured to hold its last value or assume a user-defined value on either a run-to-program or run-to-fault condition. This feature allows you to set the condition of your analog devices, and therefore your control process, which may help to ensure a reliable shutdown.
- **Selectable response to broken input sensor.** This feature provides feedback to the controller that a field device is not connected. This allows you to specify corrective action based on the channel condition.
- **Single-ended or differential inputs depending on module.** Analog modules have single-ended inputs while isolated analog and temperature modules have differential inputs. Single-ended voltage sensors reduce costs. Differential inputs are more expensive, but are typically more noise immune.
- **Over- and under-range detection and indication** are available with most modules. This eliminates the need to test values in the control program. While standard analog modules have limited diagnostics, temperature and isolated analog modules provide over-range, under-range, and wire-off diagnostics with alarm bits.
- **On-board scaling** is performed by the temperature modules and is user configurable for either °C, °F, °K, Ohms, or mV. This eliminates the need to scale the data in the user program.
- **Accuracy and resolution varies by module** and the associated application. Specifications are given for each module at it's operational conditions.
- **Internal calibration is performed** in the analog modules (1794-IE8, 1794-OE4, and 1794-IE4XOE2). User calibration is recommended (yearly) for isolated analog and temperature modules. All modules come factory calibrated.

### Analog I/O Module Summary

| Catalog Number | Inputs | Outputs | Terminal Base Unit | Module Type |
|---|---|---|---|---|
| 1794-IE8 | 8 | — | 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TB3K, 1794-TB3SK, 1794-TB3TK, 1794-TB3TSK | Selectable, non-isolated inputs |
| 1794-IE8XT | | | | Selectable, non-isolated inputs, Extended temperatures |
| 1794-IE8H | | | 1794-TB3G, 1794-TB3GS, 1794-TB3GK, 1794-TB3GSK | Single-ended, non-isolated, HART-enabled inputs |
| 1794-IE12 | 12 | | | Single-ended inputs |
| 1794-IF4I | 4 | — | 1794-TBN, 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TBNK, 1794-TB3K, 1794-TB3SK, 1794-TB3TK, 1794-TB3TSK | Single-ended, isolated inputs |
| 1794-IF4IXT | | | | Single-ended inputs, Isolated, Extended temperatures |
| 1794-IF8IH | 8 | — | 1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK | Single-ended, isolated, HART-enabled inputs |
| 1794-IR8 | | | 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TBKD, 1794-TB3K, 1794-TB3SK, 1794-TB3TK, 1794-TB3TSK | Non-isolated relay inputs |
| 1794-IRT8 | | | 1794-TB3G, 1794-TB3GS, 1794-TB3GK, 1794-TB3GSK | Non-isolated RTD/Thermocouple inputs |
| 1794-IRT8XT | | | | Non-isolated RTD/Thermocouple inputs, Extended temperatures |
| 1794-IT8 | | | 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TB3K, 1794-TB3SK, 1794-TB3TK, 1794-TB3TSK[3] | Non-isolated, Thermocouple, Millivolt inputs |
| 1794-IE4XOE2 | 4 | 2 | | Single-ended, non-isolated I/O |
| 1794-IE4XOE2XT | | | | Single-ended, non-isolated I/O, Extended temperatures |
| 1794-IE8XOE4 | 8 | 4 | 1794-TB3G, 1794-TB3GS, 1794-TB3GK, 1794-TB3GSK | Single-ended, non-isolated I/O |
| 1794-IF2XOF2I | 2 | 2 | 1794-TBN, 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TBNK, 1794-TB3K, 1794-TB3SK, 1794-TB3TK, 1794-TB3TSK | |
| 1794-IF2XOF2IXT | | | | Single-ended, non-isolated I/O, Extended temperatures |
| 1794-OE4 | — | 4 | | Selectable, non-isolated outputs |
| 1794-OE4XT | | | | Selectable, non-isolated outputs, Extended temperatures |
| 1794-OE8H[1] | | 8 | 1794-TB3G, 1794-TB3GS, 1794-TB3GK, 1794-TB3GSK | Single-ended, non-isolated, HART-enabled outputs |
| 1794-OE12[2] | | 12 | | Single-ended, non-isolated outputs |
| 1794-OF4I | | 4 | 1794-TBN, 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TBNK, 1794-TB3K, 1794-TB3SK, 1794-TB3TK, 1794-TB3TSK | Source isolated outputs |
| 1794-OF4IXT | | | | Source isolated outputs, Extended temperatures |
| 1794-OF8IH | | 8 | 1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK | Single-ended, isolated, HART-enabled outputs |

(1) Do not exceed length of 30 m (100 ft) for signal cabling.

(2) Not supported by 1747-SN or 1747-BSN for use on RIO with SLC controllers.

(3) 1794-TB2, 1794-TB3, 1794-TB3S for mV inputs only.

## FLEX I/O Counter Modules

In order to decide which FLEX I/O counter module would best suit your application needs, you should identify the following:

- What type of application the module will be used for
- What field devices, signal levels, and signal type are being connected to the counter module

**Counter Module Comparison**

| Catalog Number | Application | Network Capability | Number of Inputs/ Outputs | External DC Supply Current, Nom | Power Dissipation, Max | Thermal Dissipation, Max |
|---|---|---|---|---|---|---|
| 1794-IJ2<br>1794-IJ2XT | Rational control, including:<br>• turbine generators<br>• motors<br>• drives<br>• gears<br>• shaft | All networks supported by FLEX I/O | 2 Input<br>2 Output | 220 mA @ 19.2V DC<br>180 mA @ 24V DC<br>140 mA @ 31.2V DC | 4.5 W @ 31.2V DC | 15.3 BTU/hr @ 31.2V DC |
| 1794-VHSC | Applications including:<br>• packaging<br>• material handling<br>• flow monitoring<br>• cut-to-length<br>• motor speed control<br>• monitoring | ControlNet:<br>• 1794-ACN15<br>• 1794-ACNR15<br>EtherNet/IP:<br>• 1794-AENT<br>• 1794-AENTR | 2 Input<br>2 Output | 100 mA @ 24V DC(1) | 5W @ 31.2V DC | 17.1 BTU/hr @ 31.2V DC |
| 1794-ID2 | Applications including:<br>• quality counting<br>• positioning<br>• speed calculations | All networks supported by FLEX I/O | 2 Input | 150 mA @ 12V DC<br>75 mA @ 24V DC | 5.0 W @ 26.4V DC | 17.1 BTU/hr @ 26.4V DC |
| 1794-IP4 | Applications including:<br>• counting pulse from flow meters<br>• counting pulse from density meters<br>• quality counting<br>• speed calculations | | 4 Input | | | |

(1) Does not represent power required to supply the inputs or outputs