

MANUFACTURER DOCUMENT PACKAGE

# Manufacturer's Manual

Reference package for procurement and maintenance review

TRICONEX

## 3511

PULSE INPUT MODULE

Selected official pages follow this cover with source pagination retained.

REFERENCE PACKAGE

OFFICIAL MANUFACTURER DOCUMENT

Source: Planning and Installation Guide for Tricon v9-v10 Systems

Assembly 9700077-012

## Pulse Input Modules

This section describes the Pulse Input Modules available for use with Tricon v9–v10 systems. For important operational restrictions, see [Pulse Input Installation and Operation on page 192](#).

**Table 46 Pulse Input Modules**

| Model | Points | Type | Module Description |
|-------|--------|------|--------------------|
| 3510  | 8      | TMR  | Pulse Input        |
| 3511  | 8      | TMR  | Pulse Input        |

Pulse Input Modules provide eight very sensitive, high-frequency inputs, which are used with non-amplified magnetic speed sensors common on rotating equipment such as turbines or compressors. The module senses voltage transitions from magnetic transducer input devices. The transitions are accumulated during a selected window of time (rate measurement), and the resulting count is used to generate a frequency or RPM which is transmitted to the Main Processors. The pulse count is measured to 1 microsecond resolution.

The type of speed sensor typically used with the Pulse Input Module consists of an inductive coil and rotating teeth. The sensor is physically close to the teeth of a gear on the rotating shaft. As the shaft rotates and the teeth move past the sensor, the resulting change in the magnetic field causes a sinusoidal signal to be induced in the sensor. The magnitude of the output voltage depends on how fast the teeth pass the sensor, the distance between the sensor and the teeth, and the construction of the sensor. A typical gear has 30 to 120 teeth spaced at equal distances around its perimeter. The output frequency is proportional to the rotational speed of the shaft and the number of teeth.

### CAUTION

Pulse Input Modules use fully differential, input-signal-conditioning circuitry which are AC-coupled and of high bandwidth. The circuitry is designed for high-frequency operation and is sensitive to any type of waveform distortion which could result in erroneous measurements. The modules count transitions by examining only one edge of each pulse, which means that ringing on the input signal can result in many additional transitions being counted. The module is capable of counting over 20,000 transitions per second.

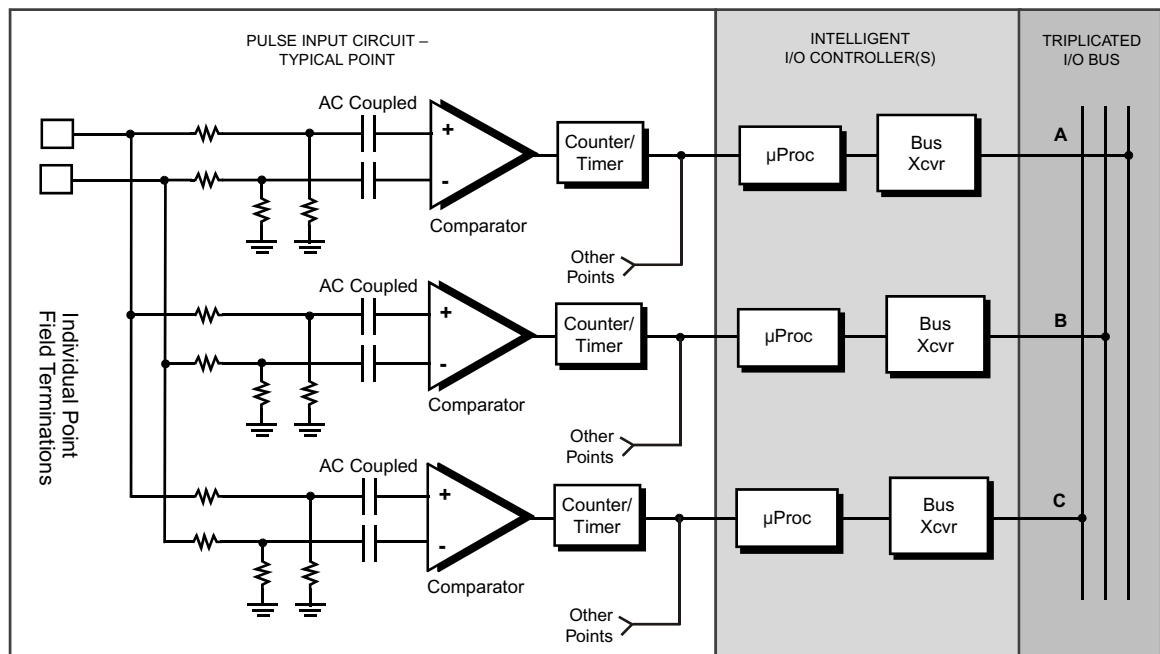
Pulse Input Modules have three isolated input channels. Each input channel independently processes all data input to the module and passes the data to the Main Processors, where it is voted just prior to processing to ensure the highest integrity.

Each module provides complete ongoing diagnostics on each channel. Failure of any diagnostic on any channel activates the module's Fault indicator, which in turn activates the chassis alarm signal. The Fault indicator points to a channel fault, *not* a module failure. The module is guaranteed to operate properly in the presence of a single fault and may continue to operate properly with certain kinds of multiple faults.

Pulse Input Modules include the hot-spare feature and require a separate field termination (a cable interface to a remotely located External Termination Panel). Each Pulse Input Module is mechanically keyed to prevent improper installation in a configured chassis.

## Pulse Input Schematic

This figure is a simplified schematic for models 3510 and 3511, which are Pulse Input Modules.



**Figure 52** 3510 and 3511 Simplified Schematic

Pulse Input Front Panels

This figure shows the front panels of models 3510 and 3511.

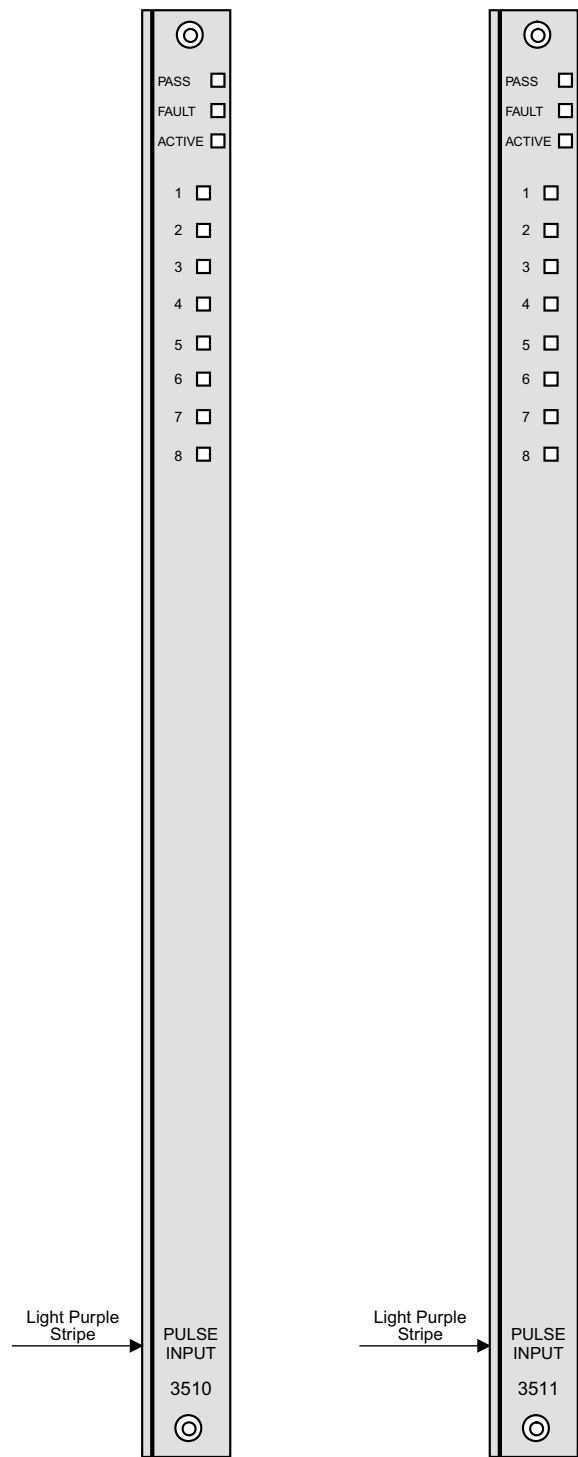


Figure 53 3510 and 3511 Front Panels

### 3511 Specifications

This table lists the specifications for model 3511, which is a Pulse Input Module. Although the input frequency range for the module is 20 to 20,000 hertz, operation below 20 hertz and above 20,000 hertz is possible. For expected accuracy and input sensitivity, contact the IPS Global Client Support (GCS) center.

#### CAUTION

- Rapidly or continuously changing inputs may cause mis-compare readings because the measured values of the three channels may in fact be different by more than 0.5 percent of full scale, which can sometimes cause a fault to be declared in error.
- If the input readings differ by a minimum of 0.5 percent of full scale and continue for a minimum period of 10 input samples, the probability of a fault increases.

**Table 48 3511 Pulse Input Specifications**

| Feature                                                   | Specification                                                                     |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------|
| Color code                                                | Light purple                                                                      |
| Number of input signals                                   | 8, non-commoned                                                                   |
| Input frequency range                                     | 20 Hz to 20,000 Hz                                                                |
| Accuracy:@ 1,000 Hz to 20,000 Hz                          | ±0.01%                                                                            |
| Accuracy:@ 100 Hz to 999 Hz                               | ±0.1%                                                                             |
| Accuracy:@ 20 Hz to 99 Hz                                 | ±1.0%                                                                             |
| Input diagnostic fault coverage                           |                                                                                   |
| Minimum input change                                      | 0.5% of full scale                                                                |
| Input change sample period                                | 1 scan or 210 ms, whichever is greater                                            |
| Minimum period of mis-compares                            | 10 samples                                                                        |
| Status indicator: Input activity                          | 1 per point                                                                       |
| Status indicator: Module status                           | Pass, Fault, Active                                                               |
| Logic power                                               | < 20 watts                                                                        |
| Input characteristics (AC-coupled, balanced differential) |                                                                                   |
| Update rate                                               | 25 ms, typical                                                                    |
| Load impedance                                            | > 8 kΩ, 20K typical                                                               |
| Common mode range                                         | -100V to +100V peak-to-peak                                                       |
| Normal mode range                                         | 1.5V to 200V peak-to-peak                                                         |
| Over-range protection                                     | ±150 VDC continuous                                                               |
| Hysteresis                                                | 150 millivolts, typical                                                           |
| Sensitivity                                               | Typical: 0.5V peak-to-peak, sine wave<br>Worst case: 1.5V peak-to-peak, sine wave |

## Slot Key Numbers

This table lists the keys for Main Processors and the COM (used for TCM, EICM, or NCM) slots.

**Table 73 Main Processor, COM, and Blank Slot Keys**

| Model      | Module Name                     | Top Key | Bottom Key |
|------------|---------------------------------|---------|------------|
| 3008       | Main Processor (MP) Module      | 007     | 002        |
| 3006, 3007 | Main Processor (MP) Module      | 007     | 007        |
|            | COM Slot (TCM, EICM, or NCM)    | 001     | 003        |
|            | Blank Logical Slot <sup>1</sup> | 001     | 008        |

1. Use this key combination or part number 2000508-001 to prevent the insertion of modules into any unused slots in your controller.

This table lists the keys for I/O and communication module slots.

**Table 74 I/O and Communication Module Slot Keys**

| Model   | Module Name                                             | Top Key | Bottom Key |
|---------|---------------------------------------------------------|---------|------------|
| 3501E/T | 115 VAC/DC Digital Input (TMR)                          | 004     | 004        |
| 3502E   | 48 VAC/DC Digital Input with Self-Test (TMR)            | 004     | 005        |
| 3503E   | 24 VAC/DC Digital Input with Self-Test (TMR)            | 004     | 006        |
| 3504E   | 24 VDC /48 VDC High Density Digital Input (TMR)         | 004     | 007        |
| 3505E   | 24 VDC Low Threshold Digital Input with Self-Test (TMR) | 004     | 006        |
| 3510    | Pulse Input, AC Coupled (TMR)                           | 004     | 001        |
| 3511    | Pulse Input, AC Coupled (TMR)                           | 004     | 001        |
| 3515    | Pulse Totalizer Input                                   | 004     | 002        |
| 3564    | 24 VDC Digital Input (Single)                           | 004     | 006        |
| 3601E/T | 115 VAC Digital Output (TMR)                            | 006     | 004        |
| 3603B   | 120 VDC Digital Output (TMR), non-commoned              | 006     | 006        |
| 3603E/T | 120 VDC Digital Output (TMR), commoned                  | 006     | 006        |
| 3604E   | 24 VDC Digital Output (TMR)                             | 006     | 007        |
| 3607E   | 48 VDC Digital Output (TMR)                             | 006     | 003        |
| 3611E   | 115 VAC Supervised Digital Output (TMR)                 | 005     | 002        |
| 3613E   | 120 VDC Supervised Digital Output (TMR)                 | 005     | 005        |
| 3614E   | 24 VDC Supervised Digital Output (TMR)                  | 005     | 004        |
| 3615E   | 24 VDC Low-Power Supervised Digital Output (TMR)        | 005     | 004        |
| 3617E   | 48 VDC Supervised Digital Output (TMR)                  | 005     | 003        |
| 3623/T  | 120 VDC Supervised Digital Output (TMR)                 | 005     | 005        |