

ITR

Isolated Timing Repeater



Features

- DIN rail-mounted
- Copper-to-fiber conversion
- Fiber-to-copper conversion
- RS232 output
- RS422 output
- Fiber output
- TTL output
- High-Voltage (HV) MOSFET output
- Optional AM IRIG-B output

Applications

- Extend the distance of an IRIG-B or pulse signal distribution network
- Provide isolation between A and B protection systems or between Intelligent Electronic Devices (IEDs)
- Convert a TTL signal from copper to fiber or fiber to copper
- Convert a TTL signal to a digital high-voltage MOSFET signal
- Reduce wiring to equipment panels

Isolation

The Isolated Timing Repeater (ITR) has been fitted with isolation on all inputs and outputs so that transients in the protection bay do not travel upstream using the dedicated timing cables. Damage is limited to an individual bay (or device) and enables the substation to continue to perform its protection functions effectively.

Regeneration of Signal

Cable capacitance becomes important for a DCLS signal being transmitted over a long distance. The effects of high cable capacitance can be seen when the rising and falling edges of the IRIG-B signal starting to become rounded. This rounding not only affects the signal accuracy, but can also cause some IEDs to falsely trip or reject the signal completely.

If you need to transmit your signals further, you can use an ITR inline to regenerate the signals. This effectively doubles the distance that you can transmit the signal.

Security

Security is a critical consideration in the substation when selecting equipment. This isn't an issue for the ITR because it is not network-connected and does not run any user accessible software, so if your inputs and outputs are secure, no bad actor will be able to leverage the ITR as an attack vector.

High Drive

When designing a timing network, the number of IEDs that need to be supported might overload the drive power of the master clock's output. This leaves you with two options.

1) Install a clock with more outputs, cables and cost

2) Install ITRs to boost the signals from a single output

With only a 2 mA burden on an average clock's IRIG-B output, fifty or more ITRs can be driven using a single-clock DC output. With each ITR driving a 150 mA load on its DC IRIG-B outputs, you can synchronize hundreds of IEDs from just one clock output.

This reduces not only the need for a clock with more outputs, but also cabling throughout the installation; the only cable is the one from the clock to the chain of ITRs. Each ITR is then fitted to the top of a panel, which then distributes DC or AM IRIG-B signals to the rest of the panel.

Compact

Space in the substation protection and control racks is at a premium, so it is critical that translation devices such as the ITR use as little space as possible. This is why we have designed the ITR so that it is DIN rail mountable, allowing you to install many other devices next to it and save important rack space.

Specification

Front Panel

Specification	Details
LEDs	One power indicator Input signal indicator

Signal Delays

Specification	Accuracy
Input to Output Copper/ Fiber Output	85 ±10 ns
Input to High-Voltage MOSFET Output	60 µs (typical)

Mechanical/Environmental

Specification	Details
Size	(W) 55 mm × (D) 60 mm × (H) 90 mm
Rising Clamp Terminals Maximum Wire Size	1.5 mm Ø
2-Pin, Low-Voltage Power Supply	12–36 VDC
2-Pin, Medium-Voltage Power Supply	20–72 VDC
2-Pin, High-Voltage (DC) Power Supply	90–250 VDC
Power Drain	1.5W
Operating Temperature	–10 to +65°C
Storage Temperature	–10 to 85°C
Operational Humidity	≤ 95%, non-condensing
Certifications	CE, FCC, CSA, RCM EN: 55 032:2015
Weight	0.15 kg
Ingress Protection	IP40

Isolation

Specification	Details
Power Supply to I/O	2 kV
Output to Earth	3.5 kV (min)
Input to Earth	3.5 kV (min)

Low-Voltage Copper



Inputs

Specification	Details
TTL	TTL: 0–5V, 2 mA max, 2-pin screw Recommended high logic threshold: 3.9V Recommended low logic threshold: 1.3V

Standard Outputs

Specification	Details
TTL	0–5V, 150 mA, fused, 2-pin screw
RS232	±10V, 15 mA max, 2-pin screw
RS422/RS485	±5V, 50x RS422 unit load, 2-pin screw
Loop Connector	
Term Connector	120Ω terminating resistor

Optional Outputs

Specification	Details
AM IRIG-B	±8 VDC 120Ω output impedance

Low-Voltage Fiber



Inputs

Specification	Details
TTL	TTL: 0–5V, 2 mA max, 2-pin screw Recommended high logic threshold: 3.9V Recommended low logic threshold: 1.3V
ST Fiber	Multimode, 62.5/125 μm , λ 820 nm Sensitivity: –34.4 dBm

Standard Outputs

Specification	Details
TTL	0–5V, 150 mA, fused, 2-pin screw
RS232	$\pm 10\text{V}$, 15 mA max, 2-pin screw
RS422/RS485	$\pm 5\text{V}$, 50x RS422 unit load, 2-pin screw
ST Fiber	Multimode, 62.5/125 μm , λ 820 nm, 17.5 dB power budget typical

Optional Outputs

Specification	Details
AM IRIG-B	AM IRIG-B (B12x) $\pm 8\text{ VDC}$

High-Voltage MOSFET



Inputs

Specification	Details
TTL	TTL: 0–5V, 2 mA max, 2-pin screw Recommended high logic threshold: 3.9V Recommended low logic threshold: 1.3V
ST Fiber	Multimode, 62.5/125 μm , λ 820 nm Sensitivity: –34.4 dBm

Standard Outputs

Specification	Details
ST Fiber	Multimode, 62.5/125 μm , λ 820 nm, 17.5 dB power budget typical
High-Voltage MOSFET	250 VDC, 100 mA, 2-pin screw
Term Connector	120 Ω terminating resistor