

Technical Documentation

# BYPASS SWITCH

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GST No. 27AAACP2446G1ZL

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This document describes the main technical features and specifications of the BYPASS Switch equipment. Please ensure that this documentation is latest, as system versions are subject to change without notice.

## Contents

1. System Description .....	3
1.1 System Description.....	3
1.2 Functions and Features .....	3
1.3 Applications.....	4
2. Specifications .....	5
2.1 Outline.....	5
2.2 Panels and Interfaces.....	5
2.3 Diagram.....	6
2.4 Specifications.....	8
3. Working Parameters.....	9
3.1 Working Mode.....	9
3.2 Working Wavelength.....	9
3.3 Working Channel .....	9
3.4 Working Channel Auto-Switching back.....	9
3.5 Bypass Control by OPM (Optical Power Monitoring) .....	10
3.6 R1/R2 Switching Threshold .....	10
3.7 Working Path Auto-Switching back control by OPM (Optical Power Monitor) ....	10
3.8 Bypass Control by Heartbeat Monitoring .....	11
3.9 Switching Protection.....	12
3.10 Switching Delay after Power On.....	12
3.11 Logs.....	13
3.12 Authorisation of panel keys.....	13
4. Engineering Connection Diagram.....	14

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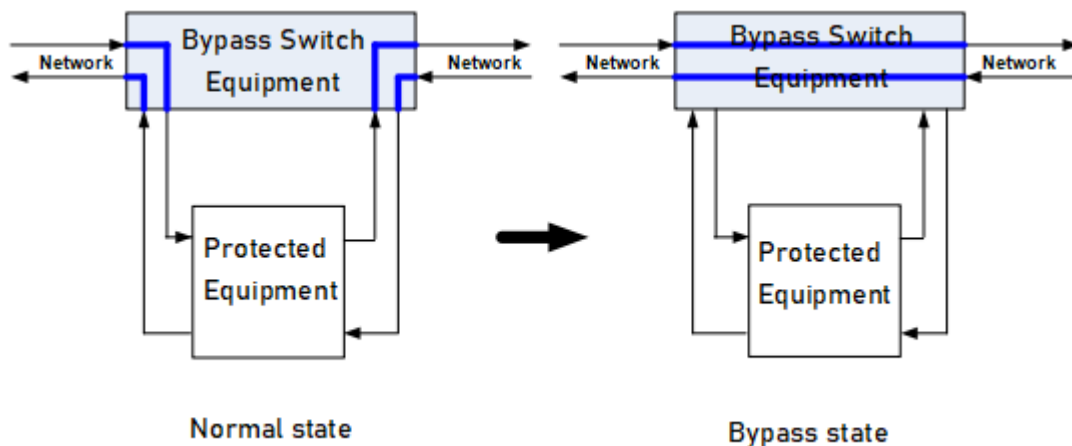
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# 1. System Description

## 1.1 System Description

Bypass Switch is an optical path control equipment, which can automatic bypass the optical path in case the protected optical device is failure (such as power supply interruption, hardware failure, software deadlock etc.) for protecting network integrity.

The Bypass Switch can monitor the power supply status and optical signal status of the protected optical device in real time. When the protected optical device fails (e.g. power failure, hardware failure, software deadlock, etc.), it can removes this point of failure by automatically switching traffic via bypass mode to keep the critical network link up.



## 1.2 Functions and Features

- Automatic bypass switching control: Supports various automatic bypass control methods such as power supply monitoring, optical power monitoring, heartbeat monitoring and their combinations.

Power supply monitoring: If the power supply is down, switch to BYPASS state.

Optical power monitoring: If the optical power degrade to the threshold we predefined, switch to BYPASS state.

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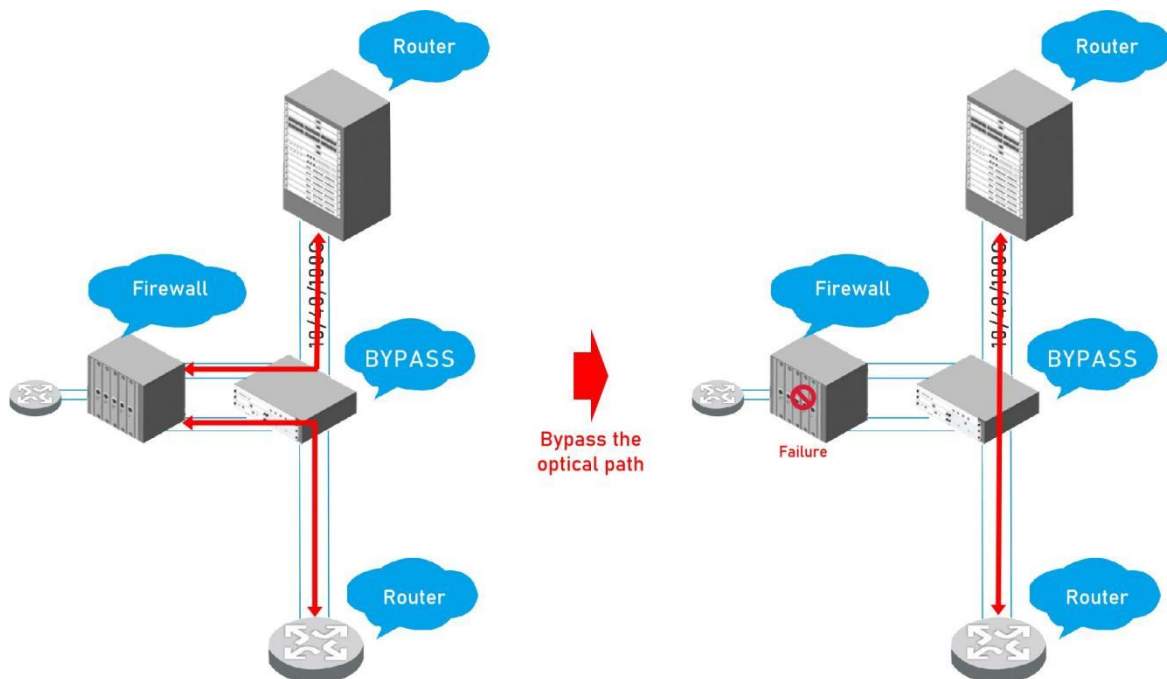
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Heartbeat monitoring: If there is no heartbeat within a certain period of time, switch to BYPASS state.

- Working in optical layer, transparent transmission to optical signals.
- High optical performance.
- Carrier grade switching speed.
- Support Auto-Switch and Manual-Switch two working mode.
- Support optical signal Internal-Splitted or External-Splitted.
- Support CLI management and panel key control with LCD display.
- Support dual power supplies for redundancy.
- Support Switching-Log saving function.

### 1.3 Applications

- Node protection for network security appliance (firewalls, IPS, DPI, flow control devices, etc.)
- Node protection for Repeater.
- Node protection for serial connection optical device.



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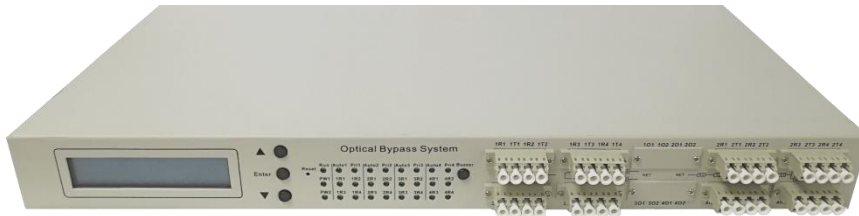
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## 2. Specifications

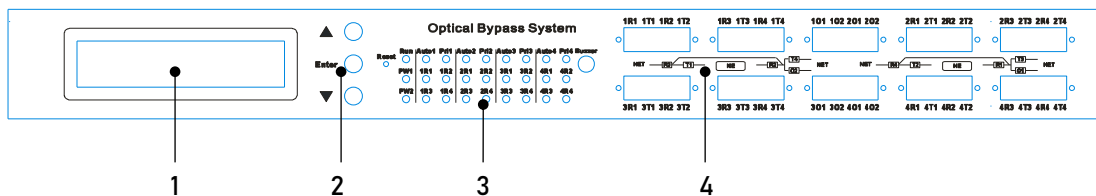
### 2.1 Outline



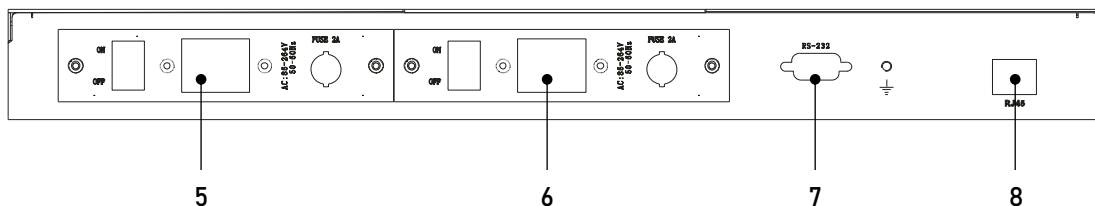
BYPASS (19inch, 1U height)

### 2.2 Panels and Interfaces

Front



Back



- 1: LCD Display
- 2: Panel Keys
- 3: Indicated LED
- 4: Optical Interface

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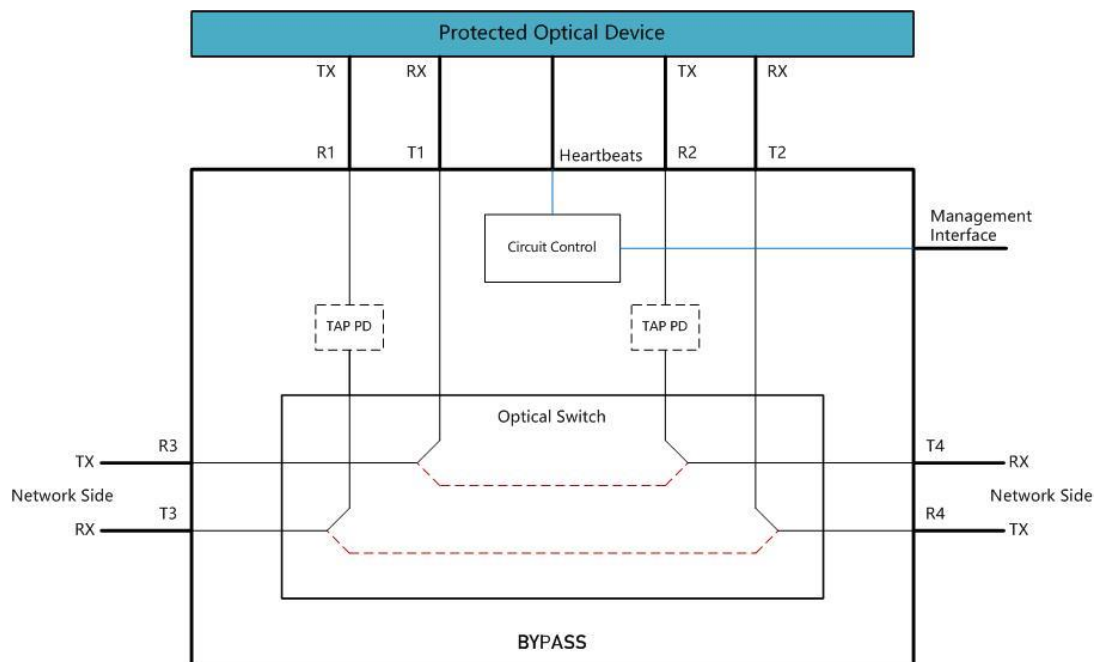
Optical Interface	Channels	Connection
1R1 / 1T1 / 1R2 / 1T2 / 1R3 / 1T3 / 1R4 / 1T4 / 1O1 / 1O2	Ch1	Referring <i>Engineering Connection Diagram</i>
2R1 / 2T1 / 2R2 / 2T2 / 2R3 / 2T3 / 2R4 / 2T4 / 2O1 / 2O2	Ch2	
3R1 / 3T1 / 3R2 / 3T2 / 3R3 / 3T3 / 3R4 / 3T4 / 3O1 / 3O2	Ch3	
4R1 / 4T1 / 4R2 / 4T2 / 4R3 / 4T3 / 4R4 / 4T4 / 4O1 / 4O2	Ch4	

5/6: -48V DC and 220V AC power supply

7: RS-232 Management Interface (DB9)

8: RJ-45 Management and Heartbeat Interface

### 2.3 Diagram



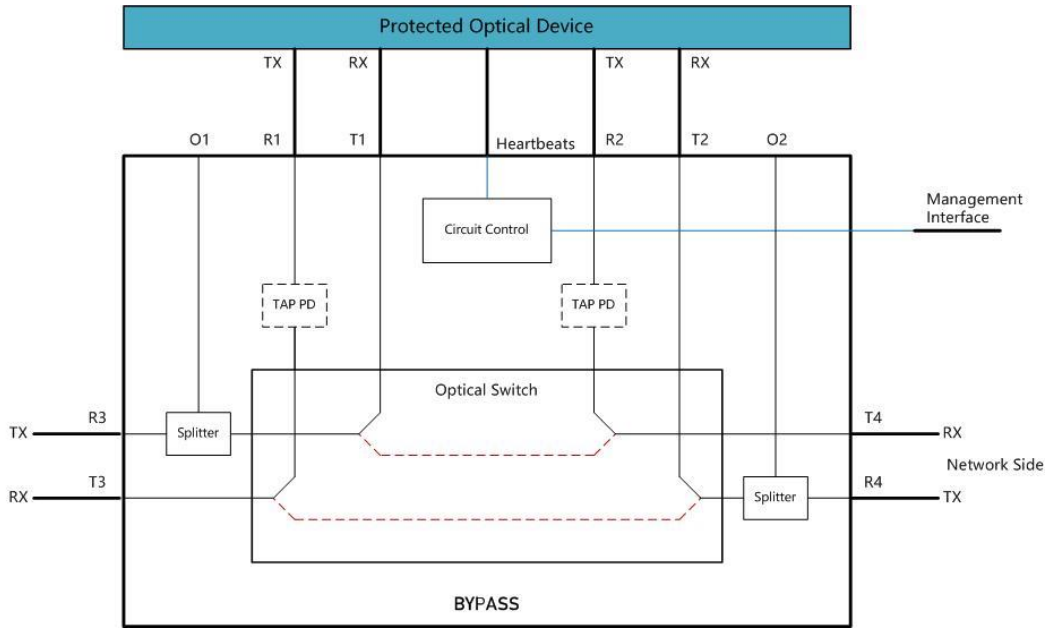
Regular

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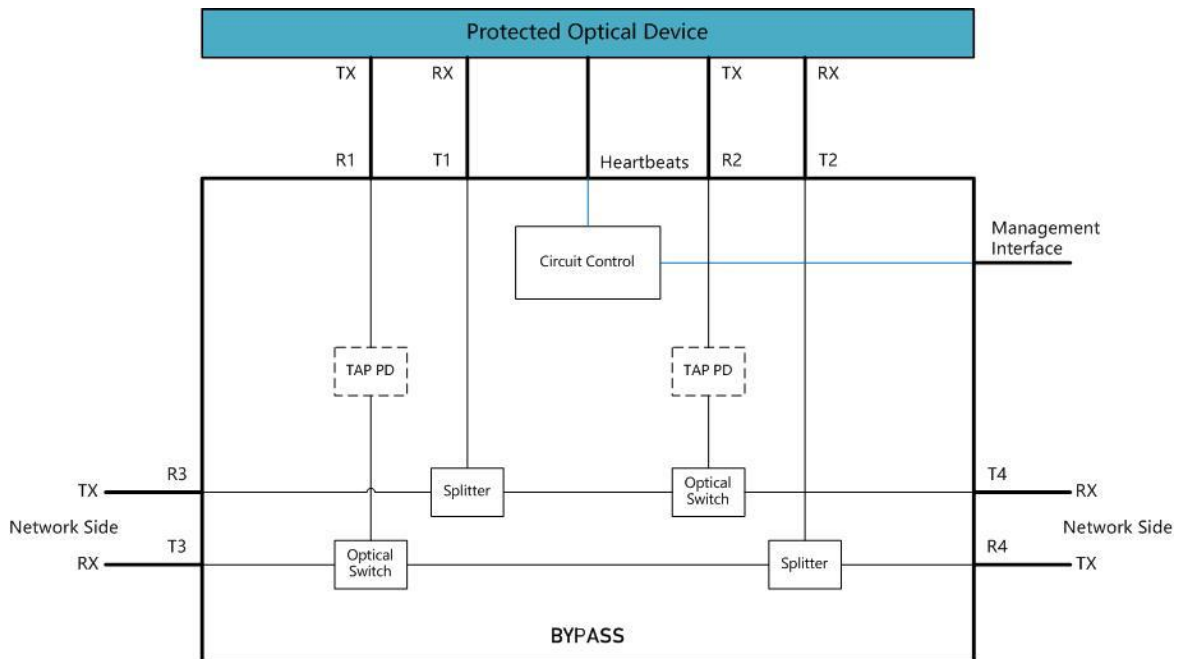
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External-Splitted



Internal-Splitted

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TAP PD

Optional optical power monitoring function.

## 2.4 Specifications

Parameter	Unit	Specifications (typical)
Working Wavelength	nm	1310 / 1550
Insertion Loss	dB	≤ 1.5
Return Loss	dB	≥ 50
Crosstalk	dB	≥ 55
WDL	dB	≤ 0.25
Switching Time	ms	< 50
Fiber Type		SM (9/125μm)
Optical Interface		LC/PC
Management Interface		RJ45、RS-232
Heartbeat Interface		ETH (RJ45)
Power Supply	V	AC: 85 ~ 264 50/60Hz) or DC: 36 ~ 72
Power Consumption	W	≤ 20
Working Temperature	°C	-5 ~ 55
Storage Temperature	°C	-20 ~ 75
Rack Size		19'inch, 1U height

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## 3. Working Parameters

### 3.1 Working Mode

Bypass Switch support Auto and Manual two working mode.

Auto mode: The channels are switch automatically according to the switching conditions.

Manual mode: The channels are switch by setting manually, normally use in force switching or equipment debugging.

Bypass Switch support Manual mode auto-return to Auto mode. In a certain period of time, if the Bypass Switch does not have any manual operation, Manual mode will automatically return to Auto mode. The factory default setting is 30 minutes, and it can be set by commands or panel key. The available value is 1 to 999 (unit: minutes). Auto-return function is disabled if the value is set to 0.

*Notes: The Bypass Switch should be working on Auto mode after operation completed for preventing protection failure.*

### 3.2 Working Wavelength

1310nm or 1550nm can be selected as working wavelength.

### 3.3 Working Channel

The Bypass Switch will select the working channel automatically according to the optical line status while working under Auto mode.

Working channel can be selected manually by panel key or commands. While switching the working channel, the Working Mode will be switch to Manual automatically.

### 3.4 Working Channel Auto-Switching back

Auto Switching Back or Non-auto Switching Back can be selected.

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In Auto switching back, while the primary optical line recover, Bypass Switch will switch the working channel from Bypass back to Primary automatically. In this mode, delay can be set from 0 to 999 seconds.

But in Non-auto switching back, the working channel will be maintain in the Bypass channel, even if the Primary channel has been recovered.

### 3.5 Bypass Control by OPM (Optical Power Monitoring)

In case the optical power of following port is lower than the threshold we predefined, switch to Bypass state.

Bypass Condition	Descriptions
R1	Only if the optical power of R1 port is lower than the threshold, switch to Bypass state.
R2	Only if the optical power of R2 port is lower than the threshold, switch to Bypass state.
R1 or R2	If the optical power of R1 or R2 port is lower than the threshold, switch to Bypass state.
R1 and R2	If the optical power of both R1 and R2 port is lower than the threshold, switch to Bypass state.

### 3.6 R1/R2 Switching Threshold

The factory default setting is -30dBm. If there is no optical power input, the power value is displayed as -50dBm.

### 3.7 Working Path Auto-Switching back control by OPM (Optical Power Monitor)

When the optical power received by Bypass Switch is recovered, it will automatically switched back to the primary path under the ***Working Channel Auto-Switching back*** mode.

Auto-Switching back Conditions	Descriptions
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R1	Only when the optical power of R1 port is recover, switch back to Normal state.
R2	Only when the optical power of R2 port is recover, switch back to Normal state.
R1 or R2	When the optical power of R1 or R2 port is recover, switch back to Normal state.
R1 and R2	When the optical power of both R1 or R2 port is recover, switch back to Normal state.

### 3.8 Bypass Control by Heartbeat Monitoring

#### 3.8.1 Active and Passive Heartbeat Monitoring

Bypass Switch support Active or Passive Heartbeat Monitoring.

**Active Heartbeat Monitoring:** The Bypass Switch actively sends Ping packets to the protected device, and the protected device will feedback a response packet if it is successfully received. If the Bypass receives the response packet, it will automatically switch to the "primary" state. Conversely, if the Bypass does not receive a response packet within a certain period of time, or if a certain number of response packets are continuously lost, it will automatically switch to the "bypass" state. Active heartbeat use TCP/IP protocol.

**Passive Heartbeat Monitoring:** The protected device actively sends Ping packets to the Bypass Switch, and the Bypass Switch will feedback a response packet if it is successfully received. If the Bypass receives the Ping packet, it will automatically switch to the "primary" state. Conversely, if the Bypass does not receive the Ping packet within a certain period of time, it will automatically switch to the "bypass" state. Passive heartbeat use TCP/IP or UDP protocol.

#### 3.8.2 Destination IP address

In active heartbeat mode, you need to configure the destination IP address.

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### 3.8.3 Interval

Set the interval for sending heartbeat packets. The unit is 10 millisecond.

The factory default setting is 50ms.

### 3.8.4 Timeout

Set the duration of receiving timeout. The factory default setting is 50ms.

If the Bypass Switch do not receive the ICMP response packets or Ping packets in this duration, the Bypass Switch will switch to bypass state immediately.

### 3.8.5 Packet Loss

Set the lost numbers of ICMP response packets or Ping packets. If a certain numbers (0-9999) of packets are continuously lost, the Bypass Switch will switch to bypass state immediately.

The factory default setting is 8.

## 3.9 Switching Protection

This function can protected the Bypass Switch equipment from possible damage caused by frequently switching. In Auto working mode, in case the switching times is more than N (N=1~500, defaulting setting is 10) within two minutes, the Bypass Switch will switch to Bypass state and Manual mode for equipment protection.

## 3.10 Switching Delay after Power On

If the delay is setted (0~999 seconds), the Bypass Switch will not make a switch judgment until after the delay time has elapsed.

The function is use to match the boot-up time of the protected device, to prevent the Bypass Switch from switching to the normal state before the protected device is fully booted up, which may mistakenly cause network interruptions.

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### 3.11 Logs

Status information such as reason, time and result of the switch is recorded and saved as a log. Logs can be viewed via programmed commands.

### 3.12 Authorisation of panel keys

The front panel keys can be set to "Enable" or "Disable" by programmed commands. The factory default setting is "Enable".

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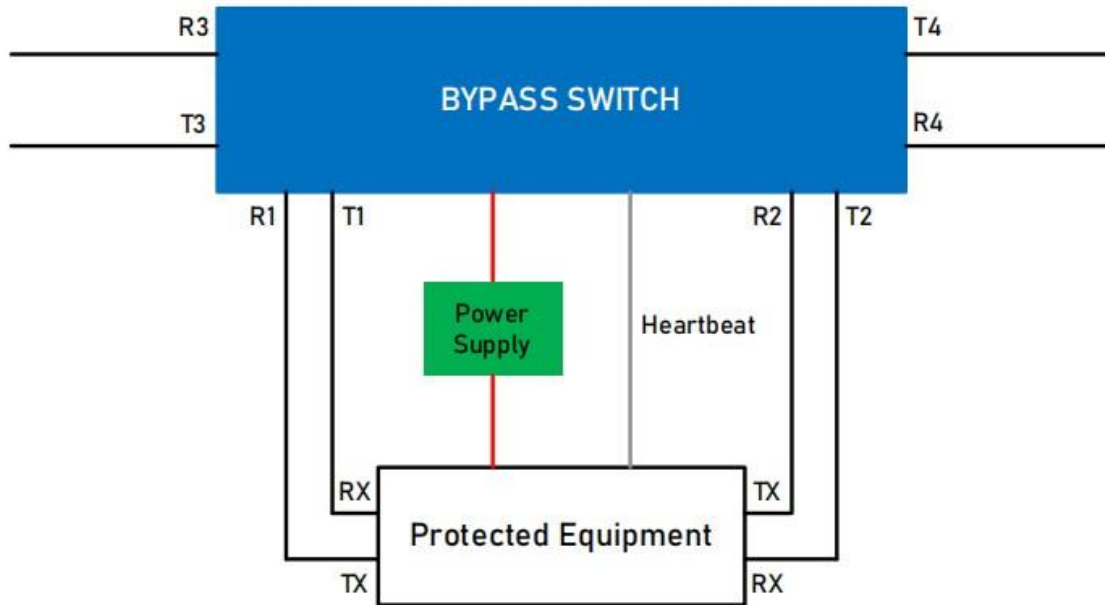
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## 4. Engineering Connection Diagram



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