ACTIVE HIGH PRECISION AMPLIFIER
—Output type TFxxxxN series

FEATURES
- 2-port isolation (input and output)
- High accuracy (0.1% F.S.)
- High linearity (0.1% F.S.)
- High isolation voltage (2KVAC/60s)
- Low ripple & noise: ≤30mVpp (20MHz)
- Extremely low temperature drift (-25~+71°C: ≤35PPM/°C)
- Small size: DIP18 (26*9.5*12.5mm)
- ESD protection (IEC/EN61000-4-2 contact ±4KV perf. Criteria B)
- With load ability: ≤500Ω (Max. signal output @20mA)
  ≥2KΩ(Max. signal output @10V)

GENERAL DESCRIPTION
The TFxxxxN series is with preceding voltage signal input and backward voltage/current signal output, and with an inner high efficiency isolated micro-power source. It can provide isolation power to peripheral circuit at the same time of providing power to internal signal processing circuit. Adopting electromagnetism isolation technology, therefore compared with photo-coupler isolation, it has higher accuracy and lower temperature drift. This module is two-port isolation (input and output). There are external functions for the series as zeros and full adjustment, convenient for customer to design and adjust.

SELECTION GUIDE

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<th>Model</th>
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<th>Input</th>
<th>Output</th>
<th>Isolation Power Output</th>
<th>Channels</th>
</tr>
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<tbody>
<tr>
<td>TF5134N</td>
<td>24V</td>
<td>0~10V</td>
<td>4~20mA</td>
<td>15V</td>
<td>1</td>
</tr>
<tr>
<td>TF5534N</td>
<td>24V</td>
<td>0~10V</td>
<td>0~10V</td>
<td>15V</td>
<td>1</td>
</tr>
<tr>
<td>TF6254N</td>
<td>12V</td>
<td>0~5V</td>
<td>0~20mA</td>
<td>15V</td>
<td>1</td>
</tr>
<tr>
<td>TF5234N</td>
<td>24V</td>
<td>0~10V</td>
<td>0~20mA</td>
<td>15V</td>
<td>1</td>
</tr>
<tr>
<td>TF5544N</td>
<td>15V</td>
<td>0~10V</td>
<td>0~10V</td>
<td>15V</td>
<td>1</td>
</tr>
<tr>
<td>TF5554N</td>
<td>12V</td>
<td>0~10V</td>
<td>0~10V</td>
<td>15V</td>
<td>1</td>
</tr>
<tr>
<td>TF5634N</td>
<td>24V</td>
<td>0~10V</td>
<td>0~5V</td>
<td>15V</td>
<td>1</td>
</tr>
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<td>1</td>
</tr>
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ELECTRICAL SPECIFICATIONS

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<tr>
<th>Power Supply</th>
<th>Voltage (Nominal power supply±5%)</th>
<th>Input Power Voltage outputs1.5W(Isolation power output)</th>
<th>Current output±2.0W(Isolation power output)</th>
<th>Power Protection</th>
<th>Reverse protection</th>
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<tr>
<td>Isolation Power Output</td>
<td>Output Voltage ±10%(Nominal)</td>
<td>Output Current ≤25mA</td>
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<tr>
<td>Input</td>
<td>Input Signal</td>
<td>Refer to the above selection guide</td>
<td>Input Impedance ≥10MΩ(Max. voltage signal input)</td>
<td>Over-load</td>
<td>≤30V(Voltage signal input)</td>
</tr>
</tbody>
</table>
### Output Specifications

<table>
<thead>
<tr>
<th>Output</th>
<th>Output Signal Refer to the above selection guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>With Load Ability</td>
<td>≤500Ω (Max. signal output @20mA)</td>
</tr>
<tr>
<td></td>
<td>≥2KΩ (Max. signal output @10V)</td>
</tr>
<tr>
<td>Ripple &amp; Noise</td>
<td>≤30mVpp (20MHz bandwidth)</td>
</tr>
</tbody>
</table>

### Transmission Specifications

- **Zero Offset**: 0.1%FS
- **Accuracy**: 0.1%FS
- **Temperature Drift**: 35PPM/°C(-25~+71°C); 50PPM/°C(-40~+85°C)
- **Adjustable Function**:
  - Full Degree Regulation: Can be adjusted within ±5% output signal range
  - Zero Regulation: Can be adjusted within ±5% output signal range
- **Frequency Response**:
  - Bandwidth: ≥2kHz
  - Response Time: ≤1mS

### Isolation Specifications

- **Electrical Isolation**: Power input and the signal input are on the common ground. Isolation power output and the signal output are on the common ground. Isolated between signal input and the signal output or power input and isolation power output.
- **Isolation Voltage**: 2.0KVAC (Tested for 1 minute, leakage current <1mA, humidity <70%)
- **Insulation Resistance**: 100MΩ (500VDC)

### EMC Specifications

- **CE**: CISPR22/EN55022 CLASS A (Recommended Circuit Refer to Figure 1)
- **RE**: CISPR22/EN55022 CLASS A
- **ESD**: IEC/EN61000-4-2 Contact ±4KV perf. Criteria B
- **RS**: IEC/EN61000-4-3 10V/m perf. Criteria A
- **EFT**: IEC/EN61000-4-4 Power port ±2KV (Recommended Circuit Refer to Figure 1) perf. Criteria B
- **Surge**: IEC/EN61000-4-5 Power port ±1KV/±2KV (Recommended Circuit Refer to Figure 1) perf. Criteria A
- **CS**: IEC/EN61000-4-6 3VRms perf. Criteria A

### Other Specifications

- **Operating Temperature**: -40~+85°C
- **Ambient Temperature**: Operating temperature: -40~+85°C
- **Transport and Storage Temperature**: -50~+105°C
- **Package**: DIP 18
- **Weight**: 8g, typ.
- **Application Environment**: Dust-free, fierce shocking, impulsion and corrosive gas

### Application Circuit Diagram

![Application Circuit Diagram](Figure 1)

**Parts List**

- **C1**: 100uF/35V
- **C2**: 100uF/35V
- **R1**: Negative zero adjustment resistance
- **R2**: Positive zero adjustment resistance
- **R3**: Negative gain adjustment resistance
- **R4**: Positive gain adjustment resistance
- **D1**: SMCJ28A
- **D2**: SMCJ30A
- **D3**: SMBJ15A
- **D4**: SMBJ15A

### Application

1. Schematic diagram

![Application Schematic Diagram](Figure 1)
2. Typical application—Isolation application of AO board card in DCS system

Isolation application figure of AO board card in DCS system

Function
In the figure, Sin are input signals for peripheral circuit. The input signals can be sent to MCU and isolated with Sin by 485 isolation transceiver, CAN isolation transceiver and Ethernet network transformer. MCU control system receive the signals, and output digital signals after signal processing. DAC is digital to analog converter, digital signals can be transferred to analog signals by DAC. TF_N output module isolation output the analog signals transferred from DAC. Sout1, Sout2, Sout3 and Sout4 are multiplex output isolation signals.

Working principle
When the circuit works, peripheral circuit provides input signals Sin, and it transfers input signals to MCU control system by isolated bus interface. The MCU receives the signals and manage them, then output digital signals. The digital signals are transferred by I/O bus. Digital signals are converted to analog signals through DAC. After these analog signals get through TF_N output module, we can get isolation signals. The whole working process realizes that the inner signals of control system are isolated with the peripheral circuit and the output signals Sout1, Sout2, Sout3 and Sout4 are isolated and not interfere with each other.

3. Application—Zero and full adjustment function
Zero and full adjustment recommended setting circuit is as shown

Zero adjustment function by setting up adjustment resistor at the zero point can change the zero signal transmission, which makes the output signal overall migration. Full adjustment function is also called the gain adjustment function, and it can change the ratio of signal transmission through the set up corresponding adjust resistance at the full adjustment, and the isolation transmission proportion of input and output signal value would be changed.

Usage
Adding and reducing negative zero resistance can reduce the zero of signal output. Adding and reducing positive zero resistance can increase the zero of signal output. Adding and reducing negative full adjustable resistance can reduce the ratio of signal transmission. Adding and reducing negative full adjustable resistance can increase the ratio of signal transmission. You can use potentiometer to adjust the output signal of zero and full. As shown in the figure, the terminal of full or zero adjustment is connected to the sliding of potentiometer, and the both ends of potentiometer is to the zero or full reference of positive and negative regulating reference. Sliding potentiometer to adjust signal full or changing the ratio of rise and fall can also adjust zero and full of the output signal.

As shown in the figure, Adjusting the potentiometer to positive can increase zero or full of the corresponding signal. Adjusting the potentiometer to negative can reduce zero or full of the corresponding signal. The maximum recommended range of potentiometer is 10KΩ~1MΩ, detail resistance selection according to the adjustment accuracy. Choose larger resistance potentiometer for high precision fine-tuning. Choose smaller resistance potentiometer for a wide range of rough adjustment.

Notice
Using the function of zero and full adjustment will affect original accuracy. Due to the effect on temperature drift of external adjustment resistor and the stability of the potentiometer, temperature drift of product will be changed, too. For the zero and full adjustment potentiometer, the ratio between positive resistance and negative resistance, which makes the zero point of different products predetermined Zero point is diverse. Please set the value of potentiometer according to actual situation.
NOTICE

1. Please read the user manual carefully before using. If any question please contact our FAE.
2. Please do not use this product in hazardous area.
3. The power supply of this product should be 24VDC power source. It is forbidden to use 220VAC power supply.
4. To avoid invalid explosion protection function, or any failure, disassembling this product is forbidden.

AFTER-SALES SERVICE

1. Products are carefully inspected and quality controlled during production and before shipment. If they operated abnormally or there was anything wrong, please contact our agent from which you purchased or MORNSUN FAE as soon as possible.
2. MORNSUN warranty our product for 3 years from manufacturing date. During this period, MORNSUN will repair or replace the product if product was found to have manufacturing defect.

APPLICATION CIRCUIT

Please check "A APPLICATION GUIDE TO ISOLATION TRANSMITTER"

DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

Note:
1. All specifications measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
2. In this datasheet, all the test setup and methods are based on our corporate standards.
3. All characteristics are for listed models, and non-standard models may perform differently. Please contact our technical support for more details.
4. Contact us for your specific requirement.
5. Specifications of this product are subject to changes without prior notice.

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