LOYAL WINGMAN TECHNOLOGIES

PRODUCT DATASHEET

LWT-TSC-01

Temperature Signal Conditioner

Universal Programmable Isolated Temperature / Process Signal Conditioner

The LWT-TSC-01 Temperature Signal Conditioner is a compact industrial signal conditioning module designed for accurate measurement, isolation, linearization, and retransmission of temperature and process signals. The module accepts one input sensor at a time and supports thermocouple, RTD, resistance, voltage, and current inputs.

The device converts the measured signal into isolated standard analog outputs such as 0-5 V, 1-5 V, 0-10 V and 4-20 mA. Three-port galvanic isolation between input, output, and power supply improves noise immunity, reduces ground-loop effects, and protects PLC, DCS, DAQ, and control systems in industrial environments.

KEY FEATURES

- Universal programmable input for thermocouple, RTD, resistance, voltage, and current signals
- Supports thermocouple types K, J, T, E, N, S, R, B, C, D
- Supports RTD types Pt100, Pt200, Pt500, Pt1000, Ni100, Ni200, Ni500, Ni1000, Cu10
- Resistance measurement range up to 4500 Ω
- Process input support: 0-10 V, 0-20 mA, and 4-20 mA
- Built-in thermocouple cold junction compensation
- Built-in linearization for each RTD and thermocouple type
- Automatic sensor break and sensor short-circuit detection
- Output ranges: 0-5 V, 1-5 V, 0-10 V, 4-20 mA
- 0.9-inch OLED display for temperature and fault status indication
- Modbus RTU software configuration interface
- Wide DC supply: 12-36 V DC, 24 V nominal

TYPICAL APPLICATIONS

- Industrial temperature measurement and signal isolation
- PLC, DCS, and DAQ temperature interface modules
- Thermocouple and RTD signal conditioning
- Furnace, oven, heater, chamber, and process temperature monitoring
- Aerospace and defence thermal test systems
- Ground-loop isolation in control panels
- Temperature-to-voltage and temperature-to-current conversion
- Process automation, test equipment, and monitoring systems

INPUT, OUTPUT, AND SYSTEM SUMMARY

Category	Specification
Input type	Universal programmable input
Input sensor connection	One sensor at a time
Thermocouple types	K, J, T, E, N, S, R, B, C, D
RTD types	Pt100, Pt200, Pt500, Pt1000, Ni100, Ni200, Ni500, Ni1000, Cu10
Resistance input	0 Ω to 4500 Ω

Category	Specification
Voltage input	0-10 V DC
Current input	0-20 mA / 4-20 mA
Output ranges	0-5 V, 1-5 V, 0-10 V, 4-20 mA
Display	0.9-inch OLED; temperature and fault status indication
Communication	RS-485 Modbus RTU
Isolation	Three-port isolation: input / output / power supply
Isolation voltage	1.6 kV DC, 1 min
Supply voltage	12-36 V DC, 24 V nominal
Power consumption	≤3 W
Operating temperature	-40°C to +85°C
Mounting	35 mm DIN rail
Enclosure	UL94-V0 graded industrial enclosure
Protection	IP20

INPUT SPECIFICATIONS

Thermocouple Input

Parameter	Specification
Supported types	K, J, T, E, N, S, R, B, C, D
Cold junction compensation	Integrated CJC
Linearization	Built-in thermocouple linearization
Sensor break detection	Supported
Fault response	Configurable upscale / downscale
Standards	IEC, NIST, or equivalent

Thermocouple Measurement Ranges

Type	Range	Type	Range
K	-200°C to +1372°C	**S**	-50°C to +1760°C
J	-210°C to +1200°C	**R**	-50°C to +1760°C
T	-200°C to +400°C	**B**	0°C to +1820°C
E	-200°C to +1000°C	**C**	0°C to +2315°C
N	-200°C to +1300°C	**D**	0°C to +2315°C

RTD / Resistance / Process Input

Parameter	Specification
Supported RTDs	Pt100, Pt200, Pt500, Pt1000, Ni100, Ni200, Ni500, Ni1000, Cu10
RTD wiring	2-wire, 3-wire, 4-wire
RTD range	-200°C to +850°C, sensor dependent
Excitation current	<1 mA
Lead compensation	Supported for 2-wire, 3-wire and 4-wire RTD modes
Resistance input	0 Ω to 4500 Ω
Voltage input	0-10 V DC
Current input	0-20 mA / 4-20 mA
Fault detection	Sensor open, sensor short, overrange, under range

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MEASUREMENT AND OUTPUT SPECIFICATIONS

Parameter	Specification
Temperature accuracy	≤±0.5°C, sensor and range dependent
Output accuracy	<±0.05% F.S.
Zero stability	<±0.02% F.S.
Update rate	>100 updates per second
Response time	≤20 ms in fast mode / filter disabled
Display resolution	≥4 digits with decimal point

Analog Output

Parameter	Specification
Number of outputs	All analog outputs simultaneously available
Voltage output ranges	0-5 V, 1-5 V, 0-10 V
Current output ranges	4-20 mA
Voltage output load	≥2 kΩ
Current output load	≤850 Ω
Output isolation	Isolated from input and power supply

DISPLAY AND COMMUNICATION

Parameter	Specification
Display type	0.9-inch OLED
Display function	Temperature value and fault status indication only
Display unit	°C
Display update	Real-time
Configuration interface	RS-485 Modbus RTU
Parameter storage	Non-volatile memory

ISOLATION, POWER, AND ENVIRONMENTAL SPECIFICATIONS

Parameter	Specification
Isolation type	Three-port galvanic isolation
Isolation voltage	1.6 kV DC, 1 min
Supply voltage	12-36 V DC
Nominal supply	24 V DC
Power consumption	≤3 W
Operating temperature	-40°C to +85°C
Storage temperature	-40°C to +85°C
Humidity	0-95% RH, non-condensing

MECHANICAL SPECIFICATIONS

Parameter	Specification
Mounting	35 mm DIN rail
Weight	250 g
Enclosure material	UL94-V0 flame-retardant industrial material
Protection rating	IP20

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DESIGNED FOR COMPLIANCE

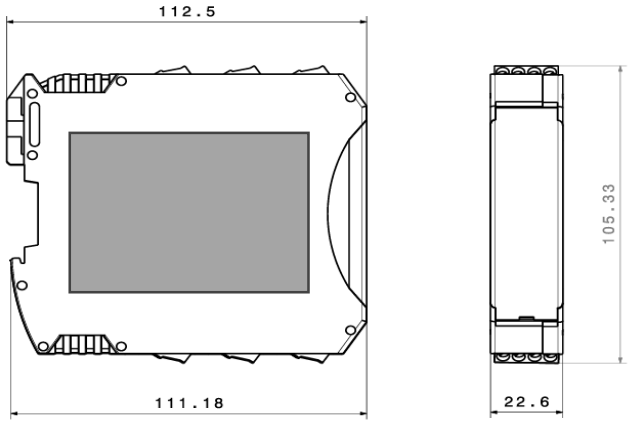
Category	Standard / Requirement
EMC for measurement/control equipment	IEC 61326
Electrical safety for measurement/control equipment	IEC 61010
Environmental testing	IEC 60068
Degree of protection	IEC 60529, IP20
DIN rail mounting	IEC 60715
Temperature reference	IEC, NIST, or equivalent

ORDERING INFORMATION

Model	Description
LWT-TSC-01	Universal programmable temperature signal conditioner, one universal input, two isolated analog outputs, 0.9-inch OLED display, Modbus RTU, 12-36 V DC supply, 24-terminal DIN rail enclosure

TERMINAL ASSIGNMENT

No.	Signal
1	0-10V DC Output
2	1-5V DC Output
3	0-5V DC Output
4	Voltage Ground
5	24V Loop Supply
6	Current +
7	Current -
8	NC



No.	Signal	No.	Signal
9	RS485 – B	17	TC_T1
10	RS485 – A	18	VOLTAGE_T2
11	RS485 GROUND	19	VOLTAGE_T1
12	NC	20	TC_T2
13	RTD_T3	21	CURRENT_T1
14	RTD_T1	22	POWER_+
15	RTD_T2	23	POWER_-
16	RTD_T4	24	CURRENT_T2