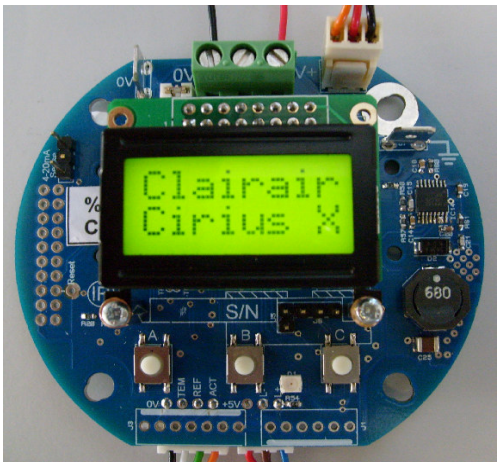
Cirius X

NDIR gas sensor OEM4-20mA transmitter



Feature

· Wide supply voltage range
· Robust linear 12-bit connection with optional 4-20mA source/reverse output section
· Fully configurable with a variety of NDIR gas sensors
· All-round RS232 communication
· Extensive fault monitoring
· Input power and output signal polarity protection
· Two rows of detachable LCD screens with switching backlight
· Menu driven button calibration
· minisize
· Designed specifically for fixed head systems
· Optional Hall effect switch panel plug for "through glass" calibration
· Wide operating temperature range
· Grounding contact plate and grounding flat joint
· Designed to comply with SIL specifications

Introduction and Operation

The CiriusX OEM 4-20mA transmitter board is a highly flexible NDIR gas sensor transmitter that operates with standard NDIR gas sensors, providing stable linear 12-bit connectivity and optional 4-20mA forward/reverse outputs. The board handles all sensor drive, signal extraction, and linearization operations. Menu sequences can be executed via three buttons or the RS232 port for calibration and configuration. During normal operation, fault detection, and calibration processes, the two-row LCD displays gas concentration, unit, fault diagnosis, and interactive text. Removing the display disables button functionality, putting the transmitter into tamper-resistant mode. The sensor connects to the Cirius X via 3 or 4 compression EH connectors, separating power supply from signal lines. Input power and 4-20mA signals are connected through screw terminals, while the flat grounding connector features solder pads for easy grounding.

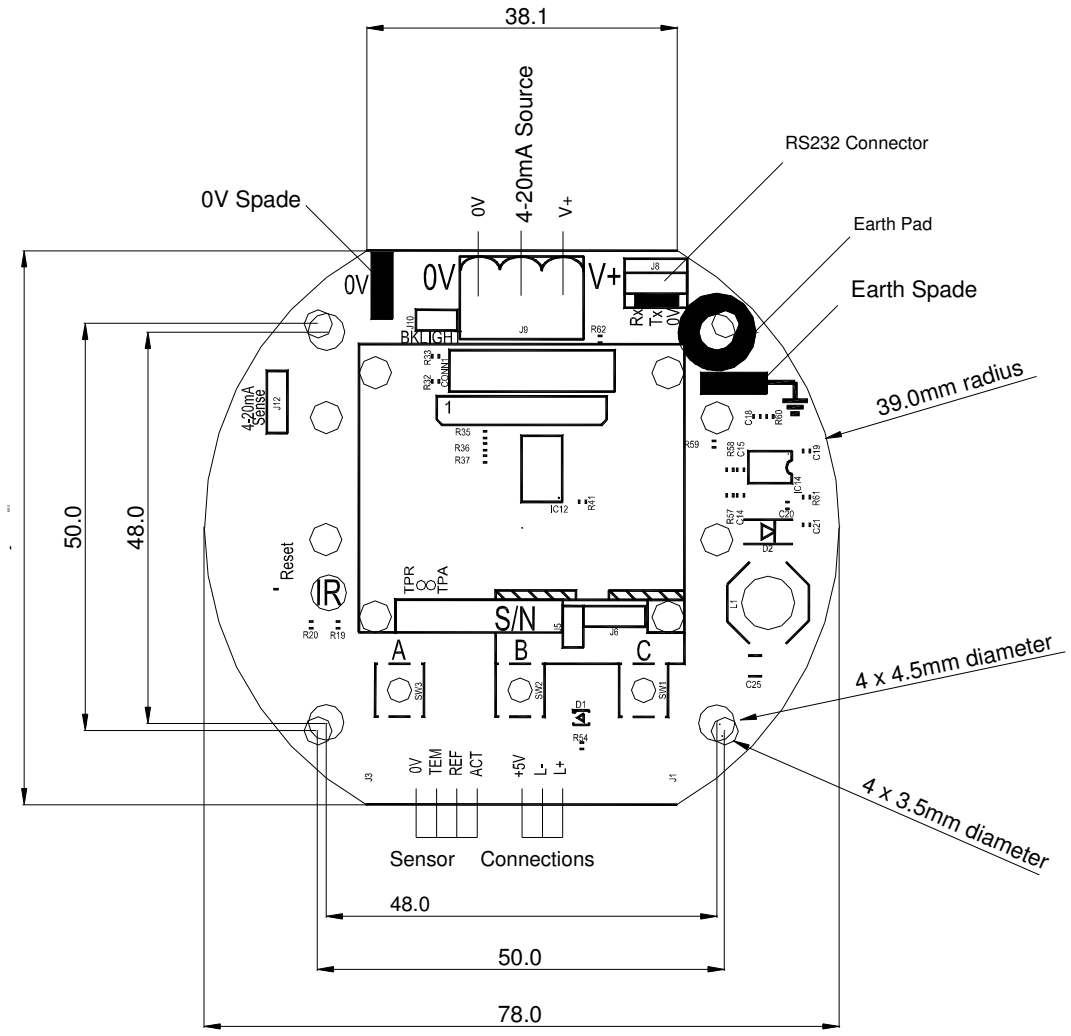
The power supply connects to the 0V and V+ terminals of the three-way junction box. The voltage range should be between 8VDC and 36VDC, with polarity protection integrated in CiriusX. The junction box also provides a 4-20mA output, forming a current loop between 0V through either a user-defined load resistor in source mode or an internal 100ΩΩ resistor in reverse mode. Output polarity protection is implemented. The output current can be measured as voltage across the corresponding current detection pins, with a detection voltage of 1mV/mA. RS232 communication is established via three compression connectors (Rx, Tx, and 0V).

When powered on and the LCD display is connected, CiriusX displays login information during internal self-test, followed by a warm-up phase showing gas concentration and unit values. If RS232 output is activated, it sends progress updates during startup and warm-up phases. Unless the transmitter detects a fault condition forcing the 4-20mA output to 2.0mA, the 4-20mA output remains set to 4mA throughout these phases. Upon successful warm-up completion, the 4-20mA output is calibrated to match gas concentrations: 4mA for zero-level gas and 20mA for full-scale concentration. Any detected fault will reset the 4-20mA output to 2.0mA.

Clairair Limited can provide technical support on the transmitter board circuit implementation.

outline dimension

All dimensions are in mm (±0.1mm unless otherwise stated)



Wiring & Signal

The power supply and 4-20mA output field wiring are connected to the three-way screw terminal box at the top edge of the circuit, as shown in the diagram above. The connection sequence is 0V,4-20mA signal, and V+ power supply. Both the power input and 4-20mA source output have polarity protection. The power supply is protected by a 400mA resettable PTC fuse. Voltage monitoring can be performed through two detection pins on the left side of the display area, allowing real-time monitoring of the 4-20mA signal current with a voltage-to-current ratio of 1mV per mA.

The sensor is connected to the right-angle connector at the lower edge of the base circuit via EH compression. Four connectors are connected to the 0V, temperature, active output, and reference output terminals. Three contactors are connected to the +5V sensor power supply, while the lamp's negative and positive terminals are also connected.

For the convenience of grounding, flat joints and grounding washers through the fixing holes are provided, as shown in the figure above.

The two LCD displays are inserted into two rows of 8-way display connectors near the three-way screw junction box. The backlight of the LCD display can be turned on using the backlight connector located above the display connectors.

Absolute Maximum Rated Parameter

Environmental temperature range: -40°C~ +75°C (without LCD display),
-20°C~ +50°C (including LCD display)

service voltage： 36V DC

Operational Notes

Static sensitive equipment

The Sirius X transmitter and related sensors contain electrostatic sensitive components. Follow anti-static precautions when using the product.

Function

Unless otherwise specified, all data obtained are acquired using:
The power supply voltage is 24V, the ambient temperature (20°C ~25°C), the ambient air pressure (995 hPa ~1020 hPa), and the Cirius1 hydrocarbon IR sensor is connected and powered by the circuit.

Power supply voltage range	8V DC – 36V DC
Power consumption with backlight	<1.5W + (4-20mA output current * supply voltage)
Power consumption without backlight	<1.0W + (4-20mA output current * supply voltage)
4-20mA output resolution 4-20	6 µA
mA maximum output range	23.2 mA (120%FS)
4-20mA under-range output	2 mA (-12.5%FS)
lower limit 4-20mA fault output	2 mA
The maximum 4-20mA loop resistance in the 4-20mA source mode = (V supply-5.7)/ 0.0232	100Ω @ 8VDC power supply 270Ω @ 12VDC power supply 780Ω @24VDC power supply
Minimum 4-20mA supply voltage in reverse mode 4-20mA	5.0V
Maximum 4-20mA supply voltage in reverse mode 4-20mA	30.0V
Single capacity of field wiring connector	0.14–2.5 mm^2 solid, 0.14–1.5 mm^2 stranded, 26–14 AWG
On-site wiring connector double capacity	0.14–1 mm^2 solid, 0.14–0.75 mm^2 stranded, 26–17 AWG
RS232 port baud rate	9600 baud
preheating time	<30s (to start working)
long	68mm
wide	Maximum 78mm (radius)
Above the height of the PCB surface (not shown)	Maximum 14mm
Higher than the height of the PCB surface (including display)	Maximum 20mm
Deeper than the surface of the PCB	Max 4.5mm
PCB thickness	1.6mm
Weight (excluding display)	27g
Weight (including display)	45g
lashing eye （a）	4 x M4 gap 48mm matrix
lashing eye （b）	4 x M3 gap 50mm matrix
mean free error time	> 5 years
relative humidity：	0 -95% RH no condensation
operating temperature range：	-30°C ~ +70°C (without display) -20°C~ +50°C (with display)
Storage temperature range:	-40°C ~+80°C (without display) -20°C ~ +50°C (with display)

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