3MNF/F CiTiceL®

Nitric Oxide (NO) Gas Sensor with mV Output
Part Number: MFF60-014

Key Features & Benefits:

- **Robust 3-Series packaging**
- **Factory calibrated mV output**

Technical Specifications

MEASUREMENT

Sensor Type Used	3NF/F
Maximum Range	5000 ppm NO
Sensitivity	1 mV/ppm ± 5%
Filter	To remove SO_2
Baseline Offset (Clean Air)	±1 mV
Response Time (T_{90})	<10 Seconds at 20°C
Resolution	1 ppm
Zero Shift (-20°C to +40°C)	<30 ppm equivalent
Repeatability	2% of signal
Linearity	Linear

ELECTRICAL

Power Supply Required	7 to 18 VDC single-ended or ±3.5 to ±9 VDC dual
Power Consumption	250 µA @ 9 VDC
Calibration	Via built-in span and zero potentiometers (Refer to OP14)

MECHANICAL

Weight	38 g (with connector)
Body Material	20% glass filled polypropylene
Position Sensitivty	None

ENVIRONMENTAL

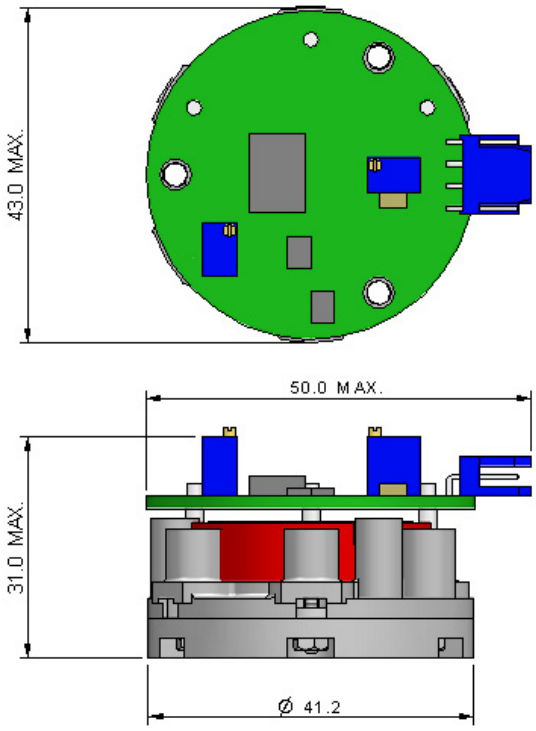
Operating Temperature Range	-20°C to +40°C*
Recommended Storage Temp	0°C to 20°C
Temperature Compensation	None
Operating Pressure Range	Atmospheric ± 10%
Pressure Coefficient	0.01% signal/mBar
Operating Humidity Range	15 to 90% RH non-condensing

LIFETIME

Long Term Sensitivity Drift	<2% signal loss/month
Expected Operating Life	Three years in air
Storage Life	6 months in CTL container
Standard Warranty	12 months from date of despatch

***** While not being used to measure NO, the 3MNF/F can withstand temperatures up to 50°C

Product Dimensions



All dimensions in mm
All tolerances ±0.15 mm unless otherwise stated

IMPORTANT NOTE:

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar. For further information on the operation and calibration of City Technology mV output sensors, please refer to OP14.

Poisoning

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation.
When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

Cross Sensitivity Table

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various other gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react. The figures are expressed as a percentage of the primary sensitivity (i.e. NO = 100%).

Gas	3MNF/F (%)
Nitric Oxide, NO	100
Carbon Monoxide, CO	0
Hydrogen Sulfide, H_2S	0
Sulfur Dioxide, SO_2	0
Nitrogen Dioxide, NO_2	<10
Hydrogen, H_2	0
Hydrogen Chloride, HCl	<5
Ethylene, C_2H_4	0

The cross-sensitivity values quoted are based on tests conducted on a small number of sensors. They are intended to indicate sensor response to gases other than the target gas. Sensors may behave differently with changes in ambient conditions and any batch may show significant variation from the values quoted.

SAFETY NOTE
This sensor is designed to be used in safety critical applications. To ensure that the sensor and/or instrument in which it is used, are operating properly, it is a requirement that the function of the device is confirmed by exposure to target gas (bump check) before each use of the sensor and/or instrument. Failure to carry out such tests may jeopardize the safety of people and property.

3NF/F CiTiceL

Performance Characteristics

Nominal Range	0-1000ppm
Maximum Overload	5000ppm
Inboard Filter	To remove effect of SO_2 in flue stream
Expected Operating Life	Three years in air
Output Signal	0.10 ± 0.02 μA/ppm
Resolution	1ppm
Operating Temperature Range *see Note1	-20°C to +40°C
Pressure Range	Atmospheric ± 10%
Pressure Coefficient	0.01% signal/mBar
T_{90} Response Time	≤25 seconds
Relative Humidity Range	15 to 90% non-condensing
Typical Baseline Range (pure air)	0 to +12ppm equivalent
Maximum Zero Shift (+20°C to +40°C)	30ppm equivalent
Long Term Output Drift	<2% signal loss/month
Recommended Load Resistor	10 Ω
Bias Voltage	+300mV
Repeatability	2% of signal
Output Linearity	Linear

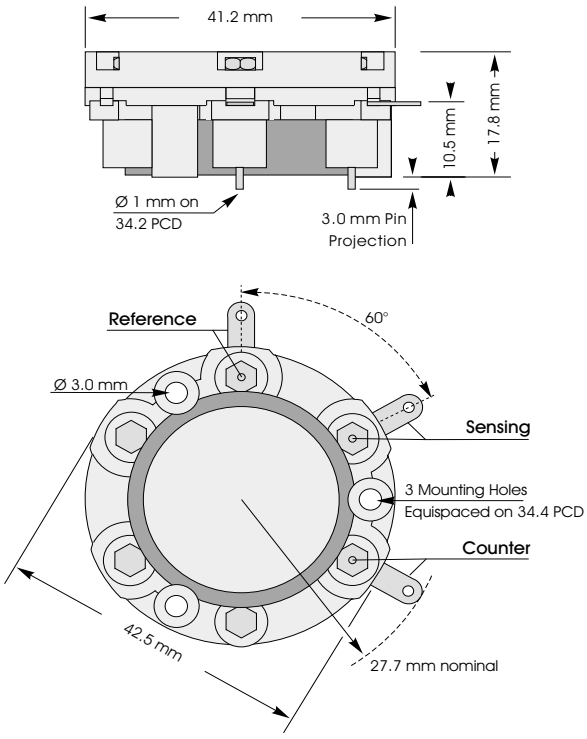
Note1: While not being used to measure NO the 3NF/F can withstand temperatures of up to +50°C

N.B. All performance data is based on conditions at 20°C, 50%RH, and 1013mBar

Physical Characteristics

Weight	22g
Position Sensitivity	None
Storage Life	Six months in CTL container
Recommended Storage Temperature	0-20°C
Warranty Period	12 months from date of despatch

Outline Dimensions



All tolerances ±0.15mm unless otherwise stated.

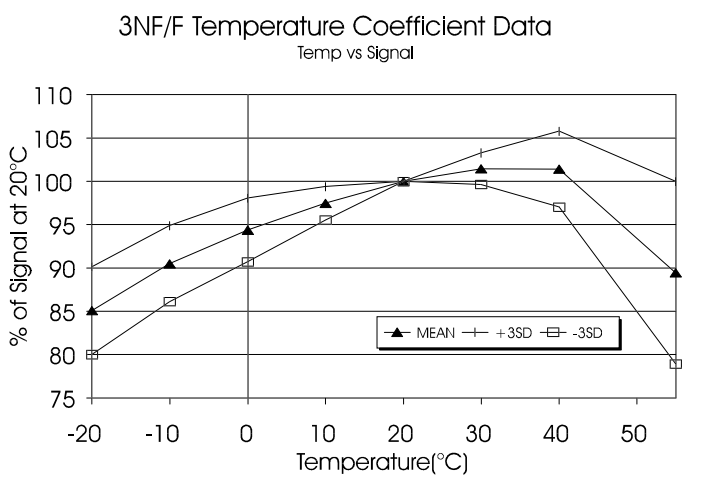
3NF/F shown with side tags and tin pins.

Do not solder to pin connections

Temperature Dependence

The output of a CiTiceL can vary with temperature. The graph here shows the variation in output with temperature for 3NF/F CiTiceLs based on a sample of about 16 sensors. The results are shown in the graph as a mean for the batch, and expressed as a percentage of the signal at 20°C.

From a statistical viewpoint, for a sample of this size, the range in values observed for all sensors of this type will fall within a range three times the standard deviation above or below the mean. Assuming therefore this sample is typical, then the temperature behaviour of all 3NF/F CiTiceLs will fall in the band +3SD to -3SD.



Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. The table below shows the typical response of 3NF/F sensors to a number of common cross-interfering gases. The figures are expressed as a percentage of the primary sensitivity (i.e. nitric oxide = 100%).

Gas	Response	Gas	Response
Carbon monoxide:	0	**Hydrogen:**	0
Hydrogen sulphide:	0	**Hydrogen chloride:**	<5
Sulphur dioxide:	0	**Ethylene:**	0
Nitrogen dioxide:	<10		

** For details of other possible cross-interfering gases contact City Technology.**

Ordering Information

The 3NF/F Nitric Oxide CiTiceL is available with side tags, gold-plated PCB pins, or both PCB pins and side tags. To ensure the appropriate option is supplied care must be taken to provide the correct code when ordering.

Type 3NF/F:- With side tag and PCB pin connections - **3NF/F**
With side tag connection - **3NF/F(S)**
With gold-plated PCB pin connection - **3NF/F(G)**

Also available with bias board - 3BNF/F

Performance Characteristics

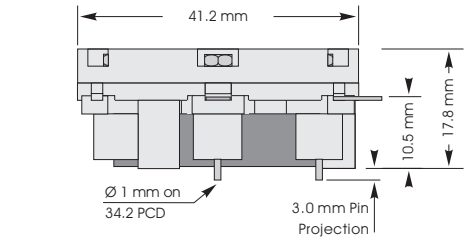
Nominal Range	0-100ppm
Maximum Overload	300ppm
Expected Operating Life	Three years in air
Output Signal	0.55 ± 0.11 µA/ppm
Resolution	0.5ppm
Temperature Range	-20°C to +50°C
Pressure Range	Atmospheric ± 10%
Pressure Coefficient	0.016% signal/mBar
T_{90} Response Time	≤10 seconds
Relative Humidity Range	15 to 90% non-condensing
Typical Baseline Range (pure air)	0 to +3ppm equivalent
Maximum Zero Shift (+20°C to +40°C)	9ppm equivalent
Long Term Output Drift	<2% signal loss/month
Recommended Load Resistor	10 Ω
Bias Voltage	+300mV
Repeatability	2% of signal
Output Linearity	Linear

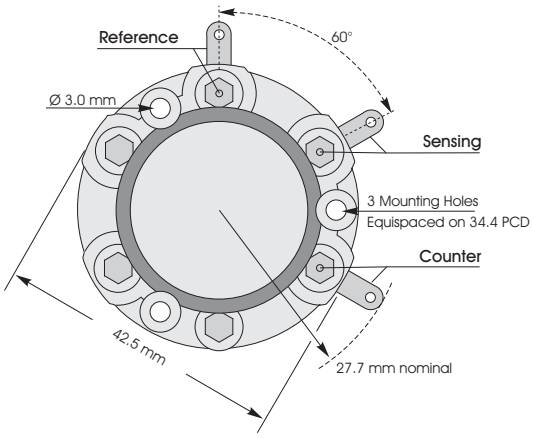
N.B. All performance data is based on conditions at 20°C, 50%RH, and 1013mBar

Physical Characteristics

Weight	22g
Position Sensitivity	None
Storage Life	Six months in CTL container
Recommended Storage Temperature	0-20°C
Warranty Period	12 months from date of despatch

Product Dimensions





All tolerances ±0.15mm unless otherwise stated.
Sensor shown with side tags and gold pins.

Ordering Information

The 3NT Nitric Oxide CiTiceL is available with side tags, gold-plated PCB pins, or both PCB pins and side tags. To ensure the appropriate option is supplied care must be taken to provide the correct code when ordering.

Type 3NT
With side tag and PCB pin connections - **3NT**
With side tag connection - **3NT(S)**
With gold-plated PCB pin connection - **3NT(G)**

Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. 3NT CiTiceLs have been tested with a number of commonly cross-interfering gases and the results are given below. The table shows the typical response to be expected from a sensor when exposed to a given test gas concentration (relevant to safety, e.g. TLV levels).

Gas	Conc.	3NT	Gas	Conc.	3NT
Carbon monoxide:	300ppm	0ppm	**Chlorine:**	1ppm	0ppm
Hydrogen sulphide:	15ppm	≈5ppm	**Hydrogen:**	100ppm	0ppm
Sulphur dioxide:	5ppm	0ppm	**Hydrogen cyanide:**	10ppm	0ppm
Nitrogen dioxide:	5ppm	<1.5ppm	**Hydrogen chloride:**	5ppm	<1ppm
Nitrous oxide:	100ppm	0ppm	**Ethylene:**	100ppm	0ppm

For details of other possible cross-interfering gases contact City Technology.

SAFETY NOTE
This sensor is designed to be used in safety critical applications. To ensure that the sensor and/or instrument in which it is used, are operating properly, it is a requirement that the function of the device is confirmed by exposure to target gas (bump check) before each use of the sensor and/or instrument. Failure to carry out such tests may jeopardize the safety of people and property.

4NT CiTiceL®

Performance Characteristics

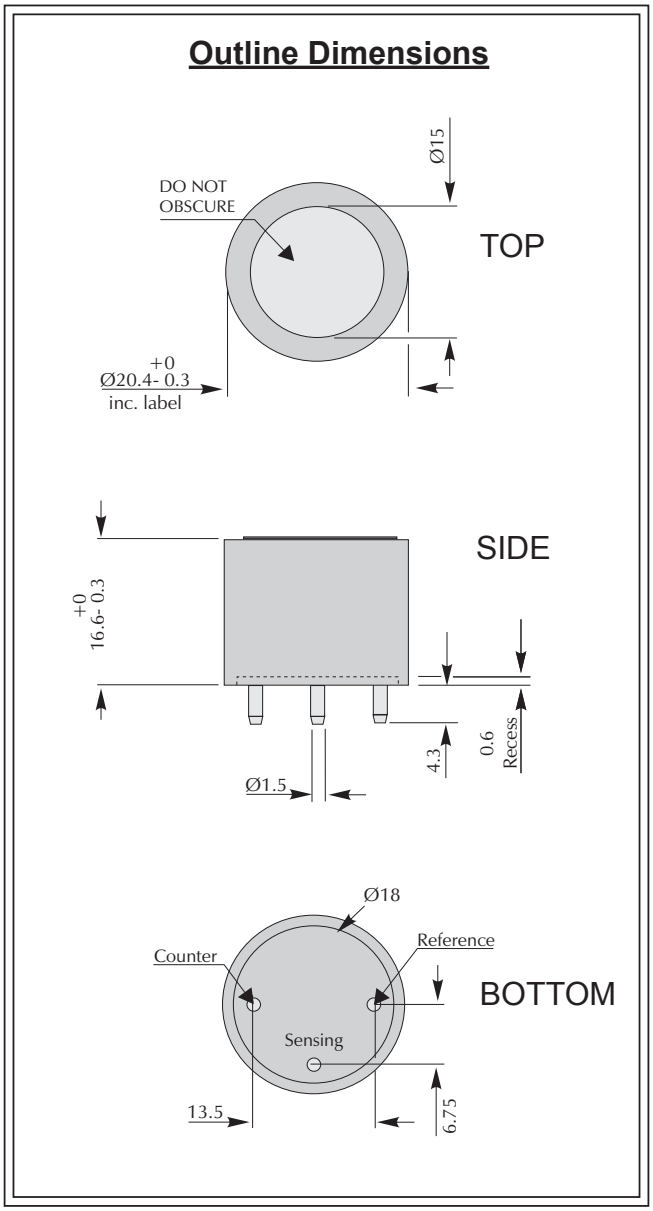
Nominal Range	0-250 ppm
Maximum Overload	1000 ppm
Expected Operating Life	Two years in air
Output Signal	0.4 ± 0.08 µA/ppm
Resolution	0.5 ppm
Temperature Range	-20°C to +50°C
Pressure Range	Atmospheric ± 10%
T_{90} Response Time	<40 seconds
Relative Humidity Range	15 to 90% non-condensing
Typical Baseline Range (pure air)	0 to +3 ppm
Maximum Zero Shift (+20°C to +40°C)	<4 ppm
Long Term Output Drift	<2% signal loss/month
Recommended Load Resistor	10 Ω
Bias Voltage	+300 mV
Repeatability	<2% of signal
Output Linearity	Linear

N.B. All performance data is based on conditions at 20°C, 50%RH, and 1013 mBar

Physical Characteristics

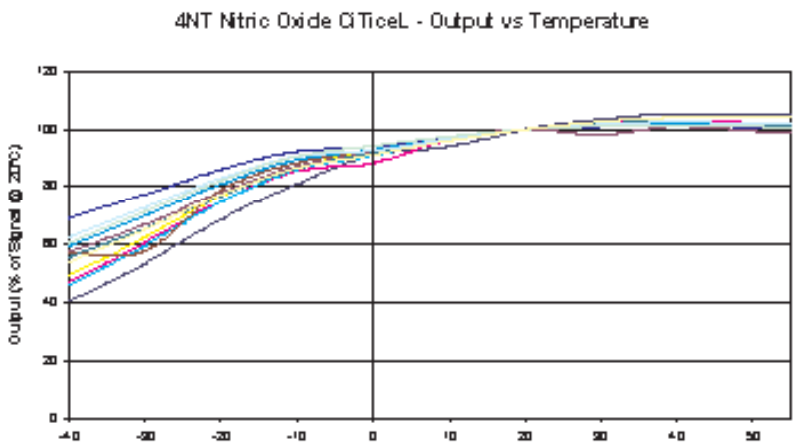
Weight	5 g (approx.)
Position Sensitivity	None
Storage Life	Six months in CTL container
Recommended Storage Temperature	0-20°C
Warranty Period	12 months from date of despatch

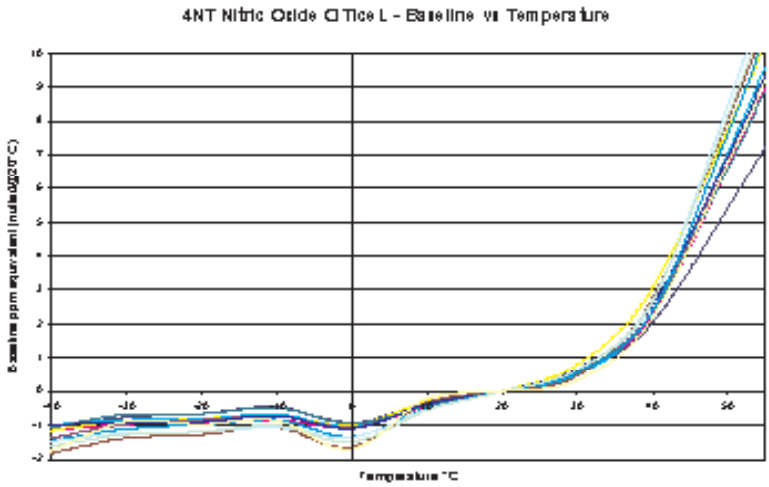
Outline Dimensions



All dimensions in mm
All tolerances ±0.15mm unless otherwise stated

IMPORTANT NOTE: Connection should be made via PCB sockets only. Soldering to the pins will seriously damage your sensor.





Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. 4NT CiTiceLs have been tested with a number of commonly cross-interfering gases and the results are given below. The table shows the typical response to be expected from a sensor when exposed to a given test gas concentration (relevant to safety, e.g. TLV levels).

Gas	Conc.	4NT	Gas	Conc.	4NT
Carbon monoxide:	300ppm	0ppm	**Nitrogen dioxide**	5ppm	<1.5ppm
Sulphur dioxide:	5ppm	0ppm	**Hydrogen sulphide**	15ppm	~1.5ppm

For details of other possible cross-interfering gases contact City Technology.

SAFETY NOTE
This sensor is designed to be used in safety critical applications. To ensure that the sensor and/or instrument in which it is used, are operating properly, it is a requirement that the function of the device is confirmed by exposure to target gas (bump check) before each use of the sensor and/or instrument. Failure to carry out such tests may jeopardize the safety of people and property.

5NF CiTiceL®

Performance Characteristics

Nominal Range	0-1000ppm
Maximum Overload	5000ppm
Internal Filter	To remove effect of SO_2
Internal Filter Life	25,000 ppm hours ($1000ppm\ SO_2$ at 200ml/min)
Expected Operating Life	Three years in air
Output Signal	0.10 ± 0.02 µA/ppm
Resolution	1ppm
Operating Temperature Range *see Note1	-20°C to +40°C
Pressure Range	Atmospheric ± 10%
Pressure Coefficient	0.01 % signal/mbar
T_{90} Response Time	< 30 seconds
Relative Humidity Range	15 to 90 % non-condensing
Typical Baseline Range (pure air)	0 to +12ppm equivalent
Maximum Zero Shift (+20°C to +40°C)	30ppm equivalent
Long Term Output Drift	<2% signal loss/month
Recommended Load Resistor	10Ω
Bias Voltage	+300mV
Repeatability	2% of signal
Output Linearity	Linear

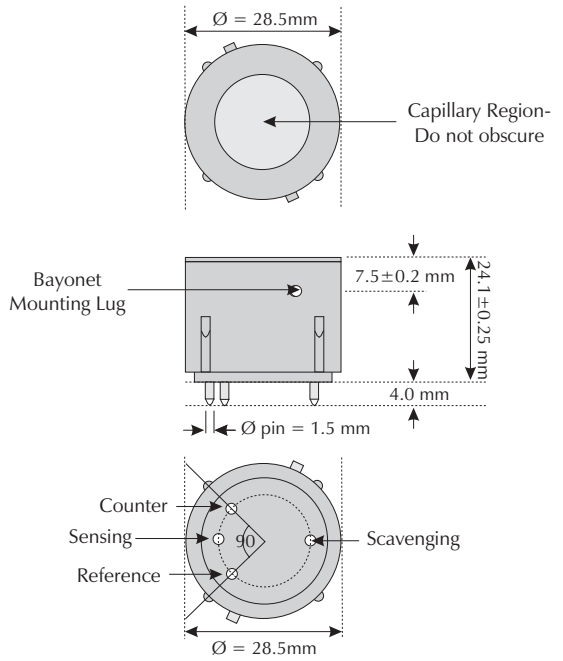
Note1: While not being used to measure NO the 5NF can withstand temperatures of up to +50°C

N.B. All performance data is based on conditions at 20°C, 50%RH, and 1013mBar

Physical Characteristics

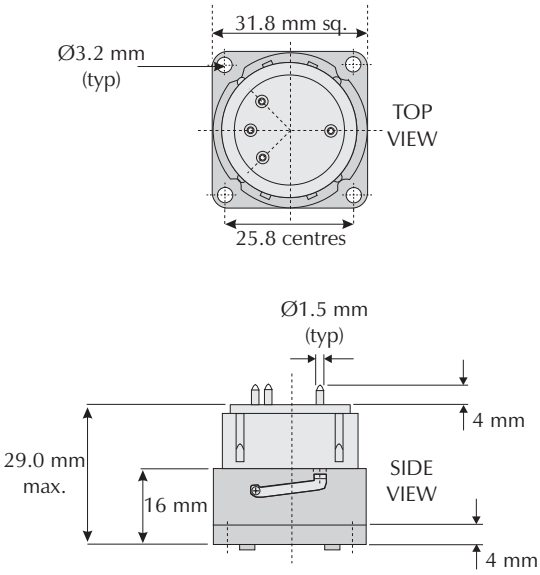
Colour Coding	Orange
Weight	13g
Position Sensitivity	None
Storage Life	Six months in CTL container
Recommended Storage Temperature	0-20°C
Warranty Period	12 months from date of despatch

Outline Sensor Dimensions

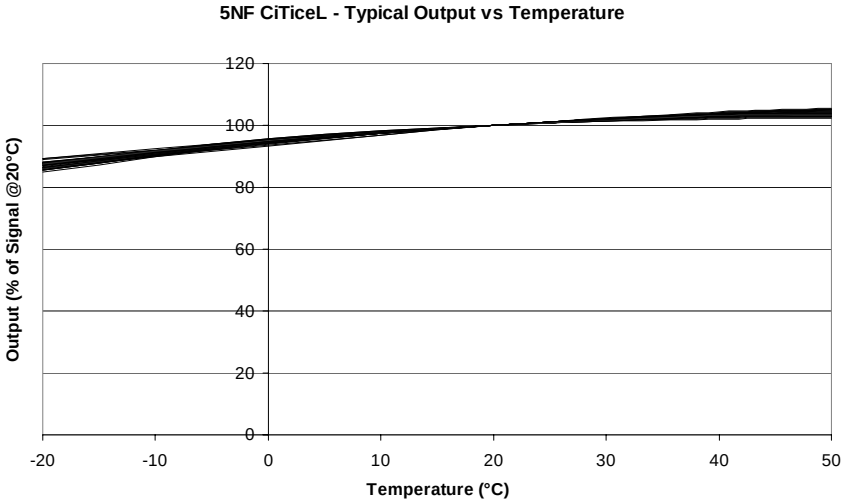


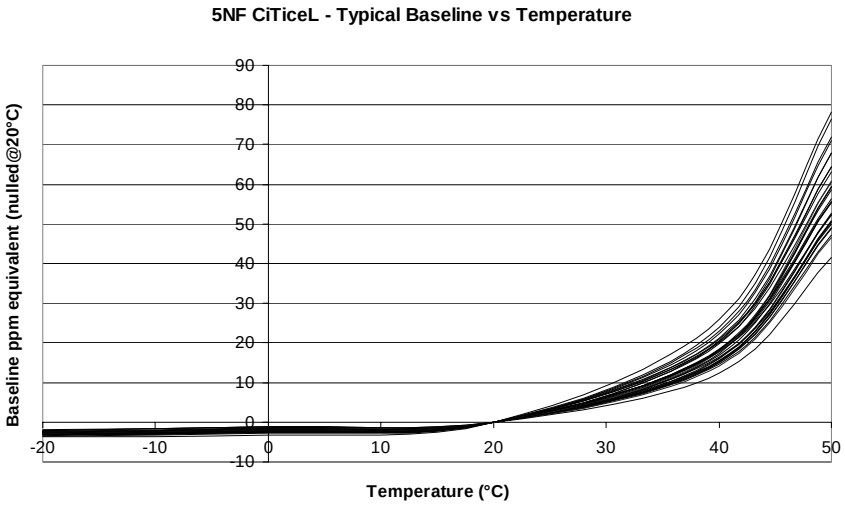
(Four pins on 17.0 mm PCD)

With Bayonet Fitting



All tolerances ±0.15mm unless otherwise stated





Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. The table below shows the typical response of 5NF sensors to a number of common cross-interfering gases. The figures are expressed as a percentage of the primary sensitivity (i.e. nitric oxide = 100%).

Gas	Response	Gas	Response
Carbon monoxide:	0	**Hydrogen:**	0
Hydrogen sulphide:	0	**Hydrogen chloride:**	<5
Sulphur dioxide:	0	**Nitrogen dioxide:**	<10

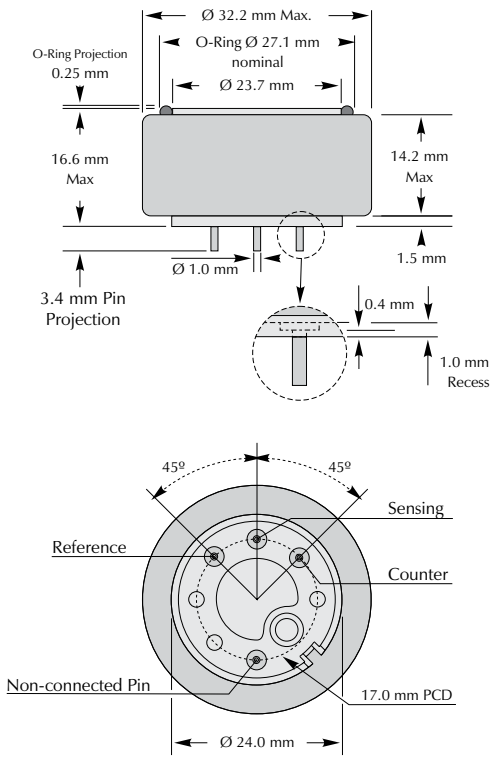
** For details of other possible cross-interfering gases contact City Technology.**

7NT Compact CiTiceL®

Performance Characteristics

Nominal Range	0-100 ppm
Maximum Overload	1500 ppm
Expected Operating Life	Three years in air
Output Signal	0.55 ± 0.11 µA/ppm
Resolution	0.5 ppm
Temperature Range	-20°C to +50°C
Pressure Range	Atmospheric ± 10%
Pressure Coefficient	0.016% signal/mBar
T_{90} Response Time	≤15 seconds
Relative Humidity Range	15 to 90% non-condensing
Typical Baseline Range (pure air)	0 to +3 ppm equivalent
Maximum Zero Shift (+20°C to +40°C)	9 ppm equivalent
Long Term Output Drift	<2% signal loss/month
Recommended Load Resistor	10 Ω
Bias Voltage	+300 mV
Repeatability	2% of signal
Output Linearity	Linear

N.B. All performance data is based on conditions at 20°C, 50%RH, and 1013 mBar



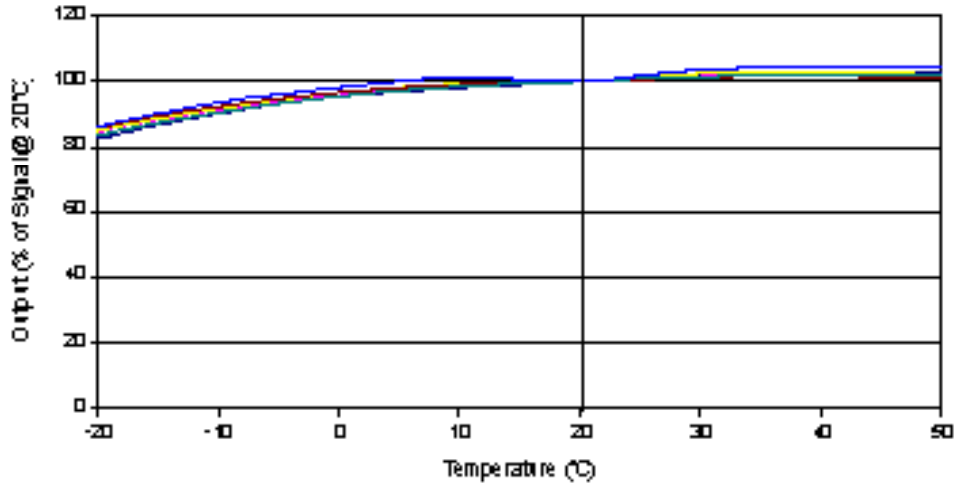
All tolerances ±0.15 mm unless otherwise stated.
Do not solder to pin connections

IMPORTANT NOTE: Connection should be made via PCB sockets only. Soldering to the pins will render your warranty void.

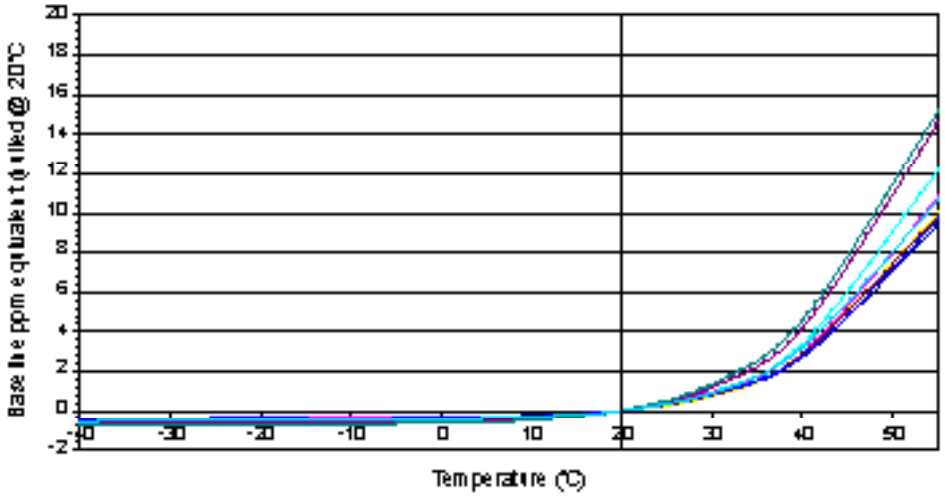
Physical Characteristics

Weight	17 g.
Position Sensitivity	None
Storage Life	Six months in CTL container
Recommended Storage Temperature	0-20°C
Warranty Period	12 months from date of despatch

7NT Nitric oxide CiTiceL - Output vs Temperature



7NT Nitric oxide CiTiceL - Baseline vs Temperature



Cross-sensitivity Data

CiTiceLs may exhibit a response to certain gases in a sample other than the target gas. 7NT CiTiceLs have been tested with a number of commonly cross-interfering gases and the results are given below. The table shows the typical response to be expected from a sensor when exposed to a given test gas concentration (relevant to safety, e.g. TLV levels).

Gas	Conc.	7NT	Gas	Conc.	7NT
Carbon monoxide:	300ppm	0ppm	**Chlorine:**	1ppm	0ppm
Hydrogen sulphide:	15ppm	≈5ppm	**Hydrogen:**	100ppm	0ppm
Sulphur dioxide:	5ppm	0ppm	**Hydrogen cyanide:**	10ppm	0ppm
Nitrogen dioxide:	5ppm	<1.5ppm	**Hydrogen chloride:**	5ppm	<1ppm
Nitrous oxide:	100ppm	0ppm	**Ethylene:**	100ppm	0ppm

Ordering Information:

Also available with bias board - 7BNT

SAFETY NOTE

This sensor is designed to be used in safety critical applications. To ensure that the sensor and/or instrument in which it is used, are operating properly, it is a requirement that the function of the device is confirmed by exposure to target gas (bump check) before each use of the sensor and/or instrument. Failure to carry out such tests may jeopardize the safety of people and property.

MNO-1 & MNO-1B MediceLs®

Nitric Oxide (NO) Gas Sensor

Part Numbers: AF0F4-H00 (standard) AF0F7-H00 (with Bias Board)

Key Features & Benefits:

- Capable of continuous measurement
- 4th electrode for additional temperature stability

Technical Specifications

MEASUREMENT

Operating Principle	4-electrode electrochemical
Measurement Range	0-100 ppm
Maximum Overlaod	1500 ppm
Output Signal	0.25 ± 0.05 μA/ppm
Response Time (T_{90})	< 10 seconds
Typical Baseline Offset (clean air)	-1 to +1 ppm equivalent
Repeatability	2% of signal
Linearity	Linear

ELECTRICAL

Recommended Load Resistor	10 Ω
Bias Voltage	+300 mV
Recommended Gain	1.1

MECHANICAL

Weight	21 g (nominal)
Housing Material	20% glass-filled polypropylene
Colour Coded Ring	Orange
Orientation	Any

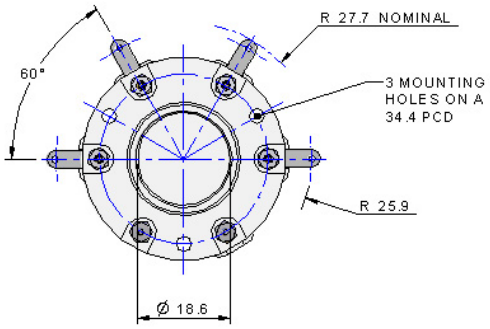
ENVIRONMENTAL

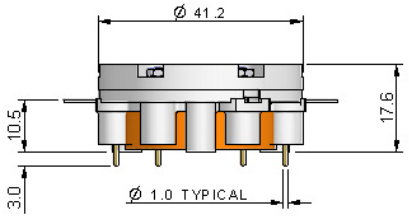
Typical Applications	Inhaled Nitric Oxide Therapy
Operating Temperature Range	-20°C to +50°C
Recommended Storage Temp	0°C to +20°C
Operating Pressure Range	800 - 1200 mBar
Differential Pressure Range	±100 mBar
Storage Pressure Range	800 - 1200 mBar
Operating Humidity Range	15% to 90% RH non-condensing

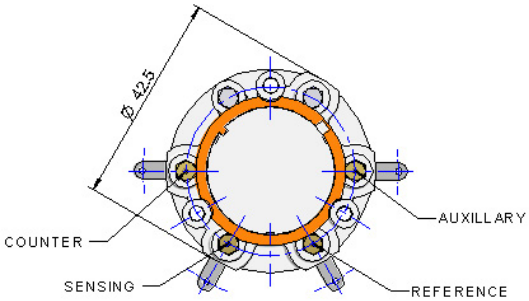
LIFETIME

Long Term Ouput Drift	Depends on usage level
Expected Operating Life	1 year
Standard Warranty	12 months from date of despatch

Product Dimensions







All dimensions in mm
All tolerances ±0.15 mm
unless otherwise stated

IMPORTANT NOTE:

Connection should be made via recommended mating parts only. Soldering to the sensor will damage it and invalidate the warranty.

All performance data is based on measurements made with cylinder gases using a flow rate of 100 ml/min. Conditions at 20°C, 50% RH and 1013 mBar, using City Technology recommended circuitry. For sensor performance data under other conditions, contact City Technology.

Continuous Exposure

After continuous exposure to high concentrations of NO for several days the sensor may take some time to stabilise in fresh air before further use is advised. During this recovery period high baseline offsets may be seen. City Technology recommend 24 hours recovery period before reuse following exposures which exceed 4 days at levels of 80 ppm or above.

Poisoning

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation.
When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

Cross Sensitivity Table

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react.

Gas	Response
Carbon Monoxide (CO)	None
Nitrous Oxide (N_2O)	None
Nitrogen Dioxide (NO_2)	<25%
Desflurane	None
Isoflurane	None
Halothane	None

SAFETY NOTE
Although this product is not designed for use in life safety applications, if it is used in such applications it is a requirement that the function of the device is confirmed by exposure to target gas (bump check) before each use of the sensor and/or instrument, to ensure that the sensor and/or instrument in which it is used, are operating properly. Failure to carry out such tests may jeopardize the safety of people and property.

MNO-2 & MNO-2B MediceLs®

Nitric Oxide (NO) Gas Sensor

Part Numbers: AF7F4-400 (standard) AF7F7-400 (with Bias Board)

Key Features & Benefits:

- Capable of continuous measurement
- 4th electrode for additional temperature stability

Technical Specifications

MEASUREMENT

Operating Principle	4-electrode electrochemical
Measurement Range	0-100 ppm
Maximum Overlaod	1500 ppm
Output Signal	0.25 ± 0.05 μA/ppm
Response Time (T_{90})	< 10 seconds
Typical Baseline Offset (clean air)	-1 to +1 ppm equivalent
Repeatability	2% of signal
Linearity	Linear

ELECTRICAL

Recommended Load Resistor	10 Ω
Bias Voltage	+300 mV
Recommended Gain	1.1

MECHANICAL

Weight	16 g (nominal)
Housing Material	20% glass-filled polypropylene
Orientation	Any

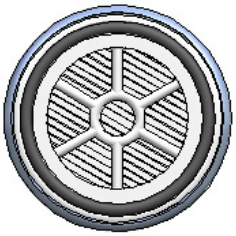
ENVIRONMENTAL

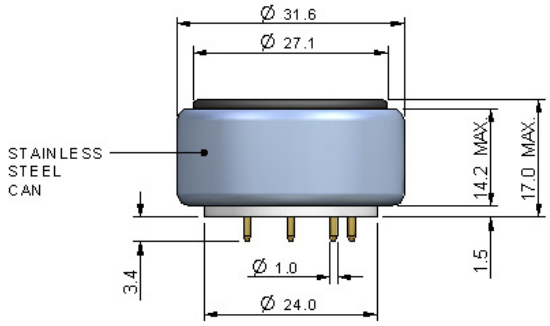
Typical Applications	Inhaled Nitric Oxide Therapy
Operating Temperature Range	-20°C to +50°C
Recommended Storage Temp	0°C to +20°C
Operating Pressure Range	800 - 1200 mBar
Differential Pressure Range	±100 mBar
Storage Pressure Range	800 - 1200 mBar
Operating Humidity Range	15% to 90% RH non-condensing

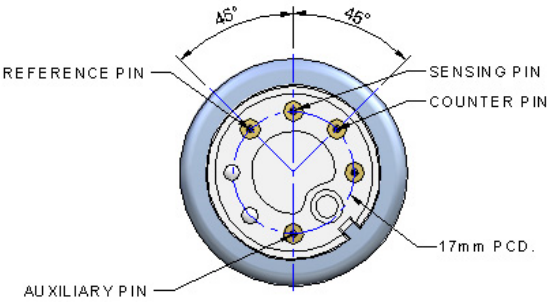
LIFETIME

Long Term Ouput Drift	Varies with usage levels
Expected Operating Life	1 year
Standard Warranty	12 months from date of despatch

Product Dimensions







All dimensions in mm
All tolerances ±0.15 mm
unless otherwise stated

IMPORTANT NOTE:

Connection should be made via recommended mating parts only. Soldering to the sensor will damage it and invalidate the warranty.

All performance data is based on measurements made with cylinder gases using a flow rate of 100 ml/min. Conditions at 20°C, 50% RH and 1013 mBar, using City Technology recommended circuitry. For sensor performance data under other conditions, contact City Technology.

Continuous Exposure

After continuous exposure to high concentrations of NO for several days the sensor may take some time to stabilise in fresh air before further use is advised. During this recovery period high baseline offsets may be seen. City Technology recommend 24 hours recovery period before reuse following exposures which exceed 4 days at levels of 80 ppm or above.

Poisoning

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation.
When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

Cross Sensitivity Table

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react.

Gas	Response
Carbon Monoxide (CO)	None
Nitrous Oxide (N_2O)	None
Nitrogen Dioxide (NO_2)	<25%
Desflurane	None
Isoflurane	None
Halothane	None

SAFETY NOTE
Although this product is not designed for use in life safety applications, if it is used in such applications it is a requirement that the function of the device is confirmed by exposure to target gas (bump check) before each use of the sensor and/or instrument, to ensure that the sensor and/or instrument in which it is used, are operating properly. Failure to carry out such tests may jeopardize the safety of people and property.

NX1 CiTiceL®

Nitric Oxide (NO) Gas Sensor
Part Number: AF747-B05

Key Features & Benefits:

- **Designed for Automotive Applications**
- **Fast Response**

Technical Specifications

MEASUREMENT

Operating Principle	3-electrode electrochemical
Measurement Range	0-5,000 ppm NO
Filter	To remove effect of SO_2 in gas stream
Sensitivity	0.05 ± 0.01 µA/ppm
Response Time (T_{95})	<8 Seconds at 20°C
Baseline Offset (clean air)	0 to +12 ppm equivalent
Zero Shift (0°C to +40°C)	<30 ppm equivalent
Resolution	Dependent on electronics (1 ppm when used with recommended electronics)
Repeatability	2% of signal
Linearity	Linear

ELECTRICAL

Recommended Load Resistor	10 Ω
Bias Voltage	+300 mV

MECHANICAL

Weight	32 g (nominal)
Housing Material	ABS
Orientation	Any

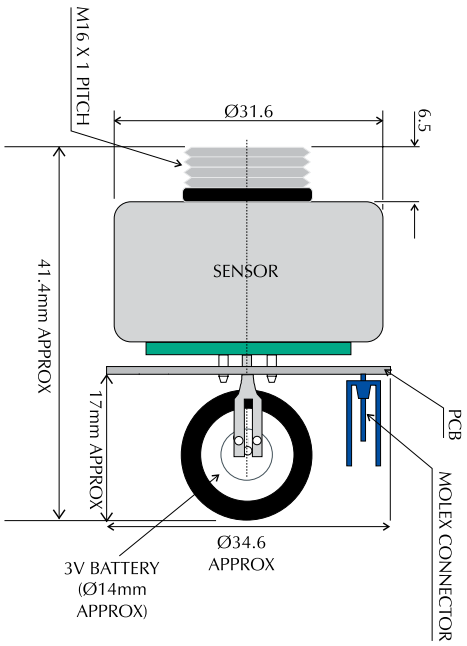
ENVIRONMENTAL

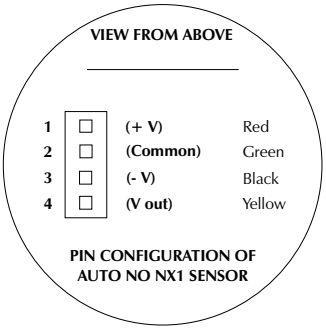
Operating Temperature Range	-20°C to +50°C
Recommended Storage Temp	0°C to 25°C in CTL packaging
Operating Pressure Range	800 to 1100 mBar
Pressure Coefficient	0.02% signal/mBar
Operating Humidity Range	15 to 90% RH non-condensing

LIFETIME

Long Term Sensitivity Drift	Typically <5% signal loss/year
Storage Life	6 months in CTL container
Standard Warranty	15 months from date of despatch

Product Dimensions





All dimensions in mm
All tolerances ±0.15 mm unless otherwise stated

IMPORTANT NOTES:

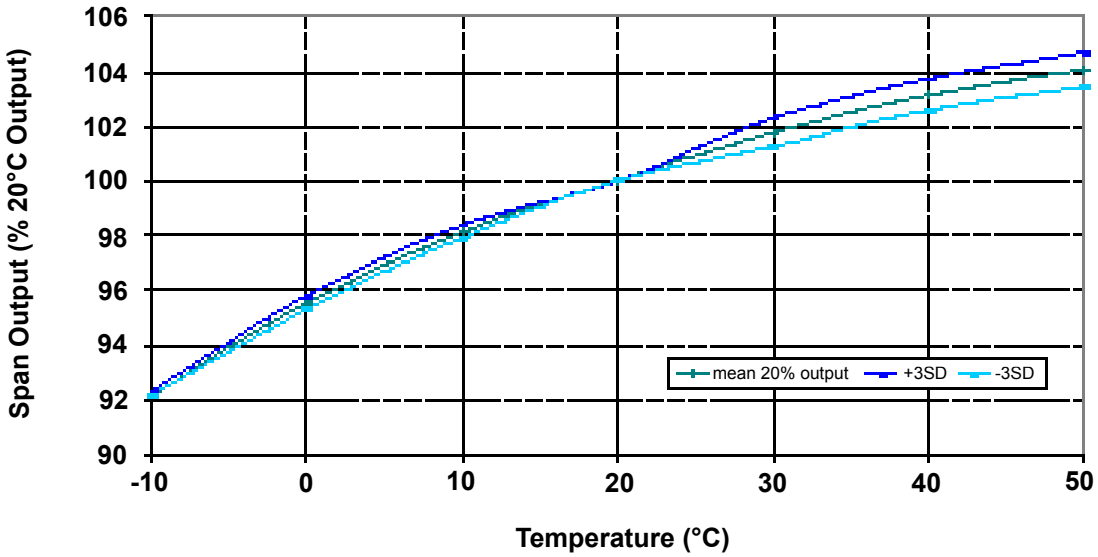
Prolonged exposure to high or low humidity may lead to an increased response time.

Connection should be made via PCB sockets only. Soldering to the pins will seriously damage your sensor and invalidate the warranty.

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar, using City Technology recommended circuitry. For sensor performance data under other conditions, contact City Technology.

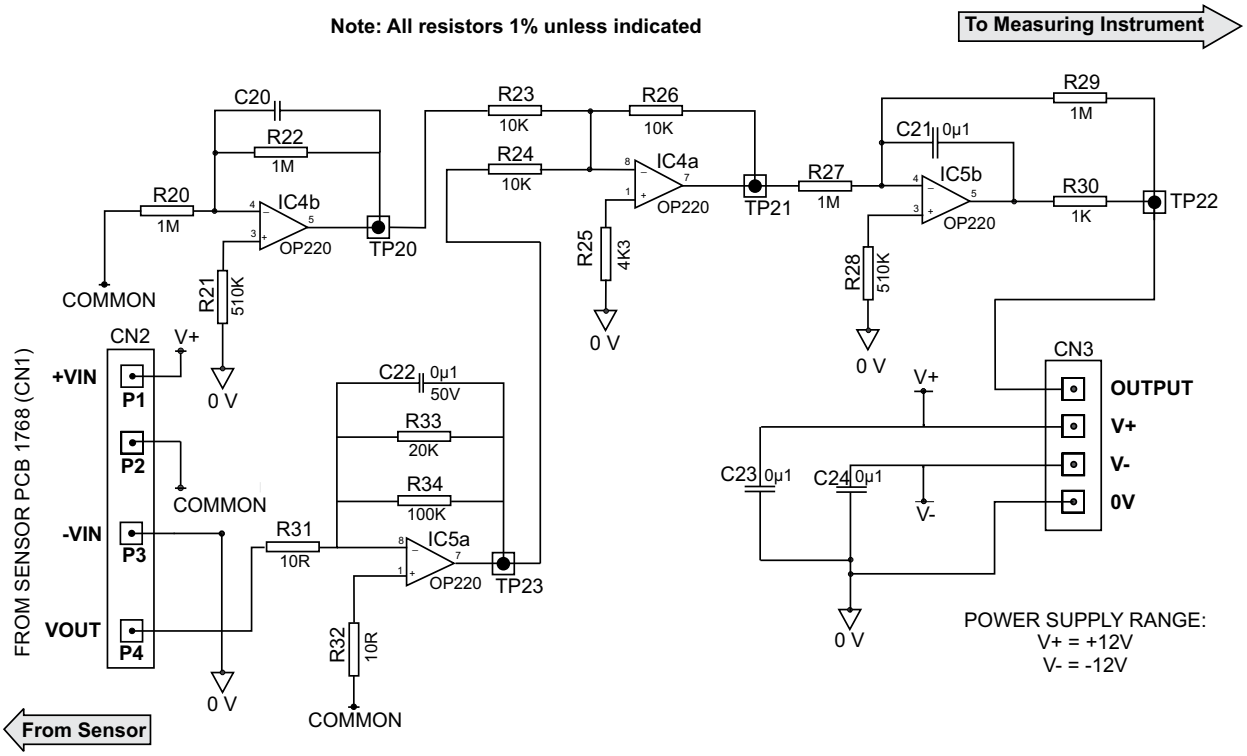
Automotive NX1 CiTiceL® Part Details	
MOLEX HEADER (0.100"/2.54mm)	Molex Part Number 22-29-2041
CRIMP TERMINAL HOUSING (MATING PART)	Molex Part Number 22-01-2045

Typical Span Output vs Temperature (°C)



Recommended External Circuit for Sensor

This diagram shows the recommended operating circuit for the NX1 CiTiceL, designed to give an output of 0-5 V over the range 0-5000 ppm, where the sensitivity is 60 nA/ppm.



Poisoning

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation.
When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

SAFETY NOTE
Although this product is not designed for use in life safety applications, if it is used in such applications it is a requirement that the function of the device is confirmed by exposure to target gas (bump check) before each use of the sensor and/or instrument, to ensure that the sensor and/or instrument in which it is used, are operating properly. Failure to carry out such tests may jeopardize the safety of people and property.

T3NF/F CiTiceL®

Nitric Oxide (NO) Gas Sensor with Transmitter

Key Features & Benefits:

- **Robust 3-Series packaging**
- **Industry standard 4-20 mA output**

Technical Specifications

MEASUREMENT

Sensor Type Used	3NF/F
Filter	To remove SO_2
Output	4-20 mA d.c.
Response Time (T_{90})	<10 Seconds at 20°C
Resolution	1 ppm
Zero Shift (-20°C to +40°C)	<30 ppm equivalent
Repeatability	2% of signal
Linearity	Linear

ELECTRICAL

Power Supply Required	10 - 35 VDC single-ended
Output Impedance	4 MΩ
Calibration	Via built-in span and zero potentiometers

MECHANICAL

Mounting	Via mounting nose supplied
Weight	58 g including mounting accessory
Position Sensitivty	None

ENVIRONMENTAL

Operating Temperature Range	-20°C to +40°C (see note 1)
Recommended Storage Temp	0°C to 20°C
Temperature Compensation	None
Operating Pressure Range	Atmospheric ± 10%
Pressure Coefficient	0.01% signal/mBar
Operating Humidity Range	15 - 90% RH non-condensing

LIFETIME

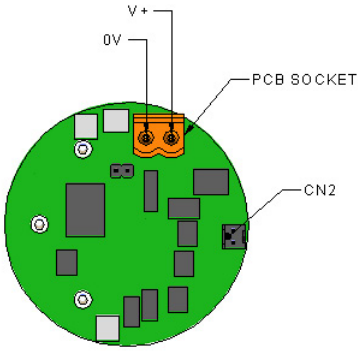
Long Term Sensitivity Drift	<2% signal loss/month
Expected Operating Life	Three years in air
Storage Life	6 months in CTL container
Standard Warranty	12 months from date of despatch

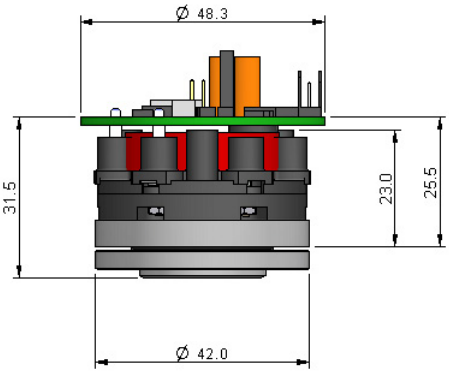
INote 1 : While not being used to measure NO, the T3NF/F can withstand temperatures of up to 50°C

IMPORTANT NOTE:

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar. For further information on the operation and calibration of City Technology 4-20mA transmitters, please refer to OP-12.

Product Dimensions





All dimensions in mm
All tolerances ±0.15 mm unless otherwise stated

RANGES AVAILABLE

3NF/F CiTiceL 4-20 mA Transmitters are available with the following precalibrated ranges, but can be recalibrated to intermediate ranges.

Range	Order Code
0-100 ppm	TF2F-1A
0-200 ppm	TF2G-1A
0-300 ppm	TF2H-1A
0-500 ppm	TF2I-1A
0-1000 ppm	TF2J-1A
0-2000 ppm	TF2K-1A

Poisoning

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation. Formaldehyde is known to temporally inhibit the operation of Nitric Oxide sensors.

When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

Cross Sensitivity Table

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various other gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react. The figures are expressed as a percentage of the primary sensitivity (i.e. NO = 100%).

Gas	3NF/F (%)
Nitric Oxide, NO	100
Carbon Monoxide, CO	0
Hydrogen Sulfide, H_2S	0
Sulfur Dioxide, SO_2	0
Nitrogen Dioxide, NO_2	<10
Hydrogen, H_2	0
Hydrogen Chloride, HCl	<5
Ethylene, C_2H_4	0

The cross-sensitivity values quoted are based on tests conducted on a small number of sensors. They are intended to indicate sensor response to gases other than the target gas. Sensors may behave differently with changes in ambient conditions and any batch may show significant variation from the values quoted.

SAFETY NOTE
This sensor is designed to be used in safety critical applications. To ensure that the sensor and/or instrument in which it is used, are operating properly, it is a requirement that the function of the device is confirmed by exposure to target gas (bump check) before each use of the sensor and/or instrument. Failure to carry out such tests may jeopardize the safety of people and property.

T3NT CiTiceL®

Nitric Oxide (NO) Gas Sensor with Transmitter

Key Features & Benefits:

- **Robust 3-Series packaging**
- **Industry standard 4-20 mA output**

Technical Specifications

MEASUREMENT

Sensor Type Used	3NT
Filter	None
Output	4-20 mA d.c.
Response Time (T_{90})	<10 Seconds at 20°C
Resolution	0.5 ppm
Zero Shift (-20°C to +40°C)	< 9 ppm equivalent
Repeatability	2% of signal
Linearity	Linear

ELECTRICAL

Power Supply Required	10 - 35 VDC single-ended
Output Impedance	4 MΩ
Calibration	Via built-in span and zero potentiometers

MECHANICAL

Mounting	Via mounting nose supplied
Weight	58 g including mounting accessory
Position Sensitivty	None

ENVIRONMENTAL

Operating Temperature Range	-20°C to +50°C
Recommended Storage Temp	0°C to 20°C
Temperature Compensation	None
Operating Pressure Range	Atmospheric ± 10%
Pressure Coefficient	0.016% signal/mBar
Operating Humidity Range	15 - 90% RH non-condensing

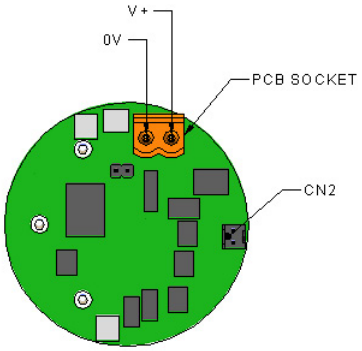
LIFETIME

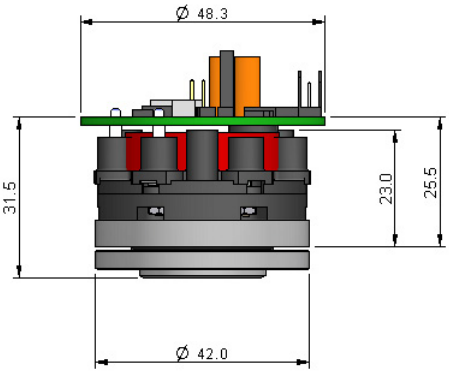
Long Term Sensitivity Drift	<2% signal loss/month
Expected Operating Life	Three years in air
Storage Life	6 months in CTL container
Standard Warranty	12 months from date of despatch

IMPORTANT NOTE:

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar. For further information on the operation and calibration of City Technology 4-20mA transmitters, please refer to OP-12.

Product Dimensions





All dimensions in mm
All tolerances ±0.15 mm unless otherwise stated

RANGES AVAILABLE

3NT CiTiceL 4-20 mA Transmitters are available with the following precalibrated ranges, and can be recalibrated to intermediate ranges.`

Range	Order Code
0-20 ppm	TF3C-1A
0-30 ppm	TF3D-1A
0-50 ppm	TF3E-1A
0-100 ppm	TF3F-1A
0-200 ppm	TF3G-1A
0-300 ppm	TF3H-1A

Poisoning

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation.
When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

Cross Sensitivity Table

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various other gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react.

Gas	Concentration Used (ppm)	3NT (ppm NO)
Carbon Monoxide, CO	300	0
Hydrogen Sulfide, H_2S	15	≈ 5
Sulfur Dioxide, SO_2	5	0
Nitrogen Dioxide, NO_2	5	<1.5
Nitrous Oxide, N_2O	100	0
Chlorine, Cl_2	1	0
Hydrogen , H_2	100	0
Hydrogen Cyanide, HCN	10	0
Hydrogen Chloride, HCl	5	<1
Ethylene, C_2H_4	100	0

The cross-sensitivity values quoted are based on tests conducted on a small number of sensors. They are intended to indicate sensor response to gases other than the target gas. Sensors may behave differently with changes in ambient conditions and any batch may show significant variation from the values quoted.

SAFETY NOTE
This sensor is designed to be used in safety critical applications. To ensure that the sensor and/or instrument in which it is used, are operating properly, it is a requirement that the function of the device is confirmed by exposure to target gas (bump check) before each use of the sensor and/or instrument. Failure to carry out such tests may jeopardize the safety of people and property.

一氧化氮传感器 0-250 ppm

性能表征

产品型号	CLE-0522-400
量程	0 to 250 ppm
最大荷载	1000 ppm
灵敏度	0.40 ± 0.08 μA/ppm
基线 0 ºC)	-0.02 to 1.44 μA
基线漂移 (-20 ºC to 50 ºC)	相当于 -2 to 10 ppm
分辨率	0.5 ppm
响应时间 (T_{90})	≤ 30 秒
线性度	线性
长期稳定性	< 2% 信号值/月

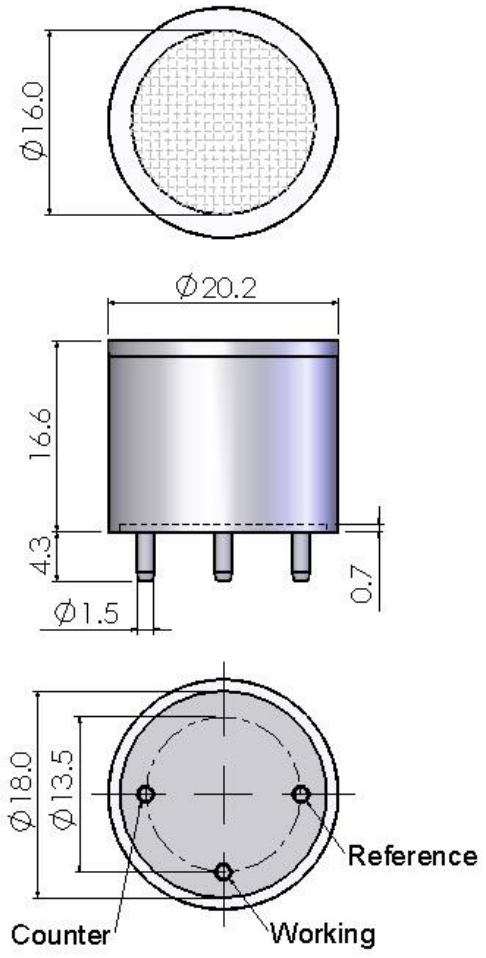
工作条件

工作温度	-20 ºC to 50 ºC
工作湿度	15 to 90%RH（无冷凝）
工作压力	90 to 110 kPa
偏压	+ 300 mV
储存时间	6 个月（专用包装盒中）
储存温度	0 ºC to 20 ºC
使用寿命	空气中 2 年
质保期	交货后 12 个月

物理性能

重量	约 5 克
方位要求	无

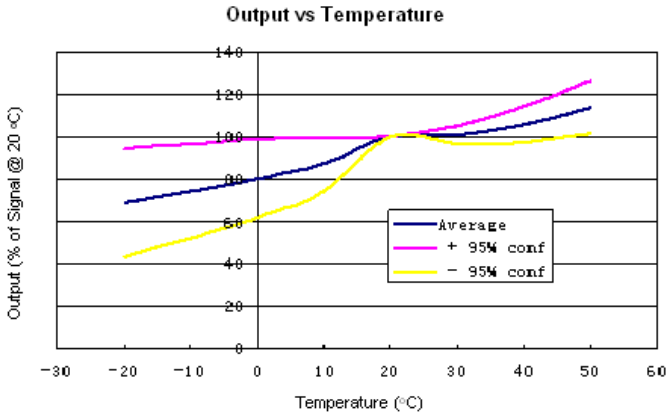
Outline Dimensions

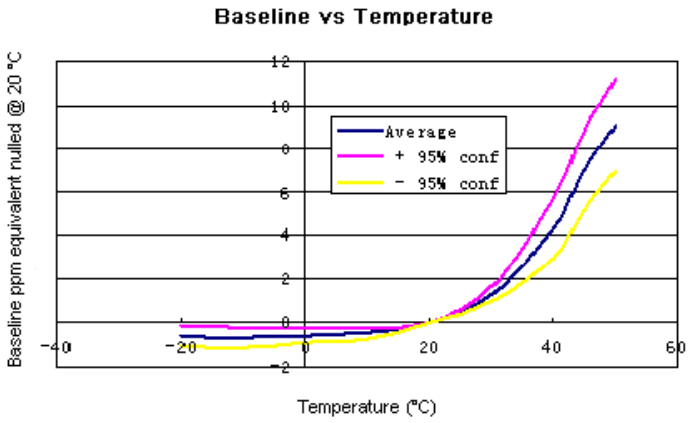


All dimensions are in millimeters.
All tolerances are ±0.2mm.

Note: 推荐使用 PCB 插座来连接传感器，焊接会损害传感器。

温度影响





交叉灵敏度

气体	Concentration (ppm)	Output Signal (相当于 ppm NO)
一氧化碳	300	0
二氧化硫	5	0
二氧化氮	5	1.5
硫化氢	15	-1.5

使用须知

1. 以上所有性能规格都是在环境条件：温度 20 ℃, 相对湿度 50% RH，一个大气压（100 kPa 或环境压力）下测得。
2. 推荐用目标气体进行标定。如果用交叉敏感气体进行标定，我们不保证其标定和测量的准确度。
3. 交叉灵敏度会有+/- 30%的浮动，并且可能随着传感器的生产批次不同和传感器的寿命而变化。
4. 上述交叉灵敏度包括但不限于上述气体，该传感器有可能对其他气体有响应。

一氧化氮传感器 0-2000 ppm

性能表征

产品型号	CLE-0523-400
量程	0 to 2000 ppm
最大荷载	2000 ppm
灵敏度	0.13 ± 0.06 μA/ppm
基线 （20 °C）	-0.2 ~ 1.44 μA
基线漂移 (-20 to 50 °C)	相当于-2 to 20 ppm
分辨率	1 ppm
响应时间 (T_{90})	≤ 60 秒
线性度	线性
长期稳定性	< 2% 信号值/月

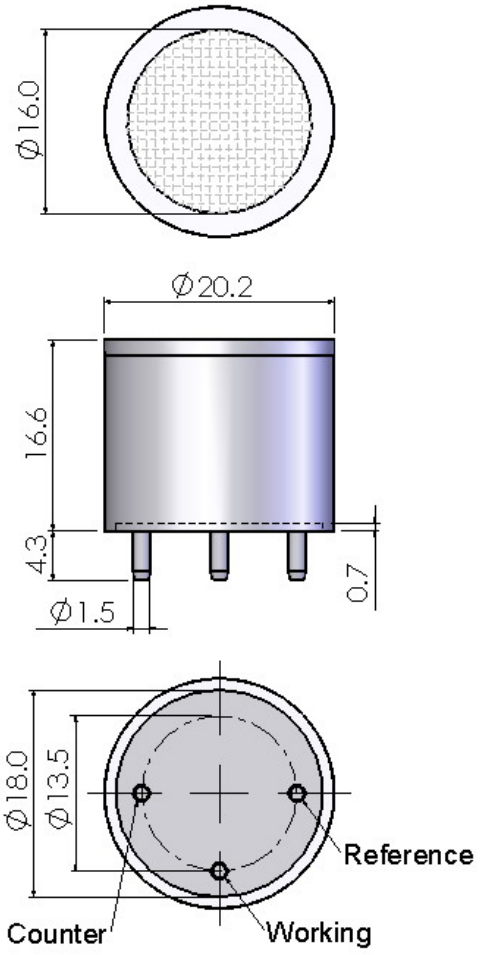
工作条件

工作温度	-20 °C to 50 °C
工作湿度	15 to 90%RH（无冷凝）
工作压力	90 to 110 kPa
偏压	+300 mV
储存时间	6 个月（专用包装盒中）
储存温度	0 °C to 20 °C
使用寿命	空气中 2 年
质保期	交货后 12 个月

物理性能

重量	约 5 克
方位要求	无

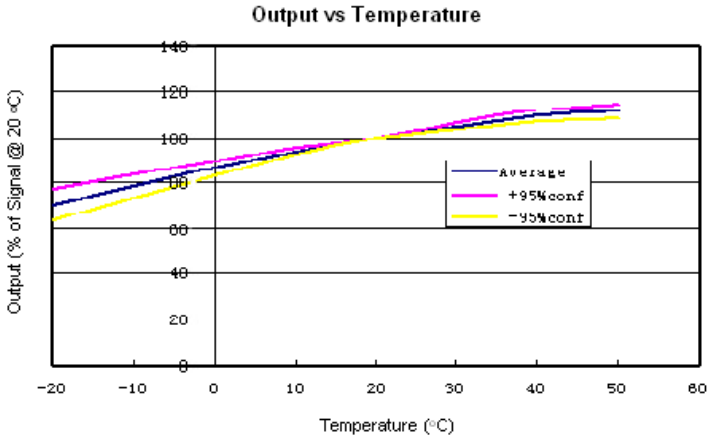
Outline Dimensions

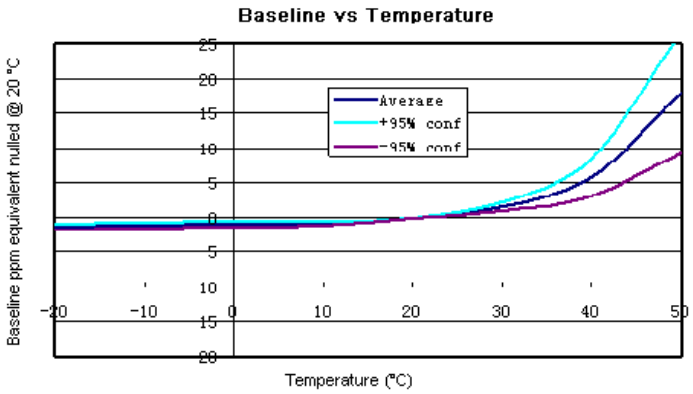


All dimensions are in millimeters.
All tolerances are ±0.2mm.

Note: 推荐使用 PCB 插座来连接传感器，焊接会损害传感器。

温度影响





交叉灵敏度

气体	浓度 (ppm)	输出信号 (相当于 ppm NO)
一氧化碳	300	0
二氧化硫	5	0
二氧化氮	5	2
硫化氢	15	7

使用须知

1. 以上所有性能规格都是在环境条件：温度 20 ℃, 相对湿度 50% RH，一个大气压（100 kPa 或环境压力）下测得。
2. 推荐用目标气体进行标定。如果用交叉敏感气体进行标定，我们不保证其标定和测量的准确度。
3. 交叉灵敏度会有+/- 30%的浮动，并且可能随着传感器的生产批次不同和传感器的寿命而变化。
4. 上述交叉灵敏度包括但不限于上述气体，该传感器有可能对其他气体有响应。