

GEMS SENSORS

OPERATING & INSTALLATION INSTRUCTIONS

CE MARKED SERIES 40XXX

PLEASE READ CAREFULLY BEFORE INSTALLING

PART NUMBER: 560550-0110

ISSUE: D

INTRODUCTION

Series 40XXX are fluid pressure measuring transducers in which a four active arm Wheatstone bridge of thin film gauges, integral with a beam structure connected to a pressure summing diaphragm, is used to convert fluid pressures into a proportional electrical signal. These instruments are suitable for long, continuous arduous service when operated within the published specifications.

Series 40XXX conform with the essential protection requirements of the EMC Directive 89/336/EEC amended by certified type testing to EN 50082-2 and EN 60081-1.

Series 40XXX with the CE0086 mark also complies with the requirements of the Pressure Equipment Regulations 1999 and is classed as a safety accessory and can be used as a safety-related device on Category IV pressure equipment. No other product should be used as "Safety Accessories" as defined by the PED Article 1, Paragraph 2.1.3.

Conformity with the requirements of the CE mark only applies when the installation conditions described in these instructions have been met. For units supplied without a cable assembly connection to the transducer must be accomplished using Gems Sensors approved cable. see APPROVED CABLE section.

All instruments conform to the appropriate specifications and/or drawings applicable and have been subjected to relevant strict quality control procedures.

HAZARDOUS PRODUCTS

The Consumer Protection Act of 1987, Section 6 of the Health and Safety at Work Act 1974 and the Control of Substances Hazardous to Health Regulations 1988 require that we advise recipients and users of our products of any potential hazards associated with their storage, handling or use.

The products which our Company supplies may be classified as Electrical, Electro-Mechanical and Electronic equipment.

These products are tested and supplied in accordance with our published specifications or individual special requirements that are agreed in writing at time of order. They are constructed so as not to affect adversely the safety of persons and property when properly installed, maintained and used by qualified personnel, in the applications for which they were designed and manufactured

ACTION ON RECEIPT

- * Check details on Calibration Certificate agree with data etched on transducer body.
- * Check accessories supplied include:
 - Calibration Certificate (or QA Certificate)
 - Seal, Dowty Bonded
 - Mating Connector (where applicable)

GENERAL

- * Transducer should not be subjected to greater than the maximum allowable pressure (P.S.) / Temperature (T.S) as defined on the transducer label.
- * Transducer should not be subjected to mechanical impact.
- * In the event of fire the end user must ensure that the system pressure is vented to a safe area.
- * The effects of decomposition of unstable fluids should be considered by the user when placing this device in service.
- * The pressure transducer has no means of draining or venting, this must be performed by another component in the end users system.
- * Pressure range must be compatible with the maximum pressure being measured.
- * Pressure media must be compatible with the transducer wetted parts which are:-
 - Ranges 1 and 1.6 bar, 15 and 30 psi :** 15-7 Mo plus 17-4 PH stainless steels
 - Ranges 2.5 bar and 60 psi and above :** 17-4 PH stainless steel
 - Pressure connection codes K or L :** Inconel alloy 625
- * Exposed end of cable must be kept free from moisture.
- * Liquid must not be allowed to freeze in the pressure port.

Full specifications for all products available on request from our Service Department.

MECHANICAL INSTALLATION

Pressure Connections: G $\frac{1}{4}$ internal pressure connection to BS2779 as standard. Alternative fitted as specified at time of order.

Pressure couplings screwed into G $\frac{1}{4}$ pressure ports should have a maximum thread engagement 13 mm and **UNDER NO CIRCUMSTANCES** be allowed to touch the pressure sensitive diaphragm. Pressure couplings should be sealed against the outer face at the pressure port entry using bonded seal washer such as:-

Part Number	Description
234646-0002	G $\frac{1}{4}$ bonded seal up to +100°C operation. Dowty Ref: 400-021-4490-02
499207-0002	G $\frac{1}{4}$ bonded seal up to +200°C operation. Dowty Ref: 300-021-0967-02
499207-0006	G $\frac{1}{8}$ bonded seal up to +200°C operation. Dowty Ref: 300-020-0967-02

Refer to Dowty for external pressure ratings.

Mounting: Pressure Transducer is designed to be attached by the coupling thread only. Omni-directional. To fit, use a 22.2 mm (7/8 inch) AF spanner on the hexagon provided and apply maximum torque of 27 Nm (20 lbf-ft). The Customer must ensure that the pressure seal is suitable for the application. If in doubt contact Gems Sensors.

Vibration: Where present, mount in a saddle clamp such as part number 499877-1000 (material: Polypropylene) or 499877-1001 (material: Polyamide). Position the clamp as close to the pressure port as practicable.

Effects of Heat: Avoid mounting the transducer near a source of heat which is liable to create a temperature gradient across the instrument. If this is unavoidable, use a heat shield to deflect uneven radiated heat or wrap the transducer in glass fibre insulation so that an even temperature is assumed throughout.

High Temperature Pressure Measurement: Possible using a length of piping or a "syphon" to isolate the instrument from the hot media. Since there is no flow, the temperature drop along the tubing is considerable and usually a relatively short length is sufficient to bring the pressure media temperature within acceptable limits for the instrument. Alternatively a temperature isolator, part number 558564-0001, can be fitted (G¹/₄ connection only). Pressure media must not be allowed to solidify in the tube and/or pressure port.

ELECTRICAL INSTALLATION

All types include suppression devices providing transient protection to EN 61000-4-2 and EN 61000-4-4.

For all types conformity with the requirements of the CE mark only applies when connection is made with Gems Sensors approved cable, See APPROVED CABLE section, and the screen of that cable is connected to a reliable earthing point at the instrumentation end.

Types 40XXX-XX-M/P2-X: These types are capable of being immersed to a maximum depth of 200m WG.

Types 40XXX-XX-M2/PN-X: To combat the effects of lightning strike these types are fitted with suppression devices providing surge immunity to IEC 801 Part 5. To protect the 'receiving' equipment it is recommended the end user fits a Lightning Protection Unit (LPU) at the instrumentation end close to the point of cable entry into the building, installed as recommended by the LPU manufacturer, to protect against the likely high current surge resulting from lightning strikes.

Types 40XXX-XX-M2-U: These types are supplied with colour-coded flying leads and are intended for users/suppliers wishing to hold stocks of pressure ranges to which various lengths of cable can be fitted. Connection **MUST** be made via Gems Sensors cable assembly part number 560509; available in lengths from 0.5 to 150 metres at time of order.

Types 40XXX-XX-D2-X: These types employ a weatherproof (IP66 rated) cable assembly.

Types 40XXX-XX-C2-X: These types are fitted with a MIL-C size 10, 6 pin receptacle. The free mating socket (not supplied) must conform to MIL-C-00264872.

APPROVED CABLES

Gems Sensors uses cable comprising 6 colour-coded cores, with a central vent tube, enclosed by an aluminium/polyester screen where the screen is in intimate contact with a separate drain wire. The outer sheath can be of various material, depending upon application and operating temperature, e.g. Exar (non-immersible, +150°C max), PTFE (non-immersible, +200°C max), Polyurethane (immersible, +70°C).

OPERATION

Having installed the transducers as instructed they are ready for use. The transducer should not be removed whilst the system is at pressure. Before applying power, check that the correct polarity and excitation levels are being applied. See ELECTRICAL REQUIREMENTS.

Compensated Temperature Range

- | | | |
|----|---------------------|-----------------|
| a) | Types 40XXX-XX-C2-X | -54°C to +120°C |
| b) | Types 40XXX-XX-D2-X | -54°C to +120°C |
| c) | Types 40XXX-XX-M2-X | -20°C to +50°C |
| d) | Types 40XXX-XX-P2-X | -20°C to +50°C |

Operable Temperature Range

- | | | |
|----|---------------------|--|
| a) | Types 40XXX-XX-C2-X | -54°C to +135°C |
| b) | Types 40XXX-XX-D2-X | -54°C to +120°C continuous
-54°C to +135°C peak |
| c) | Types 40XXX-XX-M2-X | -20°C to +50°C |
| d) | Types 40XXX-XX-P2-X | -20°C to +50°C |

OPERATIONAL LIFE:

Limited to 100M cycles to maximum allowable pressure.

CALIBRATION

Transducers are calibrated to the datum requested at time of order; this can be identified by the fifth entry in the stock numbering code as follows:-

- | | | |
|----------|---|---|
| G | - | gauge datum vented to atmosphere via the electrical connection |
| A | - | absolute datum |
| S | - | sealed reference; reference side of the instrument is sealed and the output electrically adjusted to zero with 1013 mb applied to pressure port |
| U | - | uni-directional differential |
| B | - | bi-directional differential |

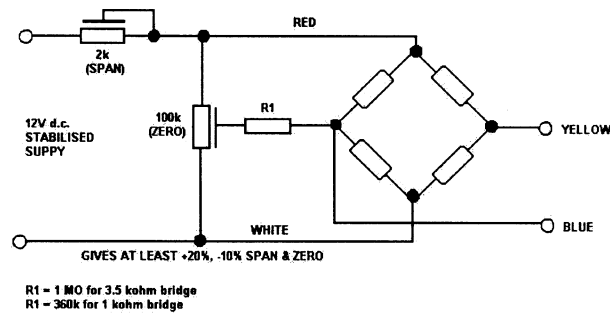
CHARACTERISTICS

Millivolt Output Transducers: All millivolt (mV) output transducers should be used with a stabilised d.c. excitation supply. Output errors directly proportional to supply instability.

Specifications are given with 10V d.c. excitation. However, a lower supply may be used with a corresponding decrease in output.

There are no adjustments for zero and span on the transducer. If local provision is required, the circuit diagram below may be employed. 12V d.c. stabilised supply is used instead of standard 10V to allow span adjustment to be obtained.

CIRCUIT DIAGRAM FOR ADJUSTMENT OF mV OUTPUT TRANSDUCERS



MAINTENANCE

Routine Inspection: Not required except for periodic inspection of the cable and moulding to ensure that these are neither damaged nor softened by incompatible liquid.

If Malfunction Occurs: Isolate the free end of the cable and measure the input and output resistance. If vastly different from specification, either lower or higher, the strain gauge is damaged and the instrument will have to be replaced.

If the reading is satisfactory but the operation is still suspect, join the input and output conductors together. Using a low voltage insulation tester, measure the insulation resistance between the conductors and the case; the reading should be 100 Mohms or greater.

On **NO ACCOUNT** use a high voltage "Megger" type of insulation tester or any device which generates more than 50V d.c. for this test.

Causes of Failure: Excess pressure of more than twice the rated range (1.5 times rated range for Inconel "wetted parts" versions). A short duration pressure cycle having such a peak value may be sufficient to damage the strain gauge.

The instrument may withstand some excess pressure without failure, but a change in residual output may result. If this is not excessive the instrument may be re-zeroed externally, although other changes in characteristics might occur which can only be determined by total re-calibration.

Failure can also occur if the system is driven into resonance by a fast pressure pulse, even though the pulse peak is within the nominal pressure range. System resonance is sometimes referred to as "water hammer" and is typically the result of valve slam or bounce, causing a shock wave through the system.

If it is suspected that adverse transient pressure pulses are present for any reason, then fit a restrictor such as our part number 466175-0000 (depending upon pressure adaptor).

CAUTION

CARE MUST BE TAKEN NOT TO TOUCH THE PRESSURE SENSITIVE DIAPHRAGM WHILST CLEANING THE PRESSURE PORT. FAILURE TO OBSERVE THIS PRECAUTION CAN CAUSE IRREPARABLE DAMAGE.

WARRANTY

The Company warrants its products to be free from defects in material and workmanship in normal use and service for a period of two years from date of shipment. The Company reserves the right and option to refund the purchase price in lieu of repair or replacement upon evaluation of the returned original part. Modification, misuse, attempted repair by others, improper installation or operation shall render this guarantee null and void. The Company makes no warranty of merchantability or fitness for a part or purpose.

SERVICING

The transducer cannot be repaired locally and if damaged should be returned to ourselves at the address shown below or to accredited dealers when a replacement/repair is required:

Gems Sensors
Lennox Road
Basingstoke
Hants. RG22 4AW

Gems Sensors Inc
1 Cowles Road
Plainville, CT 06062
U.S.A.

RETURN TO FACTORY

PLEASE NOTE: To comply with Health and Safety requirements, the instrument must be clean and safe to handle and accompanied by a formal statement to that effect duly signed by an authorised officer of the Company.

Any instrument returned without certification will be quarantined and no action will occur until cleared. It may ultimately be returned to you and subject to a transportation charge.

W A R N I N G

*** IF INSTRUMENT IS SUBJECTED TO +400°C PLUS**

Some instruments use Viton sealant. Above +400°C this material decomposes producing (amongst others) Hydrofluoric Acid which is extremely corrosive

*** DO NOT ALLOW CONTACT WITH SKIN**

If it is suspected that an instrument has been subjected to temperatures in excess of +400°C

*** CONTACT OUR SALES OR SERVICE DEPARTMENT TO ASCERTAIN IF THE INSTRUMENT CONTAINS VITON**

W A R N I N G

ELECTRICAL REQUIREMENTS

TYPE	SUPPLY VOLTS		OUTPUT	+ve SUPPLY	-ve SUPPLY	+ve OUTPUT	-ve OUTPUT	CASE EARTH
	MAX	RATED						
40XXX-XX-C2-X	15V d.c.	10V d.c.	0-30mV at rated supply	Pin A	Pin D/E	Pin B	Pin C/F	
40XXX-XX-D2-X				Red	White	Yellow	Blue	Screen
40XXX-XX-M2-X 40XXX-XX-P2-X				Red	White	Yellow	Blue	Screen
40XXX-XX-MN-X 40XXX-XX-PN-X				Red / Orange	White / Green	Yellow	Blue	Screen

EC DECLARATION OF CONFORMITY

MANUFACTURERS NAME: Gems Sensors

MANUFACTURERS ADDRESS: Lennox Road, Basingstoke, Hants, RG22 4AW

PRODUCT TYPES: 4000KXXXXXXXXX2XX
4000LXXXXXXXXX2XX

DESCRIPTION: Strain Gauge Pressure Transmitters and High Output Transducers

DATE OF ISSUE: 21st May 2002

Gems Sensors hereby declares that the product(s) above conform with the essential protection requirements of the following EC Directives:

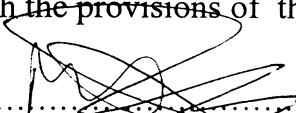
PED: *Equipment marked CE0086 complies with the requirements of the Pressure Equipment Directive 97/23/EC and is classed as a safety accessory and can be used as a safety-related device on Category IV pressure equipment. Conformity assessment procedure followed is to Modules B+D. Module B EC Type examination certificate number CE72110 issued by BSI 0086 Mayland Avenue, Hemel Hempstead, Herts, HP2 4SQ, England. The notified body monitoring the quality assurance system is BSI 0086 Mayland Avenue, Hemel Hempstead, Herts, HP2 4SQ, England. The Technical Specifications used are Gems Sensors Design Standards.*

EMC: *89/336/EEC amended by 93/68/EEC by compliance to EN 50082-2, EN 50081-1 and EN 50081-2*

SAFETY: *"For the equipment within which this component is installed to comply with the Low Voltage Directive (73/23/EEC), this product must be powered from a Safety Extra Low Voltage (SELV) source of 42V peak maximum.*

When the power source is derived from a transformer this must conform to EN 60742 or equivalent, with intrinsic short circuit protection. The power source to this component must also incorporate suitable over-current protection related to the current rating of this component"

This apparatus must not be put into service until the equipment into which it is to be incorporated has been declared in conformity with the provisions of the relevant New Approach Directive.

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Signed for and on behalf of
Gems Sensors

Michael J Powers
Technical Director
England