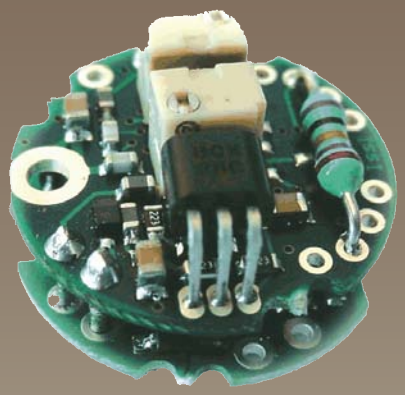
ICA
“In-Cell”
Analogue Amplifier

TYPE: ICA



Description

The second generation ICA (in cell amplifier) is an extremely high performance strain gauge amplifier, converting a strain gauge input to a volt or a mA output.

Its sub-miniature design enables it to be fitted into the majority of transducers for a wide range of signal conditioning for strain gauges, load cells, pressure and torque transducers.

The amplifier is available in six versions, offering a range of current and voltage outputs. All amplifiers have a wide operating voltage range

LCM Systems can integrate any of the ICA range of products into the majority of our sensor range. For applications where this is not possible, we can supply a small inline enclosure (ILE), which incorporates the ICA.

Features

- **Standardised mounting hole for faster & easier installation**
- **Standardised excitation 5V DC**
- **Full CE approval**
- **Plated through holes for wire connections**
- **Maximum height 7.6mm**
- **Cost effective with attractive discounts on quantity orders**
- **Robust design, reverse polarity & short circuit protected**
- **Fast calibration procedure**
- **Can be integrated into the majority of LCM Systems sensor products**

Typical Applications

- **Internal amplification of strain gauge based pressure transducers**
- **Internal amplification of strain gauge based load cells**
- **Internal amplification of strain gauge based torque transducers**

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Specifications– Voltage Output Versions

ICA1 - 3 Wire 0.1-10 volts

Electrical and Environmental

	Min	Typ	Max	Units (Notes)
Power Supply	13	24	30	V DC (note 1)
Operating Current	-	23	-	mA (note 2)
Operating temperature range	-40	-	85	°C
Storage temperature range	-40	-	85	°C
Reverse polarity protection	-	-	-30	V
Measurement				
Bridge excitation	4.9	5	5.1	V
Bridge resistance	330	350	5000	Ohms
Bridge sensitivity	0.5	2.5	150	mV/V (note 3)
Output voltage range	+0.1	-	+10.1	V
Output load	5000	-	-	Ohms
Band width	dc	-	1000	Hz
Zero adjustment	-	±2	-	%FR
Span adjustment	-	±8	-	%FR
Linearity	-	0.02	-	%FR
Zero temp stability	-	0.0004	0.0015	±%FR/°C
Span temp stability	-	0.002	0.0051	±%FR/°C

ICA2 - 3 Wire 0.1-5 volts

Electrical and Environmental

	Min	Typ	Max	Units (Notes)
Power supply	8.5	-	28	V DC (note 1)
Operating Current	-	23	-	mA (note 2)
Operating temperature range	-40	-	85	°C
Storage temperature range	-40	-	85	°C
Reverse polarity protection	-	-	-30	V
Measurement				
Bridge excitation	4.9	5	5.1	V
Bridge resistance	330	350	5000	Ohms
Bridge sensitivity	0.5	2.5	150	mV/V (note 3)
Output voltage range	+0.1	-	+5.1	V
Output load	5000	-	-	Ohms
Band width	dc	-	1000	Hz
Zero adjustment	-	±2	-	%FR
Span adjustment	-	±8	-	%FR
Linearity	-	0.02	-	%FR
Zero temp stability	-	0.0004	0.0015	±%FR/°C
Span temp stability	-	0.002	0.0051	±%FR/°C

ICA3 - 4 Wire ±10 volts

Electrical and Environmental

	Min	Typ	Max	Units (Notes)
Power supply	±13	-	±15	V DC (note 1)
Operating Current	-	23	-	mA (note 2)
Operating temperature range	-40	-	85	°C
Storage temperature range	-40	-	85	°C
Reverse polarity protection	-	-	-30	V
Measurement				
Bridge excitation	4.9	5	5.1	V
Bridge resistance	330	350	5000	Ohms
Bridge sensitivity	0.5	2.5	150	mV/V (note 3)
Output voltage range	-10	-	+10	V
Output load	5000	-	-	Ohms
Band width	dc	-	1000	Hz
Zero adjustment	-	±2	-	%FR
Span adjustment	-	±8	-	%FR
Linearity	-	0.02	-	%FR
Zero temp stability	-	0.0004	0.0015	±%FR/°C
Span temp stability	-	0.002	0.0051	±%FR/°

ICA6 - 4 Wire ±10 volts

Electrical and Environmental

	Min	Typ	Max	Units (Notes)
Power supply	14	-	18	V DC (note 1)
Operating Current	-	30	-	mA (note 2)
Operating temperature range	-40	-	85	°C
Storage temperature range	-40	-	85	°C
Reverse polarity protection	-	-	-30	V

Measurement

Bridge excitation	4.9	5	5.1	V
Bridge resistance	330	350	5000	Ohms
Bridge sensitivity	0.5	2.5	150	mV/V (note 3)
Output voltage range	-10	-	+10	V
Output load	5000	-	-	Ohms
Band width	dc	-	1000	Hz
Zero adjustment	-	±2	-	%FR
Span adjustment	-	±8	-	%FR
Linearity	-	0.02	-	%FR
Zero temp stability	-	0.0004	0.0015	±%FR/°C
Span temp stability	-	0.002	0.0051	±%FR/°C

Notes

Note 1	ICA6 Max Voltage can be increased to 24V with 1000R load cell.
Note 2	With 350R load cell connected.
Note 3	Factory setting is the typical value shown. For other values fit an alternative calibration resistor (see manual).

General Notes

The voltage between either of the power supply connections and the load cell shield should not exceed 50V. Any leakage will be greater than 10M Ohms.
FR = Full Range

Specifications – Current Output Versions

ICA4 - 3 Wire 4-20mA

Electrical and Environmental

	Min	Typ	Max	Units (Notes)
Power supply	10	24	30	V DC
Operating Current	27	-	43	mA (note 1)
Operating temperature range	-40	-	85	°C
Storage temperature range	-40	-	85	°C
Reverse polarity protection	-	-	-30	V

Measurement

Bridge excitation	4.9	5	5.1	V (note 3)
Bridge resistance	330	350	5000	Ohms(note 4)
Bridge sensitivity	0.5	2.5	150	mV/V (note 5)
Output current range	4	-	20	mA
Output load	-	-	250	Ohms(note 6)
Band width	dc	-	1000	Hz
Zero adjustment	-	±2	-	%FR(note 3)
Span adjustment	-	±8	-	%FR
Linearity	-	0.02	-	%FR
Zero temp stability	-	0.0004	0.0015	±%FR/°C
Span temp stability	-	0.002	0.0051	±%FR/°C

ICA5 - 2 Wire 4-20mA Electrical and Environmental	Min	Typ	Max	Units (Notes)
Power supply	7.5	24	30	V DC (note 1)
Operating Current	4	-	20	mA (note 2)
Operating temperature range	-40	-	85	°C
Extended operating temperature range	-40	-	125	°C (note 3)
Storage temperature range	-40	-	125	°C
Reverse polarity protection	-	-	-30	V
Measurement				
Bridge excitation	1.05	1.11	1.16	V (note 4)
Bridge resistance	350	1000	5000	Ohms (note 5)
Bridge sensitivity	0.5	2.5	55	mV/V (note 6)
Output voltage range	4	-	20	mA
Output load	-	-	800	Ohms (note 7)
Band width	dc	-	1000	Hz
Zero adjustment	-	±2	-	%FR (note 3)
Span adjustment	-	±8	-	%FR
Linearity	-	0.02	-	%FR
Zero temp stability	-	0.001	0.005	±%FR/°C
Span temp stability	-	0.007	0.014	±%FR/°C

Notes

Note 1	The ICA4 can tolerate a lower supply voltage if the output load is reduced e.g. operation is possible at 8V provided that the load does not exceed 250 Ohms in sink mode or 150 Ohms in source mode.
Note 2	With 350 Ohm load cell connected (ICA5 1000 Ohm (recommended).
Note 3	With reduced supply voltage (see manual).
Note 4	ICA5 with 1000 Ohms load cell connected.
Note 5	ICA5 recommended bridge impedance is 1000 Ohms.
Note 6	Factory setting is the typical value shown. For other values an alternative calibration resistor (see manual).
Note 7	ICA4 only: The maximum

General Notes

The voltage between either of the power supply connections and the load cell shield should not exceed 50V. Any leakage will be greater than 10M Ohms.
FR = Full Range

Enclosure

Fit into circular holes 19.5mm diameter with 7.6mm height

Controls

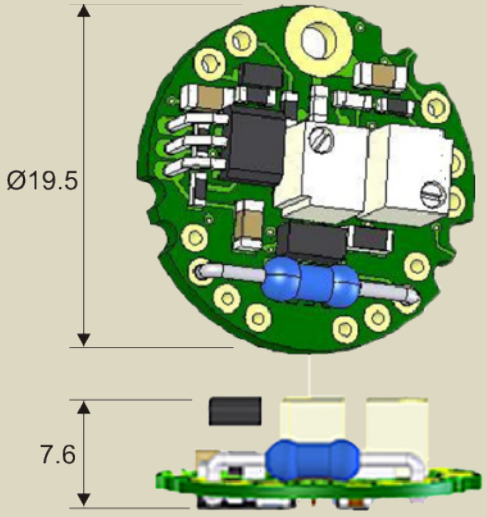
Offset & gain pot +SOT resistors for mV/V sensitivity (gain)

CE & Environmental

Storage temperature	refer to above specifications
Operating temperature	refer to above specifications
Relative humidity	95% maximum non condensing
Safety/Low Voltage Directive	73/23/EEC amended by 93/68/EEC BS EN 61010-1:2001, IEC 1010-1-1990
EMC Directive	89/336/EEC Basic Standard BS EN 61326:1998
EMC Emissions	BS EN 55011:1998
EMC Immunity	BS EN 61000-42:1995 BS EN 61000-4-3:2002 BS EN 61000-4-4:2004 BS EN 61000-4-11:20

Mechanical Dimensions

All dimensions in millimeters



Due to continual product development, LCM Systems Ltd. reserves the right to alter product specifications without prior notice.

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