



The second generation ICA (in cell amplifier) is an extremely high performance strain gauge amplifier, converting a strain gauge input to a voltage or current 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

We 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 of 5Vdc
- Full CE approval
- Plated through holes for wire connections
- Maximum height 7.6mm
- Cost effective with attractive discounts on quantity orders
- Robust design, reverse short circuit protected
- Fast calibration procedure
- Can be integrated into many 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

Specification -	- '	Voltage	Output	V	'ersions
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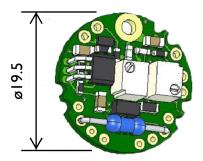
Specification - Voltage Output		_		
Electrical and Environmental	Min	Тур	Max	Units (Notes)
Power Supply Operating Current	13	24	30	V DC (note 1)
Operating Current		23		mA (note 2)
Operating temperature range	-40	-	85	°C
Storage temperature range	-40		85	°C
Reverse polarity protection	-		-30	V
Measurement	Min	Тур	Max	Units (Notes)
	4.9	5	5.1	V
Seridge excitation				•
Bridge excitation	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
1.1	-	0.02	-	%FR
Zero temp stability		0.0004	0.0015	±%FR/°C
Span temp stability		0.002	0.0051	±%FR/°C
Span temp stability	-	0.002	0.0051	±%FR/*C
Electrical and Environmental	Min	Тур	Max	Units (Notes)
Power supply	8.5	-	28	V DC (note 1)
Operating Current	-	23	-	mA (note 2)
Operating current  Operating temperature range	-40	-	85	°C
Operating temperature range	-40		85	°C
Storage temperature range	-40	•		
Reverse polarity protection	-	-	-30	V
Weasurement	Min	Тур	Max	Units (Notes)
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
				01
Output load	5000	_	_	Ohms
Output load	5000			Ohms Hz
Band width	5000 dc	-	1000	Hz
Band width Zero adjustment		- ±2	1000 -	Hz %FR
Band width Zero adjustment Span adjustment		- <b>±2</b> ±8		Hz <b>%FR</b> %FR
Band width Zero adjustment Span adjustment Linearity		- ±2 ±8 0.02	1000 - - -	Hz %FR %FR %FR
Band width Zero adjustment Span adjustment Linearity Zero temp stability	dc - - - -	±2 ±8 0.02 0.0004	1000 - - - - 0.0015	Hz %FR %FR %FR ±%FR/°C
Band width Zero adjustment Span adjustment Linearity		- ±2 ±8 0.02	1000 - - -	Hz %FR %FR %FR
Band width Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability	dc - - - -	- ±2 ±8 0.02 0.0004 0.002	1000 - - - 0.0015 0.0051	Hz %FR %FR %FR ±%FR/°C ±%FR/°C
Band width Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental	dc - - - - - Min	±2 ±8 0.02 0.0004	1000 - - - 0.0015 0.0051 Max	Hz %FR %FR %FR ±%FR/°C ±%FR/°C Units (Notes)
Band width Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental  Power supply	dc - - - -	- ±2 ±8 0.02 0.0004 0.002 <b>Typ</b>	1000 - - - 0.0015 0.0051	Hz %FR %FR %FR ±%FR/°C ±%FR/°C Units (Notes) V DC (note 1)
Band width Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental Power supply Operating Current	dc - - - - - Min ±13-	- ±2 ±8 0.02 0.0004 0.002	1000 - - - 0.0015 0.0051 Max ±15	Hz %FR %FR %FR ±%FR/°C ±%FR/°C Units (Notes) V DC (note 1) mA (note 2)
Band width Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental Power supply Operating Current Operating temperature range	dc - - - - - Min ±13- - -40 -	- ±2 ±8 0.02 0.0004 0.002 <b>Typ</b>	1000 - - - 0.0015 0.0051 Max ±15 - 85	Hz %FR %FR %FR #FR/°C ±%FR/°C  Units (Notes) V DC (note 1) mA (note 2) °C
Band width Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental Power supply Operating Current Operating temperature range Storage temperature range	dc - - - - - Min ±13-	- ±2 ±8 0.02 0.0004 0.002 Typ	1000 - - - 0.0015 0.0051 Max ±15	Hz %FR %FR %FR #%FR/°C ±%FR/°C  Units (Notes) V DC (note 1) mA (note 2) °C °C
Band width Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental Power supply Operating Current Operating temperature range Storage temperature range Reverse polarity protection	dc - - - - - Min ±13- - -40 -	- ±2 ±8 0.02 0.0004 0.002 <b>Typ</b>	1000 - - - 0.0015 0.0051 Max ±15 - 85	Hz %FR %FR %FR #FR/°C ±%FR/°C  Units (Notes) V DC (note 1) mA (note 2) °C
Band width Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental Power supply Operating Current Operating temperature range Storage temperature range Reverse polarity protection	dc Min ±134040 -	- ±2 ±8 0.02 0.0004 0.002 Typ 23	1000 - - - 0.0015 0.0051 Max ±15 - 85	Hz %FR %FR %FR #%FR/°C ±%FR/°C  Units (Notes) V DC (note 1) mA (note 2) °C °C V
Band width Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental Power supply Operating Current Operating temperature range Storage temperature range Reverse polarity protection  Measurement	dc - - - - - Min ±13- - -40 - -40 - - Min	- ±2 ±8 0.02 0.0004 0.002 Typ	1000 0.0015 0.0051 Max ±15 - 85 85	Hz %FR %FR %FR #%FR/°C ±%FR/°C  Units (Notes) V DC (note 1) mA (note 2) °C °C
Band width  Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental Power supply Operating Current Operating temperature range Storage temperature range I Reverse polarity protection Measurement Bridge excitation	dc Min ±134040 Min 4.9	- ±2 ±8 0.02 0.0004 0.002 Typ 23 -30 Typ 5	1000 0.0015 0.0051 Max ±15 - 85 85 85	Hz %FR %FR %FR #FR/°C ±%FR/°C Units (Notes) V DC (note 1) mA (note 2) °C °C V Units (Notes) V
Band width Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental Power supply Operating Current Operating temperature range Storage temperature range Reverse polarity protection  Measurement Bridge excitation Bridge resistance	dc Min ±134040 Min 4.9	- ±2 ±8 0.02 0.0004 0.002 Typ 23 -30 Typ 5 350	1000 0.0015 0.0051 Max ±15 - 85 85  Max 5.1	Hz %FR %FR %FR #FR/°C ±%FR/°C Units (Notes) V DC (note 1) mA (note 2) °C °C V Units (Notes) V Ohms
Band width Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental Power supply Operating Current Operating temperature range Storage temperature range I Reverse polarity protection Measurement Bridge excitation Bridge resistance Bridge sensitivity	dc Min ±134040 Min 4.9 330 0.5	- ±2 ±8 0.02 0.0004 0.002 Typ 23 -30 Typ 5	1000 0.0015 0.0051 Max ±15 - 85 85  Max 5.1 5000 150	Hz %FR %FR %FR #FR/°C ±%FR/°C Units (Notes) V DC (note 1) mA (note 2) °C °C V Units (Notes) V Ohms mV/V (note 3)
Band width  Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental Power supply Operating Current Operating temperature range Storage temperature range Reverse polarity protection  Measurement Bridge excitation Bridge resistance Bridge sensitivity Output voltage range	dc Min ±134040 Min 4.9	- ±2 ±8 0.02 0.0004 0.002  Typ  23  -30  Typ 5 350 2.5	1000 0.0015 0.0051 Max ±15 - 85 85  Max 5.1 5000 150 +10	Hz %FR %FR %FR #FR/°C ±%FR/°C Units (Notes) V DC (note 1) mA (note 2) °C °C V Units (Notes) V Ohms mV/V (note 3) V
Band width Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental Power supply Operating Current Operating temperature range Storage temperature range Reverse polarity protection Heasurement Bridge excitation Bridge sensitivity Output voltage range Output load	dc Min ±1340 Min 4.9 330 0.5 -10	- ±2 ±8 0.02 0.0004 0.002 Typ 23 -30 Typ 5 350	1000 0.0015 0.0051 Max ±15 - 85 85  Max 5.1 5000 150 +10	Hz %FR %FR %FR #FR/°C  ±%FR/°C  Units (Notes) V DC (note 1) mA (note 2) °C °C V Units (Notes) V Ohms mV/V (note 3) V Ohms
Band width Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental Power supply Operating Current Operating temperature range Storage temperature range Reverse polarity protection Heasurement Bridge excitation Bridge sensitivity Output voltage range Output load Band width	dc Min ±134040 Min 4.9 330 0.5	- ±2 ±8 0.02 0.0004 0.002  Typ  23  -30 Typ 5 350 2.5 - 5000	1000 0.0015 0.0051 Max ±15 - 85 85  Max 5.1 5000 150 +10	Hz %FR %FR %FR #FR/°C  ±%FR/°C  Units (Notes) V DC (note 1) mA (note 2) °C °C V  Units (Notes) V Ohms mV/V (note 3) V Ohms Hz
Band width  Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental Power supply Operating Current Operating temperature range Storage temperature range Reverse polarity protection  Measurement Bridge excitation Bridge resistance Bridge sensitivity Output voltage range Output load Band width Zero adjustment	dc Min ±1340 Min 4.9 330 0.5 -10	- ±2 ±8 0.02 0.0004 0.002  Typ  23  -30 Typ 5 350 2.5 - 5000	1000 0.0015 0.0051  Max ±15 - 85 85  Max 5.1 5000 150 +10 - 1000 -	Hz %FR %FR %FR %FR ±%FR/°C ±%FR/°C  Units (Notes) V DC (note 1) mA (note 2) °C °C V Units (Notes) V Ohms mV/V (note 3) V Ohms Hz %FR
Band width Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental Power supply Operating Current Operating temperature range Storage temperature range Reverse polarity protection  Measurement Bridge excitation Bridge resistance Bridge sensitivity Output voltage range Output load Band width Zero adjustment Span adjustment	dc Min ±1340 Min 4.9 330 0.5 -10	- ±2 ±8 0.02 0.0004 0.002  Typ  23  -30 Typ 5 350 2.5 - 5000	1000 0.0015 0.0051 Max ±15 - 85 85  Max 5.1 5000 150 +10	Hz %FR %FR %FR #FR/°C  #%FR/°C  Units (Notes) V DC (note 1) mA (note 2) °C °C V  Units (Notes) V Ohms mV/V (note 3) V Ohms Hz
Band width  Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental Power supply Operating Current Operating temperature range Storage temperature range Reverse polarity protection  Measurement Bridge excitation Bridge resistance Bridge sensitivity Output voltage range Output load Band width Zero adjustment	dc Min ±1340 Min 4.9 330 0.5 -10	- ±2 ±8 0.02 0.0004 0.002  Typ  23  -30 Typ 5 350 2.5 - 5000	1000 0.0015 0.0051  Max ±15 - 85 85  Max 5.1 5000 150 +10 - 1000 -	Hz %FR %FR %FR %FR ±%FR/°C ±%FR/°C  Units (Notes) V DC (note 1) mA (note 2) °C °C V Units (Notes) V Ohms mV/V (note 3) V Ohms Hz %FR
Band width  Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental Power supply Operating Current Operating Current Operating temperature range Reverse polarity protection  Measurement Bridge excitation Bridge resistance Bridge sensitivity Output voltage range Output load Band width Zero adjustment Span adjustment Linearity	dc Min ±134040 Min 4.9 330 0.5 -10	- ±2 ±8 0.02 0.0004 0.002  Typ  23  -30 Typ 5 350 2.5 - 5000  ±2 ±8	1000 0.0015 0.0051  Max ±15 - 85 85  Max 5.1 5000 150 +10 1000 -	Hz %FR %FR %FR %FR #%FR/°C ±%FR/°C  Units (Notes) V DC (note 1) mA (note 2) °C °C V Units (Notes) V Ohms mV/V (note 3) V Ohms Hz %FR %FR
Band width Zero adjustment Span adjustment Linearity Zero temp stability Span temp stability  Electrical and Environmental Power supply Operating Current Operating temperature range Storage temperature range Reverse polarity protection  Measurement Bridge excitation Bridge resistance Bridge sensitivity Output voltage range Output load Band width Zero adjustment Span adjustment	dc Min ±134040 Min 4.9 330 0.5 -10	- ±2 ±8 0.02 0.0004 0.002  Typ  23  -30 Typ 5 350 2.5 - 5000  ±2 ±8 0.02	1000 0.0015 0.0051  Max ±15 - 85 85  Max 5.1 5000 150 +10 1000 -	Hz %FR %FR %FR #%FR/°C ±%FR/°C Units (Notes) V DC (note 1) mA (note 2) °C °C V Units (Notes) V Ohms mV/V (note 3) V Ohms Hz %FR %FR %FR



	Electrical and Environmental	Min	Тур	Max	Units (Notes)
	Power supply	14	-	18	V DC (note 1)
$\overline{\circ}$	Operating Current	-	30	-	mA (note 2)
Þ	Operating temperature range	-40	-	85	°C
<b>ි</b>	Storage temperature range	-40		85	°C
	Reverse polarity protection	-	-	-30	V
4	Measurement	Min	Тур	Max	Units (Notes)
<	Bridge excitation	4.9	5	5.1	V
<b>S</b>	Bridge resistance	330	350	5000	Ohms
ត	Bridge sensitivity	0.5	2.5	150	mV/V (note 3)
14	Output voltage range	-10		+10	V
===	Output load	5000	-	-	Ohms
0	Band width	dc		1000	Hz
	Zero adjustment	-	±2	-	%FR
읒	Span adjustment	-	±8	-	%FR
S	Linearity	-	0.02	-	%FR
	Zero temp stability	-	0.0004	0.0015	±%FR/°C
	Span temp stability	-	0.002	0.0051	±%FR/°C

## **Mechanical Dimensions**

All dimensions in millImeters





## **Related Product**



ILE series
Field enclosure for ICA analogue
and DCell data converters

#### **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**

	Specifications - Current		310113		
	Electrical and Environmental	Min	Тур	Max	Units (Notes)
	Power supply	10	24	30	V DC
=	Operating Current	27		43	mA (note 1)
<del>ن</del>	Operating temperature range	-40	-	85	°C
K	Storage temperature range	-40		85	°C
	Reverse polarity protection	-	-	-30	V
ယ	Measurement	Min	Тур	Max	Units (Notes)
w	Bridge excitation	4.9	5	5.1	V (note 3)
≥	Bridge resistance	330	350	5000	Ohms(note 4)
ire	Bridge sensitivity	0.5	2.5	150	mV/V (note 5)
P	Output current range			20	mA
4	Output load	-	-	250	Ohms(note 6)
Ż	Band width	dc		1000	Hz
윽	Zero adjustment	-	±2	-	%FR(note 3)
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
	Electrical and Environmental	Min	Tvp	Max	Units (Notes)
	Electrical and Environmental	IVIII	IVD	IVIdX	Utilis (Notes)

	Electrical and Environmental	Min	Тур	Max	Units (Notes)
	Power supply	7.5	24	30	V DC (note 1)
_	Operating Current			20	mA (note 2)
S	Operating temperature range	-40	-	85	°C
(J)	Storage temperature range	-40	- 125	°C	
	Reverse polarity protection	-		-	
'n	Measurement	Min	Тур	Max	Units (Notes)
10	Bridge excitation	1.05	1.11	1.16	V (note 4)
≥	Bridge resistance	350	1000	5000	Ohms (note 5)
ire	Bridge sensitivity	0.5	2.5	55	mV/V (note 6)
(D)	Output voltage range	4		20	mA
4	Output load	-	-	800	Ohms (note 7)
Ŋ	Band width	dc		1000	Hz
윽	Zero adjustment	-	±2	-	%FR (note 3)
1	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

