

LAC[®] 74.1 Installation and Operating Guide

Scope: The Load cell to Analogue Converter is a highly reliable device, based on state of the art technology, which can link analogue transducers to various analogue equipment. The LAC[®] 74.1 produces either a voltage or a current loop output and allows a wide range of filter, off-set and gain settings to suit any industrial application. Because of careful design -e.g. internal signal chopping, the LAC[®] 74.1 rejects unwanted influences and disturbances better than any comparable device. These features plus the true ratiometric design ensure high accuracy and reliability. Additional safety features ensure that if a fault occurs with either the load cell, its connections or the device itself, the LAC[®] 74.1 will detect the fault condition and provide a fail-safe output signal. This is particular important in safety critical applications such as elevators, cranes, winches, etc.

General Description

Analogue input: Up to four load cells, (each >350 Ohm) can be connected. The ratiometric input stage provides for 4-wire or 6-wire connections. If a 4-wire load cell is used, the sense connections must be linked to the corresponding excitation terminal. If a 6-wire connection is used, sense voltage detection allows long load cell cables (>10 m) to be used, even in electrically hostile environments.

Input capability: Range 0mV to 35mV OR -35mV to 0mV [with maximum positive zero offset] resolution of 0.30µV per internal division (>100000 internal divisions)

Low Pass Filter: 5 steps of filter settings ranging from 0.33 to 33 Hz can be selected.

Zero Off-set: Adjustment of either positive and negative offsets (up to ± 90% FS) can be made using a combination of DIP switches (64 steps) and a 20-turn potentiometer (fine).

Gain: Can be set in 128 steps of 0.25x and fine trimmed using a 20-turn potentiometer over the range 0.3x. Three LEDs indicate status, red for over or under range, and green for within-range signals.

Output: Either a voltage output (0 - 10 VDC) or a current loop output (0 - 20 mA or 4 - 20 mA) are produced by input signals over the range 0 - 0.10 mV/V up to 0 - 3.5 mV/V FS as required.

Safety: If a short circuit occurs on the load cell supply wires, output wires or sense wires, the output from the LAC[®] 74.1 will fall to zero as a fail safe condition. With the 4-20mA range selected, an open circuit in the 4-20mA loop will also be detected as a fault. Under fault conditions the 4-20mA output will fall to 4mA. If the input signal from the load cell/s is greater than 4mV/V, then the output will also fall to zero. The fault condition is also signalled by the release of the FAULT output (normally closed, open collector) and by the red "ERROR" status LED.

Power Supply: The power supply can be any coarsely regulated source 12-24 VDC, max. 3 Watt, or 14-18 VAC, 50/60 Hz. Reverse polarity and excess voltage protection is built-in. Illumination of a green "PWR OK" LED indicates the correct operation of the internal power supply.

Mechanics: Comprising a single PC Board with a metal screening cover, and supplied with two standard WAGO[™] TS-35 DIN-rail mounting clips which can be easily removed if wall mounting is preferred. Outside dimensions are 135 x 66 x 18 mm including the row of 12 terminal blocks (5.00 mm spacing) and the EMI-protecting metal cover.

Set-up and Calibration

The following instructions provide guidance for set-up and calibration. Before starting, ensure that all load cells and power supply connections are correctly made, ensure that the load cells are carrying their minimum load(s) and connect a suitable measuring instrument to the output terminals.

- Fast set-up:
1. Select output required (0-10V, 0-20mA or 4-20mA)
IMPORTANT NOTE : If output of 0-10V is required, then the 0-20/4-20mA switch MUST BE SET to 0-20.
 2. Adjust the ZERO settings (+/- polarity), then coarse setting, then fine setting)
 3. Apply the known load
 4. Adjust the SPAN settings (coarse then fine)
 5. If the output signal is unstable, increase the filter setting

More details on the function of each of the controls follows:

Output selection: Select the required output via the two DIP-switches provided.

Output required	Switch 20mA/10V	Switch 0-20/4-20
Voltage, 0-10V	OFF	ON
Current, 0-20mA	ON	ON
Current, 4-20mA	ON	OFF

Zero setting: The first six binary DIP-switches permit the zero off-set to be adjusted in steps of 0.5 mV, throughout the range of 0 to 31.5 mV/V. The seventh DIP-switch sets the polarity of the zero adjustment, either Positive (ON) to make the output more positive or Negative (OFF) to make the output more negative. The 20-turn potentiometer permits fine trimming of the zero point.

DIP-switches ON		none	1	2	3	4	5	6	all	Pol.	Pot
Relative to 20mV	%	0	2.5	5	10	20	40	80	157	+/-	3
Input at Zero V _{out}	mV	0	0.5	1	2	4	8	16	31.5	+/-	0.6

Span (gain) setting: The seven binary DIP-switches permit the relative gain to be set in steps of 0.25x over the range 1 to 32.75x, and the 20-turn potentiometer permits fine trimming. Therefore, any input signal range between 0.1mV/V and 3.2mV/V can be used to generate the full scale output (0-10V or 0-20 mA or 4-20 mA). Note that the higher the gain, the lower the resolution that can be obtained.

DIP-switches ON		none	1	2	3	4	5	6	7	all	pot
Rel. Gain factor	x	0	0.25	0.5	1	2	4	8	16	33	0.3
Input for 20mA I _{out}	mV/V	3.2	3.0	2.8	2.4	1.6	0.8	0.4	0.2	0.1	

Low pass filter: The four DIP-switches allow the low-pass filter time constant to be set to one of 5 selections between 5ms and 500ms, resulting in equivalent settling times of between 40ms and 4 seconds.

DIP-switches ON		none	1	2	3	4
Time Constant	ms	5	16	50	160	500
Settling to ~0.02%	ms	40	130	400	1300	4000
Cut off frequency	Hz	33	10	3.3	1.0	0.33

Technical data:

The LAC[®] 74.1 meets the CE regulations regarding EMI and EMR and the relevant parts of EN45501 for weighing scales in precision class (III).

Load cell input:

Excitation voltage :	10 VDC
Excitation drive capability:	≤120 mA (eg 4 x 350 ohm load cells)
Input stage type:	True ratiometric 6-wire (sense) system
Input off-set range for 0 V _{out} :	0 - ± 31.5 mV
Standard input gain range for 10 V _{out} :	1.0 - > 32 mV
Input signal resolution:	~0.3 µV (>100000 increments)

Filters:

First filter (fixed):	33 Hz cut off frequency (5ms)
Second filter (variable):	33-0.33 Hz cut-off freq. (5-500ms)

Analog output:

Voltage output (V _{out}):	0-10 VDC	R _L ≥500Ω
or		
Current loop output (I _{out}):	0-20mA or 4-20mA	Reverse current protected

Linearity:

Max deviation 0 - Full scale:	<0.01% FS.
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Temperature Influence:

Drift 5 min. upon power ON:	<50 ppm FS (average)
Compensated temperature range:	-10°C to +40°C.
Operating temperature range:	-20°C to +50°C.
Temperature effect on Zero:	<25 ppm FS/°C.
Temperature effect on Gain:	<50 ppm FS/°C.

Power supply:

External requirements: DC	12-24 VDC 0.8~2.4 Watt
AC	14-18 VAC, 0.8~2.4 Watt
Protection:	Reverse polarity, surge and excess voltage protected

Logic output :

Type:	Open collector, normally closed at power on.
Rating:	V ≤ 30 VDC, I ≤ 300mA
Function:	Fail-safe, releases if short circuit occurs on load cell input, sense or output terminals or if the power supply fails or 4-20mA loop is open circuit or output is under or over range

EMC capability:

EMI (26-1000 MHz) at field strength:	>10 V/m (level 3)
Burst (Transients) to meet:	IEC 801-4 (level 2)
Electrostatic discharge to meet:	IEC 801-2 (level 3)

Mechanical:

Construction:	Single PC board and metal case.
Connections:	12 Robust screw terminals.
Mounting:	Dual TS35 DIN-rail clips or wall mounting.
Mechanically protected to meet:	DIN 40 050 -IP40
Dimensions (overall):	135 x 66 x 18 mm