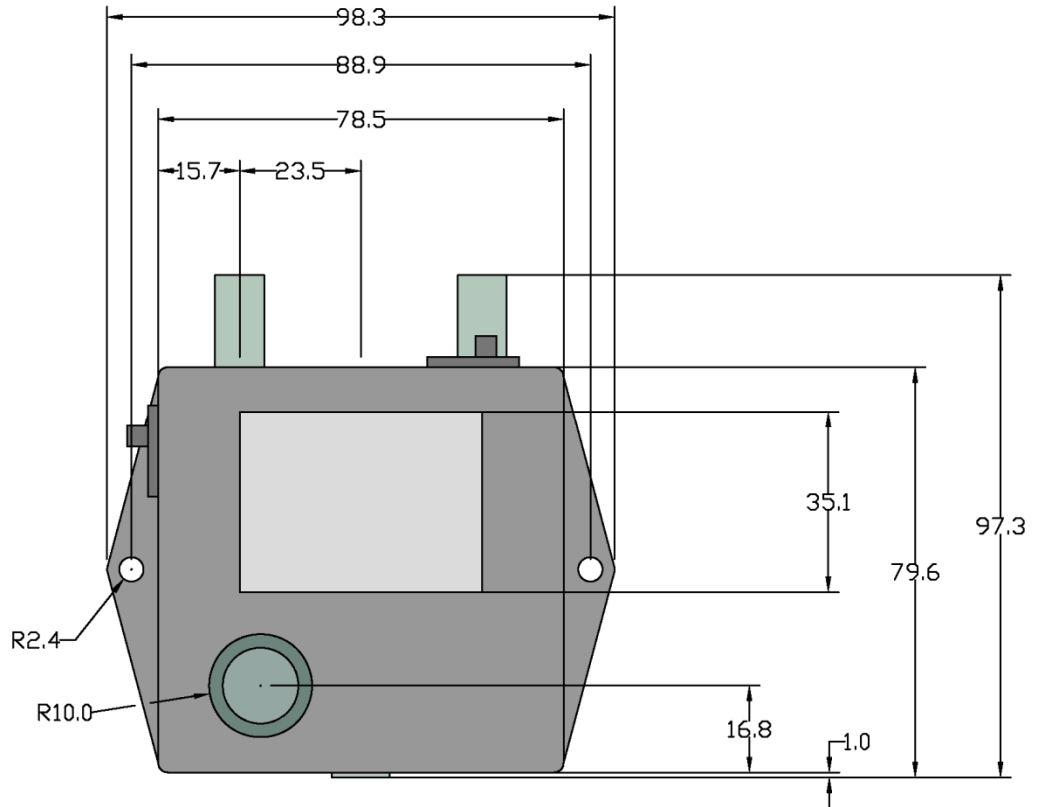


AL-05 . Product Photograph



AL-05 . Physical Dimensions



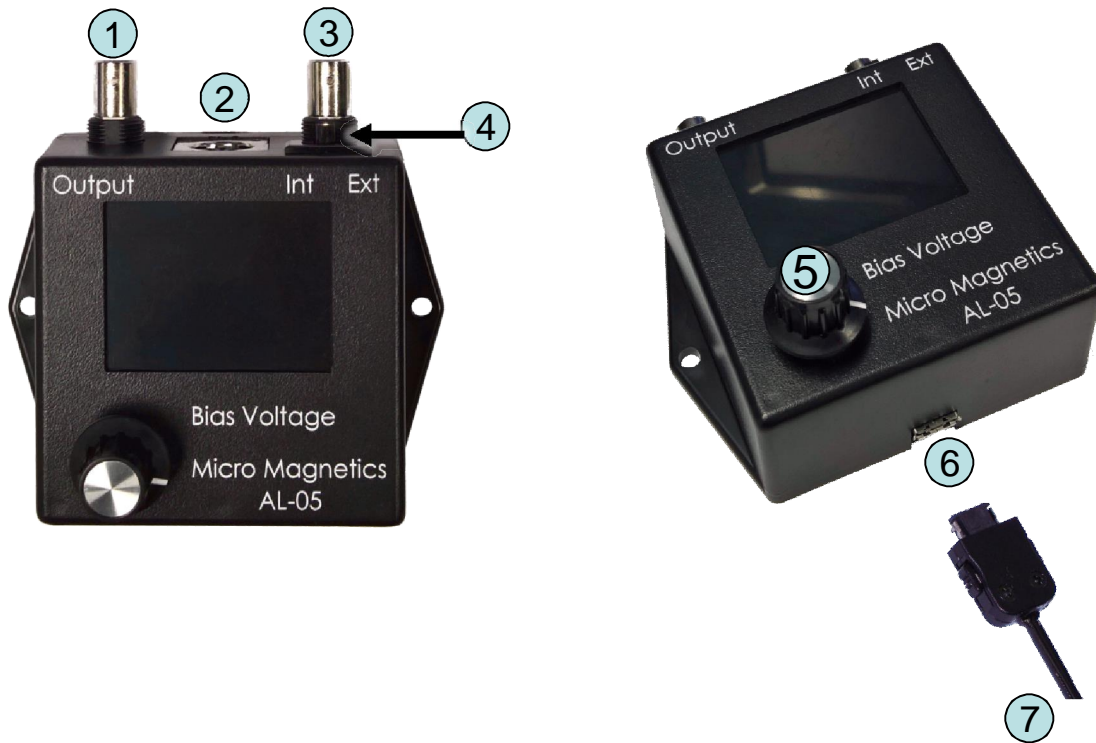
All dimensions in millimeters.

Total height of the AL-05, including the height of the null potentiometer knob is 56.6 mm (2.23±).

Thickness of the mounting flanges is 3.2 mm (0.125±).

Height of the AL-05 housing only is 38.1 mm (1.5±).

AL-05 . Physical Schematic



1. Signal Output BNC
2. Power Input Connector
3. External Bias Input BNC
4. Bias Selection Switch
5. Null Potentiometer
6. Sensor Connector
7. Sensor Probe

AL-05 . Specifications

PHYSICAL	Min.	Typical	Max.	Unit
Total Length		98.3		mm
Total Width		97.3		mm
Total Height		56.6		mm
Unit Weight (excludes P.S.) ¹		145		gram
Operating Temperature Range	0	20	40	°C
ELECTRICAL				
AC Electrical Power Voltage	90		264	V
AC Electrical Power Frequency	47		63	Hz
RTI Voltage Noise (f > 100 Hz)		12	20	nV/Hz ^{0.5}
Total Effective Gain ²	10	100	2000	
Frequency Response (G = 100)	0		700	kHz
Frequency Response (G = 2000)	0		200	kHz
Output Impedance		50		
Common-Mode Rejection (1 kHz)	80	90		dB
First-Stage Gain (G1) ²		10		
Second-Stage Gain (G2) ²		50		
Internal Bias (V _{IN})		2		V
EXTERNAL BIAS				
External Bias Input Voltage Range	-5		5	V
Signal Output Operating Range	-10		10	V

NOTES

1. The included power supply incorporates an attached 1.5 meter cable for connection to the AL-05. The power supply itself weighs approximately 0.3 kg (0.7lbs.).
2. The gain is set by Micro Magnetics prior to shipping. Custom gain upon request.

AL-05 . Detailed Description and Operating Instructions

Introduction:

The AL-05 is a low-noise preamplifier circuit meant for use with Micro Magneticsq STJ-020 and STJ-220 magnetic sensor probes. The AL-05 supplies electrical power to the sensor probe (#7), and outputs an analog voltage linearly proportional to the magnetic field at the sensor. The bipolar output voltage V_{OUT} at the signal out BNC (#1) has a range of +/- 10 V and has a value given by

$$V_{OUT} = V_0 + H \left(\frac{S \cdot V_{IN} \cdot G_1 \cdot G_2}{100(G_1 + 1)} \right)$$

where H is the magnetic field in the sensing direction, in Gauss, S is the sensor sensitivity (in units of %/G, as specified in the sensor datasheet), and V_0 is an offset which can be adjusted using the null potentiometer (#5). The parameters G_1 and G_2 are the gain parameters of the AL-05 which are set individually for each unit and are given in the AL-05 specifications datasheet. The parameter V_{IN} is the voltage which is used to power the sensor. When the bias selection switch (#4) is set for internal biasing, V_{IN} = (refer to Specs. Table on prior page). When the bias selection switch is set for external biasing, V_{IN} is equal to the voltage which is supplied through the external bias input jack (#3).

Nulling the Output and Using the Analog Output Signal:

In general, during normal operation of the AL-05, the output signal (#1) should be near zero volts when no magnetic field is applied to the sensor. The full-scale voltage range is approximately -10 to +10 V. The null potentiometer (#5) should be used to adjust the DC voltage value so that it falls within the normal operating range.

If the output voltage cannot be adjusted to less than +10V this indicates a failed sensor, or a sensor with too high impedance for use with the AL-05.

If the output voltage cannot be adjusted greater than -10V this indicates a failed sensor, or a sensor with too low impedance for use with the AL-05.

AL-05 . Detailed Description and Operating Instructions (2)

Sensor Biasing:

The voltage which is supplied to the MTJ sensor circuit is referred to as the *bias voltage*. The user has the option of either using an external voltage to power the sensor, or using an internal bias. This option is set using the bias selection switch (#4). When this switch is set for external biasing (Ext+), the user may supply a bias voltage directly to the sensor using the external bias input BNC jack (#3). **The external bias voltage should be set within the safe range given in the AL-05 specifications sheet.** When the switch is set for internal biasing (Int+), the internal bias voltage is used.

Installing and removing SpinTJ sensors:

To install an STJ-020 or STJ-220 sensor, follow these steps:

1. Power the AL-05 with the included power supply.
2. Install the sensor in the proper orientation (label up). The sensor probe will snap into the connector (#6).
3. While measuring the output voltage, adjust the voltage to zero by turning the null potentiometer (#5) in the counterclockwise (CCW) direction for a negative reading or clockwise (CW) for a positive reading.

AL-05 . Detailed Description and Operating Instructions (3)

Notes on Sensor Operation:

To check if a sensor is responding properly, the user can monitor the DC signal output voltage. Using internal bias, a noticeable change in the voltage should be observed if a small refrigerator magnet is brought within 1-2+ of the sensor's active area.

The AL-05 produces an output voltage which is linearly proportional to the magnetic field in the sensing direction, as long as the output voltage at the signal output jack (#1) is within its operating range. At sufficiently large magnetic fields, the response becomes increasingly non-linear. In addition, the sensor sensitivity can be slightly altered by large static magnetic fields in the perpendicular in-plane direction.

If you require technical support please contact Micro Magnetics at support@micromagnetics.com or (508) 672-4489.