

Step 1: Go to <https://www.ngdc.noaa.gov/geomag/calculators/magcalc.shtml#igrfwmm>

Calculate Magnetic Field

Latitude: S N
Longitude: W E
Elevation: GPS Mean sea level

Model: WMM (2019-2024) IGRF (1590-2024)
 EMM (2000-2019)
Start Date: Year Month Day
End Date: Year Month Day
Step size:
Result format: HTML XML CSV JSON

Lookup Latitude / Longitude

Enter a street address, street name, or street intersection. For best results, include as much location information as possible with the street address in your search, such as city, state, zip code.

Location:

Step 2: Enter your location

Step 3: Click on this button

(Doing this will enter your longitude and latitude on the form for you).

Step 4: Click on the **Calculate** button

Magnetic Field							
Model Used:	WMM-2020						
Latitude:	40° 7' 2" N						
Longitude:	88° 12' 15" W						
Elevation:	0.0 km Mean Sea Level						
Date	Declination (+ E - W)	Inclination (+ D - U)	Horizontal Intensity	North Comp (+ N - S)	East Comp (+ E - W)	Vertical Comp (+ D - U)	Total Field
2020-10-26	-3° 19' 49"	67° 32' 11"	20,075.6 nT	20,041.7 nT	-1,166.2 nT	48,553.8 nT	52,540.5 nT
Change/year	-0° 3' 23"/yr	-0° 4' 52"/yr	27.6 nT/yr	26.4 nT/yr	-21.3 nT/yr	-128.2 nT/yr	-107.9 nT/yr
Uncertainty	0° 23'	0° 13'	128 nT	131 nT	94 nT	157 nT	145 nT

Step 5: This calculated number tells you the downward component of the Earth's magnetic field at your location in units of nano-Tesla (nT). Since you want the upward component in units of micro-Tesla (μT), you need to divide by -1000 to get B_{Ez} .

In this example $B_{Ez} = 48553.8/(-1000) = -48.55 \mu\text{T}$.

Your B_{Ez} value will probably be **negative** if you are in the northern hemisphere, and it will probably have a magnitude similar to the number shown. If you get something ten times bigger or smaller then you should make sure you didn't make a mistake.

Options and Preferences

Select which output controls to display when your remote is on:

DAC (analog) D6 (digital) Buzzer D4 (PWM) D5 (PWM)

Specify the vertical component of the Earth's magnetic field at your location to improve your magnetometer calibration:

Local Bz = uT ([Look here](#) for detailed instructions)

Specify how long to let your IOLab be idle before powering it down:

Inactivity Timeout

Step 6: Put the B_{Ez} value that you found as described on the previous few pages into the Local Bz box on the Options and Preference panel.

Step 7: Restart your IOLab application and calibrate the magnetometer. Your new value of B_{Ez} will be used in the calibration.