# Magnetic Flowmeter Velocity, Range and Signal

Velocity in a magnetic flowmeter for a flow and meter size, the electrode signal from Faraday's law, and the flow range for a velocity band.

**Method:** Faraday's law of induction for a conductor moving in a field: E = B D v

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Volume flow | 120.00 | m³/h |
| Meter bore | 100.00 | mm |
| Magnetic flux density | 5.0000 | mT |
| Lowest velocity for good accuracy | 0.30000 | m/s |
| Highest velocity wanted | 5.0000 | m/s |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Velocity in the meter | 4.2441 | m/s |
| Electrode voltage B D v | 2.1221 | mV |
| Flow at the lowest velocity | 8.4823 | m³/h |
| Flow at the highest velocity | 141.37 | m³/h |

## Formula and method

$$v = \frac{4Q}{\pi D^2}, \quad E = B\,D\,v$$

### Variables

| | | |
|---|---|---|
| $Q$ | Volume flow | m³/s |
| $D$ | Meter bore | m |
| $B$ | Magnetic flux density | T |
| $v_{min}$ | Lowest velocity for good accuracy | m/s |
| $v_{max}$ | Highest velocity wanted | m/s |
| $v$ | Velocity in the meter | m/s |
| $E$ | Electrode voltage B D v | V |
| $Q_{min}$ | Flow at the lowest velocity | m³/s |
| $Q_{max}$ | Flow at the highest velocity | m³/s |

### Method and standards

Faraday induction in the moving conductive liquid.

### Assumptions and limits

- Uniform field and velocity.

### References

- Faraday's law of induction for a conductor moving in a field: E = B D v

## Report details

| | |
|---|---|
| Report reference | FCC-RKD6-P554 (the same inputs always give the same reference) |
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| Calculator | Magnetic Flowmeter Velocity, Range and Signal |
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| Software release | FireCAD Calc, release of 17 November 2026 |
| Release checks | 3 reference cases of this calculator, computed independently, are checked on every release |

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

### This calculator online

https://calc.firecad.com/instrumentation/flow/magnetic-flowmeter-velocity

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.