



Technology Solutions

TEK-FLUX 1400A

Electromagnetic Flow Meter

Instruction Manual

Document Number: IM-1400A



www.tek-trol.com

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

For technical assistance, contact

Customer Support

796 Tek-Drive

Crystal Lake, IL 60014

USA

Tel: +1 847 857 6076, +1 847 655 7428

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1 Safety Instructions

1.1 Intended Use

Tek-Flux 1400A is used to measure flow rate of electrically conductive liquids. Typical applications are found in all industries e.g. Metallurgy industry, Water and waste water, Agriculture and irrigation, Food and beverage industry, Pharmaceutical industry.

1.2 Safety Instructions from the Manufacturer

1.2.1 Disclaimer

The manufacturer will not be held accountable for any damage that happens by using its product, including, but not limited to direct, indirect, or incidental and consequential damages.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer has the right to modify the content of this document, including the disclaimer, at any time for any reason without prior notice, and will not be answerable in any way for the possible consequence of such changes.

1.2.2 Product Liability and Warranty

The operator shall bear authority for the suitability of the device for the specific application. The manufacturer accepts no liability for the consequences of misuse by the operator. Wrong installation or operation of the devices (systems) will cause the warranty to be void. The respective Terms and Conditions of Sale, which forms the basis for the sales contract shall also apply.

1.2.3 Information Concerning the Documentation

To prevent any injury to the operator or damage to the device it is essential to read the information in this document and the applicable national standard safety instructions. This operating manual contain all the information that is required in various stages, such as product identification, incoming acceptance and storage, mounting, connection, operation and commissioning, troubleshooting, maintenance, and disposal.

1.3 Safety Precautions

You must read these instructions carefully prior to installing and commissioning the device. These instructions are an important part of the product and must be kept for future reference. Only by observing these instructions, optimum protection of both personnel and the environment, as well as safe and fault-free operation of the device can be ensured.

For additional information that are not discussed in this manual, contact the manufacturer

Warnings and Symbols Used

The following safety symbol marks are used in this operation manual and on the instrument.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



NOTE

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

1.4 Packaging, Transportation and Storage

1.4.1 Packaging

The original package consists of

1. Tek-Flux 1400A Electromagnetic Flow Meter
2. Documentation

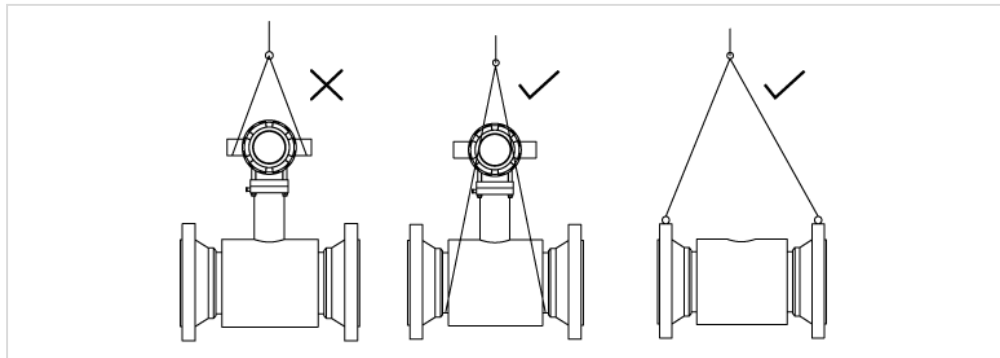


NOTE

Unpack and check the contents for damages or signs of rough handling. Report damage to the manufacturer immediately. Check the contents against the packing list provided.

1.4.2 Transportation

- Avoid impact shocks to the device and prevent it from getting wet during transportation.
- Verify local safety regulations, directives, and company procedures with respect to hoisting, rigging, and transportation of heavy equipment.
- Transport the product to the installation site using the original manufacturer's packing whenever possible.



1.4.3 Storage

If this product is to be stored for a long period of time before installation, take the following precautions:

- Store your product in the manufacturer's original packing used for shipping.
- Storage location should conform to the following requirements:
 - Free from rain and water
 - Free from vibration and impact shock
 - At room temperature with minimal temperature and humidity variation
- Before storing a used flow meter remove any fluid from the flow meter line completely. Properties of the instrument can change when stored outdoors.


1.4.4 Nameplate

The nameplate lists the order number and other important information, such as design details and technical data



NOTE

Check the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

| | |
|--|---------------------------|
| Tek-Flux 1400A Electromagnetic Flowmeter | |
| Model | Tek-Flux 1400A |
| Meter Factor K | _____ Size _____ |
| Flow Range | _____ Work.Press. _____ |
| Accuracy | _____ Work.Temp. _____ |
| Lining Mtl. | _____ Electrode Mtl _____ |
| Voltage | _____ Protection _____ |
| S/N | _____ |
|  Crystal Lake, IL 60014 USA www.tek-trol.com | |

2 Product Description

This section covers the reference and specification data, as well as ordering information.

2.1 Introduction

Electromagnetic flow meters are also called as Magmeters. They are non-contact instruments used for measuring the volumetric flow rates of any fluids that can adequately conduct electricity in closed pipelines. These instruments are highly accurate, reliable, and stable devices that are used in various high-pressure industrial processes.

2.2 Measuring Principle

The Tek-Flux 1400A Electromagnetic flow meter operates on the principle of Faraday's Law of Induction. According to this principle, any change in the magnetic flux linked to an electric circuit causes an electromotive force (or voltage) to be induced in this circuit. The induced voltage is therefore directly proportional to the rate of change of magnetic flux with time.

The flow meter typically consists of two electromagnetic coils that are mounted on opposite sides of a non-magnetic measuring tube. Two electrodes are fitted inside the tube to detect the voltage generated by the conducting fluid. Although these electrodes come into contact with the fluid, they do not obstruct its flow.

When current is applied to the coils, they generate an alternating magnetic field across the cross-sectional area of the tube. A fluid flowing through the magnetic field acts as a conductor, and a voltage is induced. The induced voltage is picked up by the electrodes and sent to a transmitter that is either mounted on the flow meter or connected remotely. The transmitter calculates the volumetric flow rate and displays the output.

The induced voltage is calculated using the following equation:

$$U = B \times d \times v$$

Where,

U = Voltage Induced by the Conducting Fluid

B = Magnetic Flux Density

d = Distance Between the Electrodes

v = Average Velocity of the Conductor (i.e. fluid flowing in the tube through the magnetic field)

Since the magnetic flux density and the distance between the electrodes remain constant, the induced voltage is directly proportional to the conductor velocity.

The value of the velocity is used to calculate the volumetric flow rate as follows:

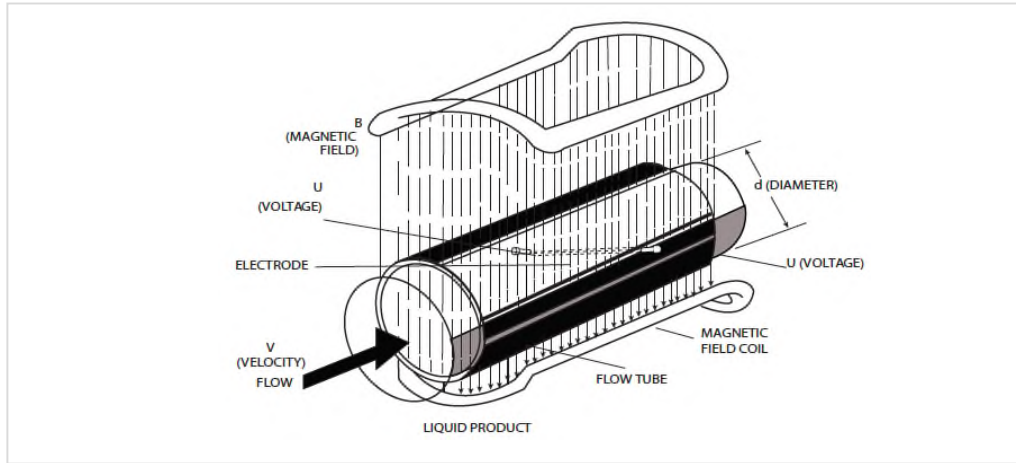
$$Q = A \times v$$

Where,

Q = Flow Rate

A = Area

v = Average velocity



Operation of an Electromagnetic Flow Meter

2.3 Specifications

2.3.1 Technical

| | | | |
|-------------------------|----------------------|--------------------------------|--------|
| Accuracy | | ±0.5% | |
| Repeatability | | 0.15% | |
| Ambient temperature | Sensor (Remote Type) | -4°F to 158°F (-20°C to +70°C) | |
| | Converter | -4°F to 158°F (-20°C to +70°C) | |
| | Integral Type | 14°F to 122°F (-10°C to +50°C) | |
| Humidity | | 5% to 95% RH (no frost) | |
| Vibration Frequency | | 55Hz | |
| Amplitude | | 0.55mm | |
| Ambient magnetic field | | ≤400A/m | |
| Fluid Temperature | Integral Type | ≤176°F | |
| | Separate Type | Rubber Lining | ≤176°F |
| | | PTFE Lining | ≤248°F |
| Nominal Pressure | | Limited to Flange Rating | |
| Power Supply | | 18 to 36VDC, 85 to 220VAC | |
| Enclosure | | IP65 | |
| Output Signal | | Pulse and 4 to 20 mA | |
| Digital Communication | | Modbus, RS485 or HART | |
| Electrode Material | | 316SS or Hastelloy C | |
| Lining Material | | PTFE or Hard Rubber | |
| Flange Material | | Carbon Steel | |
| Measuring Tube Material | | Stainless Steel | |

2.3.2 Electrode Material Selection

| Electrode Material | Application |
|--------------------|---|
| 316SS | Used for measuring water, wastewater, inorganic acid, organic acid or another corrosive medium. |
| Hastelloy-C | Used for measuring oxidizing acid such as nitric acid, mixed acid, and vitriol mixed liquid, also oxydic salt such as Fe ⁺⁺ , Cu ⁺⁺ , other oxidizing agent such as pypochloride solution whose temperature is higher than normal and seawater. |

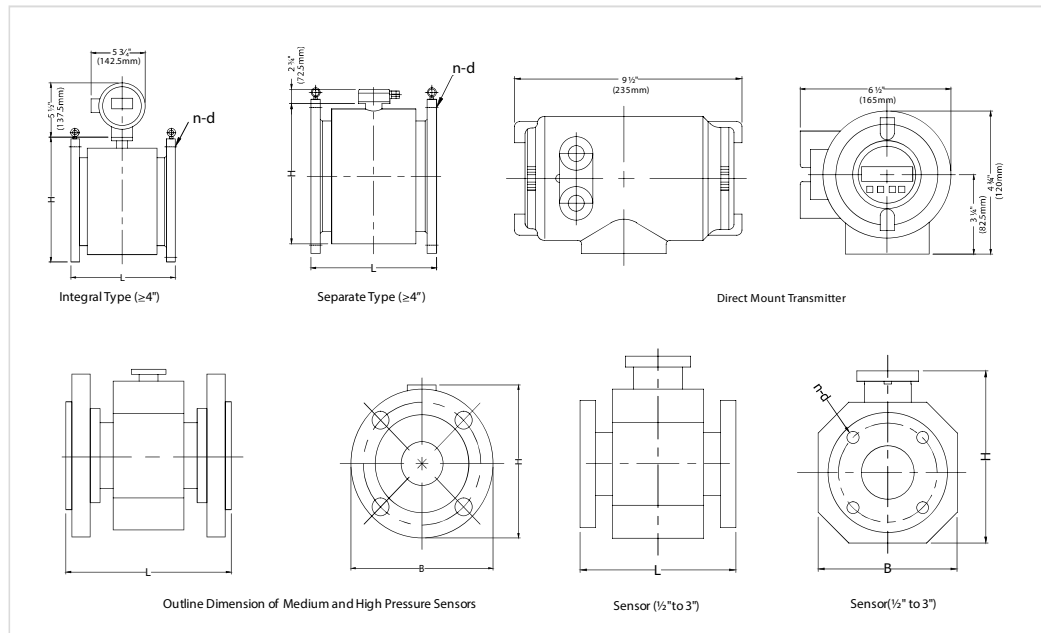
2.3.3 Lining Material

| Lining material | Main performance | Application scope |
|------------------|--|--|
| PTFE | <ul style="list-style-type: none"> Stable chemical performance, resists acid, alkali, saline solution and organic solvent. Does not resist the corrosion of chlorine trifluoride, liquid oxygen at high flow rate and ozone Common wear-resisting property | -112°F to 248°F Highly corrosive medium such as concentrated acid and concentrated alkaline |
| Synthetic rubber | <ul style="list-style-type: none"> Excellent elasticity, good breaking tenacity, good wear- resisting property. Resist acid solution, aqueous alkali and saline solution at normal low concentration of acid solution, Not resist corrosion from oxidant medium | <176°F Neutral abrasive pulp, slurry and coal slurry |

2.3.4 Flow Range and Nominal Diameter Selection

| Inch(mm) | Velocity | |
|-----------|----------------------|--------------------|
| | 0.98 to 32.80 ft/sec | 0.3 to 10 m/s |
| | gal/min | m ³ /hr |
| 1/2" (15) | 0.8 to 28.2 | 0.19 to 0.64 |
| 1" (25) | 2.4 to 77.9 | 0.53 to 17.7 |
| 2" (50) | 9.4 to 312.6 | 2.13 to 71.0 |
| 3" (80) | 23.9 to 796.9 | 5.43 to 181 |
| 4" (100) | 37.4 to 1246 | 8.49 to 283 |
| 5" (125) | 58.6 to 1946.1 | 13.3 to 442 |
| 6" (150) | 84.1 to 2800.2 | 19.1 to 636 |
| 8" (200) | 149.3 to 4975.2 | 33.9 to 1130 |
| 10" (250) | 233.8 to 7793.1 | 53.1 to 1770 |
| 12" (300) | 335.5 to 11183.3 | 76.2 to 2540 |
| 18" (450) | 757.3 to 25184.4 | 172 to 5720 |
| 20" (500) | 933.4 to 31128.3 | 212 to 7070 |
| 24" (600) | 1347.3 to 44909.2 | 306 to 10200 |
| 28" (700) | 1831.6 to 60979.7 | 416 to 13850 |

2.4 Dimensional Drawings



| Size in Inches (mm) | Sensor dimensions in inches (mm) | | | Flange connection dimension in Inches | Net weight in lbs (kg) |
|---------------------|----------------------------------|---------------|---------------|---------------------------------------|------------------------|
| | L | B | H | n-d | |
| 1/2" (15) | 7.87" (0.65) | 5.11" (0.42) | 8.66" (0.72) | 4-Φ.62" | 17.63 (8) |
| 1" (25) | 7.87" (0.65) | 5.59" (0.46) | 9.05" (0.75) | 4-Φ.62" | 26.45 (12) |
| 2" (50) | 7.87" (0.65) | 6.69" (0.55) | 10.23" (0.85) | 4-Φ.75" | 39.68 (18) |
| 3" (80) | 7.87" (0.65) | 7.87" (0.65) | 11.22" (0.93) | 4-Φ.75" | 57.32 (26) |
| 4" (100) | 9.84" (0.82) | 9.25" (0.77) | 11.41" (0.95) | 8-Φ.75" | 66.13 (30) |
| 5" (125) | 9.84" (0.82) | 10.62" (0.88) | 12.79" (1.06) | 8-Φ.88" | 79.36 (36) |
| 6" (150) | 11.81" (0.98) | 11.81" (0.98) | 13.77" (1.14) | 8-Φ.88" | 92.59 (42) |
| 8" (200) | 13.77" (1.14) | 13.38" (1.11) | 15.15" (1.26) | 8-Φ.88" | 121.25 (55) |
| 10" (250) | 15.74" (1.31) | 15.94" (1.32) | 17.51" (1.45) | 12-Φ1" | 154.32 (70) |
| 12" (300) | 19.68" (1.64) | 18.11" (1.50) | 20.27" (1.68) | 12-Φ1" | 187.39 (85) |
| 18" (450) | 23.62" (1.96) | 25.19" (2.09) | 27.16" (2.26) | 16-Φ1.25" | 330.69 (150) |
| 20" (500) | 23.62" (1.96) | 28.14" (2.34) | 29.92" (2.49) | 20-Φ1.25" | 440.92 (200) |
| 24" (600) | 23.62" (1.96) | 33.07" (2.75) | 34.64" (2.88) | 20-Φ1.38" | 573.20 (260) |
| 28" (700) | 27.55" (2.30) | 35.23" (2.93) | 38.18" (3.18) | 28-Φ1.38" | 793.66 (360) |

2.5 Model Chart

| Example | Tek-Flux 1400A | 25 | 1 | I | HC | 1 | 1 | T | Tek-Flux 1400 A-25-1-I-HC-1-1-T |
|--------------------|----------------|---|--------|-------------|---------------|------------------|--------|-------------|--|
| Series | Tek-Flux 1400A | | | | | | | | Electromagnetic Flow meter |
| Size | | 015 025 050 080 100 150 200 250 300 450 500 600 700 | | | | | | | ½" (PTFE Liner/HC Electrodes) 1" (PTFE Liner/HC Electrodes) 2" 3" 4" 6" 8" 10" 12" 18" 20" 24" 28" |
| Transmitter | | | 1 2 | | | | | | Direct Mount Remote Mount (comes with 30 ft of cable) |
| Output | | | | I S H | | | | | 4-20 mA, Pulse 4-20 mA, Pulse, Modbus RS485 4-20 mA, Pulse, HART |
| Electrodes | | | | | SS HC X | | | | 316L SS Hastelloy C ConsultFactory for Specials |
| Process Connection | | | | | | 1 2 3 6 | | | 150# ANSI Flange AWWA Flange 300# ANSI Flange 600# ANSI Flange |
| Power Supply | | | | | | | 1 2 | | 18-36VDC 85-220VAC |
| Liner Material | | | | | | | | T H X | PTFE Hard Rubber ConsultFactory for Specials |



NOTE

Please note that when ordering a PTFE lined meter that grounding rings are included and do not have an additional cost

