TOSHIBA

Toshiba LF414 Instruction Manual

Electromagnetic flowmeter detector

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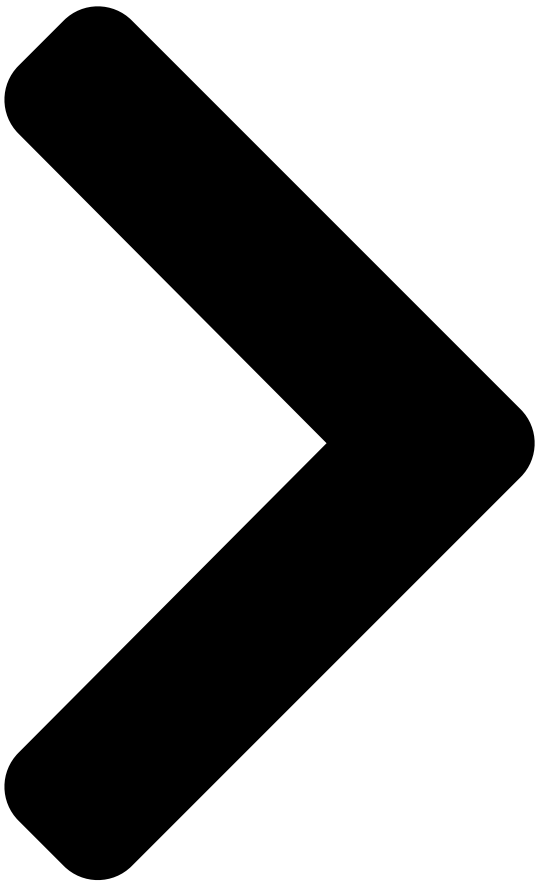

ELECTROMAGNETIC FLOWMETER DETECTOR

TOSHIBA

NOTES

Before using the equipment, please read this manual carefully and understand the contents, and then use the equipment correctly.

• NEVER attempt to operate the equipment in any ways that are not described in this instruction manual.

• After reading this manual, store it with care in a place where it can be referred to whenever needed.

• Please be sure that this manual is delivered to the personnel who will use this product.

MODEL LF414

INSTRUCTION MANUAL

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Troubleshooting

Related Manuals for Toshiba LF414

Measuring Instruments Toshiba LF410 Manual

Field intelligent device – mount-anywhere series - wafer electromagnetic flowmeter (15 pages)

Plumbing Product Toshiba LF400 Series Operation Manual

Electromagnetic flowmeter (2 pages)

Plumbing Product Toshiba LF470 Instruction Manual

Electromagnetic flowmeter detector (40 pages)

Plumbing Product Toshiba LF404 Instruction Manual

Electromagnetic flowmeter (158 pages)

Plumbing Product Toshiba LF494 Instruction Manual

Electromagnetic flowmeter (157 pages)

Plumbing Product Toshiba LF600 Series Operation Manual

Electromagnetic flowmeter (2 pages)

Plumbing Product Toshiba LF610 Series Operation Manual

Electromagnetic flowmeter (2 pages)

Plumbing Product Toshiba LF502 Instruction Manual

Electromagnetic flowmeter for partially filled pipes (111 pages)

Plumbing Product Toshiba LF602F Instruction Manual

Electromagnetic flowmeter (162 pages)

Plumbing Product Toshiba GF632 Instruction Manual

Electromagnetic flowmeter detector (56 pages)

Summary of Contents for Toshiba LF414

Page 1 • After reading this manual, store it with care in a place where it can be referred to whenever needed. • Please be sure that this manual is delivered to the personnel who will use this product. MODEL LF414 □□□□□□□□...

Page 2 We thank you very much for your purchase of our LF414 series electromagnetic flowmeter detector. Integral type LF414/LF600F, LF414/LF610F Separate type detector LF414 This instruction manual describes the notes on using an electromagnetic flowmeter detector, installation, configuration and maintenance. It is intended for the personnel in charge of installation, operation and maintenance.

Page 3: Safety Precautions

SAFETY PRECAUTIONS Safety signs and labels affixed to the product and/or described in this manual give important information for using the product safely. They help prevent damage to property and obviate hazards for persons using the product. Make yourself familiar with signal words and symbols used for safety signs and labels. Then read the safety precautions that follow to prevent an accident involving personal injury, death or damage to property.

Page 4 SAFETY PRECAUTIONS Safety Precautions for Installation and Wiring Do not disconnect while circuit is live unless location is known to be nonhazardous. Live part of electric circuit or a high temperature department can cause explosion. DON’T Do not modify or disassemble the

enclosure. Strength degradation and defects of enclosure can cause explosion.

Page 5 SAFETY PRECAUTIONS (continued) Safety Precautions for Installation and Wiring Install a switch and fuse to isolate the LF414/LF600F, LF610F and LF414 from mains power. Power supply from mains power can cause electric shock or circuit break-down. Turn off mains power before conducting wiring work.

Page 6 Warranty and Limitation of Liability Toshiba does not accept liability for any damage or loss, material or personal, caused as a direct or indirect result of the operation of this product in connection with, or due to, the occurrence of any event of force majeure (including fire or earthquake) or the misuse of this product, whether intentional or accidental.

Page 7: Handling Precautions

Handling Precautions To obtain the optimum performance from the LF600F, LF610F, LF602F and LF612F converter for years of continuous operation, observe the following precautions. (1) Do not store or install the flowmeter in: □Places where there is direct sunlight. □Places where there is snow and ice Infrared switches may not function correctly.

Page 8 Handling Precautions (continued) (5) If the inside of the converter and detector's terminal box are wetted or humidified, it may cause insulation deterioration, which can result in fault or noise occurrence. So do not conduct wiring in the open air on rainy days. Also, be careful not to wet down the converter and detector's terminal box even in the case of indoor wiring, and complete wiring work in a short period of time.

Page 9: Table Of Contents

Page 10: Product Inspection And Storage

Make sure the type and specifications of the flowmeter are in accordance with the ordered specifications. If you cannot find the items listed above or any problem exists, contact your nearest Toshiba representative. 1.2 Strage To store the electromagnetic flowmeter after opening the package, select a storing place as follows and...

Page 11: Overview

2. Overview The LF414/LF600F, LF414/LF610F and LF414 electromagnetic flowmeter can be use in the following hazardous (classified) locations. ClassI, Division 2, Groups A, B, C and D, ClassII, Division 2, Groups E, F and G ClassIII This product is a converter used for electromagnetic flowmeters that measure the volumetric flow rate of conductive fluid using Faraday's law of electromagnetic induction.

Page 12: Names Of Parts

Ground terminal for converter Ground terminal for detector For the detail of the converter, check the LF600F, LF610F converter's instruction manual. Detector Grounding ring Window for electrode Figure 3.1.1 Appearance of LF414/LF600F, LF610F Meter size 1/2inch(15mm) □ □□ □ □ □□□□□□ Flow direction arrow...

Page 13 For the detail of the converter, check the LF600F, LF610F converter's instruction manual. Terminal block cover Ground terminal for converter Flow direction arrow Detector Ground terminal for detector Grounding ring Window for electrode Figure 3.1.2 Appearance of LF414/LF600F, LF610F Meter size 1 inch(25mm) □ □□ □...

Page 14 (3) Meter size of 1 1/2 to 4 inch (40 to 100mm) Terminal block cover Ground terminal for converter Ground terminal for detector Figure 3.1.3 Appearance of LF414/LF600F, LF610F For the detail of the converter, check the LF600F , LF610F converter's instruction

manual. Flow direction arrow Detector...

Page 15 (4) Meter size of 6 and 8 inch (150 and 200mm) Terminal block cover Ground terminal for converter Ground terminal for detector Figure 3.1.1 Appearance of LF414/LF600F, LF610F For the detail of the converter, check the LF600F, LF610F converter's instruction manual. Flow direction arrow Grounding ring...

Page 16 Signal cable 3/4 - 14 NPT 3/4 - 14 NPT Ground terminal for detector Terminal Box Flow direction arrow Detector Grounding ring Window for electrode Figure 3.1.2 Appearance of LF414 Meter size 1/2inch(15mm) □ □□ □ □□□□□□□□ Terminal Box Cover...

Page 17 Signal cable Terminal Box Cover 3/4 - 14 NPT 3/4 - 14 NPT Terminal Box Flow direction arrow Detector Ground terminal for detector Grounding ring Window for electrode Figure 3.1.2 Appearance of LF414 Meter size 1 inch(25mm) □ □□ □...

Page 18 Terminal Box Cover 3/4 - 14 NPT 3/4 - 14 NPT Terminal Box Flow direction arrow Detector Ground terminal for detector Grounding ring Figure 3.1.3 Appearance of LF414 Meter size 1 1/2 to 4 inch (40 to 100mm) □ □□ □...

Page 19 3/4 - 14 NPT Terminal Box Lifting lugs *Only 8 inch (200mm) Flow direction arrow □□ □□ provided. Ground terminal for detector Grounding ring Detector Figure 3.1.4 Appearance of LF414 Meter size 6 and 8 inch(150 and 200mm) □ □□ □...

Page 20: Construction Of The Terminal Blocks

□□□□□□□□ 3.2 Construction of the terminal blocks 3.2.1 Terminal Block Construction of LF414/LF600F, LF414/LF610F Type For details of the converter, check the LF600F, LF610Fconverter's instruction manual. Integral 3.2.2 Terminal Block Construction of LF414 Type Separate Signal cable terminal Excitation cable terminal Figure 3.2.2 Terminal Block of LF414...

Page 21: Installation

DON’T WARNING CAUTION Use an appropriate device to carry and install the LF414/LF600F, LF610F and LF414 . If his product falls to the ground, injury, or malfunction of or damage to the product, can be caused. Do not modify or disassemble the LF414/LF600F, LF610F and LF414 unnecessarily.

Page 22: Notes On Selecting The Installation Location

4.1 Notes on Selecting the Installation Location Avoid places within the immediate proximity of equipment producing electrical interference (such as motors, transformers, radio transmitters, electrolytic cells, or other equipment causing electromagnetic or electrostatic interference). Avoid places where excessive pipe vibration occurs. Avoid places where fluid is pumped in a pulsating manner.

Page 23 □□□□□□□□ (2) Preventing an Empty Pipe Condition Fix the relevant pipes installed on both sides of the detector by attaching fittings, etc. to support the pipe. By supporting the pipes, not only the pipe vibration is reduced but also the damage to the pipes by the electromagnetic flowmeter's weight and the fluid mass (see Figures 4.2 and 4.3).

Page 24: Installation Procedure

4.2.2 Installation Procedure To mount the LF414, place it between the upstream and downstream pipe flanges and tighten it with flange bolts and nuts. See Figure 4.4 and follow the procedure below: Insert two lower mounting bolts through the clearance holes in the upstream (or downstream) pipe flange.

Page 25 Table 4.1 Bolt length and Nut tightening torque ANSI class 150 Through Bolts Meter size Dia- P.C.S meter 15mm 1/2” 1/2” 25mm 1” 1/2” 40mm 1 1/2” 1/2” 50mm 2” 5/8” 80mm 3” 5/8” 100mm 4” 5/8” 150mm 6” 3/4” 200mm 8”...

Page 26: Piping Connections

A minimum of 1D (diameter) length of upstream straight pipe from the flange is required to maintain the performance specification. NOTE The test results were obtained and demonstrated at Toshiba’s flow calibration facility, Fuchu Japan. (5) Other valves (not fully opened)

Technology: □...

Page 27 (2) Pipe Orientation The detector may be installed in horizontal, vertical or sloping pipe runs as shown in Figure 4.5. However, except for horizontal installation, fluid should flow from lower to upper directions. If no air bubble, vertical down flow application are acceptable under pressured piping conditions.

Page 28 (3) Flow Direction Install the detector in accordance with the flow direction arrow on the detector. See Figure 4.7. Figure 4.7 Flow direction arrow on the detector (4) Preventing an Empty Pipe Condition Design an upright pipe run (Figure 4.8) or sufficient head pressure (Fig. 4.9) at the downstream detector outlet if there is a possibility of the detector pipe becoming emptied.

Page 29: Grounding

DON’T may cause electric shock. (1) Grounding of the LF414/LF600F, LF414/LF610F type Integral Ground as shown in Figure 4.10. Make the grounding wire as short as possible. Use grounding wire material of IV wire 5.5mm instruments where grounding current may flow.

Page 30 Example: Resin product or metal piping whose inside is resin lined Grounding terminal • If the piping material is non-conductive, perform grounding resistance 100Ω or less. Figure 4.12 Grounding the LF414 Type Detector □ □□ □ □□□□□□□□ or more. Do not share a grounding wire with...

Page 31: Wiring

5.Wiring Safety Precautions for Wiring DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS LOCATION IS KNOWN TO BE NONHAZARDOUS. Live part of electric circuit or a high temperature department can cause explosion. DON’T Do not active live circuits While assembly of all components is not over. Protective performance degradation for hazardous location can cause explosion.

Page 32 Install a switch and fuse to isolate the LF414/LF600F, LF610F and LF414 from mains power. Power supply from mains power can cause electric shock or circuit break-down. Do not work on piping and wiring with wet hands. Wet hands may result in electric shock DON’T...

Page 33: Cables

Notes on wiring CAUTION (1) Select the cable runs away from electrical equipment (motors, transformers, or radio transmitters) which causes electromagnetic or electrostatic interference. (2) Deterioration of flowmeter circuit insulation occurs if the converter interior or cable ends get wet or humidified.

Page 34 When replacing the flow rate signal cable and excitation cable, also refer to the instruction manual of the relevant detector. Order the detector terminal box cover packing from Toshiba. or more. The size of the external grounding terminal screws is □...

Page 35: Wiring

5.4 Wiring 5.4.1 Terminal Treatment of Cables Follow the procedures below to treat the terminals (at the converter side) of various cables and install the cables to the terminal block. Use appropriate cables based on the description in Section 5.1 "Cables." Crimp a round type insulated crimp-type terminal to the end of the cables.

Page 36 (3) Connecting the input signal cable Separate Strip the sheath from the end of each conductor of a 2-core individually shielded cable as shown in Figure 5.4. Twist those shields and cover them with a thermal contraction tube or vinyl tube not to make contact with the case or core wires.

Page 37: Cable Connection

□□□□□□□□ 5.4.2 Cable Connection Connect and install the terminal-treated cables to the terminal block. *Connect the cables to the terminal block securely. A loose connection may cause incorrect measurement. After connecting a cable, try to pull it to check whether it has been connected securely. Referring to combined converter's manuals of "Connections and Grounding", connect each cable to the terminal block.

Page 38: Operation

6. Operation Do not touch the terminal board when power is supplied. Touching the terminal board when power is supplied can DON’T cause electric shock. Preparatory check Follow the procedure described below to prepare before starting the flow measurement (described with regard to the entire flowmeter).

Page 39: Maintenance And Troubleshooting

Wiring while power is applied can cause electric shock. DON’T WARNING CAUTION Do not touch the LF414/LF600F, LF610F and LF414 main body when high temperature fluid is being measured. The fluid raises the main body temperature and can cause burns.

Page 40: Maintenance

In order to use the display unit stably for a long time, it is preferable Integral to replace it early. For inspection and replacement, please contact your nearest Toshiba representative. Power supply unit (also used for excitation board) Electronic components deteriorate faster when the ambient temperature is high.

Page 41: Troubleshooting

7.2 Troubleshooting If a problem occurs while using the LF414/LF600F, LF414/LF610F and LF414, follow the flowcharts described below. You may find a way to solve the problem. The flowcharts are based on three symptoms (1) to (3). If you cannot solve the problem, contact your nearest Toshiba representative.

Page 42

Is accuracy calculated as follows? (Measured flow rate)-(Actual flow rate) Actual flow rate Contact your nearest Toshiba representative. Set correctly. Refer to combined converter's manual. Perform the zero adjustment. Refer to combined converter's manual.

Page 43: Flow Rate Indication Is Not Stable

Is the fluid carrying bubbles? Is there high-voltage or large current cable or equipment near the flowmeter? Contact your nearest Toshiba representative. Use a power supply within the specified range. Connect each cable securely to the terminal board.

Page 44: Principle Of Operation

π × D Therefore, volumetric flow rate is directly proportional to the induced voltage. The LF414/LF600F, LF414/LF610F and LF414 uses the square-wave excitation method, which provides long-term stable operation. With square-wave excitation, the LF414/LF600F, LF414/LF610F and LF414 offers reliable measurement without being affected by electrostatic or electromagnetic interference, or electrochemical polarization between the electrodes and the fluid to be measured.

Page 45: Specifications

System accuracy combined with TOSHIBA converter: Accuracy: ±0.2 % of Rate* * This pulse output error result is established under standard operating conditions at Toshiba's flow calibration facility, Fuchu Japan. (NIST Traceable). * Individual meter measurement error may vary up to ±0.5% of Rate at 1.64 ft/s (0.5m/s) or more and ±0.3% of rate ±0.039 inch/s (1mm/s) at 1.64 ft/s (0.5m/s)or less.

Page 46

Coating: No coating (for meter sizes 25 to 100 mm), Phthalic acid resin coating, pearl-gray colored (standard for meter size 15,150, 200mm) Structure: IP67 and NEMA 4X Watertight (Standard) Cable connection port: 3/4-14NPT male screw for both signal cable and exciting cable Cable length: Allowable cable length between the converter and the detector varies with the electrical conductivity of fluid.

Page 47

Flow and calibration velocity range: It calibration by standard Range shown in the table below when Range is not It calibration when there is specification by flowing quantity Range in which the customer is specified. Is this specification Range flowing quantity of Figure 9.1. Please confirm becoming in the upper bound value from the flow velocity chart.

Page 48

US Unit Flow volume Meter size 0.328ft/s 1/2 inch 0.2801 gal/min 0.8403 gal/min 1 inch 0.7781 gal/min 1 1/2 inch 1.992 gal/min 2 inch 3.112 gal/min 3 inch 7.967 gal/min 4 inch 12.45 gal/min 6 inch 28.01 gal/min 8 inch 49.80 gal/min Flow velocity range 0.98ft/s...

Page 49: Type Specification Code

9.2 Type Specification Code Table 9.2 Type Specification Code Specification Code 9 10 11 12 13 14 □ Electromagnetic Flowmeter Style Wafer type Area of use Division 2 Hazardous Location Meter size 15mm (1/2") 25mm (1") 40mm (1 1/2"...

Page 50 Table 9.3 Type Specification Code (Exciting Cable and Signal Cable) Model Specification Code Description 1 2 3 A C C Dedicated preformed cable Nominal cross-sectional area of Exciting cable (Note 1) 1.25 mm² 2 mm² Nominal cross-sectional area of Signal cable (Note 2) 0.75 mm²...

Page 51: Outline Dimensions

10. Outline Dimensions 10.1 Outline dimensions of LF414/LF600F, LF414/LF610F (1) Meter size of 1/2 inch (15mm) Integral (2) Meter size of 1inch (25mm) (35) Waight : approx 5kg (35) Waight : approx 5kg □ □□ □ □□□□□□□□...

Page 52 (3) Meter size of 1 1/2 to 8 inch (40 to 200mm) Meter size Overall lengeth (mm) (35) Diamete of Hight flange (L2) φ D1 □ □□ □ □□□□□□□□ Weight (kg) approx 6 approx 7 approx 8 approx 10 approx 22 approx 32...

Page 53 10.2 Outline dimensions of LF414 (1) Meter size of 1/2 inch (15mm) Separate (2) Meter size of 1inch (25mm) Waight : approx 3kg Waight : approx 3kg □ □□ □ □□□□□□□□...

Page 54 (3) Meter size of 1 1/2 to 8 inch (40 to 200mm) Meter size Overall lengeth (mm) Diamete of Hight flange (L2) φ D1 □ □□ □ □□□□□□□□ Weight (kg) approx 5 approx 6 approx 7 approx 9 approx 22 approx 36...

Page 55 □□□□□□□□ Appendix 1 1-1 A system block diagram for LF414/LF600F, LF414/LF610F □ □□ □...

Page 56 □□□□□□□□ 2-1 A system block diagram for LF414 □ □□ □...

Page 57 Write down the address and phone number of the distributor from which you purchased this product, the product code, SER.NO. and so on. Distributor Address Name Phone number □ Product code SER.NO. □ □ □ □□ □ □□□□□□□□...

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