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# MagneW 3000 Electromagnetic Flowmeter Hyper-Fill

**Model: MGR13C (Converter)**
**MGR11U (Detector)**

## User's Manual

Azbil Corporation

**CM2-MGR100-2001**
**2nd edition**

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# *Table of Contents*


***1: Overview.....1***

***2: Instrument installation .....2***

**2-1: Converter installation..... 2**

**2-2: Detector Installation ..... 3**

**2-3: Wiring ..... 4**

2-3-1: Converter wiring..... 4

2-3-2: Pulse output wiring ..... 6

2-3-3: Master-slave wiring..... 7

***3: Configuration of the converter .....8***

**3-1: Range..... 8**

**3-2: Pulse scale ..... 8**

**3-3: Pulse width..... 9**

**3-4: Drop out..... 9**

**3-5: Master/slave configuration ..... 10**

***4: Operation.....11***

**4-1: Warm-up ..... 11**

**4-2: Zero adjustment..... 11**

**4-3: Span adjustment..... 12**

# 1 : Overview

MagneW 3000 Hyper-Fill is developed for high speed batching and filling machine applications. Hyper-Fill is a magnetic flowmeter optimized for the sophisticated measurement demands found in filling applications.

# 2 : Instrument installation

## 2-1 : Converter installation

(1) Mount the converter by four M4 screws. (M4 screws are not supplied with the converter.)

(2) Rubber bush is attached to the bracket. Tighten the screws through the rubber bush and mount the converter. Handle the rubber bush with care because the rubber bush isolates the converter housing from the mounting wall.

(3) Locate the converter so that switches and terminals face to the front for easy maintenance.

(4) One converter includes maximum four main boards. Each main board drives each detector.

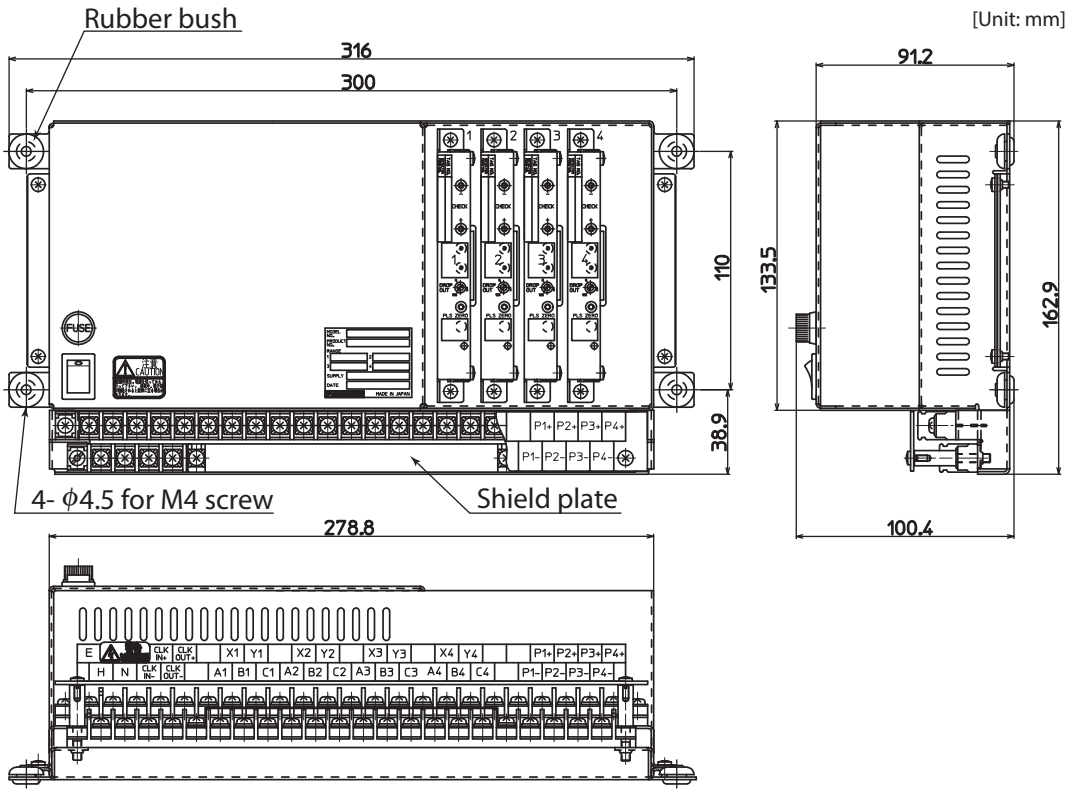


*Figure 1*

**~Note**
- *Do not mount the converter in the humid environment.*
- *Do not mount the converter where water splashes.*

# 2-2 : Detector Installation

(1) Install the detector in the following environment.

Ambient temperature: 5 to 50ºC

Humidity: 5 to 100% RH

(2) The model MGR11U detector is designed using a standard one inch IDF clamp connection. We recommend to use the welding ferrule that Azbil Corporation supplies. For the accurate measurement, pipe inner diameter and ferrule inner diameter connected to the model MGR11U detector should be 15 mm ±0.2 mm.

(3) The detector should be mounted so that the FORWARD end of the flow arrows, shown on the detector case and water-proof cover, points in the direction of flow through the tube.

(4) By connecting the special cable model MGA23W, the detector keeps waterproof performance. Do not splash water before connecting the model MGA23W cable.

(5) After connecting the model MGA23W cable, tighten the screw of the water-proof connector and tighten the belt of the water-proof cover to keep water and moisture away.

(6) Detector should be installed where the flowtube will be filled with the fluid and no air/bubbles will be entrapped.

(7) Install metal pipes to both upstream and downstream side of the detector. To ensure accurate measurement, install the detector a minimum 15 straight pipe diameters upstream and two pipe diameters downstream from both ends of the detector.

15 straight pipe diameters upstream: (upstream side pipe length: 225 mm minimum)

Two straight pipe diameters downstream: (downstream side pipe length: 30 mm minimum)

If insulation material tube, such as Teflon® tube is installed in upstream side, a minimum 20 straight pipe diameters (300 mm minimum) of metal pipe should be attached to the upstream of the detector.

(8) To ensure precise measurement, inner pipe diameter should be 15mm +/-0.2mm.

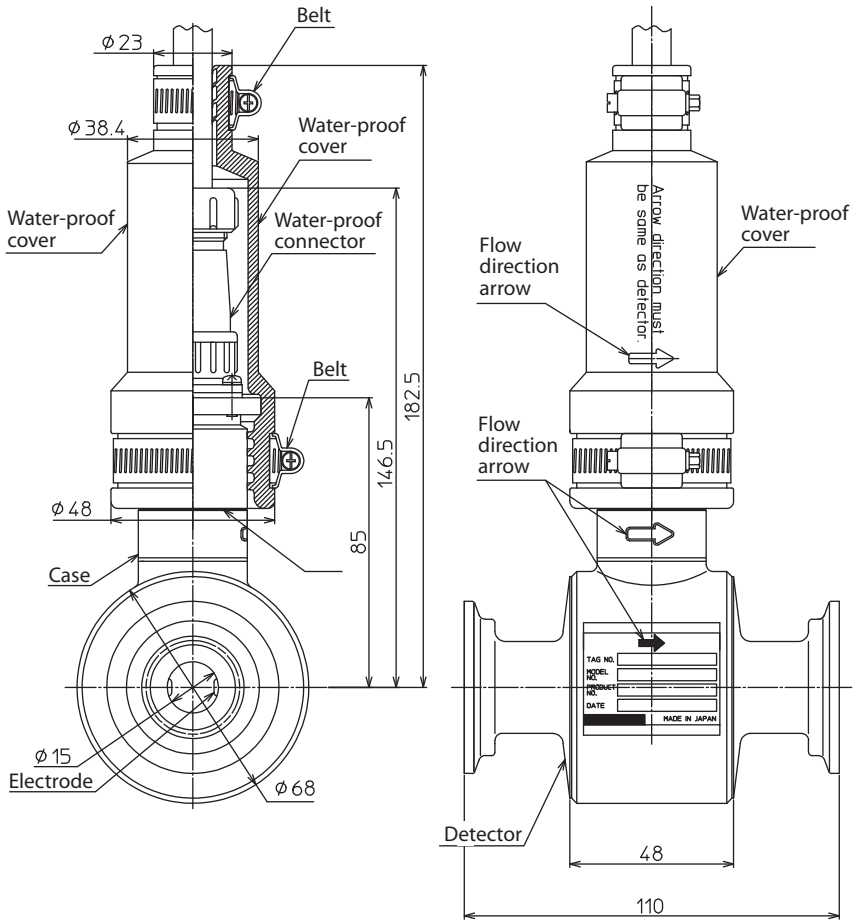


*Figure 2*

# 2-3 : Wiring

## 2-3-1 : Converter wiring

Refer to the Table 1 and perform wiring. Turn off the power during wiring.

Connect the wires to the terminals of A1 to A4, B1 to B4 and C1 to C4 at first.

After connecting wires to the terminals of A1 to A4, B1 to B4 and C1 to C4, install the shield plate as shown in the Figure 1.

The shield plate is fixed by two screws. Refer to the following table for the screw position.

| Left side screw position | Right side screw position |
|---|---|
| between CLKOUT- and A1 | between C4 and P1- |

**Table 1**

| Symbol | Connect to | Meaning |
|---|---|---|
| H, N, E | Connect to power supply. E for earth ground. (85 to 264V AC) | Power supply and earth ground |
| A1, B1, C1, X1, Y1 | Connect to the special cable model MGA23Wfor main unit 1 | Flow rate signal Excitation |
| A2, B2, C2, X2, Y2 | Connect to the special cable model MGA23W for main unit 2 | Flow rate signal Excitation |
| A3, B3, C3, X3, Y3 | Connect to the special cable model MGA23W for main unit 3 | Flow rate signal Excitation |
| A4, B4, C4, X4, Y4 | Connect to the special cable model MGA23W for main unit 4 | Flow rate signal Excitation |
| P1+, P1- | Connect to pulse receiving instrument | Pulse output for main unit 1 (Open Collector) |
| P2+, P2- | Connect to pulse receiving instrument | Pulse output for main unit 2 (Open Collector) |
| P3+, P3- | Connect to pulse receiving instrument | Pulse output for main unit 3 (Open Collector) |
| P4+, P4- | Connect to pulse receiving instrument | Pulse output for main unit 4 (Open Collector) |
| CLKOUT+, CLKOUT- | Synchronized signal output from a master converter and to a slave converter<br>Synchronized signal output from a slave converter to another slave converter | Synchronized signal output |
| CLKIN+, CLKIN- | Synchronized signal input from a master converter and to a slave converter<br>Synchronized signal input from a slave converter to another slave converter | Synchronized signal input |

**~Note**
1) *Perform earth ground for the power supply (terminal E), for safety purpose.*
2) *To ensure accurate measurement, connect master-slave cable between CLKOUT+/- and CLKIN+/-.*
3) *Pulse output is open collector type. Make sure to connect external power supply for the pulse output.*

## 2-3-2 : Pulse output wiring

The pulse output is an open collector output. Pay attention to voltage and polarity when wiring.

| | |
|---|---|
| External power supply voltage | 12 to 24V DC (30V max.) |
| Output current | 100 mA max. |
| Transient response | 5 μS typ. |

| Power supply voltage | Voltage drop (closed circuit) (HIGH voltage) | Voltage drop (Open circuit) (LOW voltage) |
|---|---|---|
| 24V DC | 19V min. | 2.5V max. |
| 12V DC | 7V min. | 2.5V max. |

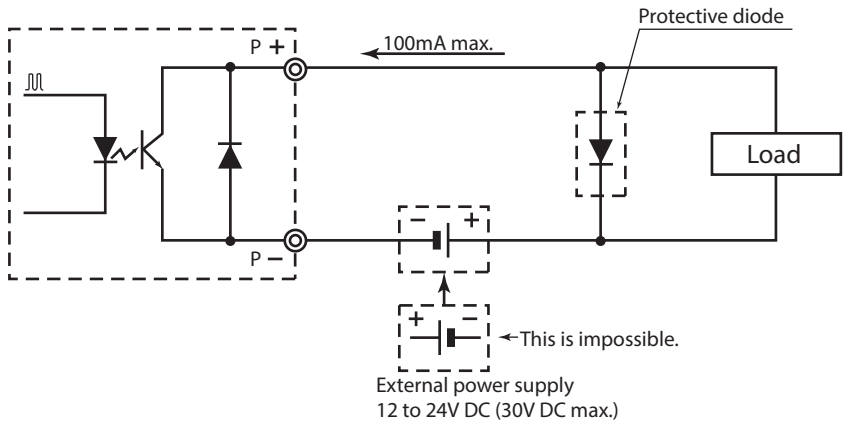


*Figure 3 Wiring diagram for pulse output*

## 2-3-3 : Master-slave wiring

If the Hyper-Fill flowmeter is installed more than five units, Hyper-Fill flowmeters consist of one master converter and slave converters.

| Number of units of the detector | Number of unit of the Master converter | Number of unit of the Slave converter |
|---|---|---|
| One to four units | One unit | Zero |
| More than five units | One unit | One unit or more |

To ensure accurate measurement, the magnetic interference should be negligible in the multiple head filling machine applications.

Master-slave cable carries synchronized signal for excitation so as to minimize magnetic interference.

Each converter should be connected with the “Master-slave” cable.

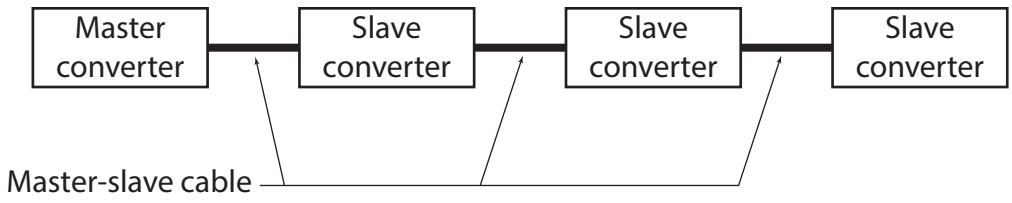


*Figure 4*

# 3 : Configuration of the converter

Refer to the following configuration table printed to the main unit for the converter configuration.

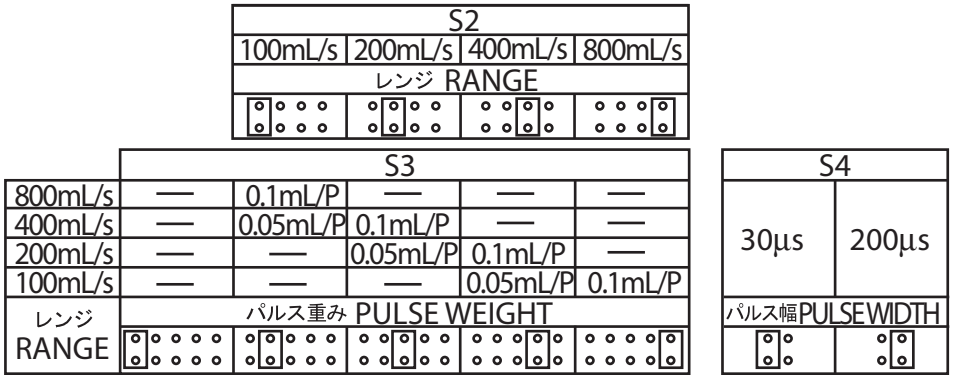


*Figure 5*

## 3-1 : Range

Select an appropriate range. It is recommended to set a range so that the flow rate is approximately 70%. Do not set a range of which the flow rate is less than 25%.

| **Range** | 100 mL/s | 200 mL/s | 400 mL/s | 800 mL/s |
|---|---|---|---|---|

Select the range by receptacles in S2 shown in Figure 5.

## 3-2 : Pulse scale

0.1 mL/P or 0.05 mL/P is selectable as a pulse scale.

Pulse scale of 0.05 mL/P is not applicable in case of range of 800 mL/s.

| **Range** | | **100 mL/s** | **200 mL/s** | **400 mL/s** | **800 mL/s** |
|---|---|---|---|---|---|
| Pulse span frequency fs | 0.05 mL/P | 2000 Hz | 4000 Hz | 8000 Hz * | N/A |
| | 0.1 mL/P | 1000 Hz | 2000 Hz | 4000 Hz | 8000 Hz * |

**~Note** * *Pulse width of 200 µS is not applicable in case that pulse span frequency fs is 8000 Hz.*

# 3-3 : Pulse width

30 μS or 200 μS is selectable as a pulse width.

| Pulse width | Tolerance |
|---|---|
| 30 μs | 30 μS ± 4 μs |
| 200 μs | 200 μS ± 22 μs |

Transient response of pulse output: 5 μs typ

Pulse width of 200 μs is not applicable in case that pulse span frequency fs is 8000 Hz. (refer to “3-2 : Pulse scale”)

# 3-4 : Drop out

Adjustable from 0 to 10% of setting range. This function is used to set the dropout value for the pulse output. The pulse output will be cut off below the setting value to avoid flow pulsation in range value close to zero, thus preventing incorrect totalization of the flow rate. Pulse counting pauses when the flow rate reaches this preset percentage of the set range. Drop out is set by adjusting variable resistor. Default setting is approximately two percent. If pulse is still output even though the valve is shut off, fluid may pulsate. Set the drop out value as approximately five percent.

# 3-5 : Master/slave configuration

This function is used to minimize magnetic interference by detectors installed closely each other in the multiple head filling machine applications. A master converter sends synchronized signal for excitation to slave converters, thus avoiding output error due to magnetic interference.

According to the model number selected, the configuration for a master or slave is done by the factory.

Master converter: MGR13C-**M

Slave converter: MGR13C-**S

In case of configuring master/slave function, follow below procedure.

(1) Turn OFF the power.

(2) Loosen screws of the main unit fixed in slot 1 and remove the main unit.

(3) Set the DIP switch as shown in the Figure 6.

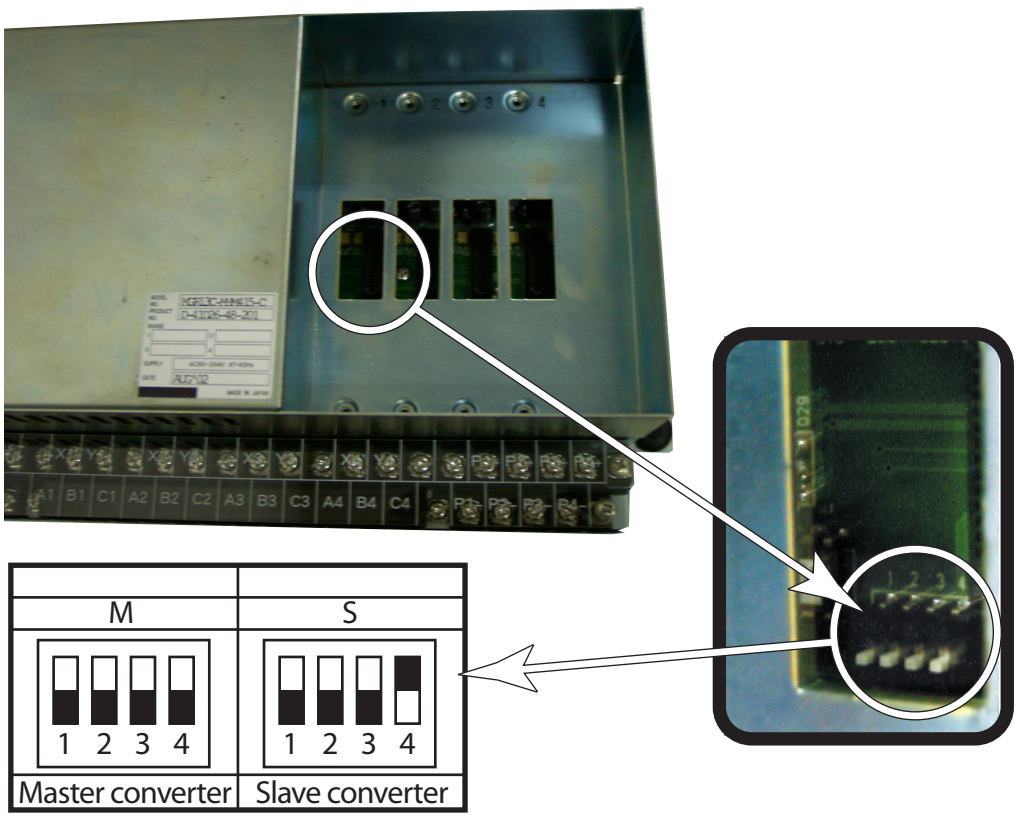


*Figure 6*

# 4 : Operation

After configuration, follow below procedures before operation.

## 4-1 : Warm-up

Turn ON the power.

For accurate measurement, the electronics needs 30-minute warm-up time to stabilize.

Once turn OFF the power and turn ON the power again, wait for 10-minute for electronics warm-up.

In this case, remove bubbles and verify no bubbles remain inside of the flowtube.

Bubbles will prevent accurate measurement.

## 4-2 : Zero adjustment

A zero adjustment is very important for accurate flow rate measurement.

Follow the procedures according to the version of the main unit.

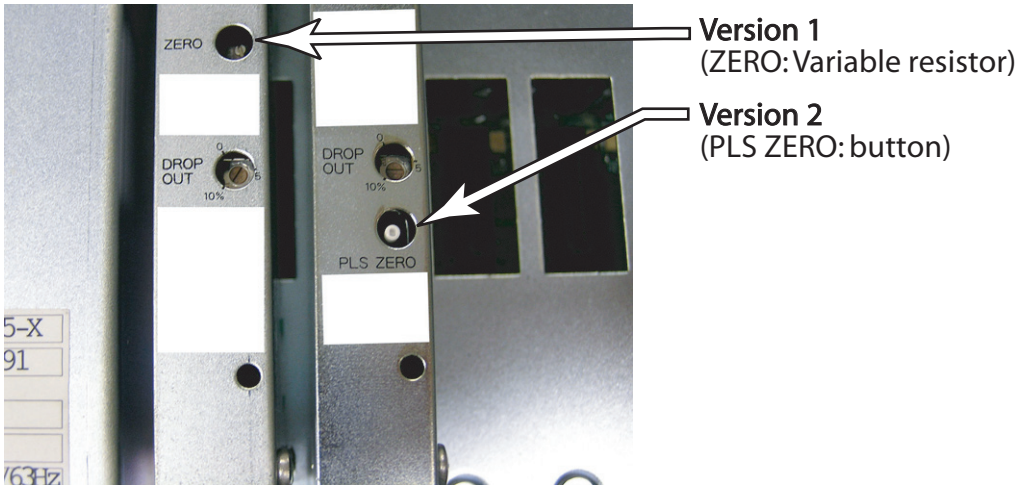


*Figure 7*

### Version 1 (ZERO: Variable resistor)

(1) Fill the fluid inside of the flowtube and verify the fluid stops.

(2) Zeroing the flowmeter.

Connect a digital voltmeter or tester between CHECK+ and CHECK- terminals of the main unit.

Adjust the variable resistor so that the voltage measured by the digital voltmeter becomes 0 ±20 mV.

### Version 2 (PLS ZERO: button)

(1) Fill the fluid inside of the flowtube and verify the fluid stops.

(2) Zeroing the flowmeter. Push the button of the PLS ZERO for one second. Zero adjustment will be done automatically. If zero adjustment is done successfully, LED lights out for five seconds then light on. If failed, LED blinked for 20 seconds. Check if wiring is correct and no bubble remains in the flowtube, and try zero adjustment again.

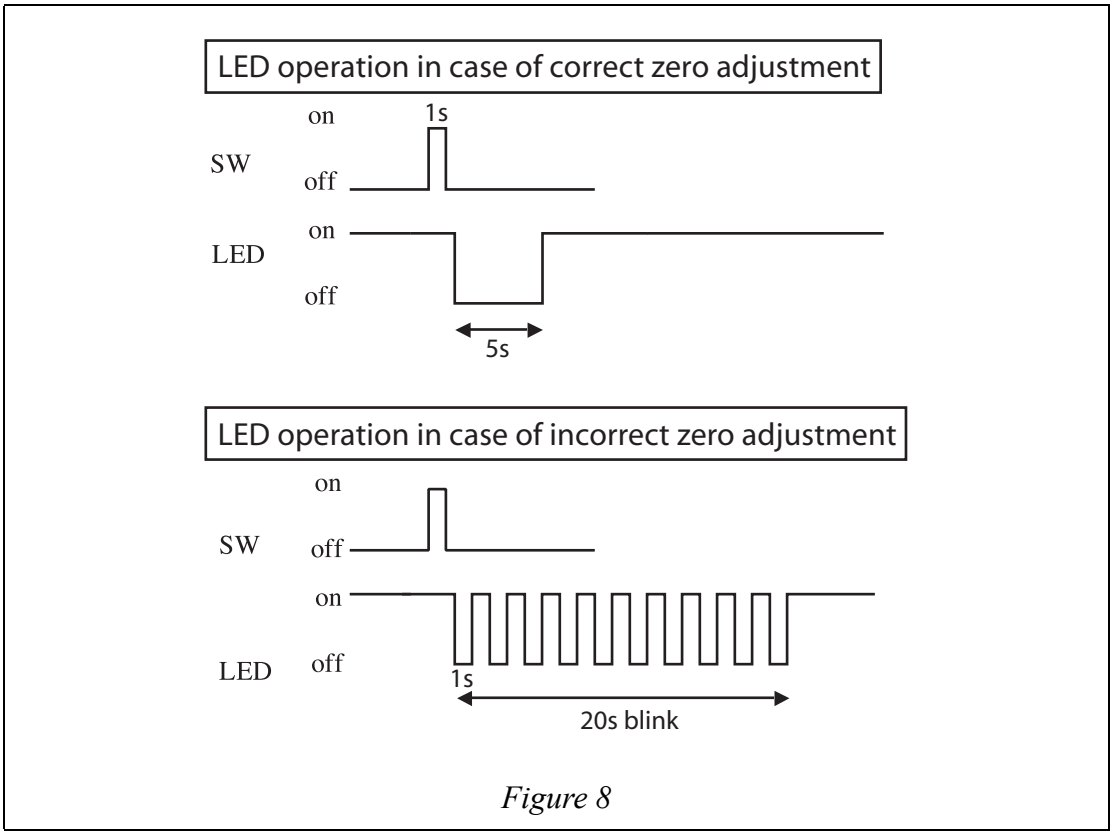


*Figure 8*

Version 2 is compatible with Version 1. Version 1 can be replaced with the version 2.

# 4-3 : Span adjustment

Span adjustment was performed at the factory. If there is some discrepancy between actual filling value and flowmeter measured value, tune the span by the “SPAN” variable resistor.

# Note

| | |
|---|---|
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