Helical Flow

A Helical Flow Type of Screw Revolution

Instruction Manual

for

HF-GC/GP Series

(SC and MP/MC Series incld.)

⚠ Caution

Before use, please read this Instruction Manual thoroughly for safe operation.
Please always keep this Instruction Manual at hand for quick reference when necessary.

TOFLO CORPORATION

25-R10

Contents

1. Safety precaution

Warning As the **Instruction manual** includes very important contents in order to use the products properly and in safety, please read thoroughly with caution and follow them.

Please always keep this **Instruction Manual** at hand for your quick reference when necessary. Should you be lost, then please contact us at nearest sales office.

《 Design precaution 》

- Never flow solid matters and gaseous matters (including air purging), as the HF-GC/GP/SC and MP/MC series have been designed for the purpose of liquids flow and their flow measurement. If done, it may cause failure or damage.
- Use the flowmeter under the rated voltage.
- Use the flowmeter under the rated pressure.
- Use the flowmeter within the max operating temperature.
- Always keep inside of the flowmeter tube filled fully with fluid inside the tube.
- HF-GC/GP/SC and MP/MC series should be for the use in an industrial instrument only and may not be used for any other applications.

《 Installation precaution 》

- Be careful to handle, as there is a type which is made of glass tapered tube in the flowmeter.
- Never mount foot on the flowmeter nor put things on it. If done, it may cause failure or damage.
- Do not use the flowmeter with immersed in liquids.
- Install the flow r control valve at the outlet of the flowmeter. If there is a throttle like a valve at the inlet, the liquids inside the flowmeter will drain out and air bubbles (Cavitation) resulted from the reduction of pressure will occur so that it may be disabled for flow measurement.

《 Wiring 》

- Wiring shall be carried out after turned off the power supply.
- Make sure power supply voltage to ensure that power supply input has not exceeded the ratings.
- In case that devices which will become noise source are used near the flowmeter such as a switching regulator or inverter motor, take steps for the noises to ground the device frame ground(F.G.) and the like.
- Be sure to do the confirmation of the color of lead wires, when wiring to the flow indicator or sequential controller.
- Avoid turning on/off the power supply continuously.
- Do not apply additional pressure and tensile stress in wiring to the terminal block. It may cause disconnection.
- Do not bind and wire the connecting wires coming from flowmeter together with, in parallel with or wire in the same metal conduit as the heavy current wires such as power supply, power cable, high voltage cable and the like. If done, it may cause malfunction due to the noises placed on signals.

《 Operating environment 》

- Never use the flowmeter in the atmosphere of the explosive gases.
- Never use the flowmeter in the atmosphere of the corrosive gases.
- Do not set the flowmeter in places, where condensation of humidity will not occur and while water is spraying, because it is not constructed in water-resistant and humidity-resistant structures. (Use it in a place where is 80% and below in humidity).
- Set the flowmeter in a place, where is not subjected to the direct ray of the sun and the ambient temperature is between 0 ℃ and 50℃.
- Use the flowmeter in a place, where it is not affected by the electromagnetic field.
- Use the flowmeter in a place, where is less mechanical vibration. If affected from outside, it may cause disconnection of the cable and may cause the chattering, and may result in error of flow measurement and occurrence of particles(Dust).

《 Liquids to be measured 》

- Do not enter foreign matter into the liquids.
- There may be a case where the viscosity is too high to disable the flowmeter for flow measurement.
- Be sure to use the flowmeter within the specified temperature of the liquids to flow.

《 Flow indication 》

- When purchased both the flowmeter and the flow indicator at the same time, the data necessary to indicate the flowrates are all configured to the indicator at the factory shipment. Only you have to do is to make up pipe and flow water so that the accurate flowrates are displayed on the indicator, provided that the data input directly with no reference to such comparative outputs, unless otherwise specified. are shipped in the initial values.
- In case where the water is initially run to the pipe (When setting up the systems), air bubbles enter into the inside the flowmeter, and air entrapping occurs accordingly. Air bubbles inside the meter may cause it to read inaccurately and/or malfunction.
  When setting up systems, eliminate air bubbles by means of running the water around maximum flowrates and fill the inside of flowmeter with water fully.

《 Other applications 》

- It shall not be covered by warranty, if the product has been disassembled and reassembled. The product has a serial number of its own. It also shall not be covered by warranty, should any change of the parts be made on the product.
- Be careful to handle flowmeter, as it is a precision instrument. It may cause leak and damage, if given the shock by falling or something fallen on it.
- HF-GC/GP/SC and MP/MC Series have only a function to produce pulse signal continuously. Please understand that any supply operation or any automatic flow control cannot be performed in a single unit of this product as such.

《 Requesting and notice 》

- Specifications and dimensions are subject to change due to improvements without prior notice.
- Warranty period of the product shall be one year from the date of purchase. (For one year counting

from the next month of the month shipped from factory).

- During the warranty period, if the fault occurred which is liable to us, we will repair the faulty part or replace it with new one only.
- A series of the type of HF-GC/GP/SC and MP/MC themselves do not have any control function to protect from disaster and accident. We would like to request you to take into consideration any safety measures on your side for the control devices entirely.
  Please be advised that we shall not any responsibility for any damages arisen out of the disaster and accident where it has been by chance occurred relating to the devices using these products.

2. Greeting

We highly appreciate your purchasing the Helical Flow type of the screw revolution “HF-GC/GP/SC and MP/MC Series”.
We would like to request you to read through the Instruction Manual with caution in order fully to display the performance and to use it safely for many years to come.

《 General description 》

- A helical flow type of flowmeter “HF-GC/GP/SC and MP/MC “ Series is a pulse counting flowmeter by Hall element which has been constructed most simple and compactly and in low cost . The flowmeter makes the Hall IC count the revolution of screw(One revolution is two pulse) and take out the pulse signal by using the magnets incorporated into t he inside the screw. The flow indicator receives the pulse signal from the flowmeter and computes and displays the instantaneous and integrated flowrates per one minute according to the sampling time and pulse counting.

《 Accessories 》

Check to ensure that the following is all present.

- Flowmeter body: (HF-GC/GP/SC and MP/MC types)
- Hall IC sensor: (HF-GCA type)
- Amp. Box: (HF-GCB and GCC types)
- Instruction Manual

＜Option＞

- Flow indicator
- Connecting cord (Only in case that the flow indicators are EM0100 DT/DR and EM1000ET)

3. Product specification

【 Output accuracy: Within FS±3% 】

- HF-MPA30 : 0.5-5 L/min
  1-10 L/min
  2-20 L/min

【Output accuracy: Within FS±3% 】

- HF-GCA30 : 0.5-5 L/min, 1-10 L/min, 2-20 L/min

【Max operating pressure 】
● 0.5 MPa(G) (In case of MP type: 0.35MPa(G))

【Pressure resistance 】
● 0.75MPa(G) (Incase of MP type: 0.5MPa(G))

【Max operating fluid temperature】
● Max 100℃ (In case of MP type: 55℃ and GCB and GCC: 50℃)

【Ambient temperature】
● 0 – 55 ℃ (Non condensing)

《 Hall IC sensor specifications 》

● Power supply voltage: 5-24VDC
● Output:: Voltage pulse NPN open collector
● Current consumption: 10mA and below

《 Specifications on amp, 4-20mA output and two contact output 》

Refer to the instruction manual attached separately.

《 Precaution when installing flowmeter 》

※ Be sure to comply .
● In making up pipe, fix the flowmeter by using a wrench.
● Tightening torque for:
HF- MP: 784 N·cm
HF- GC: 1470 N·cm
The work of piping should be done within the tightening torques as stated above.

4. Combination with flowmeter and indicator

- If purchased both flowmeter and indicator at same time, check the serial number (Mfg. No.) to ensure that the serial number of flowmeter agrees with that of indicator.
  If used the flowmeter which is different serial number from that of indicator, it may cause errors of flowrate and indication.
- The appropriate data have been configured to indicator at factory when shipping flowmeter from factory.
- If purchased the flowmeter only, check the serial number to ensure that it is securely entered.

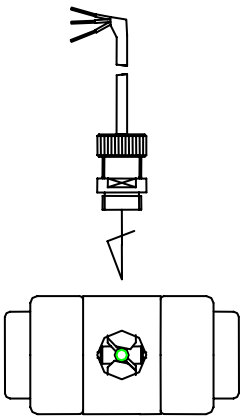
《 Combination with flowmeter and sensor 》

- Flowmeter typed HF-GC/GP/SC and MP/MC should be used after the flowmeter body has been combined with Hall IC sensor.

The flow measurement is not carried out by a single unit of flowmeter body.

- Combination figure with Hall IC sensor and flowmeter body

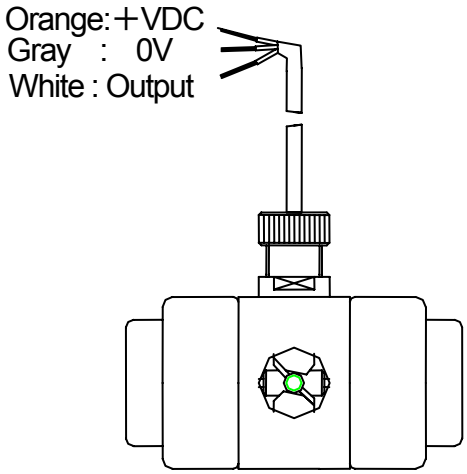
  Screw up Hall IC sensor to the flowmeter with reference to the illustration as shown below.
  Hall IC sensor shall be screwed up fully to the end. If not screwed up fully to the end, there is a case where the sensor does not operate properly.



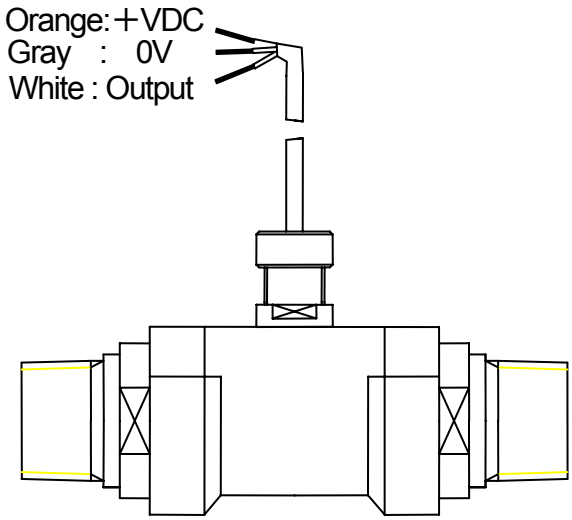
《 Explanation on the connecting terminal of flowmeter 》

● Wiring should be made with reference to the illustration as shown below.

HF- GC type



HF- MP type



Cord colors	Functional contents
Orange	＋VDC
Gray	GND
White	Output(Voltage pulse)

《 Connection of flowmeter and indicator (EM0100 DT/DR and EM1000 ET) 》

※ When using any flow indicator other than described above, refer to the Instruction Manual attached separately.

Cord colors		Functional contents
EM0100(DT, DR)	EM1000ET	
Gray	Black(Thin)	Pulse input terminal
Blue	Blue	Common terminals to input and sensor power supply
Brown	Brown	Sensor power supply (12VDC)

● Relating to other connections

How connections of the flow indicator of EM series to the driven power supply, etc. and the output from flow indicator(Analog output, etc.) are made should be wired and connected with reference to the Instruction Manual attached to the flow indicator.

5. Label contents applied to flowmeter

- FLOW RATE : Indicates the flow ranges of flowmeter.
- CONSTANT : Indicates the input frequency of the indicator typed EM series, or the values computed the discharge flowrate per pulse in units of "mL".
- TYPE : Indicates the type of flowmeter.
- SER. No. : Indicates the serial number (Mfg. No.)

6. Maintenance

Although HF-GC/GP/SC and MP/MC types have a construction which is much harder to clog with dust than the conventional rotary flowmeter, it should be maintained and cleaned once a year or half the year in order to use more safely.

7. Product specifications on HF-GC (With analog output substrate)

《 General description 》

The analog output substrate for HF- GC outputs the analog output in proportion to the flowrate in sensor in term of the current at 4-20mA.

The magnets incorporated in inside the body of flowmeter outputs as a pulse signal which make the revolutions of screw count up by the Hall IC. The cycle period of this pulse output is measured by microcomputer, operated, converted to analog voltage in terms of D-A converter and converted to the current output by V-1 converter.

Specifications

Power supply

Items	Specifications
Voltage	*12-24VDC ±10%
Current	Approx 35mA

*In case of using HF-GCT □, supply the voltage between 15V and 24VDC.

Analog output

Items	Specifications
Output ranges	4-20mADC (- 10VDC)
Output accuracy	FS±0.5%
Load resistance	400Ω and below : Power supply voltage 12-24VDC±10%

Pulse output

Items	Specifications
Output form	Same output as Hall IC output outputs in open drainage
Output sink current	10mA and below, Vol=1.0V
Max impressed voltage	35VDC and below

Operating environment

Items	Specifications
Temperature	0 - +55℃
Relative operating humidity	35 – 85% RH (No dewing)
Ambient temperature	0 – 50℃

《 Explanation on connecting terminal of the analog output substrate 》

● Wiring should be made with reference to the illustration as shown below.

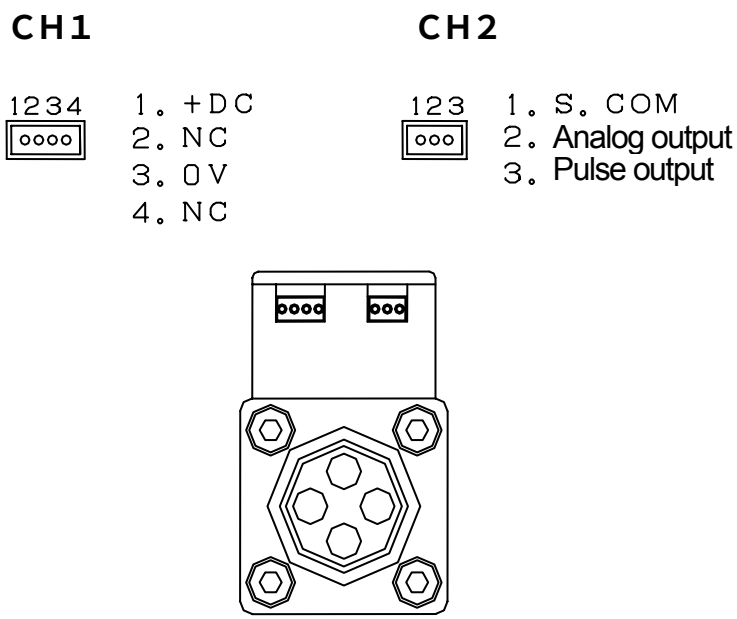
Outside input connector(CN1)
Connector maker: J.S.T. Mfg. Co., Ltd.
Type of connector: S4B-ZR
Type of connector pin: SZH-002T-P0.5

Pin No.	Names of pins	Functional contents
1	+DC	Input pin for plus side of power supply
2	NC	Not connected any
3	0V	Input pin for 0V of power supply
4	NC	Not connected any

Outside output connector(CN2)
Connector maker: J.S.T. Mfg. Co., Ltd.
Type of connector: S3B-ZR
Type of connector pin: SZH-002T-P0.5

Pin No.	Names of pins	Functional contents
1	SCOM	Common pin to signal output
2	ANO	Output pin for analog current output Analog output in proportion to values of instantaneous flowrate
3	PLS	Pulse output pin for monitor Outputs same pulse as Hall IC sensor

Reference drawing



8. Product specifications on HF-GCB (With flow proving switch substrate)

《 General description 》

Flow proving switch substrate for HF-GCB outputs the compared results to the value of the flow of the sensor and the compared value of the flow which has been preset in terms of the one staged comparative output.

The magnets incorporated in the inside of the body of flowmeter makes the revolutions of the screw count up by means of the Hall IC, and outputs as a pulse signal. The cycle period of this pulse output is measured by microcomputer, operated, compared to the comparative value which has been set by the rotary DIP switch and the results are produced in term of a relay contact and transistor NPN open collector.

Specifications

Power source

Items	Specifications
Voltage	12 – 24VDC±10%
Current	Approx 35mA

Comparative output

Items	Specifications
Comparative operation	One staged alarm output operation at upper or lower limit
Setting of comparative value	Setting in terms of rotary DIP switch
Setting ranges of comparative value	10 – 100%(when setting at upper limit) Setting resolution: 10%
	0 – 90% (when setting at lower limit) Setting resolution: 10%
Comparative output Relay	Kind of contacts: One transfer contact (1 c contact) Contact capacity: 30VDC 0.5A Life span of contact: More than 100000 times(Electrically) More than 50 million times(Mecanically)
Comparative output Transistor	NPN open collector output Sink current: 100mA and below, Vol=1.0V Max impressed voltage: 35VDC and below

Operating environment

Items	Specifications
Temperature	0 - +55°C
Relative operating humidity	35 – 85% RH (No dewing)
Ambient temperature	0 – 50°C

《 Explanation on connecting terminal of the analog output substrate 》

● Wiring should be made with reference to the illustration as shown below.

Outside input connector(CN1)
Connector maker: J.S.T. Mfg. Co., Ltd.
Type of connector: S4B-ZR
Type of connector pin: SZH-002T-P0.5

Pin No.	Names of pins	Functional contents
1	＋D C	Input pin for plus side of power supply
2	N C	Not connected any
3	0 V	Input pin for 0V of power supply
4	CP. OUT	Transistor comparative output pin

Outside output connector(CN2)
Connector maker: J.S.T. Mfg. Co., Ltd.
Type of connector: S3B-ZR
Type of connector pin: SZH-002T-P0.5

Pin No.	Names of pins	Functional contents
1	RLY-a	Output of contact a in comparative output relay (Make contact)
2	RLY-c	Output of contact c in comparative output relay (Common contact)
3	RLY-b	Output of contact b in comparative output relay (Break contact)

Reference drawing

CH 1

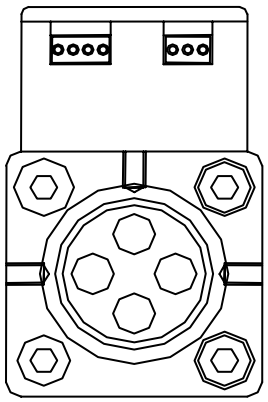
1234

1. ＋D C
2. N C
3. 0 V
4. CPO

CH 2

123

1. RLY-a
2. RLY-c
3. RLY-b



9. Product specifications on HF- GCG (Type unified with flow indicator)

《 General description 》

HF- GCG is a type of flowmeter which is unified with the flowmeter and the flow indicator(Digital meter) which has been conventionally used as an optional.

The magnets incorporated in the inside of the body of flowmeter make the revolutions of the screw count up by means of the Hall IC, and outputs as a pulse signal. The cycle period of this pulse output is operated in terms of flow indicator and displays instantaneous flowrate. It produces an alarm output in terms of flowrates which has been set by flow indicator.

Specifications

Power source

Items	Specifications	
	EM0100DT, DR	EM1000ET
Voltage	24VDC±10%	12 – 24VDC±１０%
Current	24VDC: 110mA	12VDC: 155mA 24VDC: 75mA

Comparative output

Items	Specifications
Comparative operation	Alarm output operation at upper / lower limits
Setting of comparative value	Key switch input setting configuration
Setting ranges of comparative value	9 9 9 9 9
Comparative output EM0100DT	NPN open collector output Sink current: 100mA and below, Vol=1.3V Max impressed voltage: 35VDC and below
Comparative output EM0100DR	Relay contact output Kind of contact: One transfer contact (Contact c) Contact capacity: 35VDC /0.1A(Load resistance) Life span of contact: More than 100000 times (35VDC/0.1A, resistance load) Mechanical life: More than 50 million times

Operating environment

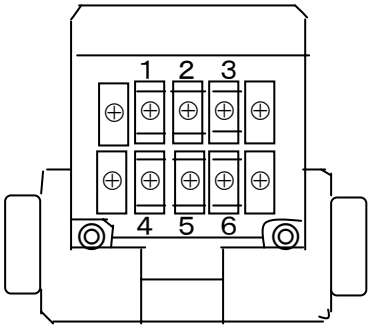
Items	Specifications
Temperature	0 - ＋55℃
Relative operating humidity	35 – 85% RH (No dewing)
Ambient temperature	0 - 50℃

《 Explanation on connection and their connecting terminal 》

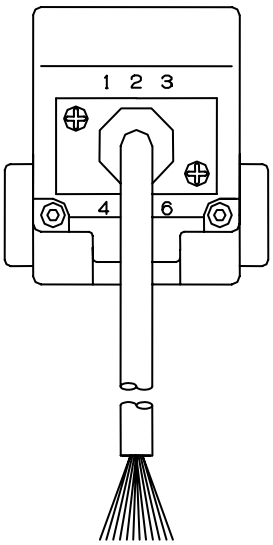
● For the connection to rear terminal of HF-GCG, refer to the following illustration.

EM0100DT/DR		
Pin No.	Names of pins	Functional contents
1	＋D C	Input pin for plus side of power supply
2	N C	Not connected any
3	0 V	Input pin for 0V of power supply
4	C P 1	Comparative output terminal on CP1.
5	C O M	Common terminal to comparative output for CP1 and 2
6	C P 2	Comparative output terminal on CP2.

HF- GCG Rear view (when using EM0100DT / DR)



HF- GCG Rear view (when using EM1000ET)



When using EM1000ET, wiring should be made by using the cable for special use in EM1000ET from the rear side.

For more information regarding flow indicator, refer to Instruction Manual for digital meter.

10. Where to call

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