TECHNICAL GUIDANCE

BLOW-BY GAS FLOWMETER

BF-2000S, BF-4000S & BRX-700 Series

Compact & High-functional

PRODUCT OUTLINE

This equipment is a flow measuring system for measuring the amount of blow-by gas that leaks into the crankcase from the gap between the cylinder and piston, of reciprocating motion type internal combustion engines such as those used in automobiles.

In recent years, blow-by gas rates have been receiving much attention as data for performance evaluations during engine development, product quality assurance of mass produced engines, evaluations of abrasion and wear in piston related components during engine bench endurance tests, endurance checks of vehicle engines, and performance evaluations of lubricants during engine bench tests. In order to collect and measure such important data easily, conveniently, and with high accuracy, the blow-by gas flowmeter has been developed, based on the thermal flowmeter "TH series Thermal Mass Flowmeter" having long years of experience and reliability.

In addition to the advantages of our conventional products, such as mass flow measurement with high durability, and small pressure loss, the flow measurement even with higher accuracy and reliability is made possible, with the addition of a large capacity drain tank, incorporation of an integrated surge tank, and a structural change of the internal piping of the equipment, reducing the amount of drain accumulation which may hinder the flow measurement.

CONFIGURATION

The blow-by gas that flows in from the equipment's main unit is led to the surge tank, and the surging elements that disturb flow measurement are removed. A dynamic damper which is incorporated in the surge tank smooths the pulsation of gas. Therefore, there is no need to attach an external surge tank even to engines with large pulsations. The blow-by gas that passes through the surge tank flows into the filter tank, where liquid and oil droplets, as well as dust, are removed.

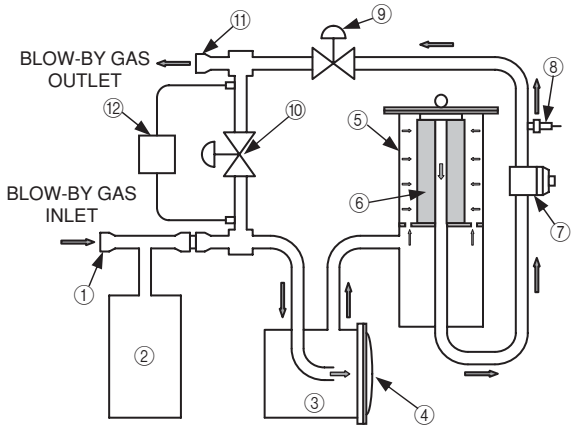
Additionally, in order to check the clogging of the filter, a differential pressure detector, for detecting the pressure loss of blow-by gas flowmeter, is installed between the blow-by gas inlet and outlet areas. Next, the blow-by gas passes through the flowmeter, the thermometer, and the main valve, and is exhausted from the exit.

In order to minimize pressure loss, the main passages of the internal piping all consist of the piping units of 1B (BF-4000S) and 1-1/2B (BF-2000S), with the number of their curves kept to a minimal, and a long elbow, with a large radius of curvature, has been adopted. Further, a main ball valve and an electrically driven ball valve, for switching bypass passages, have been installed at the blow-by gas flowmeter's exit and entrance areas, in order to prevent filter contamination during intermissions of flow measurement while collecting blow-by gas sampling data, and to protect the blow-by gas flowmeter from oil emission due to abnormalities in engine operating conditions, etc.

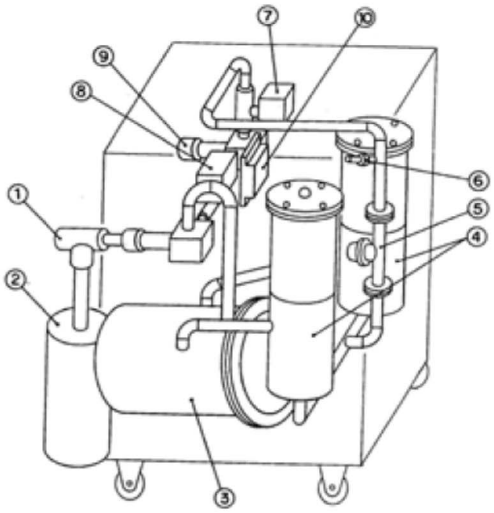
SYSTEM CONFIGURATION OF MAIN UNIT OF EQUIPMENT

Code	Name	Code	Name
①	Inlet joint	⑦	Flow element
②	Drain Tank	⑧	Thermometer
③	Surge tank	⑨	Main valve
④	Dynamic dumper	⑩	Bypass valve
⑤	Filter tank *1	⑪	Outlet joint
⑥	Filter	⑫	Differential pressure meter

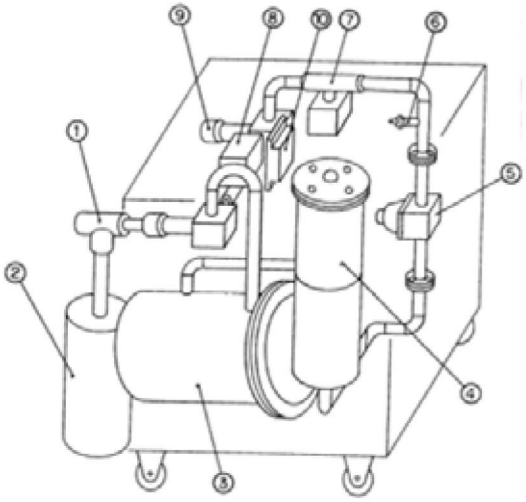
Notes:
* The figure below shows the system configuration.
*1 2 pcs. of Filter Tanks for BF-2000S are arranged in parallel.



INTERNAL CONFIGURATION DRAWING



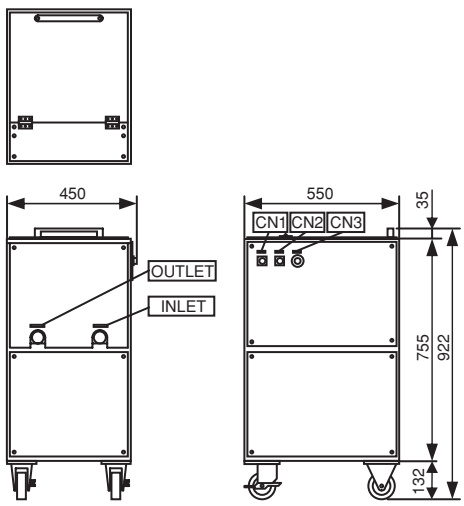
BF-2000S



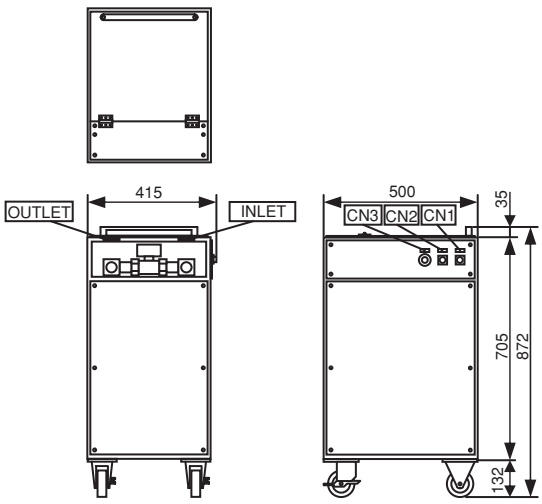
BF-4000S

Code	Name	BF-2000S Quantity	BF-2000S Quantity	Remarks
1	Inlet joint (Rc 1-1/2)	1	—	With hose connector for ϕ45mm bore hose
	Inlet joint (Rc 1)	—	1	With hose connector for ϕ32mm bore hose
2	Drain tank	1	1	Capacity: 4 litters (Approx.)
3	Surge tank	1	1	Capacity: 18 litters (Approx.)
4	Filter tank	2	1	Filter part No.TC-10 S4CV: (Advantec Co., Ltd.)
5	Flow element	1	1	Part No.: TH-1841-4FTC (BF-2000S) TH-1831-4FTC (BF-4000S)
6	Thermometer	1	1	Part No.: R7-Pt100-S-3. 2-X-SUS304-R1/4-ED-1000
7	Main valve	1	1	Ball valve (Nominal dia. 1 B)
8	Bypass valve	1	1	With hose connector
9	Inlet joint (Rc 1-1/2)	1	—	With hose connector for ϕ45mm bore hose
	Inlet joint (Rc 1)	—	1	With hose connector for ϕ32mm bore hose
10	Differential pressure meter	1	1	Part No.: KL-11 (Range: 0 to 500 Pa Standard)

DIMENSIONAL OUTLINE DRAWING



BF-2000S

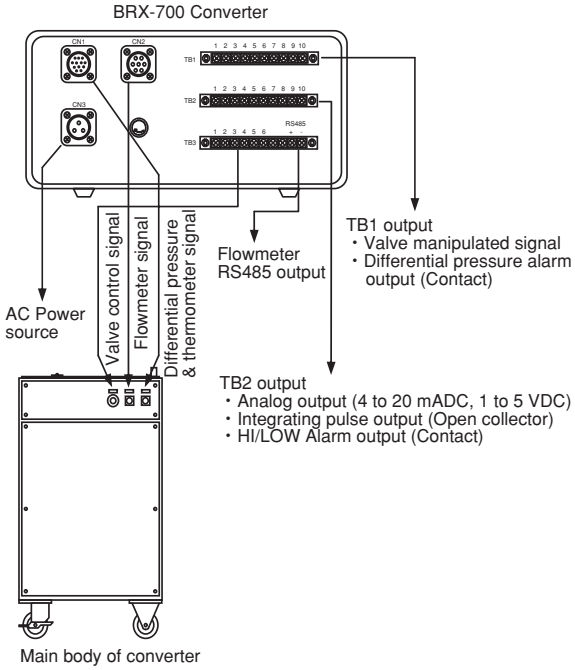


BF-4000S

BRX-700 CONVERTER

TRX-700 thermal flowmeter converter has been adopted to the BRX-700 Converter. As regards the setting for a flowmeter, the same change as the usual TRX-700 can be made.
Moreover, a maintenance is easy since the error indication by the self-diagnosis of TRX-700 Converter has been taken over to BRX-700 Converter. In addition to TRX-700 Flowmeter converter, the valve control function of the equipment and the differential pressure display function to check the filter clogging have been added to BRX-700 Converter. There are the three methods for the valve control function; the manual change by panel switch, the change by the external signal, and the simple timer control. The main valve and bypass valve of the equipment are controlled, and when not carrying out a flow measurement, and making the bypass side of valve open, the consumption of a filter can be reduced without gas flowing into the flowmeter side.
The clogging of filter is checked by a differential pressure display function, and the alarm display and contact point by an alarm setting are outputted.

CONNECTION

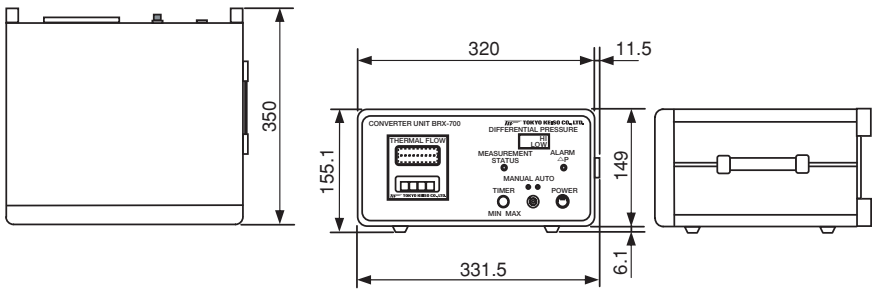


STANDARD SPECIFICATIONS

Standard combination		BF-2000, BF-4000S & BRX-700
Flow range	BF-4000S	Standard: 10 to 100 L/min (nor)
		Maximum: 10 to 150 L/min (nor)
	BF-2000S	Standard: 20 to 200 L/min (nor)
		Maximum: 20 to 300 L/min (nor)
Flow accuracy	BF-4000S	1.5% R.D.〔10 L/min (nor) or more〕
		1.5% F.S.〔10 L/min (nor) or less〕*
	BF-2000S	1.5% R.D.〔20 L/min (nor) or more〕
		1.5% F.S.〔20 L/min (nor) or less〕*
Pressure loss	BF-4000S	200 Pa at 100 L/min (nor)
	BF-2000S	200 Pa at 200 L/min (nor)
Indicator	Flow indication	LCD 5 digits
	Integrating indication	LCD 7 digits
	Differential pressure indication	LED 3-1/2 digits (Pressure loss value)
Flow output	Analog	4 to 20 mADC, or 1 to 5 VDC output
	Integrating pulse	Open collector output
	Serial	RS485
Contact alarm	Flow alarm	Relay contact output (HI/LOW)
	Differential pressure output	Relay contact output (HI)
Function	Valve control	Manual: Main (measurement) / Bypass change
		Auto 1 mode: Simple timer control change
		Auto 2 mode: External contact input change
Filter	BF-4000S	Dry paper filter - 1 pc.
	BF-2000S	Dry paper filter - 2 pcs.
Temperature	Operating temperature	0 to 60℃ (Due to the limit of differential pressure)
	Ambient temperature	0 to 60℃ (Main body of equipment)
		0 to 50℃ (BRX-700 Converter)
Power source	Standard	100 VAC ±10% 50/60 Hz
	Overseas specification	110 VAC to 240 VAC ±10% 50/60 Hz
Electric power consumption		60 VA or less

* Flow accuracy of less than 10 (20) L/min (nor) is the error of full scale of 10 (20) L/min (nor) as maximum flow rate.

DIMENSIONAL OUTSIDE DRAWING OF BRX-700 CONVERTER



ORDERING INFORMATION

This is the ordering information containing the indispensable conditions in placing an order. When placing the order with us, we would like you to specify the following contents, and accept our standard setting except for the following contents. Further, when selecting ☐ from among the alternatives, please specify the contents for 〔☐〕 if provided.

ORDER INSTRUCTIONS			
Model	☐ BF-4000S/BRX-700	☐ BF-2000S/BRX-700	
Max flow	☐ 100 L/min ☐ 50 L/min ☐ 150 L/min ☐ Other min 『Std.：100 L/min』	☐ 200 L/min ☐ 100 L/min ☐ 300 L/min ☐ Other /min 『Std.：200 L/min』	
Unit	☐ L/min(nor) (Std.)	☐ L/min std) at【 】, 1atm	☐ Other【 】* Consult factory.
Display setup	Upper	■ Instant flow rate	
	Lower	☐ Integrating flow ☐ Temperature ☐ Bar graph	
Analog output	☐ 1 to 5 VDC（Std.） ☐ 4 to 20 mADC ☐ Other【 】* Consult factory.		
Power supply	☐ 100 VAC（Std.） ☐ 110 to 240 VAC：【 】VAC 50/60Hz		
Signal cable	☐ 10m (Std.) ☐ 5m ☐ 20m ☐ Other【 】m ・3 kinds of cable		
Power cable	☐ 3m (125 VAC or less Std.) ☐ 2m (250 VAC or less Std.) ☐ Other【 】m ・one kind of cable		
Attached hose	☐ 10m（Std.） ☐【 】m ・Hose length is selectable in 0 to 30 m.		
Spare filter	☐ Not provided (Std.) ☐【 】pc. ・Provided with equipment as standard.		
Should you have any request, please write down here.			

*Specification is subject to change without notice.

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