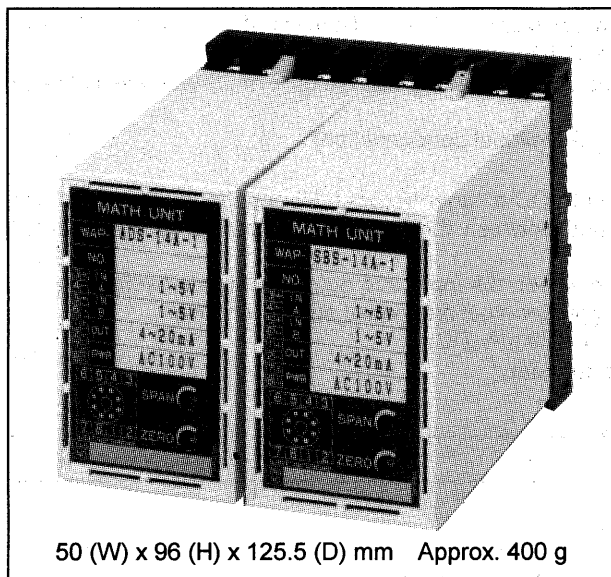# ADDITION UNIT AND SUBSTRACT UNIT (MATH UNIT)
WVP-ADD/SBD/ADS/SBS

50 (W) x 96 (H) x 125.5 (D) mm   Approx. 400 g

These are converters that receive two analog signals and deliver a signal that is proportional to their sum or difference. They can be used for addition of flow rates or the calculation of temperature differences, speed differences, etc. The ADS and SBS types come with their input, output, and power supply isolated from each other; however, their input signals are not mutually isolated.

Features

– Highly reliable design that is hardly affected by signal source resistance or receiving resistance
– Plug-in design to enable mounting on and demounting from DIN rails using a one-touch process
– The isolated types have a dielectric strength between their input and output of 2,000 VAC.

Model   WVP - ☐☐☐ - ☐☐ ☐ - ☐

ADD	Adder	Non-isolated
ADS		Isolated
SBD	Subtracter	Non-isolated
SBS		Isolated

	Power Supply	
1	AC 100 V ± 10%, 50/60Hz	
2	AC 200 V ± 10%, 50/60Hz	
3	DC 24 V ± 10%	
4	AC 110 V ± 10%, 50/60Hz	
5	AC 220 V ± 10%, 50/60Hz	

	Input Signal	
		Input Resistance
11	DC 0–100 mV	1 MΩ
12	DC 0–1 V	1 MΩ
13	DC 0–5 V	1 MΩ
14	DC 1–5 V	1 MΩ
15	DC 0–10 V	1 MΩ
32	DC 0–1 mA	100 Ω
33	DC 0–10 mA	50 Ω
34	DC 0–16 mA	50 Ω
35	DC 0–20 mA	50 Ω
36	DC 4–20 mA	50 Ω
99	Other than the above (Please consult with us.): Over 10 mV·fs up to 300 V·fs Over 10 μA·fs up to 20 mA·fs	

	Output Signal	
		Allowable Load Resistance
A	DC 4–20 mA	750 Ω or less
B	DC 1–5 mA	3 KΩ or less
C	DC 2–10 mA	1.5 KΩ or less
D	DC 0–1 mA	15 KΩ or less
E	DC 0–10 mA	1.5 KΩ or less
F	DC 0–16 mA	937 Ω or less
G	DC 0–20 mA	750 Ω or less
H	DC 1–5 V	2.5 KΩ or more
J	DC 0–10 mV	10 KΩ or more
K	DC 0–100 mV	100 KΩ or more
L	DC 0–1 V	500 Ω or more
N	DC 0–5 V	2.5 KΩ or more
P	DC 0–10 V	5 KΩ or more
S	Other than the above (Please consult with us.): Voltage output 10 V or less Current output 20 mA or less	
T	4–20 mA (up to 36 mA virtual output)	
U	0–10 V (up to 20 V virtual output)	
Z	Special virtual output	

Specification

Input signal:	DC voltage, DC current (number of input signals: 2)
Output signal:	DC voltage, DC current (number of output signals: 1)
Accuracy:	±0.2%·fs (at 23°C)
Allowable load resistance:	– For voltage output, use the converter with a load current of 2 mA or less (1 µA or less for an output below 1 V·fs).
	– For current output, use the converter with a voltage drop of 15 V or less between output terminals.
Response time:	0.2 sec (time needed to reach 90% of the final value)
Adjustable range:	Zero: -10–+10%·fs
	Span: 90–110%·fs
Operating temperature and humidity:	-5 to +55°C, 90% RH or less (without condensation)
Influence of ambient temperature:	±0.2%·fs/10°C
Insulation resistance:	100 MΩ or more with a 500 VDC megger between the input/output terminal and power supply terminal, and between the input and output terminals (isolated type)
Dielectric strength:	2,000 VAC for 1 minute between the input and output terminals (isolated type), and between the input/output terminal and power supply terminal
Power consumption:	Approx. 4 VA (AC), approx. 70 mA (DC)

Operation Expression

WVP-ADD, ADS

$$C = \frac{K_1}{100} \times A + \frac{K_2}{100} \times B \qquad \begin{aligned} &K_1, K_2: \ 10\text{–}100\% \\ &A, B, C: \ 0\text{–}100\% \end{aligned}$$

The virtual output consists in the result of A + B selected in an actual amount, when necessary. However, the unit does not deliver it, if C exceeds 100%.

[Example] A = 40%　B = 60%　$K_1 = K_2 = 100$

Standard: $C = \dfrac{100}{100} \times 40 + \dfrac{100}{100} \times 60 = 50\%$

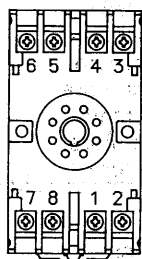Virtual output: $C = \dfrac{100}{100} \times 40 + \dfrac{100}{100} \times 60 = 100\%$

WVP-SBD, SBS

$$C = \frac{K_1}{100} \times A - \frac{K_2}{100} \times B \qquad \begin{aligned} &K_1, K_2: \ 10\text{–}100\% \\ &A, B, C: \ 0\text{–}100\% \end{aligned}$$

Where $= \dfrac{K_1}{100} \times A > \dfrac{K_2}{100} \times B$

The coefficients of K_1 and K_2 are set at the factory prior to the delivery. They cannot be modified after the delivery of the unit.

Explanation of Terminals

No.	Symbol		Description
1	OUTPUT	+	Output signal
2		-	
3	INPUT	+	Input signal
4	(A)	-	(A)
5	INPUT	+	Input signal
6	(B)	-	(B)
7	POWER	U (+)	Power supply
8		V (-)	