



*High quality data acquisition and embedded control products.*

## SSW43 Seismometer



### Functions

SSW43 is a modern seismometer. It contains 3-axis MEMS accelerometers and a 16-bit 80 MHz CPU to process the signals and do the communication. Signals of the 3-axis accelerometers are sampled with the rate of 160 Hz. The signals are first filtered against the high-frequency noise above 20 Hz, and then used for determining the seismic events.

A special technique is applied for this unit to determine the seismic events. SSW43 uses STA/LTA threshold levels plus a unique clamped acceleration slope method to remove high-frequency man-made seismic noises. The false alarm rate can be greatly reduced by this technique. The new trigger method is different from the traditional one by virtue of the new software processing technique. It provides the system with the real-time composite vector calculation, zero-g level self-test and compensation. It also benefits from hardware's long data FIFO which allow the STA (Short Time Average) and LTA (Long Time Average) values to be stably processed at high-speeds. Even the weakest seismic events can be detected while preventing false triggers induced by some man-made noises.

This unit displays the magnitude of seismic intensity which is defined to have seven levels according to ground acceleration by the Central Weather Bureau in real-time. Earthquake data such as trigger time, the magnitude level, the acceleration obtained from the composite vector, and the maximum acceleration in each axis, are also available for display. The two digital outputs on this unit can be defined by users to control other devices. It can be used to notify an elevator controller to stop the elevator at nearest floor; it can be used to cut off the gas supply or electric heaters to avoid the secondary disasters while earthquakes happen.

Both the Modbus RTU and Modbus TCP protocols are provided to directly

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1508 West Pacific Coast Highway, Harbor City, CA 90710**



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connect to a computer, a PLC or an HMI (human-machine interface). When Modbus TCP protocol is used, up to three computers or hosts are allowed to be connected simultaneously. It can be directly connected to the broadcast system or a disaster prevention system. It also provides the function to initiate a connection with a Server. This function is similar to ADSL dial-up when using a floating IP. This unit can send messages by dialing. It allows people in central control room to receive immediate messages.

## **Features**

Two Digital Outputs are available for performing users' control requirements. The range for triggering the DO can be set from 2 mg to the maximum measurable value.

Tri-axial MEMS accelerometers provide high-precision digital acceleration values. A 16-bit CPU running at 80 MHz performs the necessary digital signal processing.

Self-testing is done for automatic zero level adjustments.

The STA/LTA threshold trigger algorithm is applied for seismic data recording. The composite vector acceleration value of three-axis can be obtained in real-time. This unit can record the maximum composite vector output value and its tri-axial components; it also can record the maximum accelerations for each of the three axes.

Both the Modbus RTU and Modbus TCP protocols are available for communication. The reference clock can be synchronized with those of others by the NTP function. The unit can directly connect to a PC, a PLC, or an HMI. Maximum three clients are allowed to communicate with this module at the same time through Modbus TCP protocol.



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## Specifications

### Accelerometer

Axes:	3 (X, Y, Z)
Range:	±2g (X, Y) +1g / -3g (Z)
Frequency Response:	0 ~ 20 Hz
Shock Protection:	Level: 3000g, Duration: 0.5ms Level: 10000g Duration: 0.1ms

### Analog to digital converter

ADC Resolution:	12 bits
Digital value resolution:	< 0.001g

### Seismic (Earthquake) trigger

Criteria:	STA/LTA and clamped slope value
STA Range:	0.1 ~ 100 sec
LTA Range:	0.1 ~ 100 sec
Clamped Slope	0 ~ 0.98G
Zero Adjustment Cycle:	30 ~ 43200 minutes
Seismic Event Time:	1 ~ 200 sec

### Digital Output (Relay)

Quantity:	2
Trigger Level Setting:	0 ~1.96g
Type:	Normal Open
Capacity:	0.6A DC
Action Time:	The same with the Seismic Event Time

### Power

Voltage:	10 ~ 30 VDC
Power Consumption:	3.5W



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### **Communication**

Modbus RTU: Supports RS-232 or RS-485  
Protocol: 19200, N, 8, 1

Modbus TCP: Support 3 hosts at the same time  
Response time < 50 ms

Modbus Station ID: Default 101, changeable

Modbus Function: Provide Function 3 and 16

Modbus Register Address: 100 ~ 158, 176~191  
Register addresses 100~158 includes the information of accelerations, seismic event data, and seismic event trigger condition settings.  
Register addresses 180~191 are used for setting IP address of this unit; and Addresses 176~179 are used for setting IP address of the Server.

### **Timing Adjustment**

NTP Server: Defined by register addresses 171 ~ 174

### **Outlook**

Size: 123 mm x 72 x 33 mm  
Weight: 0.2 kg (not including the cable and power supply)

### **Environment**

Operational Temperature: -10°C - 60°C  
Storage Temperature: -20°C - 70°C