



**ADTECH**  
 Analog-Digital Technology, Inc.  
 3750 Monroe Avenue  
 Pittsford, New York 14534-1302  
 (716) 383-8280 • FAX (716) 383-8386

# SHM 60

## Non-Isolated Sample and Hold Module

### Instruction Manual

#### 1.0 INTRODUCTION

These instructions refer to the above model. Supplementary sheets are attached if the unit has special options or features. For detailed specifications, see page 4 or refer to the Data Bulletin. All ADTECH instruments are factory calibrated and supplied with a label detailing the calibration. Adjustments are normally not necessary. A simple check should be performed to verify calibration before installation to ensure that it matches the field requirement.

#### 2.0 GENERAL DESCRIPTION

The ADTECH SHM 60 is a Non-Isolated Sample and Hold Module that accepts a process input signal of 1-5 vdc or 4-20 ma dc and provides a single channel memory of the analog signal.

Control of the output signal is normally through an external contact input command. Infinite hold time with no decay is provided by the unit's digital memory.

The SHM 60 offers four (4) modes of operation: (1) The standard "SAMPLE Mode" where the input signal is sampled on the application of an external command and held as the output until a new sample command is received; (2) The "TRACK Mode" where the output follows the input as long as an external track command is present. The output signal is held at the last value when the track command is removed; (3) The "PEAK PICKER Mode" and (4) the "VALLEY PICKER Mode". In these modes (3 & 4) the SHM 60 responds to an increasing or decreasing signal respectively and holds the Peak or Valley signal level output until an external track command makes the output follow the input. The appropriate mode must be specified at time of placing the order.

The output is a true current source and provides process signals such as 4-20 ma, 0-1 ma, 0-10 ma, 1-5 ma and 10-50 ma dc or alternatively, a voltage signal of 5 vdc full scale. Other current and voltage **Inputs/Outputs (I/O)** are available as specified on the Data Bulletin.

#### 3.0 INSTALLATION

The instrument is supplied in a general purpose enclosure as standard. NEMA 4, 7 or 12 and plug in chassis enclosures are optionally available. Installation area/location must agree with the supplied instruments including operating temperature and ambient conditions.

#### Mounting

Refer to the appropriate outline drawing for mounting and clearance dimensions. The instrument is surface mounted with two #10-32 screws on 8.00 inch centers.

#### Electrical Connections

The wire used to connect the instrument to the control system I/O should be a twisted pair(s) and sized according to normal practice. Shielded cable is not normally necessary (if used, the shield must be grounded at the input negative of the ADTECH instrument and left floating at the sensor).

A 12 position barrier terminal block with #6-32 screws and 3/8" spacing is provided for I/O and power connection. A housing ground terminal marked G is also provided.

#### Controls

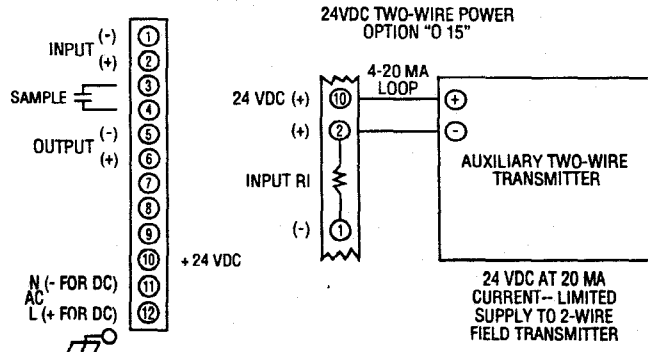
Multiturn IN-ZERO, OUT-ZERO and SPAN controls are provided to calibrate the instrument. The multiturn controls are accessible through the instrument front panel and are clearly marked for ease of use.

#### 4.0 MAINTENANCE

These instruments are electronic and require no maintenance except periodic cleaning and calibration verification. If the unit appears to be mis-operating it should be checked as installed per section 6.0 or removed for a bench check per sections 6.0-7.0. MOST problems are traced to field wiring and/or associated circuits. If the problem appears to be with the instrument, proceed to sections 6.0 and 7.0.

#### 5.0 CONNECTIONS

Standard connections are shown below and on the instrument face plate, Data Bulletin or on attached supplementary sheets.



## 6.0 CALIBRATION PEAK SAMPLE/HOLD MODE

To perform a calibration check or re-calibration of the instrument follow this procedure.

- A. Temporarily set jumper J28 to position A. This allows the output to track the input on a continuous basis.
- B. Set the control input to make the SHM output track the input. This may require either adding a jumper or removing an existing closed contact across terminals 3 and 4. For pulse input, it may require either the pulse 0, or pulse high status.
- C. Make sure the unit I/O wiring is properly connected and that the correct power source per the label is also connected. The instrument must be operating at normal power for at least 2 minutes before proceeding.
- D. The input source(s) must be adjustable from 0 to 100% in steps of 10% or at least 25%. The source(s) should be either precalibrated or an accurate meter must be used to monitor the input(s).
- E. Connect a digital voltmeter from terminal (#1) to internal test point, TP1.
- F. Set the input source to the minimum input value and adjust the multiturn potentiometer marked IN-ZERO to provide 0.00 volts at test point, TP1.
- G. The output may be monitored either as a direct voltage for a voltage output signal or as a current that can be represented as a voltage across a resistor shunt.
- H. Set the input source to minimum input value and adjust the multiturn potentiometer marked OUT-ZERO to provide minimum calibrated output (e.g.)  $4.00 \pm 0.01$  ma dc.
- I. Set the input source to maximum input value and adjust the multiturn potentiometer marked SPAN to provide the maximum calibrated output (e.g.)  $20.00 \pm 0.01$  ma dc.
- J. Repeat steps H and I until the readings are within desired calibration  $\pm 0.1\%$  of span.
- K. The instrument should now be checked at 25, 50, and 75% of span minimum.
- L. Replace jumper, J28 to position A and apply the hold command to verify the output holds and samples correctly.
- M. This completes the calibration.

## 6.1 CALIBRATION TRACK MODE

- A. Follow steps B through K in section 6.0.
- B. Set the control input in hold mode and verify that the output holds.
- C. This completes the calibration.

## 6.2 CALIBRATION PEAK PICK/TRACK, VALLEY PICK/TRACK MODE

- A. Follow steps B through K in section 6.0.
- B. Set the control input in pick mode and verify the output represents a peak or valley.
- C. This completes the calibration.

## 7.0 FIELD TROUBLE SHOOTING GUIDE

This section offers a simple, first level trouble-shooting aid for an apparent instrument malfunction.

<u>SYMPTOM</u>	<u>CORRECTIVE ACTION</u>
No output	<ol style="list-style-type: none"><li>1. Check the input and output connections carefully.</li><li>2. Check that the power supply polarity is correct and that power is present on the instrument terminals.</li><li>3. Check that the input source(s) is correct and that it changes magnitude between zero and full scale values when so adjusted.</li><li>4. If the output is a current signal (4-20 ma, etc.), make sure the output loop is complete and that the correct meter range is selected.</li></ol>
	All external checks are complete. Problem seems to be internal.

The following information is provided for a qualified technician or serviceman as check points for use in internal troubleshooting.

<u>CHECKPOINT/ COMPONENT</u>	<u>VOLTAGE/RANGE</u>
(across) C20	$26 \pm 4$ vdc
Term 1(-) to E <sub>2</sub> (+)	$12 \pm 0.6$ vdc
Term 1(-) to E <sub>1</sub> (+)	$-12 \pm 0.6$ vdc
Term 1(-) to Z <sub>4</sub> pin 19	$9.4 \pm 0.5$ vdc

## NOTES

1. If recalibration to a different input and/or output signal is required, use the appropriate tables in section 8.0 to change the required components to get the input and/or output signal required.
2. For sample/hold or track/hold modes: Internally jumper, J32 is present for sample or track commands on closed contact input, while an open contact is the hold function. Jumper, J32 is absent for sample or track commands on open contact input, while a closed contact is the hold function.
3. For peak picker and valley picker modes: When jumper, J32 is present, a closed contact provides track and an open contact provides the pick function. When J32 is absent an open contact provides track and a closed contact provides the pick function.

8.0 TABLES, PCB LAYOUT

INPUT TABLE

INPUT SIGNAL FULL SCALE	INPUT SHUNT RI
50 ma dc	100 ohm, 1/2 W
20 ma dc	250 ohm, 1/2 W
10 ma dc	499 ohm
1 ma dc	4.99K ohm
10 vdc	See Note 1
5 vdc	None

OUTPUT TABLE

OUTPUT SIGNAL FULL SCALE	OUTPUT SHUNT RL	FEEDBACK RES RF
50 ma dc	NONE	20 ohm
20 ma dc	NONE	49.9 ohm
10 ma dc	NONE	100 ohm
1 ma dc	NONE	1K ohm
10 vdc	604 ohm, 1/4 W	49.9 ohm
5 vdc	250 ohm, 1/2 W	49.9 ohm

All selected resistors are 1%, M.F., 1/4 W, 50 PPM, unless otherwise noted

NOTE 1: R69 = 150K, R46 = 100K, RI = out

FUNCTION TABLE

SHM-60 FUNCTION	JUMPERS			DIODES	
	J25	J28	J29	CR3	CR2
UPDATE	A	B	OUT	IN	IN
TRACK	A	A	OUT	IN	IN
PEAK	A	OUT	A	IN	OUT
VALLEY	A	OUT	A	OUT	IN

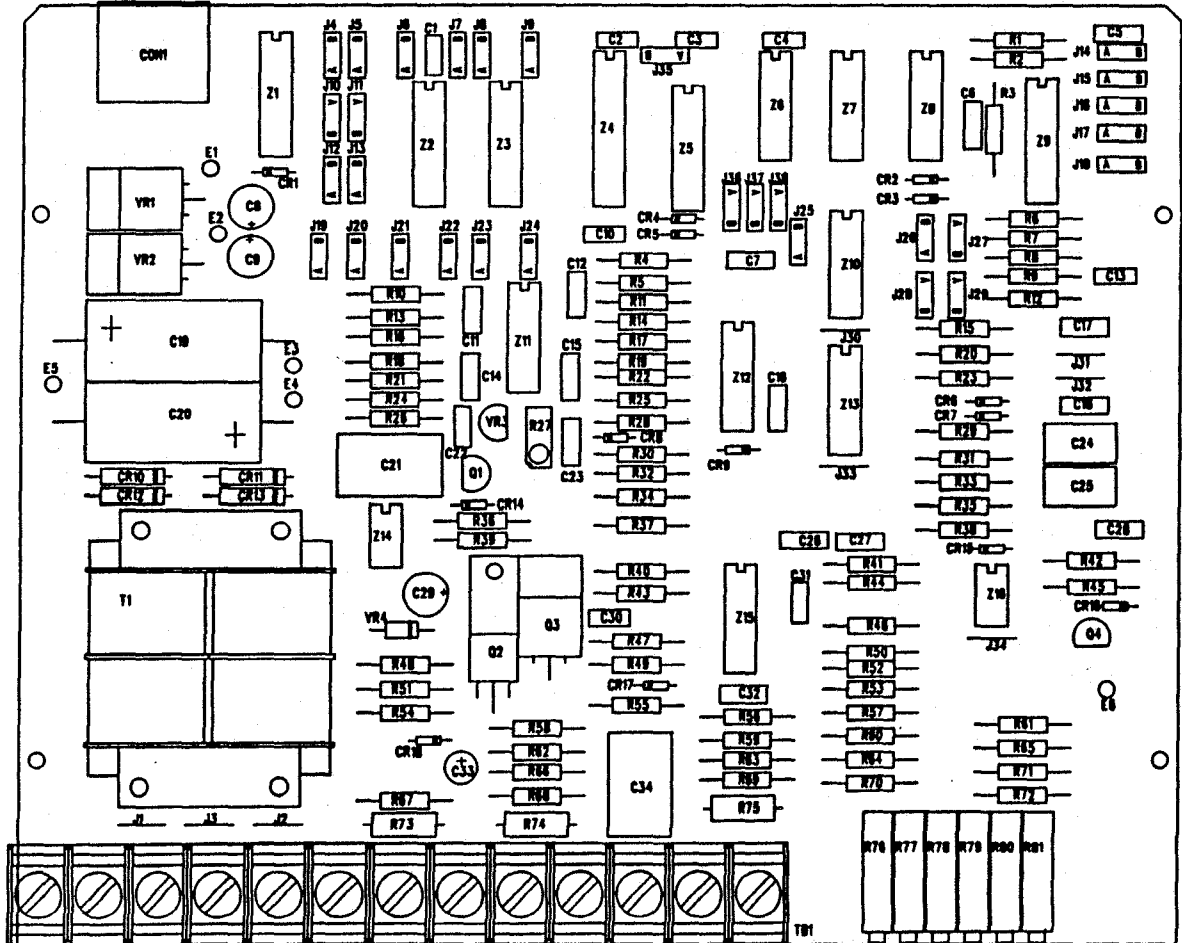
NOTE: All other Jumpers shown are IN unless otherwise stated

SHM 60

RI = R75

RL = R74

RF = R58



## 9.0 SPECIFICATIONS

### INPUT/OUTPUT

#### INPUT SIGNALS

- Contact 24 vdc @ 2 ma rating, N.O. or N.C.: specify
- Voltage: 0 to 12 vdc minimum, 30 vdc maximum
- Ramp Range: 0.1 second to 50 hours
- Ramp hold and up/down command input

#### OUTPUT SIGNALS/OUTPUT DRIVE

	AC Power	DC Power
a. 4-20 ma dc	0-1000 ohms max.	0-900 ohms max.
b. 10-50 ma dc	0-400 ohms max.	0-350 ohms max.
c. 0-1 ma dc	0-20,000 ohms max.	0-18,000 ohms max.
d. 1-5 vdc	250 ohms Z out	250 ohms Z out
e. 0-10 vdc	500 ohms Z out	500 ohms Z out

Zero based current and voltages in the above ranges are standard (e.g.) 0-20 ma, 0-5 vdc. Other voltage and currents optional.

#### PERFORMANCE

- Calibrated Accuracy:**  $\pm 0.1\%$
- Linearity:**  $\pm 0.1\%$  maximum,  $\pm 0.04\%$  typical
- Repeatability:**  $\pm 0.05\%$  maximum
- Temperature Stability:**  $\pm 0.01\%/^{\circ}\text{F}$  maximum,  $\pm 0.004\%/^{\circ}\text{F}$  typical
- Load Effect:**  $\pm 0.01\%$  zero to full load
- Output Ripple:** 10 mv P/P maximum
- Response Time:** 150 milliseconds
- Temperature Range:**  $0^{\circ}$  to  $140^{\circ}\text{F}$  ( $-18^{\circ}$  to  $60^{\circ}\text{C}$ ) operating  
 $-40^{\circ}$  to  $185^{\circ}\text{F}$  ( $-40^{\circ}$  to  $85^{\circ}\text{C}$ ) storage
- Power Supply Effect:**  $\pm 0.05\%$  for a  $\pm 10\%$  power variation

Note: All accuracies are given as a percentage of span

#### POWER

- 115 vac:  $\pm 10\%$ , 50/60 Hz, 3 watts, 0.7 Pf (standard)
- 24 vdc:  $\pm 10\%$  isolated, 3 watts (Option P2)
- 48 vdc:  $\pm 10\%$  isolated, 3 watts (Option P3)
- 125 vdc: Nominal (105-140 vdc) isolated, 3 watts (Option P4)
- 230 vac:  $\pm 10\%$ , 50/60 Hz, 3 watts, 0.7 PF (Option P5)

## 10.0 OUTLINE & MOUNTING

