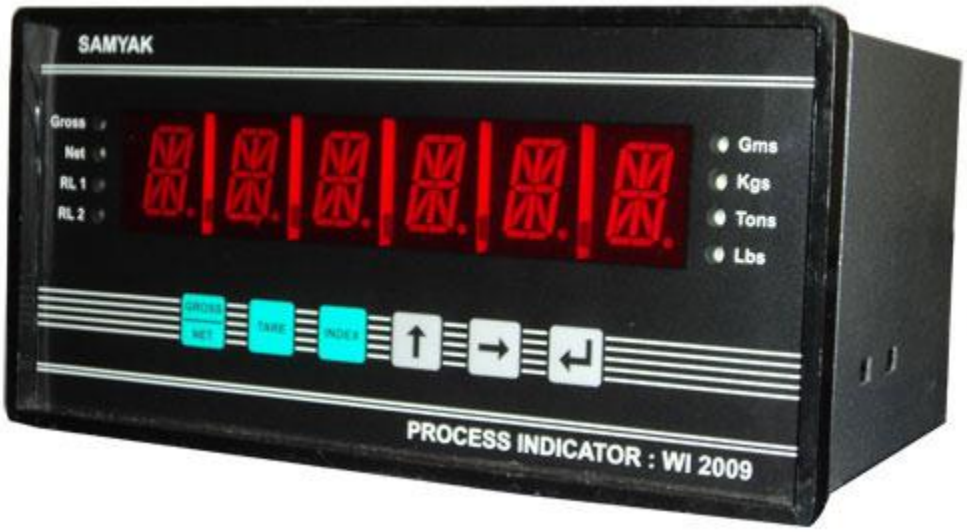
Samyak

OPERATING MANUAL
OF
WEIGHT INDICATOR
WI-2009



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CHAPTER 1

1.1 INTRODUCTION

- This is a Microcontroller based Weight Indicator Unit.
- It is highly versatile,accurete and different from the conventional indicator.
- It is based on a popular 8-bit Microcontroller.
- The Set Parameters are stored in Nonvolatile flash RAM and No battery back up is required
- Calibration through software (Offset**: 'Z'** & Span**: 'S'** stored in NVRAM/Flash RAM)
- The unit has:
    - 0.8" 6 Digit 16-Segment Red LED Display
    - The unit has 2 Discrete LEDs for Control Output Status Indication
    - The unit has 2 Discrete LEDs for Gross and Net Indication
    - The unit has 4 Discrete LEDs for the scale of measurement Indication

- The system is designed to have one Load cell input,4 digital inputs,6 control outputs**.**

1.2 SPECIFICATIONS

1	Power Supply	110-230V AC +/- 10% or Single Phase, 50 Hz Nominal 24VDC (factory configured)
2	Key board	6 keys keypad
3	Display	0.8" 6 Digit 16-Segment Red LED Display
4	Analog Inputs	4 wire load cell
5	Digital Inputs	4
6	Control Outputs	Up to 6 (Batching/Alarm)
7	Data Storage	USB Interface (Optional)
8	SMS Facility	GSM interface For Sent data by SMS to registered Mobile or Sending data to Cloud (optional)
9	Serial Interface	RS-232/485 (Modbus/Print) (Optional)
10	Retransmission output	Isolated 4-20Ma/0-10VDC (Optional)
11	Enclosure	General purpose, Panel Mount Made up of MS powder coated
12	Panel Mounting Dimensions	Cutout Size:186mm(W)*92mm(H) Outer:192mm(W)*96mmmm(H)*110mm(D)

CHAPTER 2

2.1 SYSTEM DESCRIPTION

- The unit is based on an 8-bit microcontroller.
- It displays analog signal (mV) input from the load cell into engineering values.
- With the help of the keypad and display, unit allows to set and modify various configuration parameters and calibration.
- The controller accepts up to 4 digital inputs.
- Controller also provides control outputs: Relay or Transistor.
- User can used two controllers in Master/Slave mode, to increase bagging speed.
- It is Panel mount unit supplied in an industry standard size.

2.2 HARDWARE DESCRIPTION

Construction of the instrument is Modular. It consists of:

- CPU & POWER SUPPLY CARD
- ENCLOSURE
- FRONT PANEL (KB/DISPLAY)

2.2.1 CPU & POWER SUPPLY CARD

- It is based on microcontroller.
- The configuration data is stored in non-volatile RAM.
- Battery is not required for retention of data.
- Watch dog circuit is also incorporated on the CPU card to prevent malfunctioning of the system due to external noise thro' power supply or any other source. If the CPU starts malfunctioning, the watch dog circuit resets it and system will be brought to it's Power On status.
- This card is connected with Display card.
- This card accepts Load cell Input.
- It provide +5VDC Excitation voltage to Load cell.
- 24-bits ADC is used for Digitizing Analog Input.
- It accepts 110-230V AC as inputs.
- It provides DC regulated Supply : +24VDC, +5VDC to the system.
- The CPU card carries Male connectors for external interface.

The connectors are accessible from back panel cut-out. Mating female connectors are supplied along with the instrument.

2.2.2 ENCLOSURE

- The unit is supplied an MS powder coated enclosure.
- It is panel mounting type DIN standard enclosure.
- Outer dimensions are: 192mm (W) x 96mm (H) x 110 (D) mm.
- Panel cut-out required: 186mm x 92 mm
- Side brackets are supplied with the instrument to mount in the panel.

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2.2.4 K/B DISPLAY CARD & FRONT PANEL

- On the Front there is window for 16-Segment LED Display.
- 6 Keys are mounted on this card.
- The card is connected with CPU card through 20-pin connector.
- The card is fitted on back side of front Bezel.
- It has 2 Discrete LEDs on the left side for Control Output Status Indication
- The unit has 2 Discrete LEDs on the left side for Gross and Net Indication
- The unit has 4 Discrete LEDs on the right side for the Scale of the measurement Indication

2.3 INSTALLATION GUIDE

- Unpack the instrument from the packing box carefully.
- Mount the instrument in the panel cutout of 186 mm * 92 mm.
- Fix the instrument with the panel using side brackets.
- All the electrical connections to be done at the back panel of the unit using spade lugs. Refer the Appendix for back panel layout.
- Make sure that no wire is connected loosely to avoid generation of spark and RFI. Connect mains cord on the back panel on the Phase, Neutral and Earth terminals.
- Instrument is factory configured for power supply of 110-230VAC or 24VDC
- Earth the instrument properly.
- Some of the contacts are powered. Hence don't touch any terminal directly when power is applied to the instrument. Whenever any connection is to be made or removed from the unit, always switch off the power.

CHAPTER 3

3.1 OPERATING DETAILS

The following paragraphs give detailed description of how to operate the unit. For efficient use of the instrument one must study and understand this section.

3.2 DISPLAY & KEYBOARD

- The unit has 6 digit 16-Segment red LED Display.
- It has keypad with 6 keys organized as 6 x 1 Matrix.
- In normal mode of operation, it displays Gross/Net. While in EDIT mode, parameters are displayed in this window.

List of keys and their functions:

KEYS	FUNCTION
GROSS / NET	'GROSS/NET' key: Use this key to Select GROSS/NET Mode
TARE	'TARE' key: Use this key to Tare Gross Weight This Key is Work When User is in Edit Mode Thro' Password
INDEX	'INDEX' key: Use this key to view and Modify Parameters
↑	'INCREMENT' Key: Use this key to Increment Selected Digit Value Also use for Batching Stop.
→	'DIGIT SELECT' key: Use this key for Digit Select Also use for Batching Start.
↵	'ENTER' key: Use this to save Parameter Value.

TARE KEY:

Press 'TARE' key, tare weight will be equal to the gross weight. Net weight will be zero. The equation that gives the relation between Gross, Net and Tare is as follows**:**

Net Weight=Gross Weight-Tare Weight.

Note:

(1) Tare will be allowed only in the gross mode
(2) Tare will be allowed only when the gross weight is positive.
(3) Tare can also be done by applying digital input Between **Tare** (Terminal No.9) & **Common** (Terminal No.13) From Back Terminal. It can be done without password.

3.3 MANUAL MODE OF OPERATION

In Manual Mode User Can Take Batches by using Start and Discharge Digital Inputs.

3.4 NORMAL MODE OF OPERATION

Whenever power is switched on to the unit**:**

- Engineering value proportional to the input signal will be displayed as Process variable (weight).
- Decimal point is displayed at selected position.

INDICATION:

Micro controller reads ADC and calculates process variable value.

For conversion in engineering value, the input is scaled using Zero Calibration and Difference (of Zero and Full scale calibration) values as per following formula:

Indication of weight (Engineering Value) =

((ADC Row Counts – Cal zero Reading)*(Weight))/ (Difference of Row Counts)

The calculated value is displayed.

3.5 EDIT MODE

- In this mode user can view and/or modify various parameters.
- One can perform this mode only when the instrument is in ‘STOP’ mode.
- Entry into Edit mode is protected by Password.
- There are two different passwords.

(1)Operator’s Password: 0101
(2)Engineer’s Password: 1234

3.5.1 LIST OF PARAMETERS:

User can set following parameter in the WI-2009 Unit:

PARAMETER DESCRIPTION	DISPLAY	PASSWORD	VALUE
Zero Calibration	ZERO	1234	Zero Weight
Span Calibration	SPAN	1234	Known Weight
Current output 4 Ma Calibration	OUTZ	1234	0 to 4095 (Max)
Current output 20Ma Calibration	OUTS	1234	0 to 4095 (Max)
Decimal Point	Dp	1234/0101	Up to 3 decimal point
Resolution	ROUND	1234/0101	1 / 2 / 5
Full Scale	FS	1234/0101	0 to 99999(Max)
Average	AVG	1234/0101	00 to 30
Set Point 1	SP1	1234/0101	0 to 99999(Max)
Set Point 2	SP2	1234/0101	0 to 99999(Max)
Operation delay	OPDLY	1234/0101	0to 200(Max)
Offset	OFF	1234/0101	0 to 999(Max)
Discharge time	ds tm	1234/0101	0 to 200(Max)
Unit	UNIT	1234/0101	Gms/Kgs/Tons/Lbs
Discharge	DISCH	1234/0101	0 to 99999(Max)
Type	OPERA	1234/0101	TYP1 / TYP2
Date	Date	1234/0101	000000
Time	Time	1234/0101	0000
Clear Batch	Clr	1234/0101	Yes/No
Tare	Tare	1234/0101	Yes/No
Print	PRL	1234/0101	000-999
Baud Rate	BAUD	1234/0101	19200/9600/4800/2400/1200
Unit Number	UNIT NO	1234/0101	1 to 32
Serial Type	SERIAL	1234/0101	MODBUS/PRINT

To change any parameter value, Press ‘INDEX’ Key. The Password page will be displayed.

- Press ‘DIGIT SELECT’ key, First digit will flash.
- Set Password: 1234 Using ‘INCREMENT’ Key and ‘DIGIT SELECT’ Key.
- Once correct value is set, Press ‘ENTER’ Key.

User can go to Above Parameters one by one by pressing ‘INDEX’ key:

DECIMAL POINT SELECTION (DP):

- Select “DP” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to display currently selected decimal position.
- Using 'INCREMENT' Key select desired decimal point position and press 'ENTER' key.
- The decimal point will be displayed at newly selected position.

SELECT	DECIMAL POSITION
0	No Decimal
0.0	One Decimal
0.00	Two Decimal
0.000	Three Decimal

RESOLUTION (ROUND):

- Select “ROUND” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to display currently set value.
- Using 'INCREMENT' Key set required value and press 'ENTER' key to store it in NVRAM.
- If Resolution is set to ‘2’, least significant digit will roll at 0,2,4,6 & 8.

SELECT	RESOLUTION
1	0,1,2,3,4,5,6,7,8,9
2	0,2,4,6,8
5	0,5

FULL SCALE (FS):

- Select “FS” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to display currently set value.
- Using 'INCREMENT' Key and ‘DIGIT SELECT’ Key set required value and press 'ENTER' key to store it in NVRAM.
- This parameter is used to set the range at which the current output from the unit will give 20mA.

AVERAGE (AVG):

- Select “AVG” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to display currently set value.
- Using 'INCREMENT' Key and ‘DIGIT SELECT’ Key set required value and press 'ENTER' key to store it in NVRAM.
- This parameter is used to set the average of the ADC reading to be taken for displaying the weight.

SETPOINT 1 (SP1):

- Select “SP1” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to display currently set value.
- Using 'INCREMENT' Key and ‘DIGIT SELECT’ Key set required value and press 'ENTER' key to store it in NVRAM.

SETPOINT 2 (SP2):

- Select “SP2” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to display currently set value.
- Using 'INCREMENT' Key and ‘DIGIT SELECT’ Key set required value and press 'ENTER' key to store it in NVRAM.

OFFSET (OFF):

- Select “OFF” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to display currently set value.
- Using 'INCREMENT' Key and ‘DIGIT SELECT’ Key set required value and press 'ENTER' key to store it in NVRAM.

DISCHARGE TIME (DS TM):

- Select “DS TM” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to display currently set value.
- Using 'INCREMENT' Key and ‘DIGIT SELECT’ Key set required value and press 'ENTER' key to store it in NVRAM.

UNIT (UNIT):

- Select “UNIT” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to display currently set value.
- Using 'INCREMENT' Key set required value and press 'ENTER' key to store it in NVRAM.

SELECT	UNIT
1	Grams
2	Kgs
3	Tons
4	Pound(Lbs)

DISCHARGE WEIGHT (DISCH):

- Select “DISCH” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to display currently set value.
- Using 'INCREMENT' Key and ‘DIGIT SELECT’ Key set required value and press 'ENTER' key to store it in NVRAM.

TYPE (OPERA):

- Select “OPERA” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to display currently set value.
- Using 'INCREMENT' Key set required value and press 'ENTER' key to store it in NVRAM.

When operation “TYP1” selected, current output will change only for positive side of the weight linearly as per the range set. Limiting value of current output, for the weight change shall be as under

WEIGHT DISPLAYED	CURRENT OUTPUT
@Zero	Equal to DAC count set in CALZ parameter
@Fullscale	Equal to DAC count set in the CALS parameter

DATE:

- Select “DATE” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to display currently set Date.
- Using 'INCREMENT' Key and ‘DIGIT SELECT’ Key modify Date and press 'ENTER' key to store it in NVRAM.

TIME:

- Select “TIME” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to display currently set Time.
- Using 'INCREMENT' Key and ‘DIGIT SELECT’ Key modify Time and press 'ENTER' key to store it in NVRAM.

CLEAR BATCH (CLEAR):

- Select “CLR” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to display currently set value.
- Using 'INCREMENT' Key set YES/NO and press 'ENTER' key to store it in NVRAM.
- Clear function is used to clear value of number of batches.

PRINT (PRL):

- Select “PRL” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to display 000 value.
- Using 'INCREMENT' Key and ‘DIGIT SELECT’ Key set number to last print and press 'ENTER' key to starts printing offline batches from that number in descending order.

BAUDRATE (BAUD):

- Select “BAUD” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to display currently set value.
- Using 'INCREMENT' Key set required value and press 'ENTER' key to store it in NVRAM.

SELECT	BAUD RATE
1	19200
2	9600
3	4800
4	2400
5	1200

UNIT NO:

- Select “UNIT NO” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to display currently set value.
- Using 'INCREMENT' Key and ‘DIGIT SELECT’ Key set required value and press 'ENTER' key to store it in NVRAM.
- It is device id for serial Communication.

SERIAL TYPE (SERIAL):

- Select “SERIAL” Parameter Using ‘INDEX’ Key.
- Press ‘DIGIT SELECT’ key to set PRINT/MODBUS.
- Using 'INCREMENT' Key to set PRINT/MODBUS and press 'ENTER' key to store it in NVRAM.
- If Print mode is selected, batch data will be printed.
- On completion of every batch, data will print automatically.
- When Print mode is selected, HEADER can be print by pressing ‘ENTER’ key, and on get data ‘INC’ key is to be pressed.
- If MODBUS mode is selected, data will be available on MODBUS application.

HOW TO CHANGE PARAMETER VALUES?

To change set value of any of the above parameter, user needs to go to desired parameter after entering correct password.

- Once desired parameter is selected, press ‘DIGIT SELECT’ key to allow Edit. Digit will start flashing
- Set desired value of parameter by using ‘DIGIT SELECT’ key and ‘INCREMENT’ Key
- Once desired value is set, Press “ENTER” Key. New value will be saved against selected parameter.

3.6 CALIBRATION PROCEDURE

3.6.1 WEIGHT CALIBRATION

One can do calibration through the keyboard itself; no trimming of potentiometer is required.

The Zero and Full-scale values are stored in NVRAM. The calibration is allowed only in Engineer's Password mode.

- Switch on the instrument and allow 15 minutes of warm up time before starting calibration.
- Connect the load cell to be used for the weight measurements at the load cell input terminals**.** (See the CONNECTION DETAILS for the same.).

ZERO CALIBRATION:

- Press'INDEX'Key So PASS Parameter will be Display
- Enter Engineers: Password '1234' Using 'DIGIT SELECT 'Key & 'INCREMENT 'Key
- Press 'INDEX' Key After Entering this Password
- The Parameter 'ZERO' for Calibration Zero will be displayed
- Press 'DIGIT SELECT' Key So First digit is blinking
- Enter known value to be displayed for empty platform: in most of cases this should be set as '0000'
- Allow the reading to settle, press **'ENTER'** Key
- This reading will be stored as Zero-calibration reading

SPAN CALIBRATION:

- Put some known weight on the weight plat form
- Press'INDEX'Key So PASS Parameter will be Display
- Enter Engineers: Password '1234' Using 'DIGIT SELECT 'Key & 'INCREMENT 'Key
- Press 'INDEX' Key After Entering this Password
- The Parameter 'SPAN' for Calibration Span will be displayed
- Press 'DIGIT SELECT' Key So First digit is blinking
- Enter known Weight which is put on the weight plat form
- This reading will be stored as Zero-calibration reading

- When Calibration is Complete Check linearity of the instrument by applying different Weight.

Note: If after multiple calibration attempts, linearity is not observed:

- You may check that load cell fixing with plate form is proper.
- Also ensure that load cell is healthy.
- You may check wiring also.

3.6.2 ANALOG OUTPUT CALIBRATION

- Connect Multi Meter at output Terminal
- Press'INDEX'Key So PASS Parameter will be Display
- Enter Engineers: Password '1234' Using 'DIGIT SELECT 'Key & 'INCREMENT 'Key
- Press 'INDEX' Key three times After Entering this Password
- The Parameter 'OUTZ' for Out Zero will be displayed
- Press 'DIGIT SELECT' Key So First digit is blinking
- Now Set Counts such that Current Output Shows 4 mA
- Press 'INDEX' Key so Parameter 'OUTS' for Out Span will be displayed
- Press 'DIGIT SELECT' Key So First digit is blinking
- Now Set Counts such that Current Output Shows 20 mA
- Set FS (Full Scale) for which you need 20 mA current that is Full Output.
- For ex: If FS is set 200, then output will vary linearly from 4-20ma proportional to 0 – 200

CHAPTER 4

4.1 TERMINAL DETAILS

PIN NO	DESCRIPTION	
1	C	RELAY 4
2	RL4/NO	
3	C	RELAY 3
4	RL3/NO	
5	C	RELAY 1
6	RL1/NO	
7	C	RELAY 2
8	RL2/NO	
9	TARE	DIGITAL INPUTS
10	DISCHARGE	
11	STOP	
12	START	
13	COMMON	
14	OUTPUT(-)	ANALOG OUTPUT 4-20mA
15	OUTPUT(+)	
16	RxD/RxTx+	SERIAL RS-232/485
17	TxD/RxTx-	
18	GND	
19	SIG(-)	LOAD CELL INPUT
20	SIG(+)	
21	EX(+)	
22	EX(-)	
23	SHIELD	
24	EARTH	MAIN SUPPLY 230VAC
25	NEUTRAL	
26	PHASE	

CHAPTER 5

5.1 SERIAL COMMUNICATION DETAILS

Refer Terminal Details for Serial Cable Connection.

How to Test:

To test serial interface, you may use MODSCAN32.EXE utility.

Settings:

- Set Device Address = 1
- Set Data type= Holding Register
- Set Start Address=1
- Set Length = 15
- BAUD RATE = 9600
- Set Proper COM Port
- Set Data Format= Decimal
- Now click on 'Connect' button.

5.2 MODBUS PARAMETER LIST:

Reg. No.	Parameter	Function	Details
40001	Net Weight_MSB	Read	
40002	Net Weight_LSB	Read	
40003	Gross Weight_MSB	Read	
40004	Gross Weight_LSB	Read	
40005	Loss Weight_MSB	Read	
40006	Loss Weight_LSB	Read	
40007	Round	Read/Write	0 For 1,1 For 2,2 For 3
40008	Unit (Unit of Weight)	Read/Write	0 For Gms,1 For Kgs,2 For Tons,3 For Lbs
40009	DP (Decimal Point)	Read/Write	0 For 0,1 For 0.1, 2 For 0.01 and 3 For 0.001
40010	Ds Dl (Discharge Delay)	Read/Write	
40011	SP1_MSB (Set Point 1)	Read/Write	
40012	SP1_LSB (Set Point 1)	Read/Write	
40013	SP2_MSB (Set Point 2)	Read/Write	
40014	SP2_LSB (Set Point 2)	Read/Write	
40015	Cal Zero (Zero Calibration)	Read/Write	
40016	Cal Span (Span Calibration)	Read/Write	
40017	Start/Stop	Read/Write	0 For Stop,1 For Start

CHAPTER 6

6.1 BATCHING OPERATION

1. On Giving Start command thro' digital input, Coarse-Relay-1 will be ON
2. When weight = SP1, Coarse Relay will be switched off and Fine-Relay-2 will be ON
3. When Weight = SP2-OFFSET, Fine Relay will be switched OFF and Discharge Delay Timer [dS tm] will be started.
4. On completion of Discharge Delay Timer, Discharge Gate Open-Relay-3 will be switched ON.
5. When Weight is less than Discharge Weight Discharge Relay will be switched off and Print Weight data.
6. Now Bagging process will be continued from Step

CHAPTER 7

7.1 APPLICATIONS

- Bagging
- Batching-Single component, Multi component
- Weight indicator
- Loss-in weight

CHAPTER 8

6.1 SALES & SERVICE

When you face any issue while installation, calibration or using the Indicator, you may contact:

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