CE
Approved for Digital
Weigh Indicator

Digital Weighing Indicator
SI 460C

User Manual

2014.06.13

SEWHACNM
주식회사 세화씨엔엠

CONTENTS

1. BEFORE INSTALLATION

Caution / Warning Marks

	This mark warns the possibility to arrive death or serious injury in case of wrongly used.
	This mark cautions the possibility to arrive serious human body injury or product lose in case of wrongly used.

Copy Rights

Inquiries

If you have any kinds of inquiries for this model, please contact your local agent or Head Office.

Head Office : SEWHACNM CO., LTD.

Website : http://www.sewhacnm.co.kr

Email : sales@sewhacnm.co.kr

2. INTRODUCTION

2-1. Introduction

Thank you for your choice of this SI 460A Industrial Digital Weighing Indicator.

This SI 460A model is high-performance weighing Indicator.

Please review and learn this instruction Manual and enjoy your process efficiency

with "SI 460A" Weighing Indicator.

2-2. Cautions

1. Don't drop on the ground and avoid serious external damage on item.
2. Don't install under sunshine or heavy vibrated condition.
3. Don't install place where high voltage or heavy electric noise condition.
4. When you connect with other devices, please turn off the power of item.
5. Avoid from water damage.
6. For the improvement of function or performance, we can change item specification without previous notice or permission.
7. Item's performance will be up-dated continuously base on previous version's performance.

2-3. Features

1. SI 460A model is the square DIN SIZE and compact enough, so it is easy to install.
2. Front panel is covered with Polycarbonate film, strong against dust and water.
3. RS422, RS485 serial interface and Modbus(RTU) is standard installed.
4. User can choose various options; 4-20mA, 0-10V, RS232C and Extra RS422, RS485.

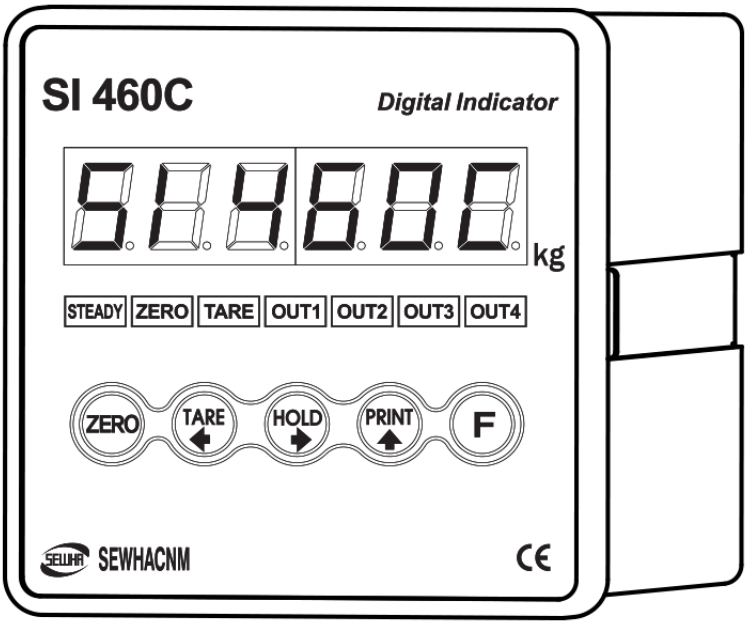
3. SPECIFICATION

3-1 Specification

Content			Specification
Performance	External Resolution		1/20,000
	Internal Resolution		1/2,000,000 (±1,000,000)
	Input Sensitivity		Min 0.1μV/V
	Max Signal Input Voltage		3.0mV/V
	Load cell Excitation		DC +5V
	A/D Conversion Method		Sigma-Delta
	Decimal Point		0, 0.0, 0.00, 0.000
	Drift	Offset	10PPM/℃
		Span	10PPM/℃
	Linearity		0.001% of Full Scale
	Analogue Sampling(sec)		Max 60times / sec
Environment	Operating Temperature Range		-10℃ ~ +40℃ [14℉ ~ 104℉]
	Operation Humidity Range		40% ~ 85% RH, Non-condensing
Function	Calibration Mode		Test Weight Calibration Mode Simulation Calibration Mode
	Display		6 digit, 15mm(0.6inch) Red Color FND
	Key Pad		5EA Standard Key pad
	Additional Digital Input		4pcs external input key addable
Communi-cation	Standard Serial Interface (RS-422/485)		Data Transference Command Mode Serial Printer Mode Modbus (RTU)
	Option Serial Interface (RS-232C)		Data Transference Command Mode Serial Printer Mode
	Analog Output (Option)		0~10V, 4~20mA (Selectable)
Power	DC : 24V, Power Consumption 12W AC (Option) : 110~220V, Power Consumption 12W		
Size	96mm(W) x 96mm(H) x 116mm(D)		Weight : 500g (DC) 700g (AC.)

3-2. Front Panel

3-2-1 Front Panel (Display / Key Pad)



3-2-2. State LED

STEADY	When the weight is “STEADY”, ON.
ZERO	When the current weight is “ZERO”, ON.
TARE	“TARE” function is set, ON.
OUT1	When OUT1 (Relay) is operated, ON.
OUT2	When OUT2 (Relay) is operated, ON.
OUT3	When OUT3 (Relay) is operated, ON.
OUT4	When OUT4 (Relay) is operated, ON.

3-2-3. Key Operation

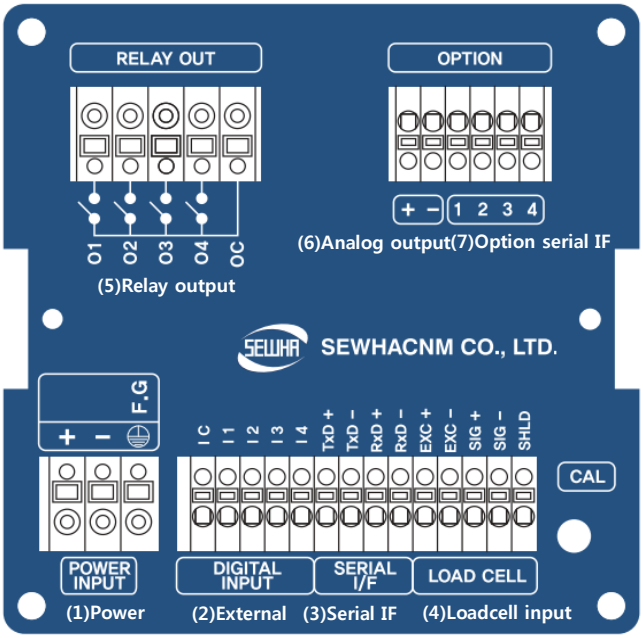
	1. Make weight value to Zero. 2. Cancel or ESC.
	1. Set the TARE Function 1st input : "TARE", 2nd input : "TARE Reset" (When "HOLD" or weight value is ZERO, then this key doesn't work.) 2. Moving the cursor to left.
	1. Set the "HOLD" Function 1st input : "HOLD", 2nd input : "HOLD Reset" ※ When HOLD is on, "H" mark will be shown at the display. 2. Moving the cursor to right.
	1. Print out 2. Increase the value (4. Saving weight date under F-function 103-0,4,5,6
	1. Press this key 4 times, within 3 secs to enter "SET-UP" mode. 2. Press during 4 secs to enter "Hidden Function" 3. Saving data and move next step

3-2-4. Hot key (F Key combination)

	Continuous "TARE" setting (From the second TARE setting, use this key)
	If the Printer is installed, You can print out the "Grand-total data". (GRAND-total data can be checked though Print output)

Tip **Max accumulated weighing count : 999,999times**
Over 999,999times → return to "0" time
Max accumulated weight display : 999999999 (g, kg, ton)
Over 999,999,999 (g, kg, ton) → return to "0" (g, kg, ton)

3-3 Rear Panel



1. Power DC IN: 24V (Power: 24V 1A recommended)
2. External Input terminal: Refer F-Function 231~234 to select each function.
3. Serial Interface terminal

Communication	TX+ Terminal	TX- Terminal	RX+ Terminal	RX- Terminal
RS – 422(Standard)	TxD+	TxD-	RxD+	RxD-
RS – 485(Standard)	Not used	Not used	RxD +	RxD-

4. Load cell Input

Terminal	EXC+	EXC-	SIG+	SIG-	SHLD
Load cell	EXC+	EXC-	SIG+	SIG-	SHEILD

5. Relay output (Function 226~229, Relay COM terminal is common.)

Terminal	O1	O2	O3	O4	OC
Relay	OUT 1	OUT 2	OUT 3	OUT 4	O COM

6. Analog output

Terminal	+	-	Note
4~20mA	(+)	(-)	Option
0~10V	(+)	(-)	Option

7. Option Serial Interface terminal (port No.2 top side)

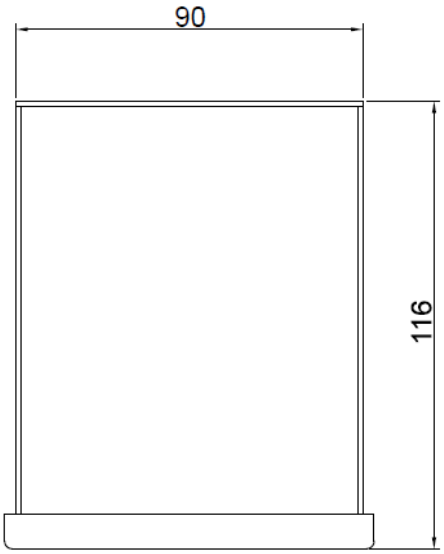
단자	1	2	3	4	Note
RS – 232C	GND	GND	Tx	Rx	Option
RS - 422	TxD+	TxD-	RxD+	RxD-	Option
RS - 485	Not used	Not used	D+	D-	Option

Caution Please check the Comm. and other specification in the label, attached on the cover plate first, and make connection according to that information.

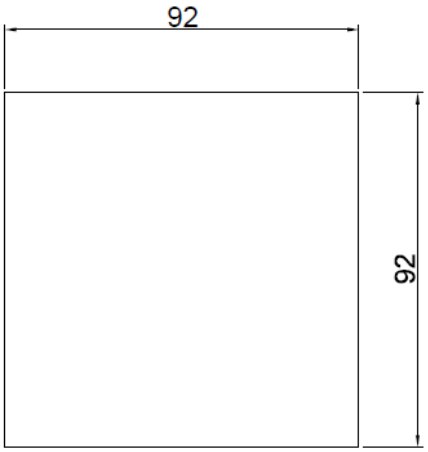
4. INSTALLATION

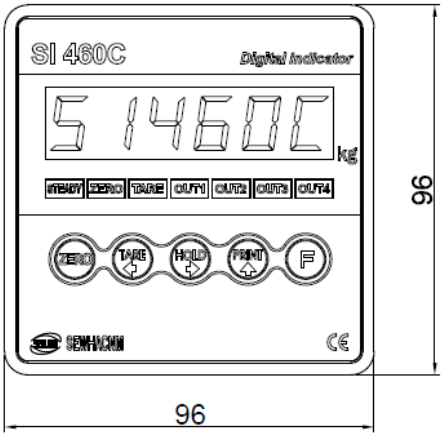
4-1. External Dimension & Cutting Size

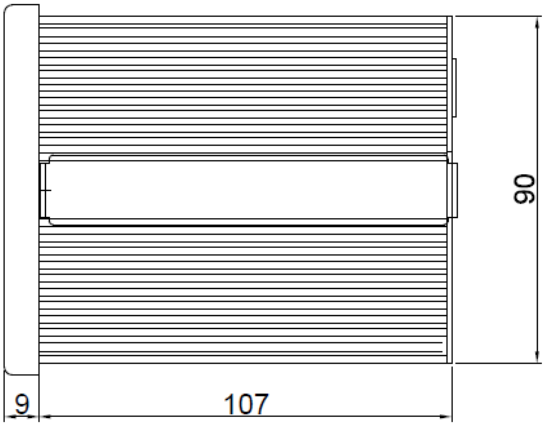
External Dimension (Unit : mm)



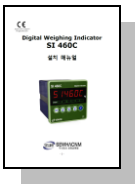
Cutting Size (Unit : mm)







4-2. Installation Components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4-3 Load cell Installation

Load Cell Wire Connection (In case of SEWHACNM's Load cell)

It depends on the manufacturer of load cell, please check the specification.

Caution **Under Set-up the Load cell, if EXC+ and EXC- have a short circuit, It may cause damage in the indicator.(specially analogue board)**

If you connect other wires to Load cell terminal wrongly, it may cause damage in the analogue board.

Before connecting the load cell cable you have to power off and be sure to connect the cable to the terminal correctly.

Do not weld near the load cells , Indicators or other devices.

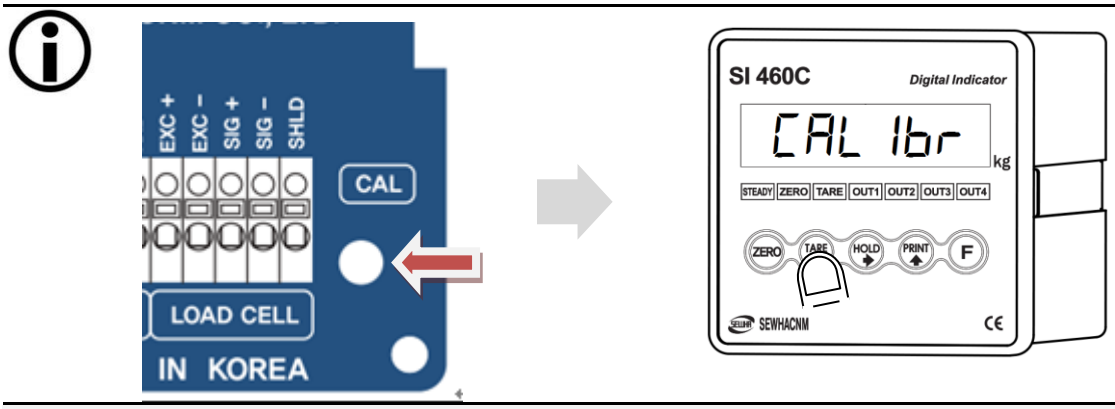
Load Cell Installation

1. You can connect Max 8pcs of same capacity Load cells at once. (350 Ω)
2. You have to make horizontal balance on the ground.
3. If you install more than 2pcs of load cells, use Summing box and adjust output signal difference as minimum. It can make wrong weighing process caused by each load cell's variation.
4. If there is some temperature difference around Load cell, it can cause wrong weight measurement.
5. Don't do Welding job or Arc discharge around installation place. But, there is no choice, please disconnect power cable and Load cell cable. If you measure static electricity material, please make earth between down part and up part of Load cell.

5. SET-UP

5-1. Test Weight Calibration Mode (Using test weight)

5-1-1. Start Test Weight Calibration Mode



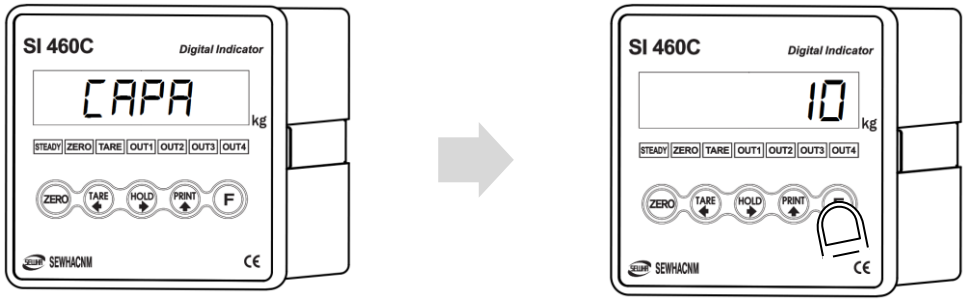
Remove "CAL-BOLT" on the Front panel, . and press "CAL - LOCK S/W" inside.

When "CALIBR" displays, press TARE key,

When "CALIBR" displays, press TARE key,

Then Test Weight Calibration Mode starts.

5-1-2. Setting "Capacity of weighing Scale"

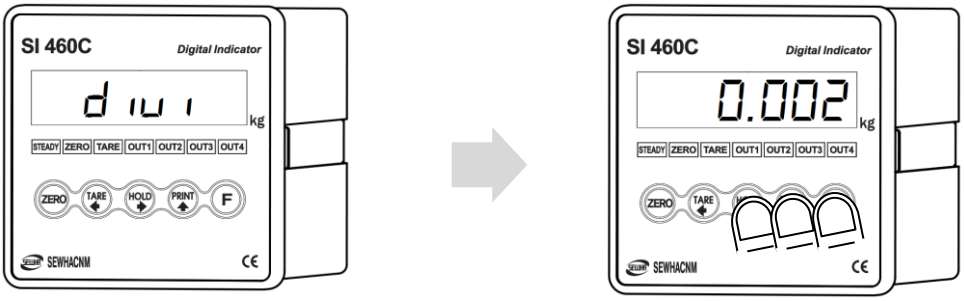


After displaying "CAPA", input max capacity with keys & Press F key to save & move to next step.

Tip

If you want to set Max capacity as 1,000kg and the division is 0.1 (100g), then just input "1000"..

5-1-3. "Decimal Point" and "Digit / Division" Value



After "DIVI" is displayed select Decimal point with HOLD key.

Whenever pressing HOLD key , decimal point will be changed.

Please stop at the optimal position. And select Division optimal division with PRINT key.

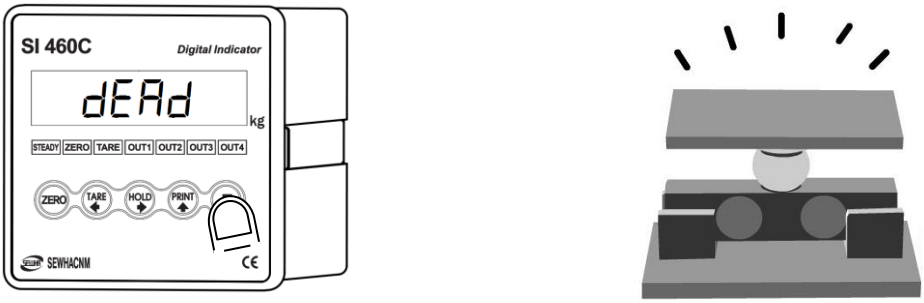
Finally press F key to save and move to next step.

Tip Max decimal point will be 0.001, and digit can be selected among 1, 2, 5, 10, 20, 50. Digit and decimal point must be fulfilled under the below condition.

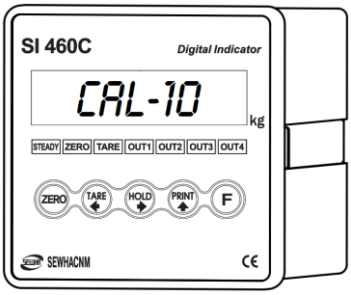
- (division value / Max capacity value) cannot be over 1/20,000.

If this condition is not fulfilled, "Err-1" will be displayed and move back to capacity setting mode.

5-1-4. Measuring the "DEAD" Weight of Weighing Scale.



When **"DEAD"** is displayed, Press F key, then indicator will calculate dead weight of scale part automatically (While this process, there should be nothing on the scale part.)



Indicator will search "DEAE weight" during 10~20 secs automatically to find the best condition.

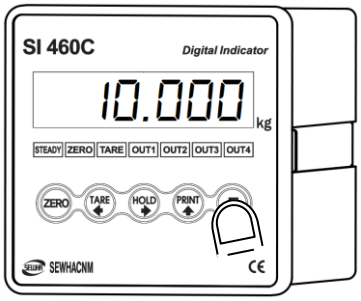
※ Over than 1/10,000 resolution setting,

To guarantee the preciseness, DEAD weight calculation (CAL00~CAL09) will be operated twice.

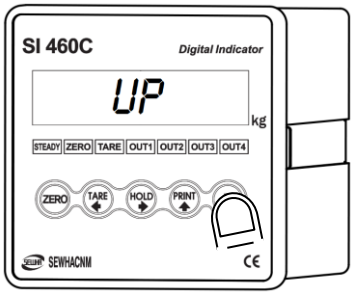
Tip In this step, if there is unstable condition such as some forces or Vibration on the scale part, "ErrorA" will be displayed, and "DEAD value" will not be calculated.

Please remove the cause of the force or vibration and process it again.

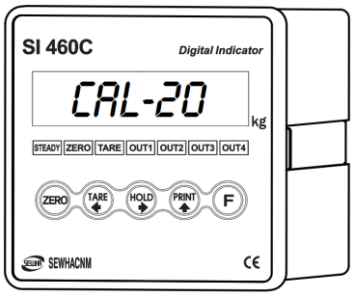
5-1-5. Calculating span value



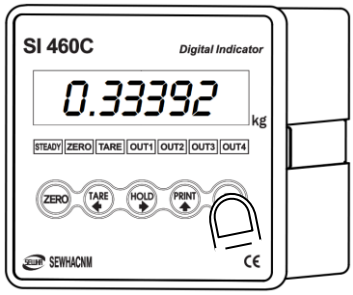
If "SPAN" is displayed, input the weight of your "Test Weight" and press F key.

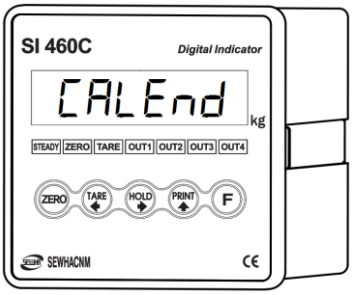


If "UP" is displayed, please load "Test Weight" on the scale part and press F key.



※ Over than 1/10,000 resolution setting,
To guarantee the preciseness, Span calculation will be operated twice.





After calculation, span value will be displayed on the display. Then press  key.

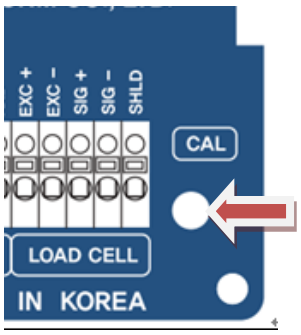
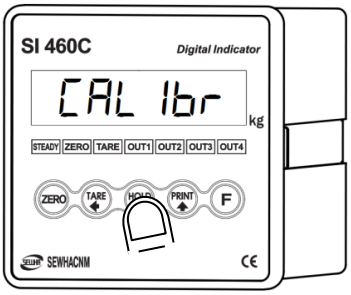
When "CALEND" is displayed and calibration is completed.

5-2. Simulation Calibration Mode(Calibrate without Test weight)

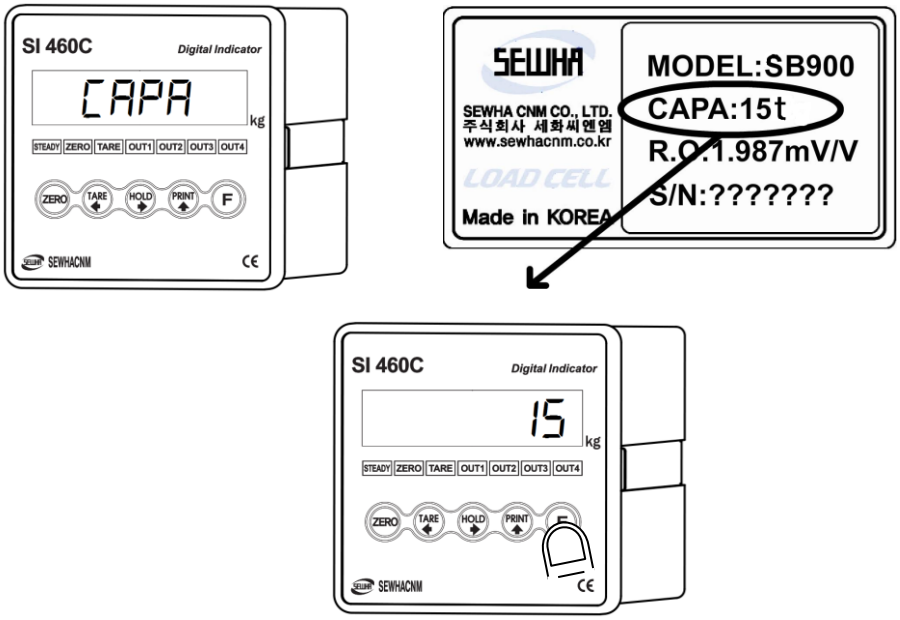
With this "Simulation Calibration Mode" you can make simple calibration without any "TEST weight" This calibration mode uses "Load cells' max capacity" and "Max Output Rate(mV)", so the weight adjustment degree might be less than "Test weight Calibration".

The guaranteed resolution of this "Simulation Calibration" is 1/3,000.

5-2-1. Simulation Calibration Mode Start

<table>
<tr>
<td> 
</td>
<td>Remove "CAL-BOLT" on the Front panel, and press "CAL - LOCK S/W" inside.</td>
</tr>
<tr>
<td> 
</td>
<td>When "CALIBR" is displayed,
press HOLD key.</td>
</tr>
</table>

5-2-2. Setting “Capacity of Load Cell”



After “CAPA” displayed, Check Max Capacity of Load cell.
(refer the load cell label, or Test Report)

Input the Max Capacity of Load cell. And press 

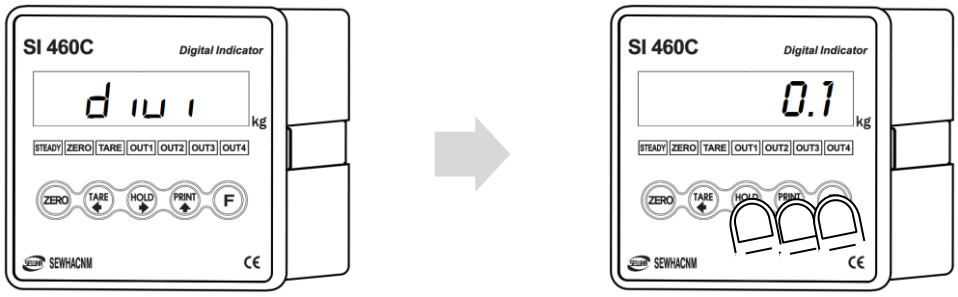
key.

Tip In case of multiple pieces of load cells are installed, Please make sum of each load cell’s capacity and make setting with Max Capacity.

EX) There are 4pcs of load cells, and each load cell’s Max capacity is1,000kg.

Then, total Max Capacity will be 4,000kg(1,000 x 4) and you have to input 4,000.

5-2-3. Setting “Digit / Division” value



After “DIVI” is displayed select Decimal point with 

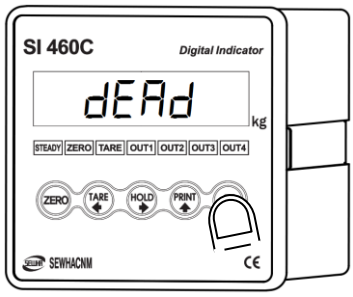
key.

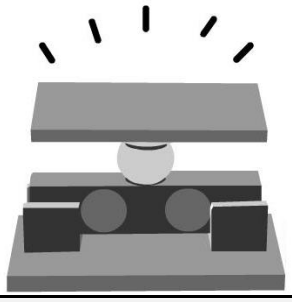
And select Division optimal division with 

key. Press 

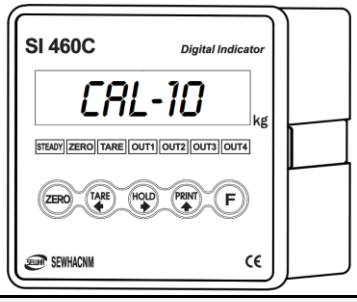
key to save.

5-2-4. Measuring the "DEAD Weight" of Weighing Scale.





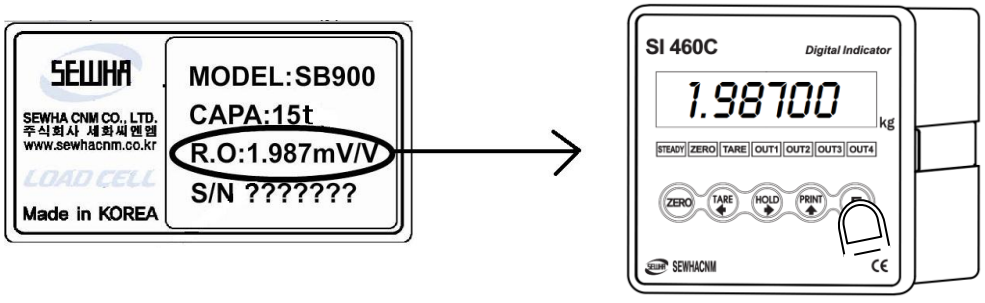
When **"DEAD"** displays, Press F key, then indicator will calculate dead weight of scale part automatically.
(While this process, there should be nothing on the scale part.)



It takes 10secs or 20secs to find the best condition.

Over than 1/10,000 resolution setting,
To guarantee the preciseness, dead weight calculation will be operated twice.

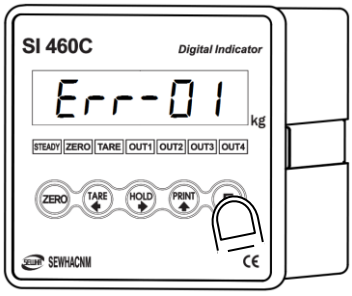
5-2-5. Inputting Max Output (Rated Output Voltage / mV)



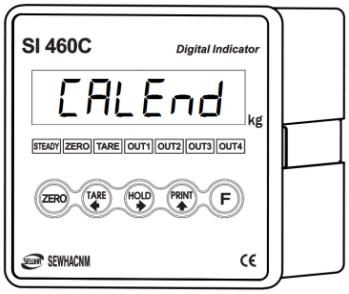
Input the output value of load cell.

After "**mV**" displayed, Check the Rated output value of Load cell.

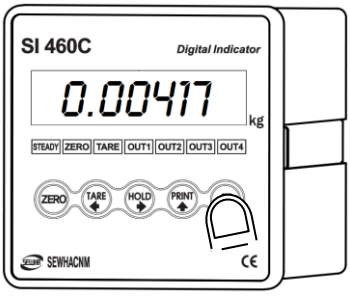
(Refer to the load cell label, or Test Report) . And Press F key to save and move to next step.



If input wrong value, there will display "Err-01", please go back to Setting "Capacity of Load Cell". After recheck the label of load cell and retry the process.



After finishing calculation, calculated "Span value" will be display with "CALEND"



Now, the Simulation Calibration is done, press 

key to complete the calibration process.

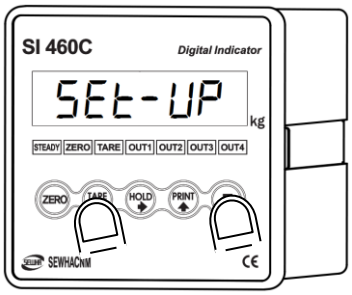
Tip In case of multiple pieces of load cells are connected, the rated output will be same as single load cell's. (Because plural load cells are connected with parallel connection, the sum of rated output voltage is same as single load cell's rated output)

※Due to some variation between **"State output rate"** and **"Real Output rate"** of load cell, there might be some weight difference after finishing calibration.

If you want to make more precise weighing process, please measure real output rate of load cell and input the measured value. Then the weight measurement will be more precise than before.

5-3. F-FUNCTION Setting

5-3-1. Starting F-FUNCTION Mode

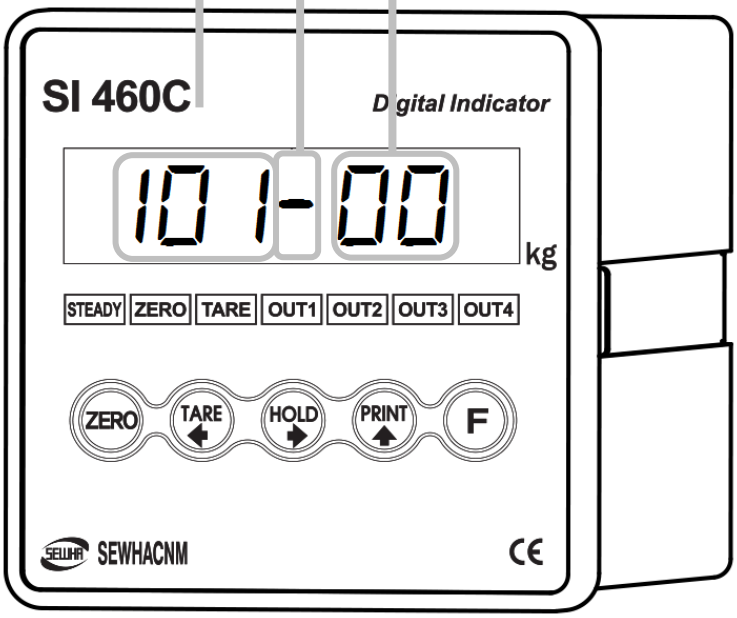


Press F key 4 times → When "SETUP" is displayed, press TARE key.

Enter the function No. that you want to move,
and Press ENTER key.

Whenever press PRINT key, function No. is increased.

Input the set value and press ENTER key.



5-3-2. F-function list

F-list	Subject	Default	Contents
101	Equipment No. setting – ID No.setting	01	01~99
102	Weight–Back up Mode	02	00:Normal mode 01: Weight Back up Mode(Zero) 02: Weight Back up Mode(Zero&Tare)
103	Weighing Data Save Method (Refer page 26)	03	00: Manual: Whenever "Print" key input 01: Auto: At every steady states 02: Auto: At the first steady states 04: Manual& Auto: At every steady states 05:Manual& Auto: At the first steady states 06: Manual& Auto: After finish weighing
104	Display Up-Date Speed	09	01:Slow(1time per 1sec) ~ 09:Fast(60times per 1sec)
108	Buzzer sound (External input detection)	00	00:Buzzer sound, 01:No Buzzer sound
110	Weight Unit	00	00:kg, 01:g, 02:ton
111	Language	00	00:Korean, 01:English
201	EMPTY Range	100	00~999999
202	Auto Zero Range	00	00~99 (Unit:0.25gradation)
203	Steady Range	08	01~99 (Unit:0.25gradation)
204	Steady condition check time	10	01~99 (Unit:0.1sec.)
205	Digital Filter	20	01:Weak vibration ~ 99:Strong vibration
206	Zero key operation mode	00	00:Always active 01:Active under steady condition only
207	Tare Key operation mode	00	00:Always active 01:Active under steady condition only
209	Zero key Operation Range	02	00: Active within 2% of Max Capacity 01: Active within 5% of Max Capacity 02: Active within 10% of Max Capacity 03: Active within 20% of Max Capacity 04: Active within 50% of Max Capacity 05: Active within 100% of Max Capacity 06:No limit

210	Tare key Operation Range	02	00: Active within 10% of Max Capacity 01: Active within 20% of Max Capacity 02: Active within 50% of Max Capacity 03: Active within 100% of Max Capacity
211	Auto Zero function under Tare state	00	00:Disuse, 01:Use
212	Tare Delay Time	00	00:Disuse, 01 ~ 10:Use (Unit:1sec.)
213	Auto tare set when weighing starts	00	00:Disuse, 01:Use
214	Tare Removal Time	00	00:Manual (Tare key) 01:Auto (Under near zero range) 02:Auto (At the steady condition) 03: Auto (After T1 –Function 239)
215	Auto Tare Removal Time	00	00 : Disuse 01 ~ 09 : Use (Unit : 1 sec)
216	Hold Mode	00	00:Sample Hold, 01:Peak Hold, 02:Average Hold
217	Hold Delay Time	00	00:Disuse, 01~10:Use (Unit:1sec.)
218	Hold Removal at the near zero	00	00:Disuse, 01:Use
219	Auto Hold Removal Time	00	00:Disuse, 01~10:Use (Unit:1sec.)
220	Average Hold Time	10	01 ~ 99 (Unit:0.1sec.)
221	Minus (-) Mark Display	00	00:USe 01:Disuse
222	Under UNPASS/OVERLOAD state, Weight display	00	00:Display, 01:No display
223	Weighing Mode	01	00:Disuse 01:Limit Mode1 02:Limit Mode2 03:Limit Mode3 04:Packer Mode1 05:Packer Mode2 06:Packer Mode3 07:Accumulating Mode1 08:Accumulating Mode2
224	Relay Control Type	00	00:Minus&Plus weight Control 01: Plus weight Control
225	Relay Output Auto / Manual Setting	00	00:Auto., 01:Manual(User custom)
226	Relay Output 1 Setting	00	00:Disuse 01:Near Zero 02:SP1 03:SP2 04:SP3 05:SP4
227	Relay Output 2 Setting	00	00:Disuse 01:Near Zero 02:SP1 03:SP2 04:SP3 05:SP4

228	Relay Output 3 Setting	00	00:Disuse 01:Near Zero 02:SP1 03:SP2 04:SP3 05:SP4
229	Relay Output 4 Setting	00	00:Disuse 01:Near Zero 02:SP1 03:SP2 04:SP3 05:SP4
233	External Input 1 Setting	01	00:Disuse 01:Zero 02:Tare 03:Tare removal 04:Tare/Tare removal 05:Hold 06:Hold removal 07:Hold/Hold removal 08:Start(Packer Mode) 09:Stop(Packer Mode) 10:Start/Stop(Packer Mod) 11:Print 12:Grand total Print
234	External Input 2 Setting	04	00:Disuse 01:Zero 02:Tare 03:Tare removal 04:Tare/Tare removal 05:Hold 06:Hold removal 07:Hold/Hold removal 08:Start(Packer Mode) 09:Stop(Packer Mode) 10:Start/Stop(Packer Mod) 11:Print 12:Grand total Print
235	External Input 3 Setting	07	00:Disuse 01:Zero 02:Tare 03:Tare removal 04:Tare/Tare removal 05:Hold 06:Hold removal 07:Hold/Hold removal 08:Start(Packer Mode) 09:Stop(Packer Mode) 10:Start/Stop(Packer Mod) 11:Print 12:Grand total Print
236	External Input 4 Setting	11	00:Disuse 01:Zero 02:Tare 03:Tare removal 04:Tare/Tare removal 05:Hold 06:Hold removal 07:Hold/Hold removal 08:Start(Packer Mode) 09:Stop(Packer Mode) 10:Start/Stop(Packer Mod) 11:Print 12:Grand total Print
239	Finish Relay Output Delay Time (T1)	10	00 ~ 99 (Unit:0.1sec.)
240	Finish Relay Output Time (T2)	10	00 ~ 99 (Unit:0.1sec.)
251	Zero state lamp output standard	00	00 : Near Zero 01 : Zero
253	Near zero output Setting Under tare ON state	00	00:Zero Output 01:Actual zero output except Tare weight

301	Parity / Stop bit	00	00:Databit 8, Stopbit 1, Paritybit Non 01:Databit 8, Stopbit 1, Paritybit Odd 02:Databit 8, Stopbit 1, Paritybit Even 03:Databit 7, Stopbit 1, Paritybit Odd 04:Databit 7, Stopbit 1, Paritybit Even
302	Serial Communication Speed	02	00: 2,400bps 01: 4,800bps 02: 9,600bps 03: 14,400bps 04: 19,200bps 05: 28,800bps 06: 38,400bps 07: 57,600bps 08: 76,800bps 09: 1115,200bps
303	Data transmission mode	00	00:Simplex / Stream Mode 01:Duplex / Command Mode 02:Print Mode 03:Modbus(RTU)
304	"Check-Sum" under command mode	00	00:Disuse, 01:Use
305	Data Format under Stream Mode	00	00:Format1(19byte) 01:Format2(22byte) 02:Format3(17byte) 03:Format4(22byte)
306	Date transference under stream mode	00	00:Countinuously 01:Single time on every steady state 02:Single time at the first steady point 03:Single time output after weighing finish 04:When input F key
307	Modbus Transmit Data MSB/LSB location	00	00:Standard, 01:Change
308	Parity / Stop bit (Serial Port2)	00	00: Data bit8, Stop bit1, Parity bit Non 01: Data bit8, Stop bit1, Parity bit Odd 02: Data bit8, Stop bit1, Parity bit Even 03: Data bit7, Stop bit1, Parity bit Non 04: Data bit7, Stop bit, Parity bit Even
309	Serial Communication Speed (Serial Port2)	02	00: 2,400bps 01: 4,800bps 02: 9,600bps 03: 14,400bps 04: 19,200bps 05: 28,800bps 06: 38,400bps 07: 57,600bps 08: 76,800bps 09: 1115,200bps
310	Data transmission mode (Serial Port2)	02	00:Simplex / Stream Mode 01:Duplex / Command Mode 02:Print Mode

311	"Check-Sum" under command mode (Serial Port2)	00	00: Disuse, 01: Use
312	Data Format under Stream Mode (Serial Port2)	00	00:Format1, 01:Format2, 02:Format3 03:Format4 04:Format5
313	Date transference under stream mode (Serial Port2)	00	00:Countinuously 01:Single time on every steady state 02:Single time at the first steady point 03:Single time output after weighing finish 04:When input F key
352	Print Format Setting	00	00: Continuous Print, 01: Single Print
354	Print Output Delay Time Setting	00	00~09 (Unit:1sec.)
355	Paper Withdraw Rate setting (After Continuous/Single Print)	00	00~09 (Unit:1line add)
356	Paper Withdraw Rate setting (After SUB/GRAND Total Print)	00	00~09 (Unit:1line add)
358	Deleting Grand total data after printing out	00	00:Delete 01:No delete
401	Analog Output Applying Weight Range Setting	00	00: Absolute number(-&+) 01: Positive number(only +)
402	Analog Output Direction Setting	00	00:Forward 01:Reverse
403	Analog Output Standard Setting	00	00:CAPACITY 01:SP1 02:SP2 03:SP3 04:SP4 05:CAPACITY(Gross weight under Tare)

◆ **Weighing Data Saving time point and print**

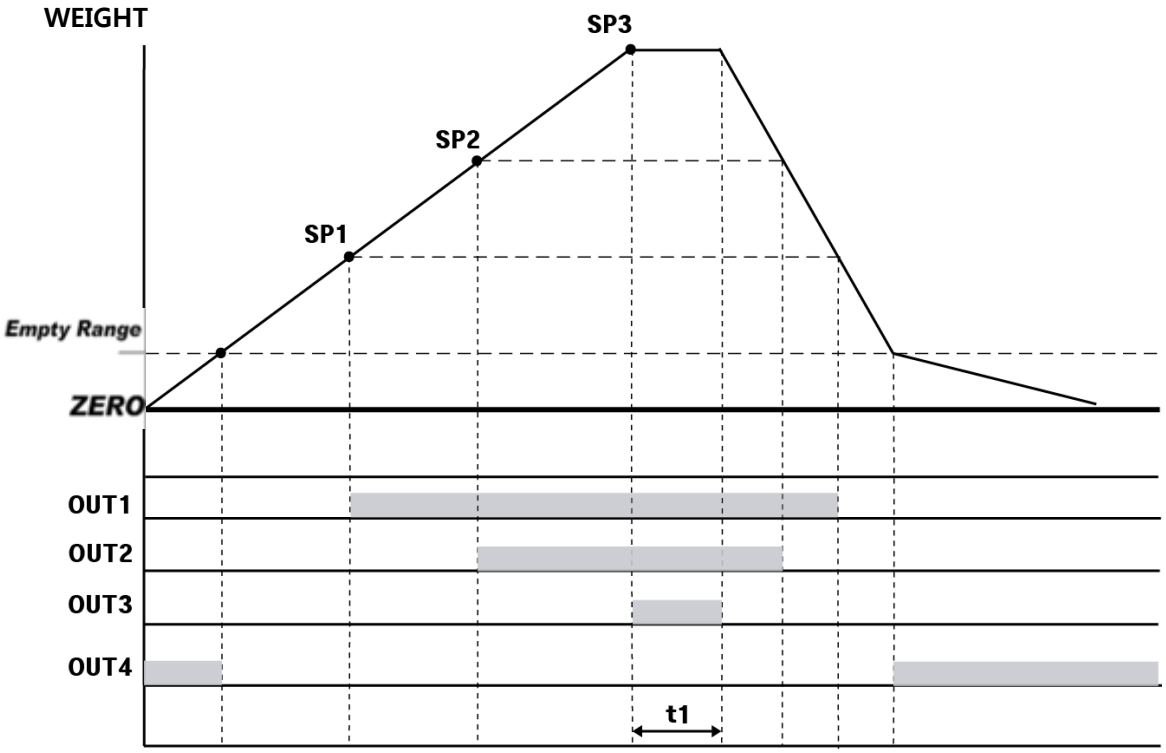
Weighing Data Save Method (F-function 103)		**Print input (Key, Communication, External input)**	**Printing out data**	**Saving Data**
00	Manual	○	Current weight	Current weight
		X	X	X
01	Auto: At every steady states	○	Recent stable weight	X
		X	Steady weight	Steady weight
02	Auto: At the first steady states	○	Recent stable weight	X
		X	Steady weight	Steady weight
03	Manual& Auto: At every steady states	○	Recent stable weight	X
		X	Finish weight	Finish weight
04	Manual& Auto: At the first steady states	○	Current weight	Current weight
		X	Steady weight	Steady weight
05	Manual	○	Current weight	Current weight
		X	Steady weight	Steady weight
06	Auto: At every steady states	○	Current weight	Current weight
		X	Finish weight	Finish weight

5-3-3. Hidden Option

How to enter Hidden function setting mode : Press  Key during 4sec and input your password. Default password is  (**1111**). Press  key after input your password.

F-LIST	Subject	Default	Contents
H01	Serial Number Check	-	-
H03	S/W Version Check	-	Program version check
H04	H/W Version Check	-	-
H05	DATE(Y,M,D) Check / Modification	-	-
H06	TIME(H,M,S) Check / Modification (24Hours)	-	-
H07	Password Setting (4digit)	-	1:Tare Key 2:Hold Key 3:Print Key (Password combination within 1~3)
H08	Maximum Capacity Weight Check and Modification	-	-
H13	Analog Output Use Setting	00	00:4-20mA Output 01:0-10V Output
H14	Minimum Analog Output Setting	-	Input Range:-20~+20, Default:0
H15	Maximum Analog Output Setting	-	Input Range:-20~+20, Default:0
H16	Function List Factory Reset	-	Change to default F-setting

◆ Weighing Mode 1 – Limit mode 1 (Function223 – 01)



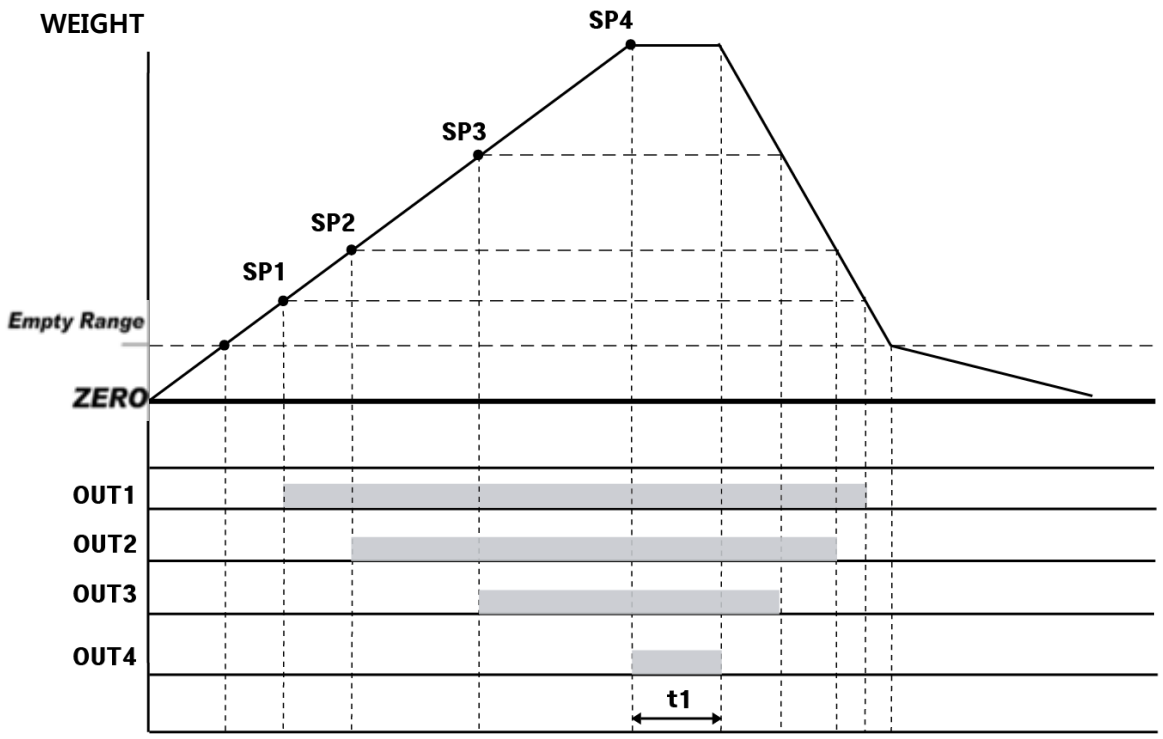
Time Setting

Time	Content
t1	Finish Relay Output Delay Time (Function 239) In case of Function 103-3 or 103-6, save the weighing data after t1 time.

Relay Output

Relay	Contents	Relay	Contents
OUT 1	Current weight ≥ SP1 (ON) Current weight < SP1 (OFF)	**OUT 2**	Current weight ≥ SP2 (ON) Current weight < SP2 (OFF)
OUT 3	Current weight ≥ SP3 (ON) Current weight < SP3 (OFF)	**OUT 4**	Within "EMPTY" range "ON" (Refer Function 201)

◆ **Weighing Mode 2 – Limit Mode 2 (Function223 – 02) – Relay "ON" when weight reaches set value. "A" dry**



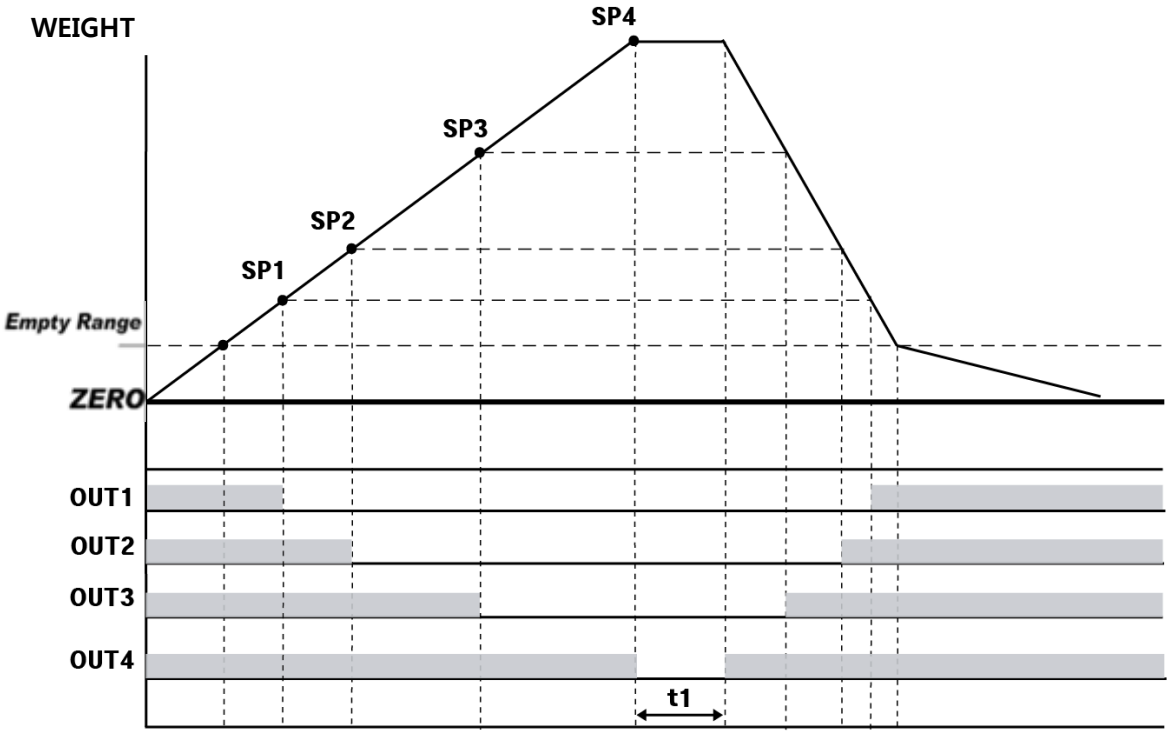
Time Setting

Time	Content
t1	Finish Relay Output Delay Time (F239) In case of Function 103-3 or 103-6, save the weighing data after t1 time.

Relay Output

Relay	Contents	Relay	Contents
OUT 1	Current weight ≥ SP1 (ON) Current weight < SP1 (OFF)	**OUT 2**	Current weight ≥ SP2 (ON) Current weight < SP2 (OFF)
OUT 3	Current weight ≥ SP3 (ON) Current weight < SP3 (OFF)	**OUT 4**	Current weight ≥ SP4 (ON) Current weight < SP4 (OFF)

◆ **Weighing Mode 3 – Limit Mode 3 (Function223 – 03) – Relay "ON" when weight reaches set value. "B" dry**



t1 set

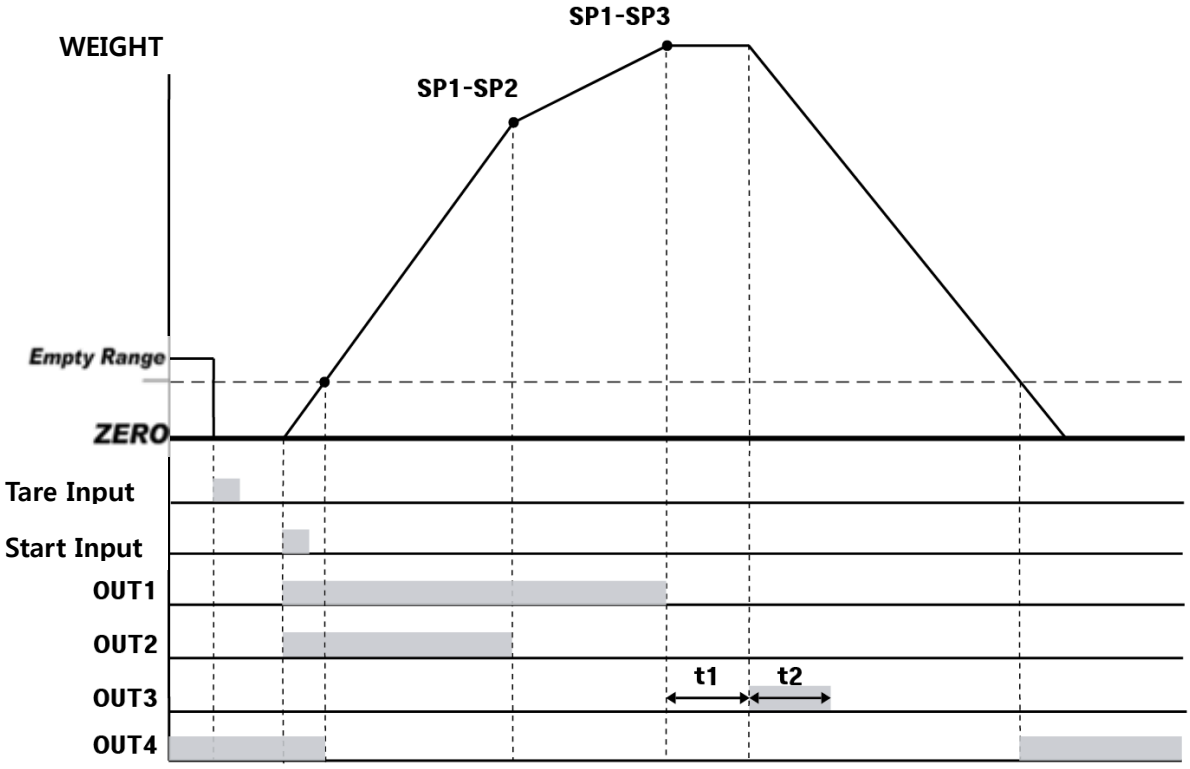
Time	Content
t1	Finish Relay Output Delay Time (F239) In case of Function 103-3 or 103-6, save the weighing data after t1 time.

Relay Output

Relay	Contents	Relay	Contents
OUT 1	Current weight < SP1 (ON) Current weight ≥ SP1 (OFF)	**OUT 2**	Current weight < SP2 (ON) Current weight ≥ SP2 (OFF)
OUT 3	Current weight < SP3 (ON) Current weight ≥ SP3 (OFF)	**OUT 4**	Current weight < SP4 (ON) Current weight ≥ SP4 (OFF)

◆ **Weighing Mode 4 – Packer Mode 1 (Function 223 – 04) – 2 Step control**

– Relay "ON" when weight reaches set value, Relay "ON" Within "EMPTY" range



SP1, SP2, SP3 set

SP1	SP2	SP3
Target	Drib	Free fall

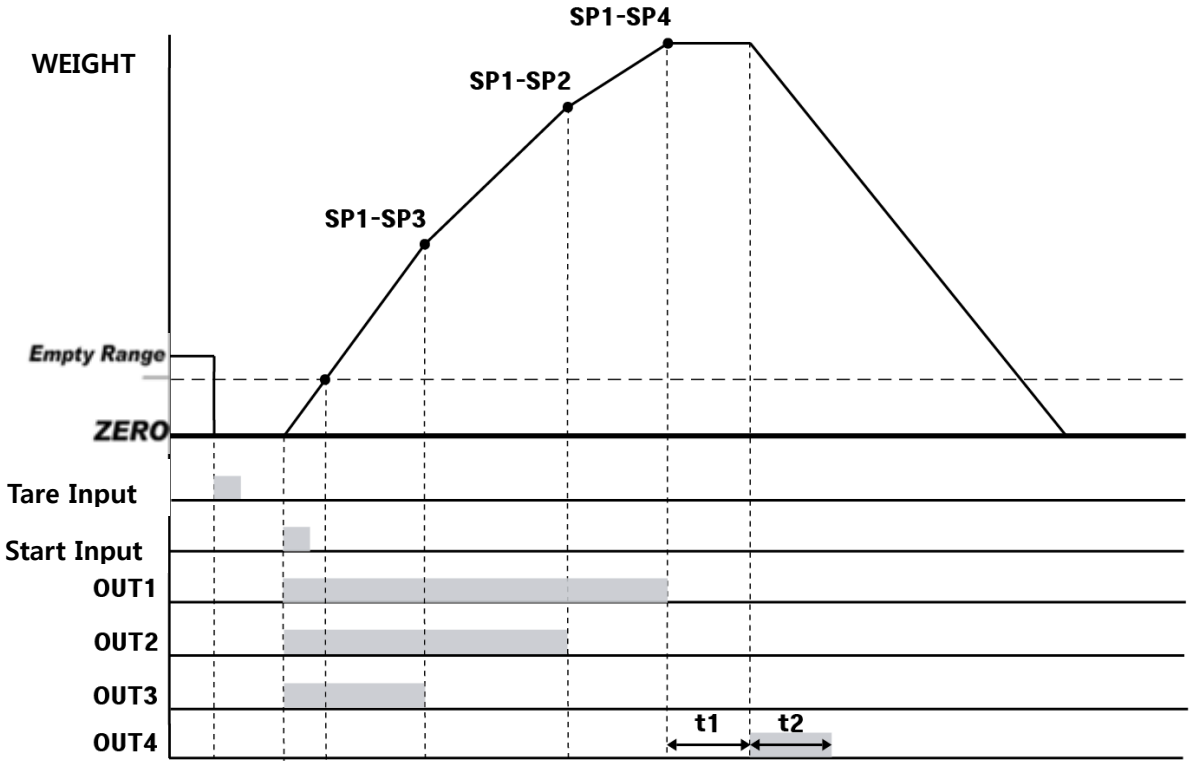
t1, t2 set

Time	Content
t1	Finish Relay Output Delay Time (Function 239) In case of Function 103-3 or 103-6, save the weighing data after t1 time.
t2	Finish Relay Output Delay Time (F240)

Relay Output

Relay	Contents	Relay	Contents
OUT 1	"START"(ON) Current weight≥SP1-SP3(OFF)	**OUT 2**	"START"(ON) Current weight ≥ SP1-SP2(OFF)
OUT 3	Current weight ≥ SP1-SP3 After "t1", during t2"(ON)	**OUT 4**	Within "EMPTY RANGE (Function 201) set(ON)

◆ **Weighing Mode 5 – Packer Mode 2(Function223 – 05) / 3 Steps control**
– Relay "ON" at finish point



SP1, SP2, SP3, SP4 set

SP1	SP2	SP3	SP4
Target	Drib	Bulk	Free fall

t1, t2 set

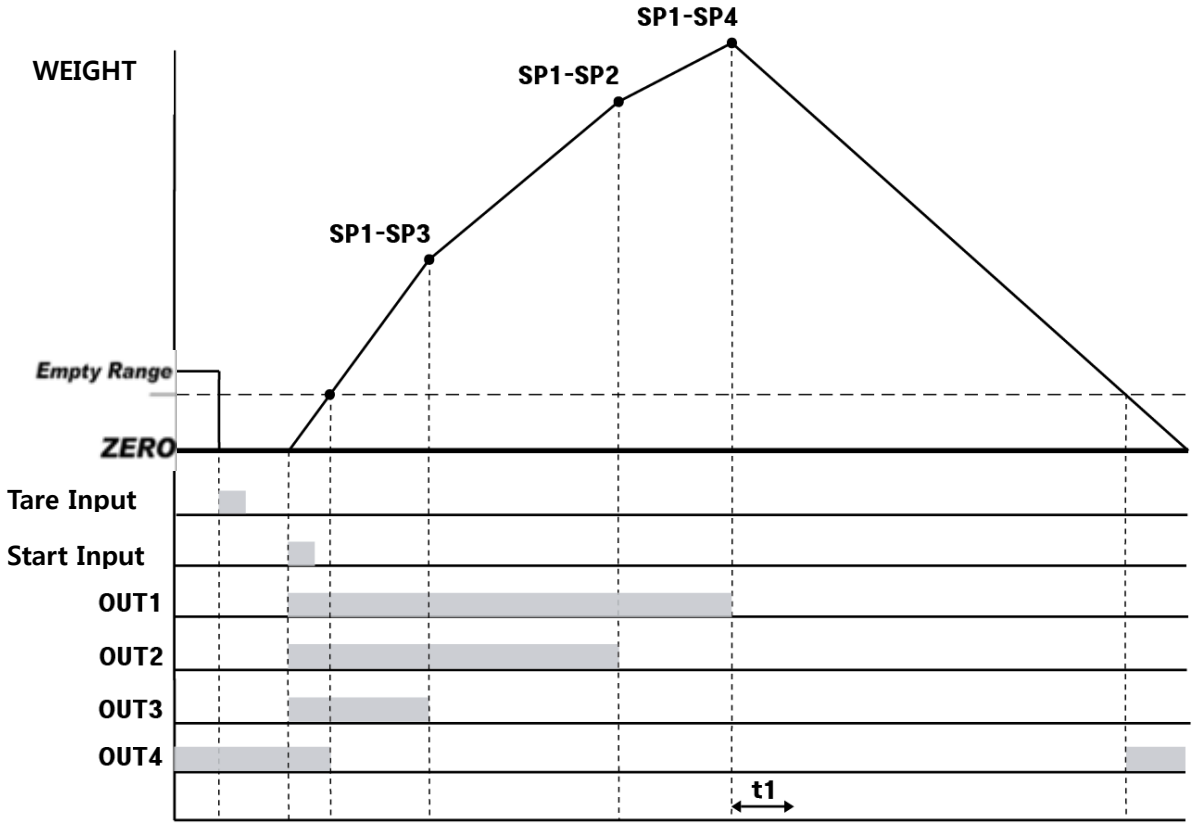
Time	Content
t1	Finish Relay Output Delay Time (Function 239) In case of Function 103-3 or 103-6, save the weighing data after t1 time.
t2	Finish Relay Output Delay Time (F240)

Relay Output

Relay	Contents	Relay	Contents
OUT 1	"START"(ON) Current weight ≥ SP1-SP3(OFF)	**OUT 2**	"START"(ON) Current weight ≥ SP1-SP2(OFF)
OUT 3	Current weight ≥ SP1-SP3 After "t1" time, during "t2"(ON)	**OUT 4**	Within "EMPTY RANGE(F201) set(ON)

◆ **Weighing Mode 6 – Packer Mode 3(F223 – 06) / 3 Steps Control**

- Relay "ON" at Empty range



SP1, SP2, SP3,SP4 set

SP1	SP2	SP3	SP4
Target	Drib	Bulk	Free fall

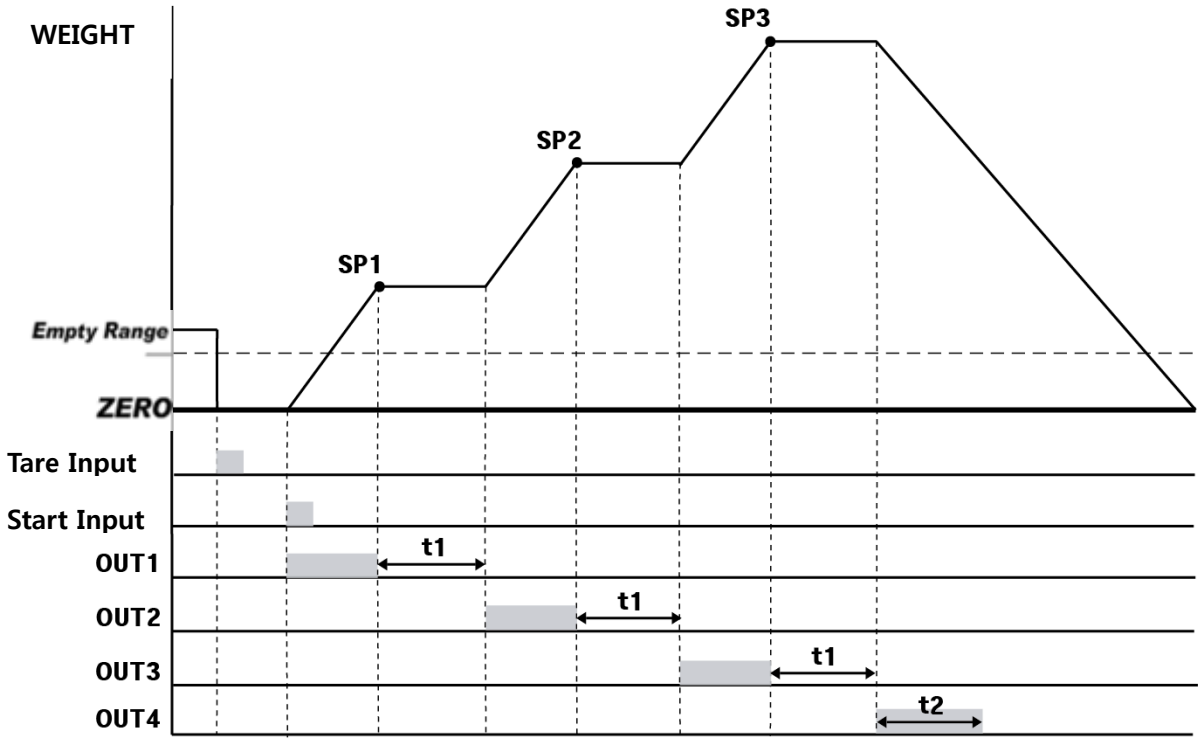
t1 set

Time	Content
t1	Finish Relay Output Delay Time (Function 239) In case of Function 103-3 or 103-6, save the weighing data after t1 time.

Relay Output

Relay	Contents	Relay	Contents
OUT 1	"START"(ON) Current weight ≥ SP1-SP4(OFF)	**OUT 2**	"START"(ON) Current weight ≥ SP1-SP2(OFF)
OUT 3	"START"(ON) Current weight ≥ SP1-SP3(OFF)	**OUT 4**	Within "EMPTY RANGE(F201) set(ON)

◆ Weighing Mode 7 – Accumulating Mode 1 (F223 – 07)



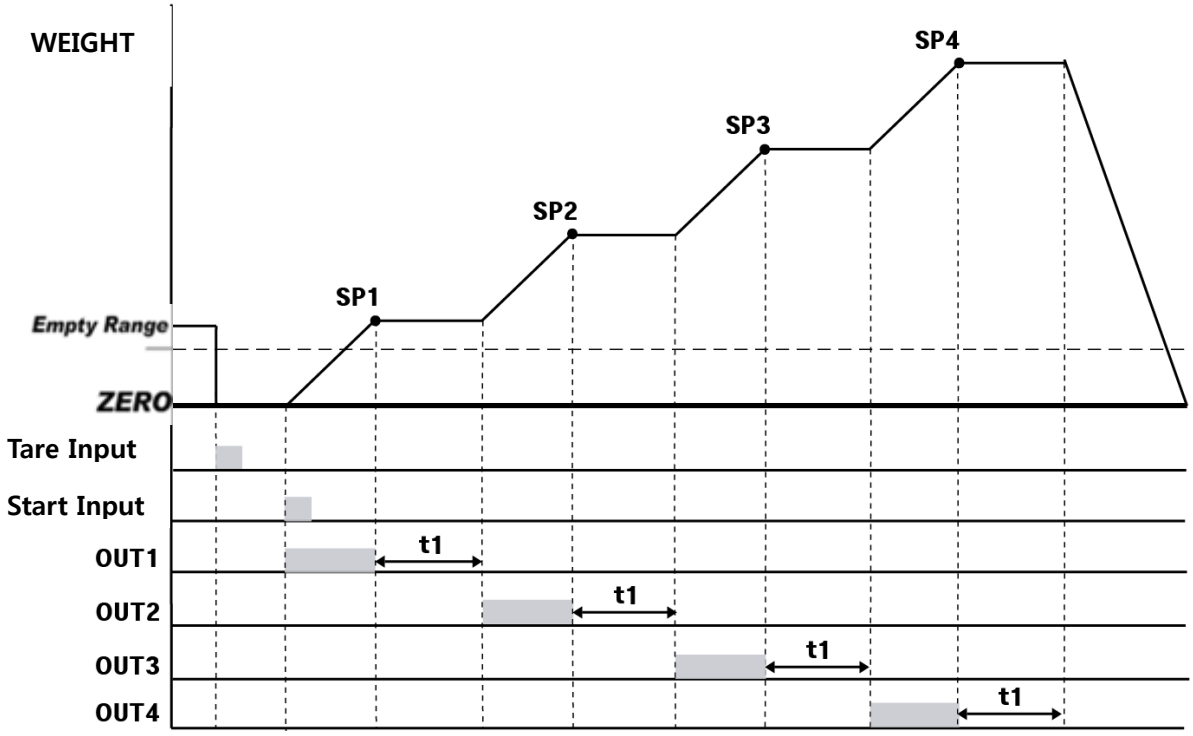
t1, t2 set

Time	Content
t1	Finish Relay Output Delay Time (Function 239) In case of Function 103-3 or 103-6, save the weighing data after t1 time.
t2	Finish Relay Output Delay Time (F240)

Relay Output

Relay	Contents	Relay	Contents
OUT 1	"START"(ON) Current weight ≥ SP1-SP1freefall(OFF)	OUT 2	Current weight <SP2-SP2freefall(ON) Current weight ≥ SP2-SP2freefall(OFF)
OUT 3	Current weight < SP3-SP3freefall(ON) Current weight ≥ SP3-SP3freefall(OFF)	OUT 4	Current weight ≥ SP3-SP3freefall After "t1" time, during "t2"(ON)

◆ Weighing Mode 8 – Accumulating Mode 2 (F223 – 08)



t1 set

Time	Content
t1	Finish Relay Output Delay Time (Function 239) In case of Function 103-3 or 103-6, save the weighing data after t1 time.

Relay Output

Relay	Contents	Relay	Contents
OUT 1	"START"(ON) Current weight ≥ SP1-SP1freefall(OFF)	OUT 2	Current weight < SP2-SP2freefall(ON) Current weight ≥ SP2-SP2freefall(OFF)
OUT 3	Current weight < SP3-SP3freefall(ON) Current weight ≥ SP3-SP3freefall(OFF)	OUT 4	Current weight < SP4-SP4freefall Current weight ≥ SP4-SP4freefall(OFF)

5-4. Test Mode

Before starting the TEST mode, please remove operating devices.

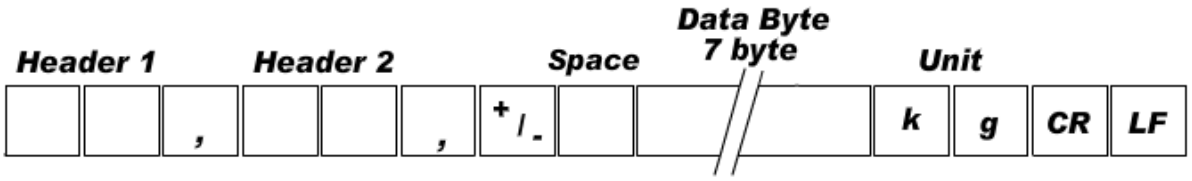
Test Mode 1	Analog Variation Value	**Press** F **key 4times →** HOLD **→** TARE
	Display	**Press** F **key 4times →** HOLD **→** HOLD
	Key	**Press** F **key 4times →** HOLD **→** PRINT
	Analog output (4~20mA/0~10V)	**Press** F **key 4times →** HOLD **→** F
Test Mode 2	External Input	**Press** F **key 4times →** PRINT **→** TARE
	Relay Output	**Press** F **key 4times →** PRINT **→** HOLD
	Serial I/F 1	**Press** F **key 4times →** PRINT **→** PRINT
	Serial I/F 2 (Option Port)	**Press** F **key 4times →** PRINT **→** F

6. INTERFACE

6-1. Serial Interface

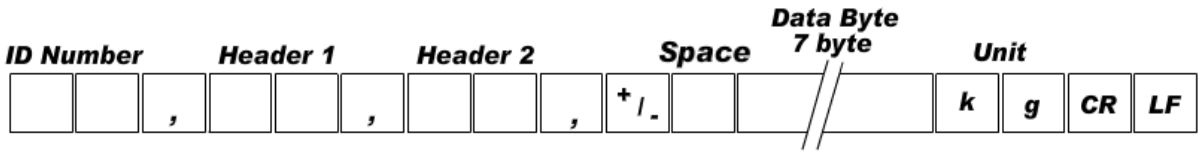
6-1-1. Data Format

1. Data Format1 : ID Number is not be transferred. (Refer F-function 305-00) -19byte



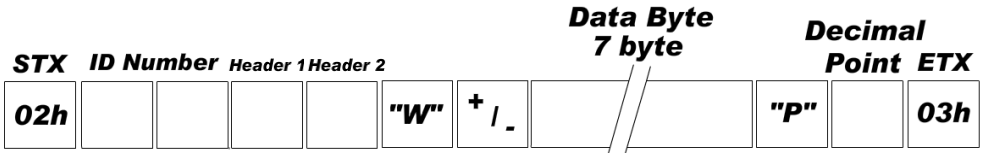
Header1	Header2
OL : OVER LOAD	NT : NET-WEIGHT(Tare is not set)
ST : STEADY	GS : when setting TARE
US : UNSTEADY	

2. Data Format2 : ID Number + Data Transference (Refer F-function 101, 305-01) -22byte



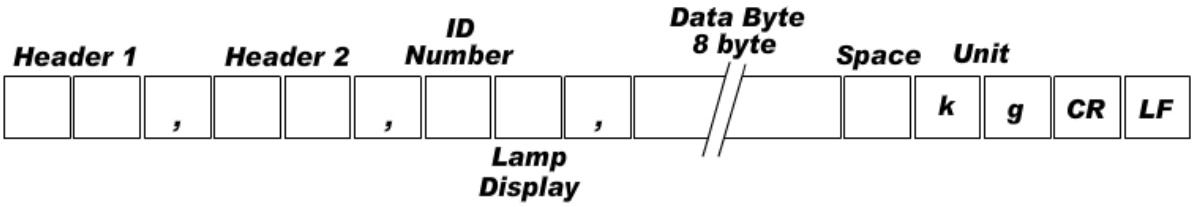
Header1	Header2
OL : OVER LOAD	NT : NET-WEIGHT(Tare is not set)
ST : STEADY	GS : when setting TARE
US : UNSTEADY	

3. Data Format3 : ID Number + State (Refer F-function 101, 305-02) -17byte



Header1	Header2
O : OVER	G : Gross weight
S : STEADY	N : Net weight
U : UNSTABLE	

4. Format 4 (ID Number, Function 101, 305-03) – 22 byte

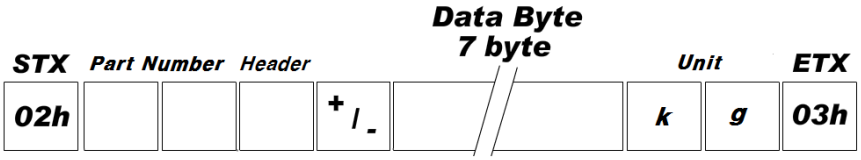


Header1	Header2
OL : OVER LOAD	NT : NET-WEIGHT(Tare is not set)
ST : STEADY	GS : when setting TARE
US : UNSTEADY	

Lamp display

Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
ZERO	TARE	Gross Weight	Print	HOLD	1	STEADY	1

5. Format 5 (P/N, Judgement weight, Weight transmission, 305-04) : For checker mode– 15byte



Header
U : Under
O : Over
P : Pass
N : No judgement

6-1-2. Command Mode

Under "Command Mode", Indicator will recognize the receipt of Order based on 02h(STX) and 03h(ETX) signal, and transfers 06h(ACK), 15h(NAK).

Error Code (Function 304 - 01 or 311 - 01)			
0 (30h)	Normality	**3 (33h)**	Number data Error
1 (31h)	Check-Sum Error	**4 (34h)**	Excess of write data's allowable range
2 (32h)	Data length Error		

6-1-3. Read Command

Subject	Command	Length of transmission data
Current Weight	**STX ID RCWT ETX**	**22 byte**
Current data	**STX ID RCWD ETX**	**46 byte**
Grand total data	**STX ID RGRD ETX**	**28 byte**
Sub-total date	**STX ID RSUB ETX**	**30 byte**
Weighing completion value	**STX ID RFIN ETX**	**18 byte**
Current date data	**STX ID RDAT ETX**	**14 byte**
Current time data	**STX ID RTIM ETX**	**14 byte**
Tare weight	**STX ID RTAR ETX**	**18 byte**
SP1	**STX ID RSP1 ETX**	**17 byte**
SP2	**STX ID RSP2 ETX**	**17 byte**
SP3	**STX ID RSP3 ETX**	**17 byte**
SP4	**STX ID RSP4 ETX**	**17 byte**
SP1, SP2, SP3, SP4	**STX ID RSPA ETX**	**38 byte**
Current weight, Input, Output state	**STX ID RWRS ETX**	**26 byte**

6-1-4. Write Command

Subject	Command	Length of transmission data
Zero	STX ID WZER ETX	8 byte
Tare	STX ID WTAR ETX	8 byte
Tare Reset	STX ID WTRS ETX	8 byte
Hold	STX ID WHOL ETX	8 byte
Hold Reset	STX ID WHRS ETX	8 byte
Print	STX ID WPRT ETX	8 byte
Grand total Print	STX ID WGPR ETX	8 byte
Delete Grand total	STX ID WGTC ETX	8 byte
Run	STX ID WSTR ETX	8 byte
Stop	STX ID WSTP ETX	8 byte
Date setting	STX ID WDAT DATE (YYMMDD) ETX	14 byte
Time setting	STX ID WTIM TIME (HHMMSS) ETX	14 byte
SP1	STX ID WSP1 SP1 value ETX	15 byte
SP2	STX ID WSP2 SP2 value ETX	15 byte
SP3	STX ID WSP3 SP3 value ETX	15 byte
SP4	STX ID WSP4 SP4 value ETX	15 byte
SP1, SP2, SP3, SP4	STX ID WSPA SP1, SP2, SP3, SP4 value ETX	36 byte

6-1-5. Modbus Memory Map

Tip

- RO : Read Only
- RW : Read Write
- Each P/N's set point can't over max capacity of Indicator.
  ex)35.00kg = 3,500 (0xDAC)
- When you input date and time, it should be 6digit.

ex) 1st January 2014 = 140101 (0x22345)

15(H) : 50(M) : 17(S) = 155017 (0x25D89)

- Refer the memory register for regarding Lamp, Error, Digital Input, Standard Key, Special Key
- Modbus Function Codes
  '03' (0x03) : Read Holding Registers
  '04' (0x04) : Read Input Registers
  '06' (0x06) : Write Single Registers
  '16' (0x10) : Write Multiple Registers
- CRC Check Method is CRC-16.

Address	Length	Feature	Description
1	2	RO	Capacity
3	2	RO	None(0x00)
5	2	RO	Analog Value
7	2	RO	Span Value
9	1	RO	Division
10	1	RO	Decimal point
11	2	RO	Current Weight
13	2	RO	Tare Weight
15	2	RO	Measured Weight
17	2	RO	Digital input
19	2	RO	Lamp
21	2	RO	Error
23	1	RO	Weighing Mode
24	1	RO	Weighing Step
33	2	RO	Grand total Count
35	2	RO	Grand total Weight

437	2	RW	Date
439	2	RW	Time
441	1	RW	Key value
443	1	RW	Relay output
445	2	RW	SP 1
447	2	RW	SP 2
449	2	RW	SP 3
451	2	RW	SP 4

6-1-6. Modebus memory register

(1) Digital input register (Address : 17, Length : 2)

0	1	2	3
INPUT 1	INPUT 2	INPUT 3	INPUT 4

(2) Lamp register (Address : 19, Length : 2)

0	1	2	3	4	5	6	7
Steady	Zero	Tare	OUT1	OUT2	OUT3	OUT4	Hold

(3) Error register (Address : 21, Length : 2)

0	1	2
Loadcell Error	Over Load	Set point Error

(4) Key register (Address : 441, Length : 1)

0	1	2	3	4	5	6	7	8	9	10	11
Start	Stop	Zero	Tare	Tare Removal	Hold	Hold Removal	Print	-	-	Grand total Print	Grand total delete

(5) Relay output register (Address : 443, Length : 1)

0	1	2	3
OUT1	OUT2	OUT3	OUT4

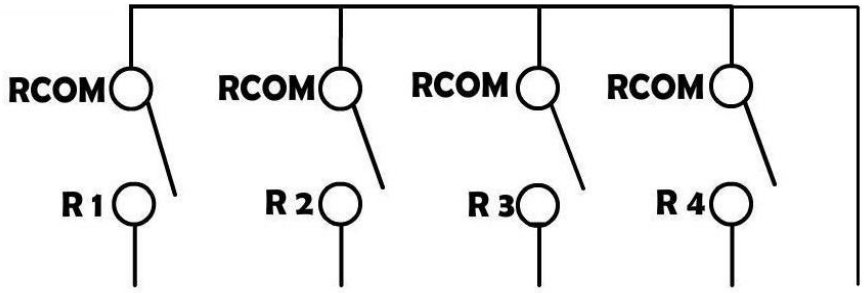
6-2. Relay output

4pcs relay output : Each relay's function can be set under Function 226~229.

6-2-1. Relay specification

Coiling Rating	**12VDC**
Contact Ratings	**1A 24VDC**

6-2-2. Relay output internal circuit



Tip **If you enter to Calibration or Test mode, Relay output will be off.**

Caution **If you use higher voltage than relay specification, indicator might be damaged.**

6-3. Analogue I-Output Interface : 4~20mA (Option)

This output card converts weight value to Analog output signal (4~20mA) and transfers to external devices(Recorder, P.L.C), controlled by voltage output.

6-2-1. Specification

Output Current	Output Range :2~22㎃ (Default : 4~20㎃)
Accuracy	More than 1/5,000
Temperature Coefficient	0.01%℃
. Max Loaded Impedance	500Ω MAX

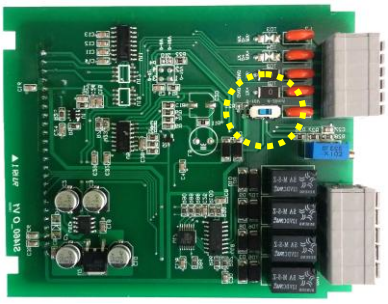
Tip Under Calibration mode or "CELL-ERR" condition, Analogue output will not activated.
If the output is deactivated, the last output signal value will be hold until next activation.

6-2-2. Output Adjustment

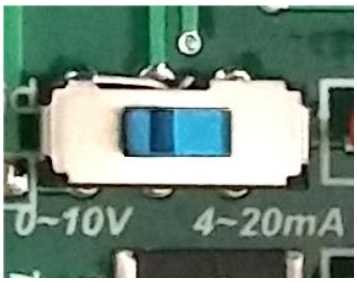
① Default analog output value is 4mA(weight zero) , 20mA(Full using capa).

② The analogue output value is adjusted with DIGITAL MULTI-METER.

Upper main board



Select Switch



Check the setting to use the analog output switch in the upper main boad.
(Default : 4~20mA)

③ How to adjust analog output value.

Step1) Connect Digital multi meter to the Indicator (A out terminal).

Step2) Enter "F-function HF14 Minimum Analog Output Setting" mode.

Step3) Adjust the displaying value of indicator with keys(by 9,999) to make Digital multi meter's value as minimum(ex:4mA) and save.(When the SI 460C indicate about 5,200 , the Digital multi meter indicates about 4mA)

Step4) Enter "F-function HF15 Maximum Analog Output Setting" mode

Step5) after connect digital multi meter to the indicator, then adjust the displaying value of indicator with keys (by 32,768) to make Digital multi meter's value as maximum (ex:20mA).

※ This D/A Converter has Max 1/5,000 accuracy, so this output is not suitable for high accuracy application, more than 1/5,000.

6-4. Analog V-Output Interface :0~10V (Option)

This output card converts weight value to Analog output signal (0~10V) and transfers to external devices(Recorder, P.L.C), controlled by voltage output.

6-3-1. Specification

Output Voltage	0~10V DC output
Accuracy	More than 1/1,000

Tip

According to display weight of indicator, analogue signal will be output.

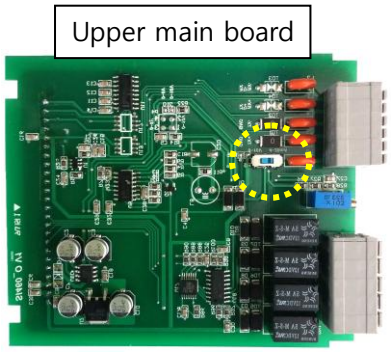
Under Calibration mode or "CELL-ERR" condition, Analogue output will not activated.

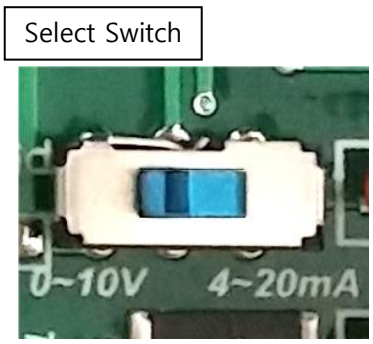
If the output is deactivated, the last output signal value will be hold until next activation

6-3-2. Output Adjustment

① Default analog output value is 0V(weight zero) , 10V(Full using capa).

② The analogue output value is adjusted with DIGITAL MULTI-METER.





Check the setting to use the analog output switch in the upper main boad.
(Default : 4~20mA)

③ How to adjust analog output value.

Step1) Connect Digital multi meter to the Indicator (A out terminal).

Step2) Enter "F-function HF14 Minimum Analog Output Setting" mode.

Step3) Adjust the displaying value of indicator with keys(by 9,999) to make Digital multi meter's value as minimum(ex:0V) and save.(When the SI 460C indicates about 30,150 , the Digital multi meter indicates about 10V)

Step4) Enter "F-function HF15 Maximum Analog Output Setting" mode

Step5) after connect digital multi meter to the indicator, then adjust the displaying value of indicator with keys (by 32,768) to make Digital multi meter's value as maximum (ex:10V).

※ This D/A Converter has Max 1/5,000 accuracy, so this output is not suitable for high accuracy application, more than 1/5,000.

6-5 Serial Print (F-function 303 or 310-02 setting) – RS-232 Serial Interface.

It can be connected with all kinds of Serial interface printer, but the printing format is already programmed and fixed with SE7200/7300 model.

6-4-1. Printing Format

Using the RS-485 or 422 interface, please use convertor and converts to RS-232 and connect with Serial printer.

If you use RS-232 serial interface, connect directly without any convertor.

6-4-2. English Format

```
============================
DATE :          2009-05-10
TIME :            18:00:10
 COUNT           WEIGHT
     1       +   1.330kg
     2       +   5.350kg
     3       +   1.380kg
     4       +   2.330kg
```

Continuous Print Format(Function 352-00)

```
============================
DATE :          2009-05-10
TIME :            18:00:10
 COUNT           WEIGHT
     2       +   5.350kg


============================
DATE :          2009-05-10
TIME :            18:00:10
 COUNT           WEIGHT
     3       +   1.280kg
```

Single Print Format(Function 352-01)

```
============================
          TOTAL
DATE :          2009-05-10
TIME  :           18:00:10
COUNT :                 10
TOTAL WEIGHT :     258.145kg
============================
       TOTAL DELETE
============================
```

Grand Total Print

7. Error & Treatment

7-1. Load Cell Installation

Error	Cause	Treatment	Remarks
Weight Value is unstable	1) Load cell broken 2) Load cell isolation resistance error 3) Weighing part touches other devices or some weight is on the weighing part 4) Summing Board Error	1) Measure input/output resistance of Load cell. 2) Measure Load cell isolation resistance	1. Input Resistance of "EXC+" and "EXC-" is about 400Ω ±30 2. Output Resistance of "SIG+" and "SIG-" is about 350Ω ±3.5 3. Isolate Resistance is more than 100MΩ
Weight Value is increased regular rate, but not return to "Zero"	1) Load cell Error 2) Load cell connection Error	1) Check Load cell connection 2) Measure Load cell Resistance	
Weight Value is increased to under Zero	Load cell Output wire (SIG+, SIG-) is switched	Make wire correction	
"UN PASS" display	Load cell broken or Indicator connection Error	Load cell Check Load cell connection Check	
	Power was "ON" when some weight is on the load cell.	Remove weight on the Load cell	
"OL" or "UL" display(Over Load)	1) Load cell broken or Indicator connection Error 2) Loading over than Max Capacity	1) Load cell Check 2) Load cell connection Check 3) Remove over loaded weight	

7-2. Calibration Process

Display	Cause	Treatment
Err01	When Max capacity/digit value is over 20,000	Re-input the Max Capacity, less than 20.00 (Max Capacity / Digit)
Err04	Standard weight value is over than Max Capacity	Re-input Standard weight value with Number keys, under Max Capacity
Err05	Standard weight value is less than 10% of Max Capacity	Re-input Standard weight value with Number keys, more than 10% of Max Capacity
Err06	Amp. Gain is too big	Check standard weight's weight with set value. If there is difference between set value and real weight, please re-input the value (set value is too small)
Err07	Amp. Gain is too small	Check standard weight's weight with set value. If there is difference between set value and real weight, please re-input the value (set value is too big)
Err08	Under "F-function" model, set value is "N.A"	Check the correct value and re-input
Err-A	When there is continuous vibration on the weighing part,, indicator cannot process calibration any more.	- Find vibration cause and remove - Load cell check - Load cell cable and connecting condition check

7-3. Digital Weighing Indicator

Display	Cause	Treatment
"CELL-Er" or "OUEr"	1. Load cell Error 2. Load cell cable Error 3.Load cell connection Error 4. A/D Board Error 5.If Analogue value is over 1,040,000. ※ When weigh "-" value, If it is over set max capa, "OVER" is displayed. Ex) Even though set max capa is "100" and it is over "-100", "OVER" is displayed.	1. Under "TEST" mode 1, check analogue value. If you cannot get any analogue value or there is no change although adding load, please check load cell, load cell cable, connection conditions first. 2. Replace another load cell, and check the indicator condition. If you have same problem, please replace new indicator and check A/D board error. 3. Try to connect the indicator's A/D with the other indicator. 4. Check the power and connection of terminal.
"UNPASS"	1. Power is ON, when some materials are on weighing part. ※ Under "Normal Mode", if there are more than 20% loading of Max capacity, "**Un-Pass**" display will be appeared and indicator will stay until removing the load. ※Setting Back-up mode it can memory empty value, and it becomes set value without displaying" Un-pass")	1. If you set "Normal Mode", please check weighing part empty or not before turn on the power. If there are some materials in/on weighing part, please remove those materials and turn on the power. 2. Please try to set F-function 102-02(Back-up) mode so that the indicator can remember first empty value.
"SEt"	When Power is on, "SET" displays. It means EEPROM has some problem.	Please contact the distributor or Head Office.
"HALt"	H/W has some problem.	
"t-Err"	The dead Battery	

※ Under "CELL-Er", Zero key, Tare key, Hold key and print key will not be activated.

WARRANTEE CETIFICATION

This product is passed "Sewhacnm's strict quality test.

If there is defect of manufacturing or abnormal detection within warrantee period, please contact our Agent or Distributor with this Warrantee certificate.

Then, we will repair or replace free of charge.

WARRANTEE CLAUSE

1. The Warrantee period, we can guarantee, is one(1) year from your purchasing date

2. Warrantee Exception Clause

- Warrantee period is expired.
- Any kinds of Mal-function or defection caused by Modification or Repair without Sewhacnm's permission.
- Any kinds of Mal-function, Defection, or External damage, caused by operator
- Any kinds of Mal-function, Defection, caused by using spare part from Non-Authorized Distributor or Agent.
- Any kinds of Mal-function, Defection, caused by not following Warnings or Cautions mentioned on this manual.
- Any kinds of Mal-function, Defection caused by "Force Majeur", like Fire, Flood.
- Without presentation of this **"Warrantee Certification".**

3. Other

- Any kinds of "Warrantee Certification" without authorized Stamp is out of validity

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Made in KOREA

Website : http://www.sewhacnm.co.kr ,

Email : sales@sewhacnm.co.kr

Product	Digital Weighing Indicator
Model	SI 460C
Serial No.	
AUTHORIZED STAMP