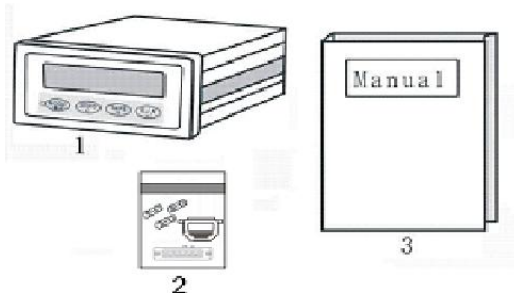# CHAPTER 1 INTRODUCTION

§ 1-1 Items In Carton

The carton in which the BDE-2007 is delivered contains:
1. Indicator.   2. Accessory pack (In bag).   3. Manual.

CHAPTER 2 INSTALLATION

§ 2-1 Best Conditions For Use

When installing and wire connecting on **BDE-2007**, please follow the guidelines below:
◎ Before connecting the Electric Power Supply, please identify the input Electric voltage type is DC 12V or DC 24V.
◎ The Operation Temperature shall range within 0℃ ~ 45℃, please DO not install in any place of direct sun-light. Due to the minute output signal from Load Cell, please use isolated cables. Also, separate the Load Cell cable from the power supply cable and control I/O cables.
◎ The input power shall be DC 12V or DC 24V±10%, if the Electric Power Supply is not stable or the interference signal exists, that may cause uncertain actuation or reaction, even damage. Therefore, please utilize Electric Power Supply Stabilizer of adequate capacity.

§ 2-2 Connecting the Load Cell

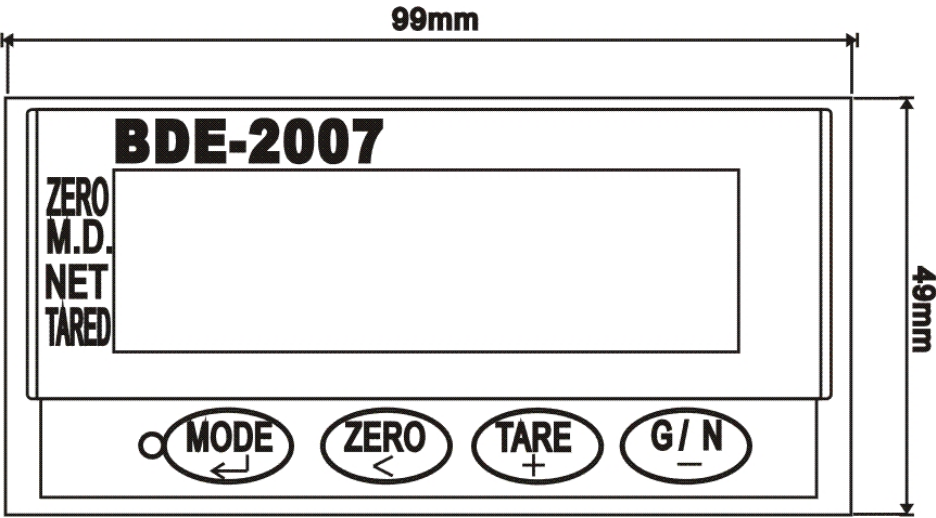💣※Do not turn on your power until you have completely connected the load cell.
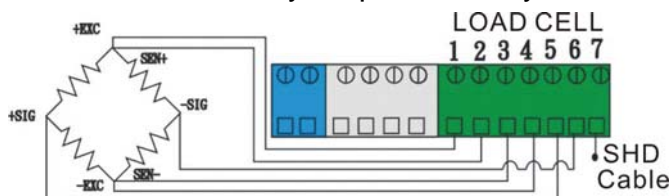
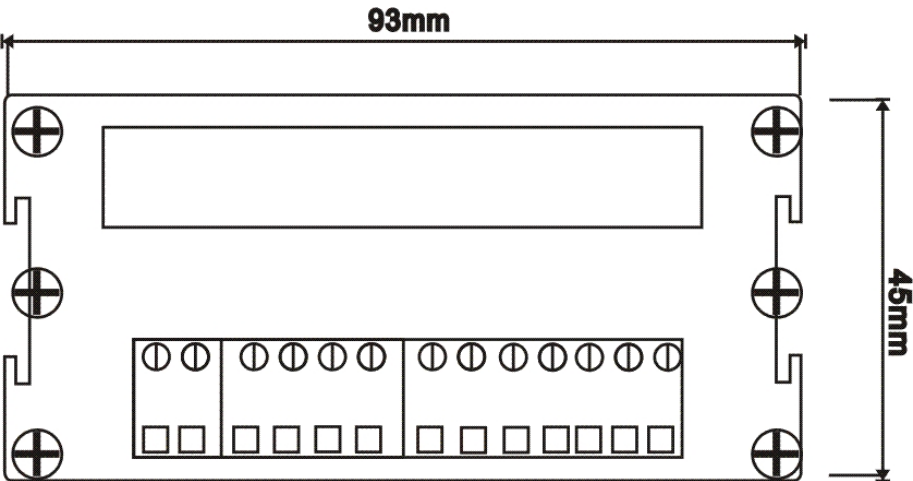| Screw	Signal
1	Positive Excitation Voltage, (EXC+)
2	Positive Sense Voltage, (SEN+)
3	Negative Sense Voltage, (SEN-)
4	Negative Excitation Voltage, (EXC-)
5	Positive Signal Voltage, (SIG+)
6	Negative Signal Voltage, (SIG-)
7	Shield, (SHD)

Open the case, there is a jumper〔S1〕near the transformer, please insert a short-circuit pin to the available side.

ⓘ To connect your load cell to the weighing Indicator use a six-wire cable with shield - connect the wires as indicated above. If the **BDE-2007** / **BDE-2007** is located near the Load Cells (Within five meters or a few yards) you may use a 4-wire cable with shield, but first connect screws 1&2 and 3&4 with independent jumper leads.
ⓘ The analogue output from the Load Cell and input/output signals are sensitive to electrical noise. Do not bind these cables together as it could result in cross-talk interface. Please also keep them away from AC power cables.

§ 2-3 Front and Rear Panel Dimensions

99mm

BDE-2007

ZERO
M.D.
NET
TARED

MODE ← ZERO < TARE + G / N −

49mm

Front Panel of BDE-2007

93mm

45mm

Rear Panel of BDE-2007

160mm

148mm

45mm
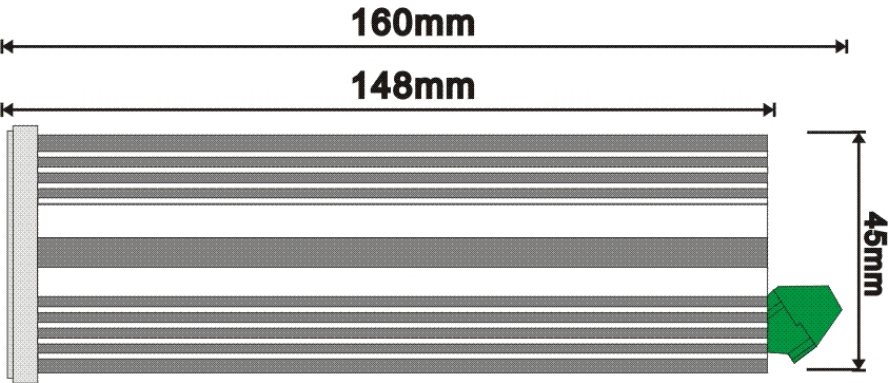
Side View of BDE-2007

93.5mm

46.5mm

Mounting Cut for BDE-2007

CHAPTER 3 SPECIFICATIONS

§ 3-1 Analog Input and A/D Conversion

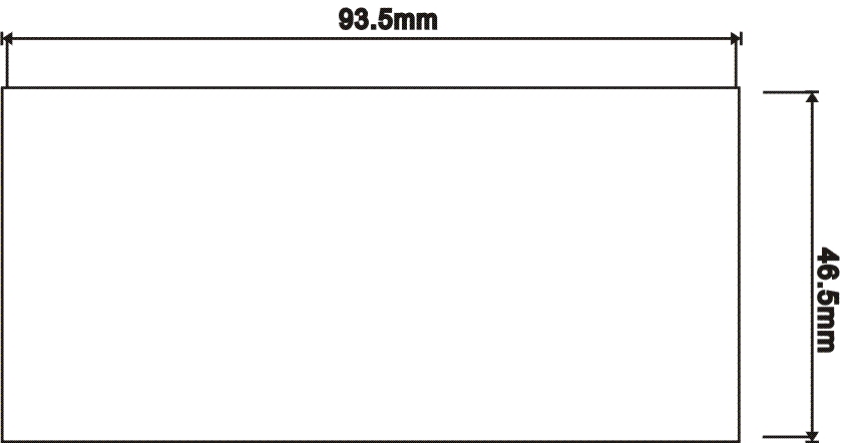| ◎Analog Input and A/D Conversion	
Type	**BDE-2007**
Input Sensitivity	0.12 μ V/D or above
ZERO Adjustment Range	0 ~20mV
Load Cell Excitation	DC5V $\pm$ 5%， 120mA, Remote Sensing. Can be connected up to 8 350Ω Load Cells.
Non-Linearity	0.01 % F.S.
A/D Conversion Method	$\triangle\Sigma$
A/D Resolution	$\fallingdotseq$ 1/1,000,000
A/D Conversion Rate	120 Times／Sec.
Max. Load Cell Input Voltage	20mV
ZERO Temperature Comp.	$\pm$(0.2 μ V + 0.001% of Dead Load)/℃ TYP
SPAN Temperature Comp.	$\pm$ 0.001% ℃ TYP
Max. Resolution	1/30,000

§ 3-2 General

◎ General	
Type	**BDE-2007**
Power Requirements	DC 12V or 24V $\pm$10%，400A
Net weight	$\fallingdotseq$ 0.4 kg
Operation Temperature	$-$10℃～45℃
Maximum	85%〔non-condensing〕
Physical Dimensions	160 (D)×99 (W)×49 (H) mm

§3-3 Display and signs

＊3-3-1 Front Panel of BDE-2007
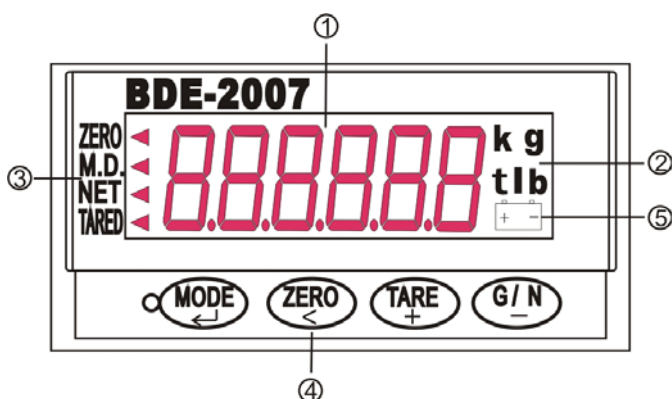
No.	Display	Spec.
①	8.8.8.8.8.8	6 digit (Positive)
②	K g , t, lb	Weight indication
③	ZERO, M. D. , NET, TARED	Status indication ZERO M. D. (Unstable) NET TARED
④	MODE ZERO TARE G/N	Key
⑤	+ −	DC Voltage low

＊ 3-3-2 Operation Modes

Press Mode key for more than 2 seconds and release, the LED light will change as follows：

**MODE0** (No light) ➜ **MODE1** (Red light) ➜**MODE2** (Green Light) ➜**MODE3** (Orange light)

1.MODE0: Normal Weight display mode.
2.MODE1 (Red): Batch operation mode
3.MODE2 (Green): Set point and Accumulation Mode.
4.MODE3 (Orange): Not in Use.

　　**Press ZERO keys more than 2 seconds will escape.
　　** See 5-1 to learn setup of set point values.

Key Mode	Press MODE To	Press ZERO To	Press TARE To	Press G/N To
Mode 0	Manual Accumulation = Press mode key 1 second.	ZER0	Tare = Press mode key 1 second. Tare Clear＝Press mode key >2 second.	Gross / Net Change
Mode 1 (RED)	Manual Accumulation = Press mode key 1 second.	ZERO	Tare = Press mode key 1 second. Tare Clear＝Press mode key >2 second.	Batching Start/ Stop
Mode 2 (Green)	ENTER = Press mode key 1 second.	Set Point	Display Accumulation	Up and down
Mode 3 (Orange)	Not in Use			

＊ 3-3-3 Rear Panel
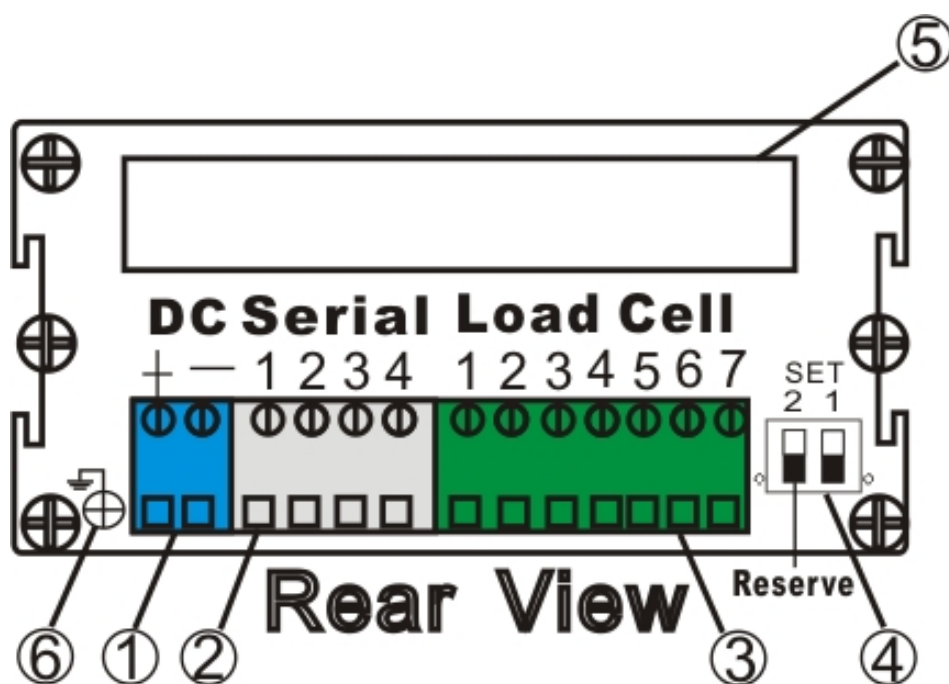
No.	Spec.
①	DC power input
②	Serial
③	Load cell input 7 pins
④	SET cover
⑤	Option cover
⑥	Grounding

CHAPTER 4 SYSTEM UNCTIONS
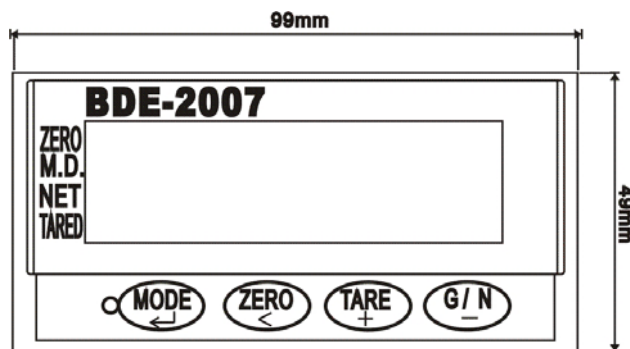
§ 4-1 System Check

A system check should be run: after initial installation, after moving your BDE-2007, after connecting or disconnecting an attachment from the Rear Panel and as means of locating any unexplained system error.

STEP 1: Power OFF, make sure all **SET** [⊡⊡]OFF .

STEP 2: Power ON, Press **MODE**
With **ZERO** key more than 2 seconds, displayed F-CSET→FUNC.

STEP 3: Press TARE key, shows CHECK .

STEP 4: Press MODE Key, the system will check 7 Segment Leeds in sequence., When show EE-1,
Slide Set 1 [⊡⊡]ON , then press MODE key, System will Check MEMORY〔**EEPROM**〕shows
I-0 , it means system error.

STEP 7: System check will go to **Input/Output** checking. When the screen show I-O , Subsequently,
the screen will show OUTPUT . Please make SHORT-CIRCUIT test on 25-Pin **D** shape
Output on the rear panel. When short-circuiting COM17 or COM16 with other pins, the
short-circuit pin will light up a specific LED on the screen. If not, there suggests an error
occurred.

STEP 8: Check keypad. (1,2,3,4). When pressing a key, the key number will show in the middle of the
screen: **KEY 01～KEY 4.** If the key number does not match, it suggests an error occurred.
Please contact us.

STEP 9: Finish checking, Slide **SET** [⊡⊡]OFF , and then press **MODE With ZERO** key 1 second,
BDE-2007 will back to normal mode.

§ 4-2 Functions

STEP 1: Press **MODE With ZERO** key more than 2 seconds, displayed F-CSET→FUNC.

STEP 2: Press MODE key to show F000 afterward.

STEP 4: Please press TARE or G/N key to go up and down (F000, F200, F300, F400 or F500). Then
press the MODE Key to enter the category. Press **MODE** key to enter.

ⓘ If any errors occurred, please check if each setting value within effective range.

STEP 5: When you finished changing the Function setting, Press **ZERO** key more then 2 seconds to
escape,

◎**General Functions**

F000	Decimal Point Adjustment	
	0	No Decimal	123456
	1	1 Decimal	12345.6
	2	2 Decimal	1234.56
●	3	3 Decimal	123.456

F001	Weighing Unit Selection	
	0	None
●	1	kg
	2	ton
	3	Lb

F002	Display Update Rate
0	5 Times/Sec
1	10 Times/Sec
● 2	20 Times/Sec
3	40 Times/Sec

F003			Filter	Environment Vibration	Response Speed
	0	No stage	Weak	Bad	Fast
	1	1st stage			
	2	2ed stage			
	3	3rd stage	▲	▲	▲
●	4	4th stage	▼	▼	▼
	5	5th stage			
	6	6th stage			
	7	7th stage	Strong	Good	Slow

F003 Digital Filter

F004	Set ZERO Range	
	5	±5% of weighing platform Full Capacity
●	10	±10% of weighing platform Full Capacity
	20	±20% of weighing platform Full Capacity
	30	±30% of weighing platform Full Capacity

F005	Motion Detection	
	00	Stable
	01	0.5 SEC 1 DIV
	02	0.5 SEC 2 DIV
	03	0.5 SEC 3 DIV
	04	0.5 SEC 4 DIV
	05	0.5 SEC 5 DIV
	06	0.5 SEC 6 DIV
	07	0.5 SEC 7 DIV
	08	0.5 SEC 8 DIV
	11	1 SEC 1 DIV
●	12	1 SEC 2 DIV
	13	1 SEC 3 DIV
	14	1 SEC 4 DIV
	15	1 SEC 5 DIV
	16	1 SEC 6 DIV
	17	1 SEC 7 DIV
	18	1 SEC 8 DIV

F006	Automatic ZERO Tracking Compensation	
	00	OFF
	11	1 SEC 0.5 DIV
	12	1 SEC 1 DIV
	13	1 SEC 1.5 DIV
●	14	1 SEC 2 DIV
	15	1 SEC 2.5 DIV
	16	1 SEC 3 DIV
	17	1 SEC 3.5 DIV
	18	1 SEC 4 DIV
	21	2 SEC 0.5 DIV
	22	2 SEC 1 DIV
	23	2 SEC 1.5 DIV
	24	2 SEC 2 DIV
	25	2 SEC 2.5 DIV
	26	2 SEC 3 DIV
	27	2 SEC 3.5 DIV
	28	2SEC 4 DIV

F007	ZERO & TARE keys Availability	
●	0	ZERO & TARE keys always work
	1	ZERO & TARE keys only work when display is STABLE

F008	TARE key Availability	
●	0	TARE key always work
	1	If the GROSS is negative, TARE key does not work

F009	Accumulation Availability	
	0	OFF
	1	Stable
	2	Manual
	3	Control Input--Command Accumulation (For Modbus)
●	4	Control Input -Command Accumulation

◎ Control

F100	Set ZERO Band
6 digit Zero band value (● Initial "000.000")	

F101	Batching Mode	
●	1	Customer Programmed Control Mode: Normal Batching
	2	Customer Programmed Control Mode: Loss-in-Weight Batching
	3	Built-in Automatic Program Mode: Normal Batching
	4	Built-in Automatic Program Mode: Loss-in weight Batching

F103	Timer-Finish Signal
The finish signal timer can be Set between 0.0 to 9.9 Sec	

※● Initial 0.0 Sec
※ Finish Signal sent ON at 0.0 Sec. And stays ON until the next START Signal.
※ (Only apply to batching mode 3 and 4).

F102	Timer-Comparator Inhibitor
Set between 0.0 to 2.0 Sec (● Initial 0.0 Sec) (Only apply to batching mode 3 and 4).	

F104	Pulse Width of Finish Signal
Set between 0.0 Sec to 2.0 Sec	

※ ● Initial 0.5 Sec
※ Stable at 0.0 Sec. Which is apply to F101 setting at 3 or 4.

F105	Output 8	
●	0	Unstable
	1	Error

F106	Input by (Batch start/ stop)	
●	1	Panel key
	2	BCD Input
	3	Serial Input/ Modbus

F108	Memory Automatic Free Fall Compensation	
●	0	Yes
	1	Not Memory

F107	Automatic Free Fall Compensation
Please enter 6 digit free fall Compensation value within effective range	

●initial "000.000"--- Free Fall OFF

◎SERIAL (RS-232 two way/ RS-485 Modbus)

F200	Band Rate	
	24	2400BPS
●	48	4800BPS
	96	9600BPS
	19	19200Bps

F201	Set data length, Parity, Stop bit	
	0	D8,N,1
●	1	D7,E,1
	2	D7,O,1
	3	D8,N,2
	4	D8,E,1
	5	D8,O,1
Only 3,4,5 applicable MODBUS (RTU)		

F202	Output data	
●	1	Same as display
	2	GROSS Weight
	3	NET Weight
	4	TARE Weight
	5	GROSS Weight, NET Weight, TARE Weight

F203		Output Mode
●	1	Stream
	2	Stable and auto print
	3	Manual Print Mode
	4	Accumulate and Print
	5	For RS-232 commanding
	6	For Modbus commanding

F204	Serial address (RS-485)
00-not used(●Factory set at 00)	
00-99 Used	

F205		RS-232 Models select
●	0	BDI-2001/ AD4321
	1	BDI-9301
	2	IQ-350
	3	HB-8210

◎ **Analog Output**

F 500		Analog Output Data
●	1	Output 4~20 mA
	2	Output 0~+10 V

F 501		Output Mode
●	1	Same as display
	2	GROSS Weight
	3	NET Weight

F 502		Loss-in-weight Absolute Value
●	0	Not read Absolute Value
	1	BDI-2001B reads Absolute Value

F 503	Output current when display ZERO
0.0 through 99.9	
● Initial 4.0	
(If **F 500=1**, Normally between 4-20, If **F 500=2**, Normally between 0-10)	

F 504	Output current at Full Capacity
0.0 through 9.99	
● Initial 20.0	
(If **F 500=1**, Normally between 4-20, If **F 500=2**, Normally between 0-10)	

◎ Serial (RS-232-one way)

FL00		**Band Rate**
	1	**1200BPS**
●	**2**	**2400BPS**

FL01		Output data
●	1	Same as display
	2	GROSS Weight
	3	NET Weight
	4	TARE Weight
	5	GROSS Weight, NET Weight, TARE Weight

FL02		Output Mode
●	1	Stream
	2	Stable and auto print
	3	Manual Print Mode
	4	Accumulate and Print

§4-3 Calibration

STEP 1: Power OFF, Power ON, Rear Panel SET 1 [⊡⊡]°ᴺ ON. **Shows** CAL → F-CAL.

〔**1**〕 *Setting Minimum Division*

Press MODE key, displays di 01 Use the + or - key to move through the available divisions.
〔01、02、05〕. Press the MODE key to set the minimum division.

〔**2**〕 *Setting Decimal*（*F000 can also change---see § 4-2*）

The screen will show dp → d000.000.
Use the + or - key to move through the available divisions.〔01、02、05〕. Press the MODE key to set the minimum division.

〔**3**〕 *Setting Maximum Capacity*

Screen will show CAP → C000.000. Use the< or + or - key to move through the available divisions.
〔01、02、05〕. Press the MODE key to set the minimum division

〔**4**〕 *ZERO Adjust*

The Screen will display ZERO. Please move the calibration mass and objects away on the Weighing device then press **MODE** key. A display of . . . . . . means finishing the Adjustment.

〔**5**〕 *SPAN Calibration*

The screen will show SPAN . Press **MODE** key and place your calibration mass on the weighing device and input weight value. Use the< or + or - key to set your mass weight. Press the MODE key to mark the SPAN. The screen will show END .
Slide the **SET** switch to the original side.

◎ Calibration Errors

C.Err 1：The resolution exceeds 1：30,000.
⇨Change the minimum division and maximum capacity within 1／30,000. Resolution ratio= Minimum division／maximum capacity

C.Err 2：The load cell output is too large at ZERO calibration.
⇨Add an additional resistor
(50kΩ～500KΩ) between EXC+ and SIG-.
※ Refer to the Right Figure

C.Err 3：The load cell output is too small at ZERO calibration.
⇨ Add an additional resistor
(50kΩ～500KΩ) between EXC+ and SIG+.
※ Refer to the Right Figure

C.Err 4：The calibration mass has been mistakenly entered as a value greater than the maximum capacity.
⇨Please reduce the weight of calibration mass, and re-enter the weight value.

C.Err 5: The calibration mass has been wrongly entered zero or it is smaller than the minimum capacity.
⇨Please increase the weight of calibration mass, and re-enter the weight value.

C.Err 6: The load cell output is too low.
⇨Replace your load cell with a more sensitive one or adjust the minimum division.

C.Err 7: The load cell signal pins are reversed, or the load cell output voltage is too low.
⇨Check the load cell connections if reversed or load cell failure.

C.Err 8: The load cell output voltage at maximum capacity is too high.
⇨ Check the load cell specification or load cell failure.

C.Err 9: The maximum, capacity has been wrongly entered as a value smaller than 100.
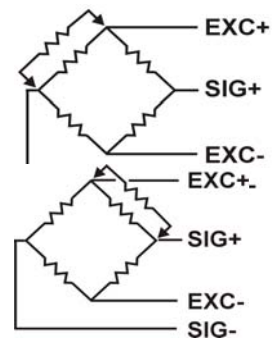⇨Check Resolution Table.

C.Err 10: The maximum, capacity has been wrongly entered as a value greater than 750,000.
⇨ Check the load cell specification or load cell failure.

C.Err 11：Please clear and Tare first
⇨Please make ZERO calibration first

C.Err 12：Input value too big or small. ⇨Input again.

§ 4-4 SYSTEM INITILAIZE

STEP 1: Power OFF, slide rear SET 1 ON.
STEP 2: Screen shows CAL, Press TARE key until show init
STEP 3: Press MODE key, screen will show NO,
STEP 4: Press + key to show YES , Press MODE key to confirm → END .
 STEP 5: Finish initialize, Slide **SET** and back to normal mode.

§ 4-5 Accumulation

4-5-1 Display Accumulation：

In MODE 2 Status ,
Press **TARE key** , the screen will show its total count.
Press TARE again, the screen will show Accumulation.
Press ZERO key more than 2 seconds will escape.

4-5-2 Clear Accumulation：

Press TARE key more than 2 seconds will show CLR A.C.
Press MODE key to clear count and accumulation.
Press ZERO key more than 2 seconds will Escape.

CHAPTER 5   SET POINTS

§ 5-1 SET POINTS

5-1-1 Change Set point code and Set point values
☞

Press ZERO key to show Final. Press Mode key to show 000.000 , Use +/ -/ <   key to set Final Values. Press Mode key to confirm the Final Value.
 Press Mode key to show SP1, Press Mode key to show 000.000 , Use +/-/ <   key to set Sep point 1 values. Press Mode key to confirm the SP1 value.
 Press Mode key to show SP2, Press Mode key to show 000.000 , Use +/-/ <   key to set Sep point 2 values. Press Mode key to confirm the SP2 value.
Press Mode key to show FREE, Press Mode key to show 000.000 , Use +/-/ <   key to set Free fall values. Press Mode key to confirm the Free fall value.
Press Mode key to show Hi, Press Mode key to show 000.000 , Use +/-/ <   key to set Hi limit values. Press Mode key to confirm the Hi value.
Press Mode key to show Lo, Press Mode key to show 000.000 , Use +/-/ <   key to set Lo limit values. Press Mode key to confirm the Lo value.
Press ZERO key more than 2 Seconds to leave.

§ 5-2 BATCHING MODES

☛Batching Modes
1. Customer Programmed Control Mode: Normal Batching
2. Customer Programmed Control Mode: Loss-in-Weight Batching
3. Built-in Automatic Program Mode: Normal Batching
4. Built-in Automatic Program Mode: Loss-in weight Batching
5. Multiple-Ingredient Batching

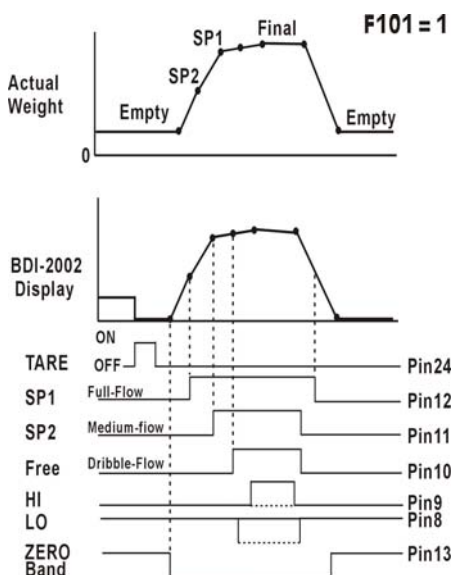◎ **Customer Programmed Control Mode: Normal Batching(F101 = 1)**

SP1 – Full Flow Gate
SP2 – Medium Flow Gate
Free – Dribble Flow Gate
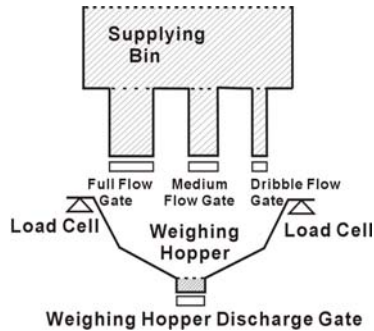
1. The Weighing Hopper is empty, the display shows "0", and all Gates are closed. If the display is not at ZERO, **input a TARE** signal(Pin 24) to **re-ZERO the display**.
2. Open the Supply Bin's: Full-Flow Gate,Medium-Flow Gate, and Dribble-Flow Gate.
3. When the display reaches "**Final - SP 1**", the **SP 1** Output (Pin 12) signal will come **ON**. Closed the Full-Flow Gate by using the SP 1Output ON signal.
4. When the display reaches "**Final - SP 2**", the **SP 2** Output (Pin 11) signal will come **ON**. Closed the Medium-Flow Gate by using the **SP 2** Output ON signal.
5. When the display reaches "**Final - FREE**", the FREE Output (Pin 10) signal will come **ON**. Closed the Dribble-Flow Gate by using the FREE Output ON signal.
6. After Free Fall has stopped - check if the HI and LO (Pin 9, 8) signals are OFF. If both outputs are OFF then the batch is completed correctly.
7. An Automatic Free Fall Compensation Command (Min. 200ms pulse to Pin 21) may be given at this time. If you change the Free Fall Set Point value either from the Front Panel or the RS-232C, RS-422/485－the learned Free Fall value will be cleared.
8. Use the FREE (Pin 10) signal to delay a time period as the control signal is processing empty the Weighing Hopper.
9. When the GROSS weight is below the ZERO band, the ZERO Band Output will come ON -signifying the Weighing Hopper is empty. Closed the Weighing Hopper Discharge Gate by using the ZERO Band (Pin 13) Output ON signal.
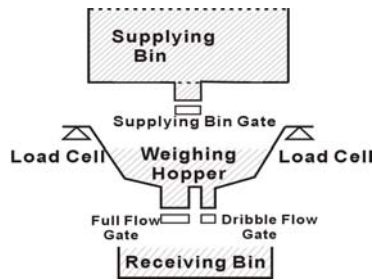10. You are now ready for your next batching event.

## ◎ Customer Programmed Control Mode: Loss-in-Weight (F101 = 2)

SP1 – Supplying Bin Gate
SP2 – Full Flow Gate
Free – Dribble Flow Gat

1. The Weighing Hopper is empty as is the Receiving Bin. The display shows "0", and all Gates are closed.
2. Open the Supplying Bin Gate.
3. When the GROSS Weight reaches "**SP 1**", the **SP 1** Output (Pin 12) signal will come **ON**. Closed the Supplying Bin Gate by using the **SP 1** Output ON signal.
4. The displayed weight will exceed the **SP 1** value by the Free Fall value. This weight is not necessarily accurate - but accuracy is not needed at this moment since the purpose of this event is to fill up the Weighing Hopper. The SP 1 value is always compared to GROSS weight.
5. Input a TARE signal (Pin 24) to ZERO the display.
6. Open the Full-Flow Gate and the Dribble-Flow Gate for Full-Flow filling into the Receiving Bin.
7. When the display reaches "**Final - SP 2**", the **SP 2** Output (Pin 11) signal will come **ON**. Closed the Full-Flow Gate by using the **SP 2** Output ON signal.
8. When the display reaches "**Final - FREE**", the FREE Output (Pin 10) signal will come **ON**. Closed the Dribble-Flow Gate by using the FREE Output ON signal.
9. After Free Fall has stopped - check to see if the HI and LO (Pin 9, Pin 8) signals are OFF. If both outputs are OFF then the batch is completed correctly.
10. An Automatic Free Fall Compensation Command (Min. 200ms pulse to Pin 21) may be given at this time.
11. If the GROSS weight of the Weighing Hopper is below the ZERO Band (Pin 13), the ZERO Band Output will be ON. The ZERO Band Output will refill Weighing Hopper if needed.
12. Ready for next batching event.
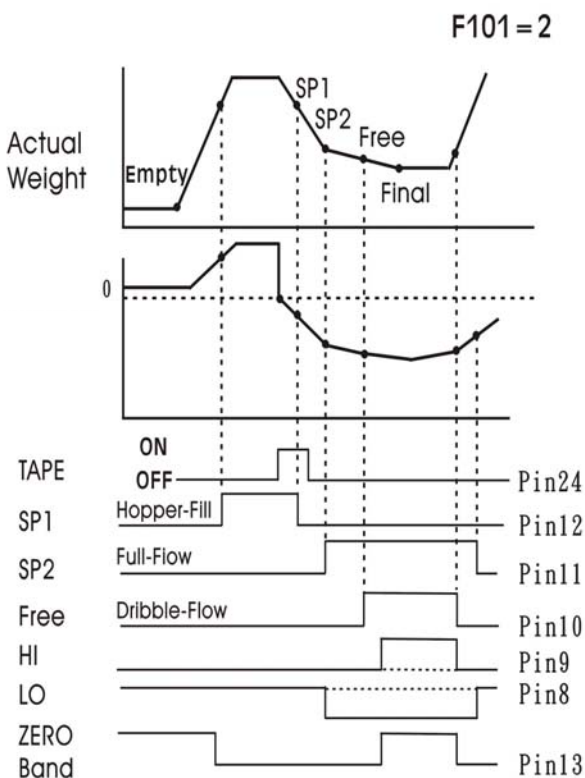
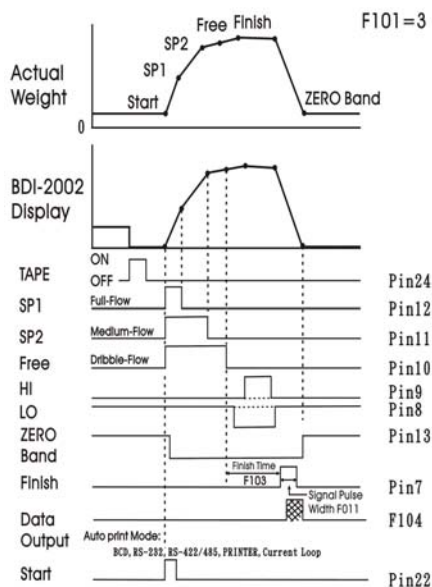# Built-in Automatic Program Mode: Normal Batching(F101 = 3)

   SP1 - Full Flow Gate
   SP2 - Medium Flow Gate
   Free - Dribble Flow Gate
   Start signal – Pin22
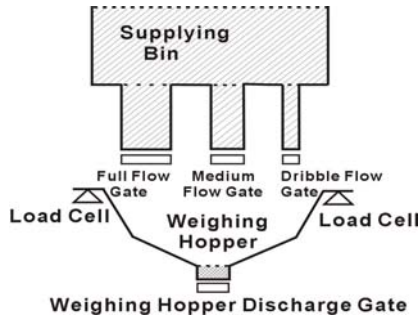
1. The Weighing Hopper is empty, the display shows "0", and all Gates are closed. If the display is not at ZERO, **input a TARE** signal (Pin 24) to **re-ZERO the display**.
2. Check if the Weighing Hopper is empty using the ZERO Band Output (Pin 13).
3. Input the Start signal via the Control I/O Interface connector (Pin 22). When the Start signal is received, then **SP 1**, **SP 2**, and Free Output signals will "come ON".

   Note: When the Final Weight is 0, the Pin 12, 11 and 10 are kept OFF.

4. Open the Supply Bin's: Full-Flow Gate, Medium-Flow Gate, and Dribble-Flow Gate.

5. When the display reaches "**Final - SP 1**", the **SP 1** Output (Pin 12) signal will come **OFF**. Closed the Full-Flow Gate by using the **SP 1** Output OFF signal.
6. When the display reaches "**Final - SP 2**", the **SP 2** Output (Pin 11) signal will come **OFF**. Closed the Medium-Flow Gate by using the **SP 2** Output OFF signal.
7. When the display reaches "**Final - Free**", the **Free** Output (Pin 10) signal will come **OFF**. Closed the Dribble-Flow Gate by using the Free Output OFF signal.
8. Batch Finish signal is sent after the set time period (F103) or when the display is stable.
9. After Free Fall has stopped - check to see if the HI and LO (Pin 9, 8) signals are OFF. If both outputs are OFF then the batch is completed correctly.
10. Automatic Free Fall is now recalculated for the next event.
11. The Weighing Hopper Discharge Gate will be opened using the Finish Output (Pin 7) ON signal.
12. Data Output is sent (Auto print Mode: BCD, RS-232C, RS-422/485, Printer or Current Loop). The NET Weight data will be accumulated.
13. Ready for the next batching event.
14. If an Abort signal is sent (Pin 21) anytime after the Start signal is received, then:
(1) SP 1, SP 2 and Free signals will go OFF, and Gates will be closed.
(2) Batch Finish and Data Output signals will be sent.
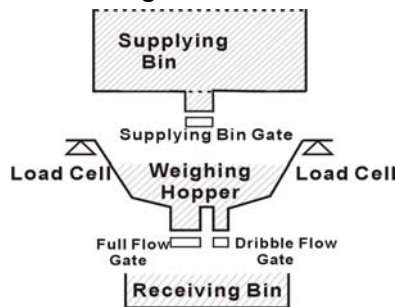(3) NET Weight data will be accumulated.

◎ Built-in Automatic Program Mode: Loss-in-Weight Batching (F101=4)

SP1 – Supplying Bin Gate
SP2 – Full Flow Gate
Free – Dribble Flow Gate
Start signal – Pin22

1. The Weighing Hopper/ Supply Bin is empty .The display shows "0", and all Gates are closed.
2. Open the Supplying Bin Gate.
3. When the GROSS Weight reaches "**SP 1**", the **SP 1** Output (Pin 12) signal will come **ON**. Closed the Supplying Bin Gate by using the **SP 1** Output ON signal.
4. The displayed weight will exceed the **SP 1** value by the Free Fall value. This weight is not necessarily accurate - but accuracy is not needed at this moment since the purpose of this event is to fill up the Weighing Hopper. The SP 1 value is always compared to GROSS weight.
5. Input a TARE signal (Pin 24) to ZERO display.
6. Input the Start signal via the Control I/O interface connector (Pin 22). When the Start signal is received, the SP 2 and Free Outputs "come ON".

   Note : When the Final Weight is 0, the Pin 11 and 10 are kept OFF .

7. Open the Full-Flow Gate and the Dribble-Flow Gate for Full-Flow filling into the Receiving Bin.
8. When the display reaches "**Final - SP 2**", the **SP2** Output (Pin 11) signal will come **OFF**. Closed the Full-Flow Gate by using the **SP2** Output OFF signal.
9. When the display reaches "**Final - FREE**", the FREE Output (Pin 10) signal will come **OFF**. Closed the Dribble-Flow Gate by using the FREE Output OFF signal.
10. Batch Finish signal is sent after the set time period (F103) or when the display is stable.
11. After Free Fall has stopped - check if the HI and LO (Pin 9, 8) signals are OFF. If both outputs are OFF then the batch is completed correctly.
12. Automatic Free Fall is now recalculated for the next event.
13. The Weighing Hopper Discharge Gate will be opened using the Finish Output (Pin 7) ON signal.
14. Data Output is sent (Auto print Mode: BCD, RS-232C, RS-422/485, Printer or Current Loop). The NET Weight data will be accumulated.
15. Signal (Pin 13) will refill using ZERO Band Output if needed. Ready for next batching event.
16.Ready for the next batching event.
17. If an Abort signal is sent (Pin 21) anytime after the Start signal is received, then:
(1) SP 1, SP 2 and Free signals will go OFF, and Gates will be closed.
(2) Batch Finish and Data Output signals will be sent.
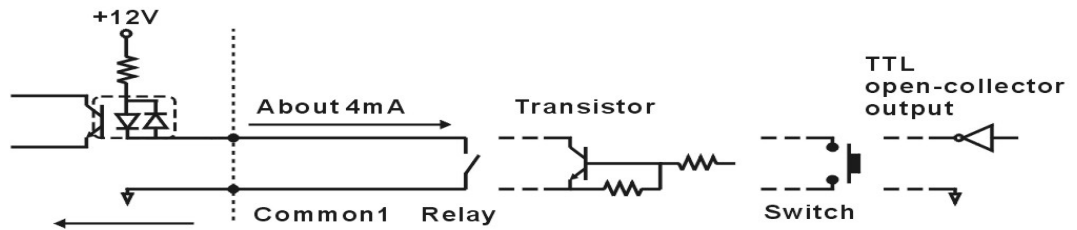(3) NET Weight data will be accumulated.
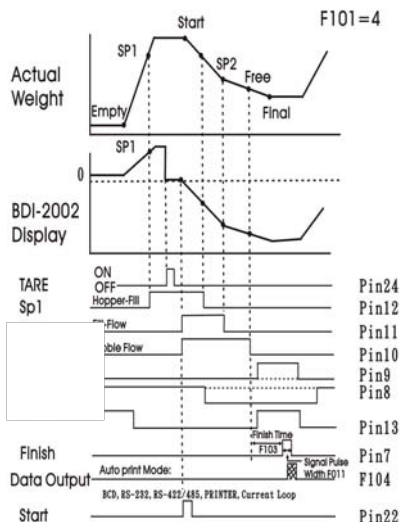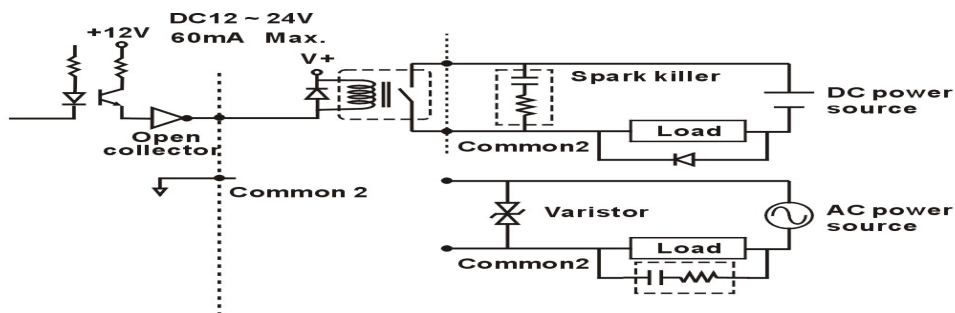
CHAPTER 6   OPTIONS

§ 6-1 I/O INTERFACE

◎ Control I / O

Input：

The width of these input pulse should at least 0.25 sec.

Output：

◎ INPUT Pins Description When F101 =1, 2.

Pin	Name	Signal	Function
Pin25	ZERO Input	pulse	**BDE 2007 will zero according to F004**
Pin24	TARE Input	pulse	**BDE 2007** will return to zero and store tared weight.
Pin23	TARE Reset	pulse	Clear Tared Weight
Pin21	Auto Free Fall Compen -sation when batching	pulse	When P21 and COM 1 shortage, BDE 2007 will adjust compensation value for next batch. And accumulate Net Weight.
Pin18	Clear count and acculmulation.	pulse	Clear count and accumulation.
Pin17、16	Input Common（COM1）		

◎ INPUT Pins Description When F101 =3, 4.

Pin	Name	Signal	Function
Pin25	ZERO Input	Pulse	**BDE 2007** will zero according to F004
Pin24	TARE Input	Pulse	**BDE 2007** will return to zero and store tared weight.
Pin23	TARE Reset	Pulse	Clear Tared Weight
Pin22	Batch/Loss in Weight Start batch (Pulse input)	Pulse	Start Batch
Pin21	Batch/Loss in Weight Stop batch (Pulse Input).	pulse	Stop Batch and send finish signal, and accumulation.
Pin18	Clear count and accumulation.	pulse	Clear count and accumulation.
Pin17、16	Input Common（COM1）		

◎ Output When F101=1,2,3,4

Pin	Name	F101	Description
Pin13	ZERO Band		Gross Weight≦ZERO Band
Pin12	SP1	1,3	Batch：Net Weight＞＝Final－SP1
		2,4	Loss in Weight：Gross Weight＞SP1
Pin11	SP2		Net Weight＞＝Gross－SP2
Pin10	FF		Net Weight＞＝Final －FF
Pin9	HI		Net Weight＞Final＋Hi value
Pin8	LO		Net Weight＜Final－Lo Value
Pin7	FINISH	3,4	Batch/ Loss-in Weight： Final Output -Finsh Signal
Pin6	Unstable / Error		F105＝0：Stable：Open，Unstable：Short. F105＝1：Error Output，ZERO exceed valid Range, Overload, or Printer Error.
Pin3、4	Output 12V		Max. 0.5A
Pin1、2	COM2		

§ 6-2 Serial interface OP-02

There are two kinds of OP-02：
(1) High speed two way(Pin3,Pin4)　　F200　　　　(2)Low speed one way(Pin1)　　　　FL00
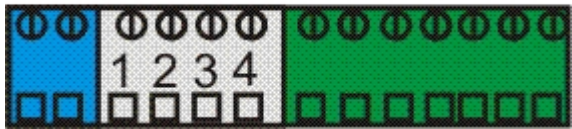
◆Specifications		
Type	EIA-RS-232C 12V	
Transmission	Half Duplex, Asynchronous Transmission	
Baud Rate	1200、2400、4800、9600、19200BPS	
Bit	8 bit	7 bit
Parity	non- parity	Odd / even parity
Stop bit	1 bit	
Output Code	ASCII	
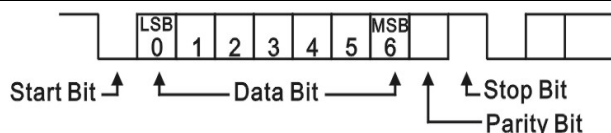
✱OP-02A （RS-232）

25 Pin assigments

Pin	Assigment
Pin 1	TxD2 (Transmit Data)
Pin 2	SG (Signal Ground)
Pin 3	RxD (Receive Data)
Pin 4	TxD (Transmit Data)

✱OP-02B （RS-485）

◆ RS-485 Spec：		
Type	EIA-RS-485	
Transmission	Half Duplex, Asynchronous Transmission	
Baud Rate	2400BPS、4800BPS、9600BPS、19200BPS、38400BPS	
Bit	8 bit	7 bit
Parity	non- parity	Odd / even parity
Stop bit	1 bit	
Output Code	ASCII	

◆ *Pins when connect PC：*
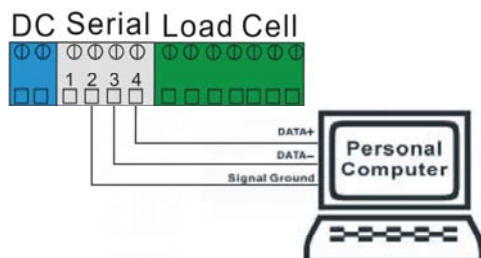
◆ Data format

F205＝0　（standard）

format1（F002）　　　　　　　　　　　↓ UNIT

S	T	，	N	T	，	0	0	5	4	3	2	•	1	k	g	Cr	Lf

↑Header1↑Header2↑ Data（8 digits in length）

※ HEADER 2	
N	➔ NET
G	➔ GROSS
T	➔ TARE

※ HEADER 1		
O	L	➔ Over Max. Capacity or under
S	T	➔ STABLE
U	S	➔ UNSTABLE

※ UNIT 單位		
k	g	➔ Kilogram
l	b	➔ Pound
t	t	➔ Ton

ASCII data characters
" 0 " ～ " 9 "
" " Space（20H）
" • " Decimal Point（2EH）
" — " Minus（2DH）
" ＋ " Plus（2BH）

※Command List Table

Sending Command to BDE-2007	BDE-2007 response
R01 Cr Lf 〈READ〉	Sending latest data once (Data format depends on F202)
K01 Cr Lf 〈ZERO〉	BDE-2007 display will ZERO. Z Cr Lf will be sent by BDE-2007.
K02 Cr Lf 〈TARE〉	BDE-2007 will go to NET Mode and display will TARE. T Cr Lf will be sent by BDE-2007.
K04 Cr Lf 〈NET〉	BDE-2007 will go to NET Mode. N Cr Lf will be sent by BDE-2007.
K03 Cr Lf 〈GROSS〉	BDE-2007 will go to GROSS Mode. G Cr Lf will be sent by BDE-2007.

Sending Command to BDE-2007	BDE-2007 response
C01 Cr Lf ＜BEGIN BATCHING＞	Send back signal "BB". "BB" can only be received in the Built in Automatic Program Control Mode. (Only F101=2,3)
C02 Cr Lf ＜HALT BATCHING＞	Send back signal "HB". "HB" an only be received in the Built in Automatic Program Control Mode (Only F101=2,3)
R04 Cr Lf ＜READS FINAL NET＞	Sending Final NET weight. If B Cr Lf is send by BDE-2007, that means batching is still in process. (Only F101=2,3)
W02:Data Cr Lf ＜SETPOINT＞	Signal "S Cr Lf " will send back by BDE-2007. BDE-2007 will send back SET POINT CODE until totally receive SET POINT CODE data.

R03 Cr Lf ＜READ SETPOINT＞	SS XX Cr Lf will send back by BDE-2007. BDE-2007 will send back SET POINT values until totally receive SET POINT values.
W01:Data Cr Lf ＜SET ACCESSORIES＞	BDE-2007 will send back signal "SA Cr Lf". BDE-2007 will send back ZERO band data until totally receive Zero Band Value.
R02 Cr Lf ＜READ ACCESSORIES＞	BDE-2007 receives signal "RS Cr Lf".

※ Error message

BDE 2007 Error number	BDE 2007 Error message
E01	**The format of command is not correct.**
E02	**The data of command is not correct.**
E03	**Data not Accept.**
E04	**Can not execute.**
E05	**Indicator is busy.**

※If an invalid character is received？Cr Lf will be sent by the BDE-2007

※If the commands are not accepted for any reason：I Cr Lf will be sent by the BDE-2007

※Batch 1 2 3 4 S Cr Lf

6	5	4	3	2	1	4	5	6	7	8	9	0	2	3	4	5	6

♠Final   ♠SP1   ♠SP2

1	2	3	4	1	2	3	4	1	2	3	4	Cr	Lf

♠Free   ♠Hi   ♠Lo

※SA Cr Lf format

0	0	3	4	5	6	Cr	Lf

Zero Range

※Please setup F204 first and give command @XX（XX＝F204）
  Ex: @XX R Cr Lf   @XX T Cr Lf

§ 6-3 Analog OP-05
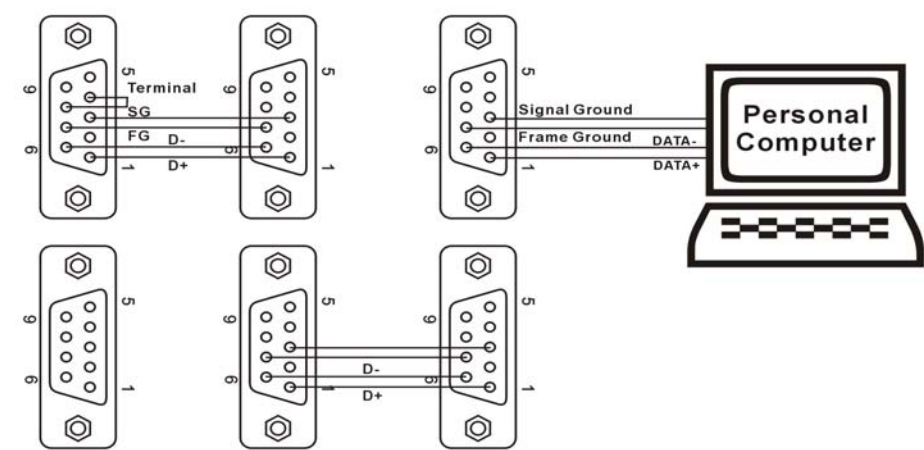
> ⊠Please refer to § 4-2 F500 ~ F504

＊ OP-05 Set at Analog 4 ~ 20mA

Range	4 ~ 20mA (Possible: 2 ~ 22mA)
Resolution	Min. 1 / 3000
Temp. coefficient	± (0.015% / ℃of rdg + 0.01mA) / ℃
Max. resistance load	Max. 500Ω

Pin1 Pin2 Pin3 Pin4 Pin5

FG   FG

Iout SG
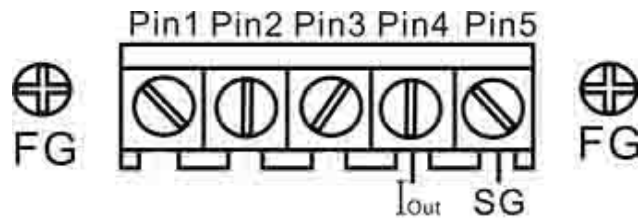
☛**If you add a 250Ω resistor , the output will be 1V to 5V (4~20mA)**

ⓘThis resistor must be large enough for proper power consumption.

Use the following formula: $W = I^2 \times R$

where

W: Power   I: Output Current

R: Resistor

If a 500Ω resistor is used , power consumption will be :

$W = (0.02)^2 \times 500 = 0.2$ when the Output Current is set to 0.2mA

The resistor should have a power greater than "0.5" (w = 0.5) and have a very low temperature coefficient. In this example power consumption is "0.2" and thus, the 500Ω resistor is adequate.

☛**Setting Output Current**

$IOUT = IZ + (\text{weight} / \text{capacity}) * (IM - IZ)$ (if 2<= IOUT <=22 mA)

IOUT: Output Current   IZ: Output at ZERO (F501)   IM: Output at Maximum Capacity (F502)

Example: A weighing system has a Maximum Capacity of 10,000kg.

If you need the Output current to be 4mA at ZERO display, and 20mA at 1/2

Maximum Capacity then:

$IM = \text{capacity} / \text{simulated}) \times (IOUT - IZ) + IZ$

$IM = 10000 / 5000 \times (20\,mA - 4\,mA) + 4\,mA = 36\,mA$

When Output at Full Scale is set at 36mA, and Output Current at Display ZERO is set at 4mA, then at 1/2 Capacity (5000kg) the Output Current will be 20mA.

※ NOTE: The Maximum Output will be saturated at 24mA.

Output Circuit：

+V ─⊙⊙─ ▷   Iout (Pin4)

R

SG (Pin5)

SG

OP-05 Inside※ Resistance R≦ 500Ω
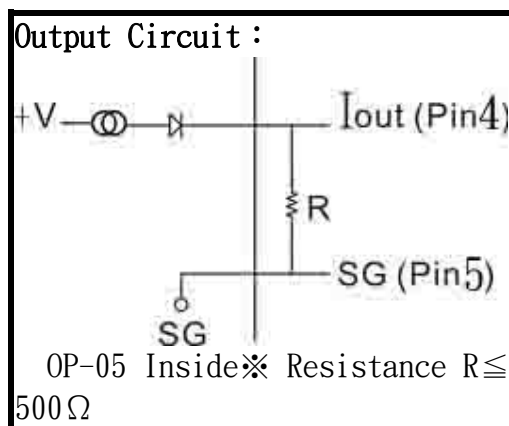
＊ OP-05 Set at Analog 0 ~ 10V

If you set at 0-10V, Please also connect V+ V- as follows. 。

☛If you add a 10 KΩ resistor , the output will be 0mA to 1mA (0~10 V)

ⓘ This resistor must be large enough for proper power consumption.
Use the following formula: $W = V^2 / R$
where
W: Power   V: Output Voltage   R: Resistor
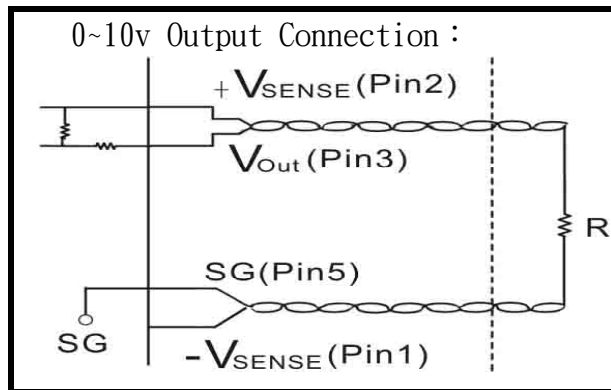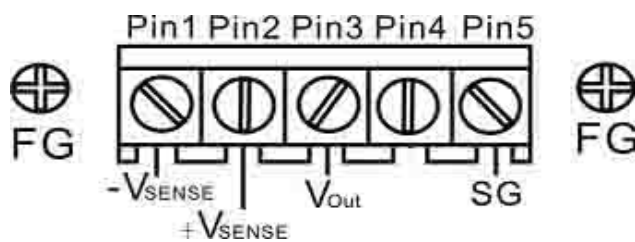
☛ Setting Output Voltage

VOUT = VZ + (weight / capacity) * (VM - VZ)   (if 0<= VOUT <=10 V)
                VOUT: Output Voltage
                VZ: Output at ZERO (F503)
        VM: Output at Maximum Capacity (F504)

NOTE: The Maximum Output will be saturated at 10 (V).

Range	0～＋10V，(Possible: -1.25 ~ 11.25V)
Resolution	Min. 1 / 3000
Temp. coefficient	± (0.015% / ℃ of rdg＋0.01mA) / ℃
Max. resistance load	Min. 5KΩ

§ 6-4 *RELAY CONTROL INTERFACE   OP-08*
**This option is to connecting BDE 2007 OP-01 Control I/0, which enable OP-01 to RELAY OUTPUT.

Specifications:

Power： Standard：DC12 from Outside.

Pin assignment：
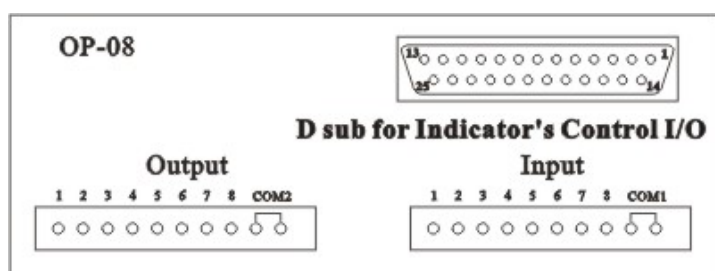
Accessory：
（1）25PIN Male to Female Wire 1.8 Meter.

(A) RELAY TYPE

Input (IN)
　　Number of Pins：8.
　　Input Common Pin：COM1

Output (OUT):
　　Number of Pins：8.
　　Type：for RELAY.
　　Max. Load：250VAC, 30VDC, 3A
　　Output Common Pin：COM2
　　RELAY durance：About 100,000 Times.
　　LED light will ON when work.

(B) SSR TYPE

Input (IN)
　　Number of Pins：8.

　Input Common Pin：COM1

Output (OUT):
　Number of Pins：8.
　　Type：for RELAY.
　　Max. Load：24~280VAC, 3A (Only for AC)
　　Output Common Pin：COM2
　　RELAY durance：About 100,000 Times.

　　LED light will ON when work.

CONTROL I/O Pins		
OP-08 I/O		BDE-2007 Control I/O
Input	1	PIN 25
	2	PIN 24
	3	PIN 23
	4	PIN 22
	5	PIN 21
	6	PIN 20
	7	PIN 19
	8	PIN 18
Output	1	PIN 13
	2	PIN 12
	3	PIN 11
	4	PIN 10
	5	PIN 9
	6	PIN 8
	7	PIN 7
	8	PIN 6

§ 6-5   MODBUS

Data Register					
R/W	Type	Function	Address	Modbus address	Description
R	Word	R:04	0000 ~ 0001	30001 ~ 30002	Same as display
R	Word	R:04	0002 ~ 0003	30003 ~ 30004	G.W.
R	Word	R:04	0004 ~ 0005	30005 ~ 30006	N.W.
R	Word	R:04	0006 ~ 0007	30007 ~ 30008	Tare Value
R	Word	R:04	0008 ~ 0009	30009 ~ 30010	Accumulation
R	Word	R:04	0010 ~ 0011	30011 ~ 30012	Total Count
R	Word	R:04	0012 ~ 0013	30013 ~ 30014	Actual Final
R/W	Word	R:03,W:06	0000 ~ 0001	40001 ~ 40002	Final
R/W	Word	R:03,W:06	0002 ~ 0003	40003 ~ 40004	SP1
R/W	Word	R:03,W:06	0004 ~ 0005	40005 ~ 40006	SP2
R/W	Word	R:03,W:06	0006 ~ 0007	40007 ~ 40008	FF
R/W	Word	R:03,W:06	0008 ~ 0009	40009 ~ 40010	HI
R/W	Word	R:03,W:06	0010 ~ 0011	40011 ~ 40012	LO

Bit I/O					
R/W	Type	Function	Address	Modbus address	SCALE Output
R	Bit	R:02	0000	10001	ZERO
R	Bit	R:02	0001	10002	M.D.
R	Bit	R:02	0002	10003	G.W.
R	Bit	R:02	0003	10004	N.W.
R	Bit	R:02	0004	10005	Tared
R	Bit	R:02	0005	10006	OVER
R	Bit	R:02	0030	10049	Zero Range
R	Bit	R:02	0031	10050	SP1
R	Bit	R:02	0032	10051	SP2
R	Bit	R:02	0033	10052	FF
R	Bit	R:02	0034	10053	HI
R	Bit	R:02	0035	10054	LO
R	Bit	R:02	0036	10055	Finish
R	Bit	R:02	0037	10056	Unstable / Error

Bit I/O					
R/W	Type	Function	Address	Modbus Address	SCALE Intput
R/W	Bit	R:01,W:05	0000	00001	ZERO
R/W	Bit	R:01,W:05	0001	00002	TARE
R/W	Bit	R:01,W:05	0002	00003	TARE Cleared
R/W	Bit	R:01,W:05	0003	00004	Display G.W.
R/W	Bit	R:01,W:05	0004	00005	Display N.W.
R/W	Bit	R:01,W:05	0030	00049	Add 1
R/W	Bit	R:01,W:05	0031	00050	Clear ACC and Count
R/W	Bit	R:01,W:05	0032	00051	Start Batch
R/W	Bit	R:01,W:05	0033	00052	Stop Batch

Additional address	Function code	Data	Error check(CRC)

General MODBUS frame

Function codes descriptions :

04 (0x04) Read Input Registers

Function code	1 Byte
Starting Address	2 Byte
Quantity of Input Registers	2 Byte
CRC	2 Byte

Request:

				Data		
Additional address	Function code	Starting Address Hi	Starting Address Lo	Quantity of Input Reg. Hi	Quantity of Input Reg. Lo	CRC

Response:

			Data		
Additional address	Function code	Byte count	Input Registers	CRC	

EX: Read same as display :

01	04	00	00	00	02	71CB

Read same as display -Response:

01	04	04	Data	CRC

03 (0x03) Read Holding Registers

Function code	1 Byte
Starting Address	2 Byte
Quantity of Registers	2 Byte
CRC	2 Byte

Request:

				No. of Registers Hi	No. of Registers Lo	CRC
Additional address	Function code	Starting Address Hi	Starting Address Lo			

Response:

			Data		
Additional address	Function code	Byte count	Input Registers	CRC	

EX: Read Final weight

01	03	00	02	00	02	D00B

Read Final weight - Response:

01	03	04	Data	CRC

02 (0x02) Read Discrete Inputs

Function code	1 Byte
Starting Address	2 Byte
Quantity of Inputs	2 Byte
CRC	2 Byte

Request:

Additional address	Function code	Starting Address Hi	Starting Address Lo	Quantity of Inputs Hi	Quantity of Inputs Lo	CRC

Response:

Additional address	Function code	Register Address	Register Value	CRC	

EX: Read ZERO status.

01	02	00	00	00	01	B9CA

EX: Read ZERO status- Response:

01	02	01	Data	CRC

06 (0x06) Write Single Register

Function code	1 Byte
Register Address	2 Byte
Register Value	2 Byte
CRC	2 Byte

Request:

Additional address	Function code	Register Address Hi	Register Address Lo	Register Value Hi	Register Value Lo	CRC

Response:

Additional address	Function code	Register Address	Register Value	CRC

EX: Write 500 TO Final Weight

01	06	00	00	13	88	849C

EX: Write 500 TO Final Weight- Response:

01	06	00	00	Register Value		CRC
				13	88	

02 (0x02) Read Discrete Inputs

Function code	1 Byte
Starting Address	2 Byte
Quantity of Inputs	2 Byte
CRC	2 Byte

Request:

Additional address	Function code	Starting Address Hi	Starting Address Lo	Quantity of Inputs Hi	Quantity of Inputs Lo	CRC

Response:

Additional address	Function code	Register Address	Register Value	CRC

EX: Read ZERO status.

01	02	00	00	00	01	B9CA

EX: Read ZERO status- Response:

01	02	01	Data	CRC

※BDE-2007 MODBUS SAMPLE CODE

EX：Read as display：01 04 00 00 00 02 71 CB

EX：Read as N.W.：01 04 00 02 00 02 D0 0B

EX：Read Final weight：01 03 00 00 00 02 C4 0B

EX：Read SP1weight：01 03 00 02 00 02 65 CB

EX：Write 5000 to Final weight：

    01 06 00 00 13 88 84 9C

EX：Write 300 to SP1 Value：

    01 06 00 02 0B B8 2F 48

EX：Read ZERO status：01 02 00 00 00 01 B9 CA

EX：Read ZERO Range：01 02 00 30 00 01 B9 C5

EX：Write ZERO to BDE 2007：

    01 05 00 00 FF 00 8C 3A

※Error Code：

01	Function Code Error
02	Data Address Error
03	Not Valid (0X0000<= Register Value =>0xFFFF)
04	Can not execute

Appendix 2

【Screen characters】

0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9

A	B	C	D	E	F	G	H	I	J	K	L	M
A	b	C	d	E	F	G	H	i	J	h	L	ii

N	O	P	Q	R	S	T	U	V	W	X	Y	Z
n	o	P	q	r	S	t	U	u	Y	h	Y	2

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Benediction Enterprise Co., Ltd, Taiwan

20090602 VER.

BDE 2007 Weighing Indicator & controller
User's Manual