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LINEAR WEIGHER CONTROLLER with LED DISPLAY

High Speed weighing of rice, pulses, cereals etc., with 1 gram accuracy.

SPARK DNA's Linear Weigher Controller - LWC is an ideal choice for weigh-metric applications mainly for food processing and packaging industry. It is designed with a high performance 32-bit ARM Microcontroller, Load Cell Amplifier, RS485 MODBUS RTU and application specific Inputs and Outputs. This module directly controls a Vibratory feeder or a belt conveyer driven by VFD to achieve the required weight. Hence processing power of PLC is saved.

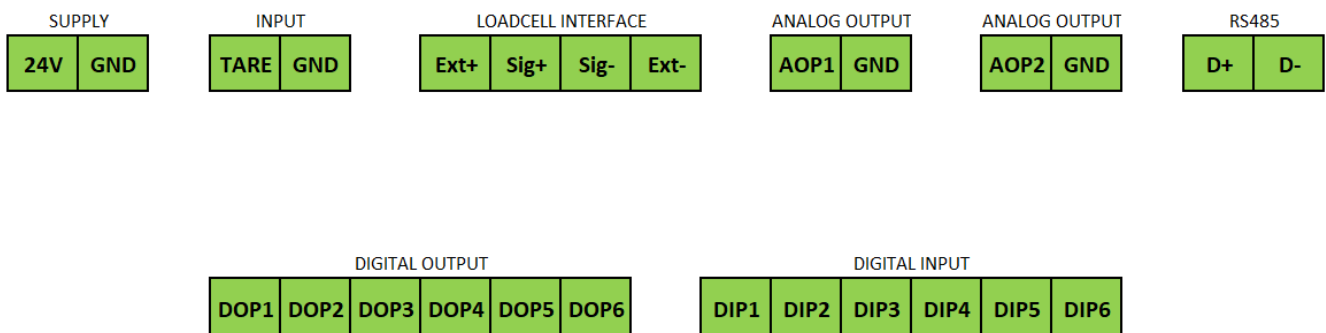


SPECIFICATIONS:

- ✓ Standard 24V Operation.
- ✓ Dual display - Red for Target weight setting and Green for Actual weight indication.
- ✓ Built-in RS-485 MODBUS RTU Communication.
- ✓ Load-cell calibration, Target grams, Coarse, Fine values and speed, Tare, Bucket open/close timings can be set easily using Keypad and LED Screen.
- ✓ Six digital inputs, six digital outputs, two analog outputs available for dedicated functions.
- ✓ Independently control a single head linear weigher machine
- ✓ Controls Vibrator drive or VFD drive directly using 0...10VDC outputs

CONNECTIONS:

WEIGHER CONTROLLER PIN DETAILS



Note:

- All Digital inputs are PNP inputs.
- All Digital outputs are NPN outputs.
- AOP: 0-10Vdc

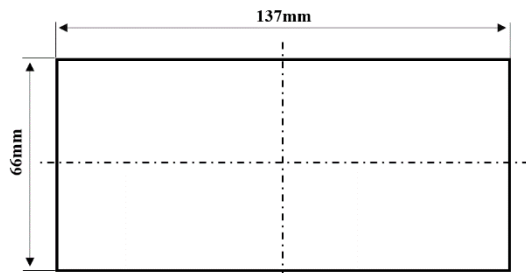
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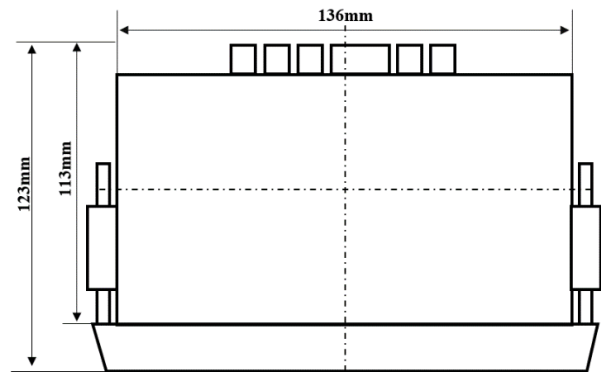
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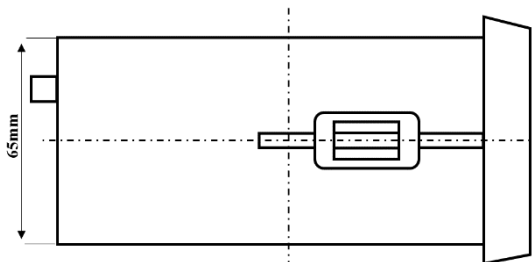
DIMENSIONS:



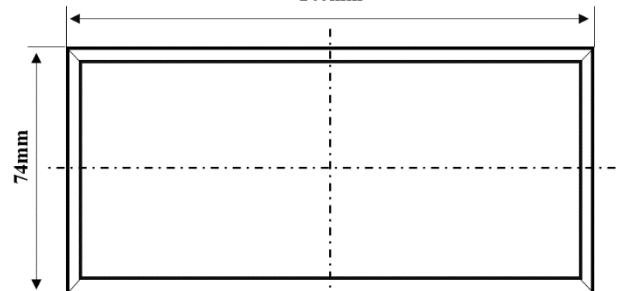
Panel Hole Dimensions: It can be installed



Top View
146mm

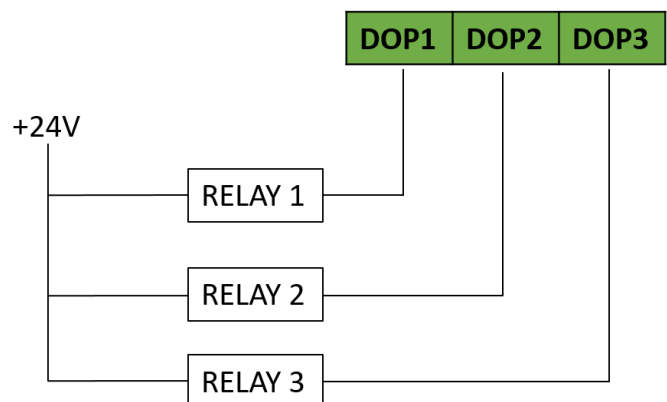
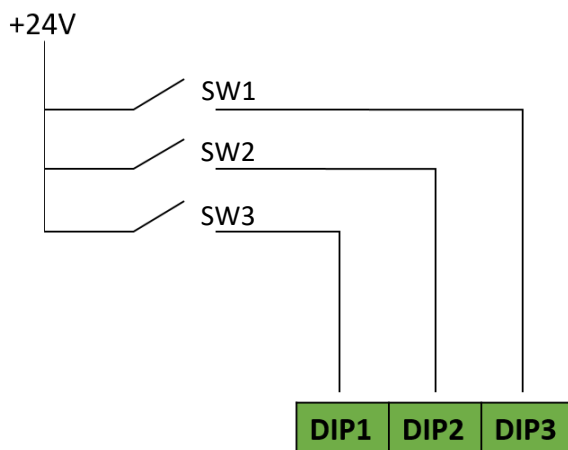


Side View



Cover

Example digital input/output connections.





Functions of I/O:

Digital Input	On	Off
DIP 1	Normal	Emergency Stop
DIP 2	Filling on	Filling off
DIP 3	Auto Dump on	Auto Dump off
DIP 4	Dump Signal	normal
DIP 5	Front Vibrator High material	Front Vibrator Low material
DIP 6	Bucket open Feedback	Bucket Closed Feedback

Digital Output	Status
DOP 1	Bucket open/Discharge
DOP 2	Filling complete
DOP 3	Bulk feed
DOP 4	Medium feed
DOP 5	Fine feed
DOP 6	Clamp

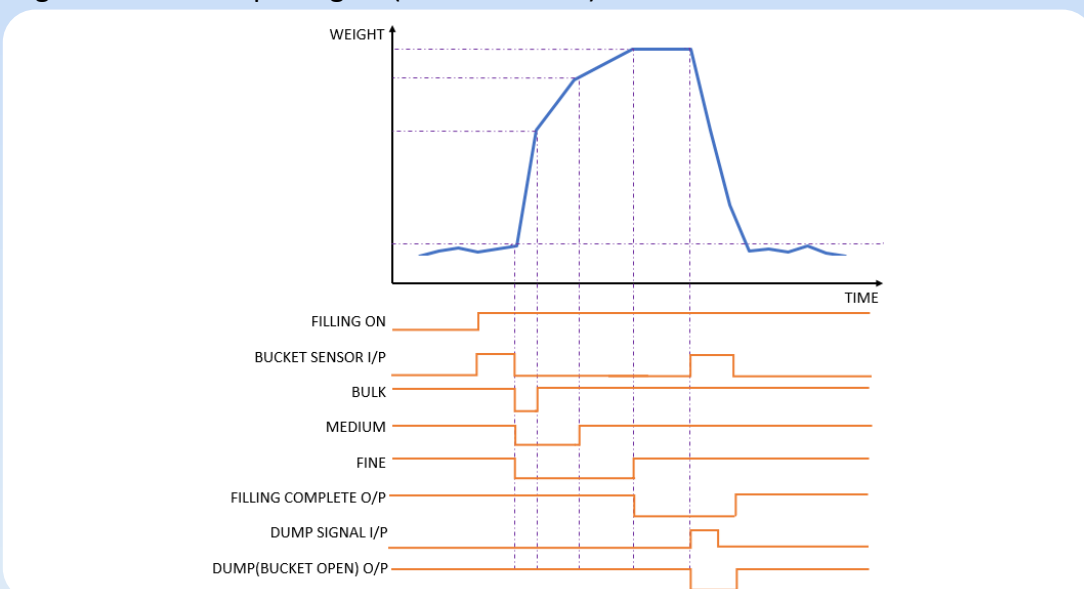
Analog Output	Status
AOP 1	Output for Front/Bulk -Vibrator controller/ VFD Drive
AOP 2	Output for back/Fine -Vibrator controller/ VFD Drive

Typical Application and Logic:

In order to make sure packing accuracy and improve the working efficiency, the controller will provide 3 filling speeds (Bulk, Medium, and Fine).

Additional, you can setup the Analog output AOP1, AOP2 (0-10VDC) to control the vibratory feeder, belt conveyor or screw conveyor with the respective Drivers.

The controller will discharge the material in the collection bucket when the weight reaches the target and Bucket open signal (DUMP SIGNAL) is detected.





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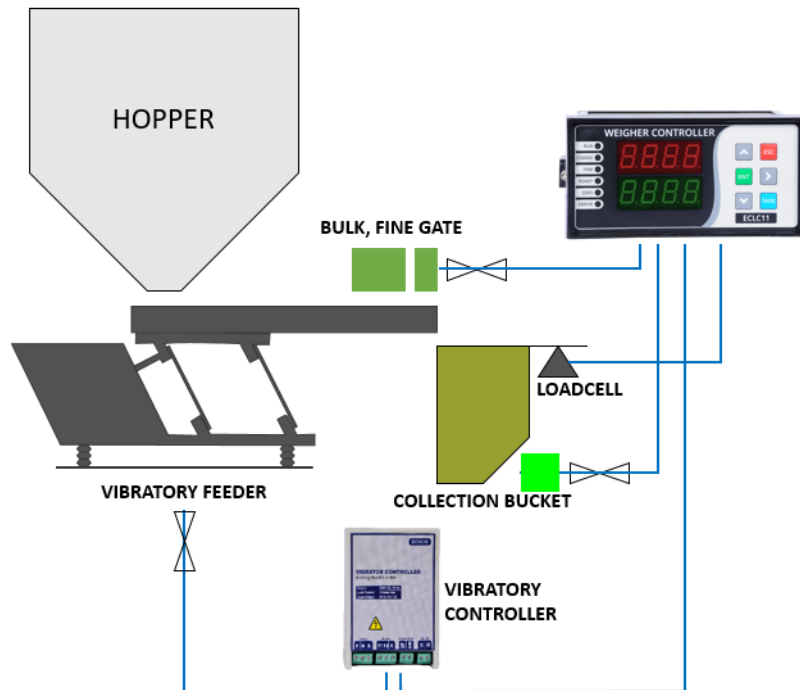
Application Diagram:

Single Vibrator model:

In this model material in hopper will be transferred to collection bucket through a vibrator.

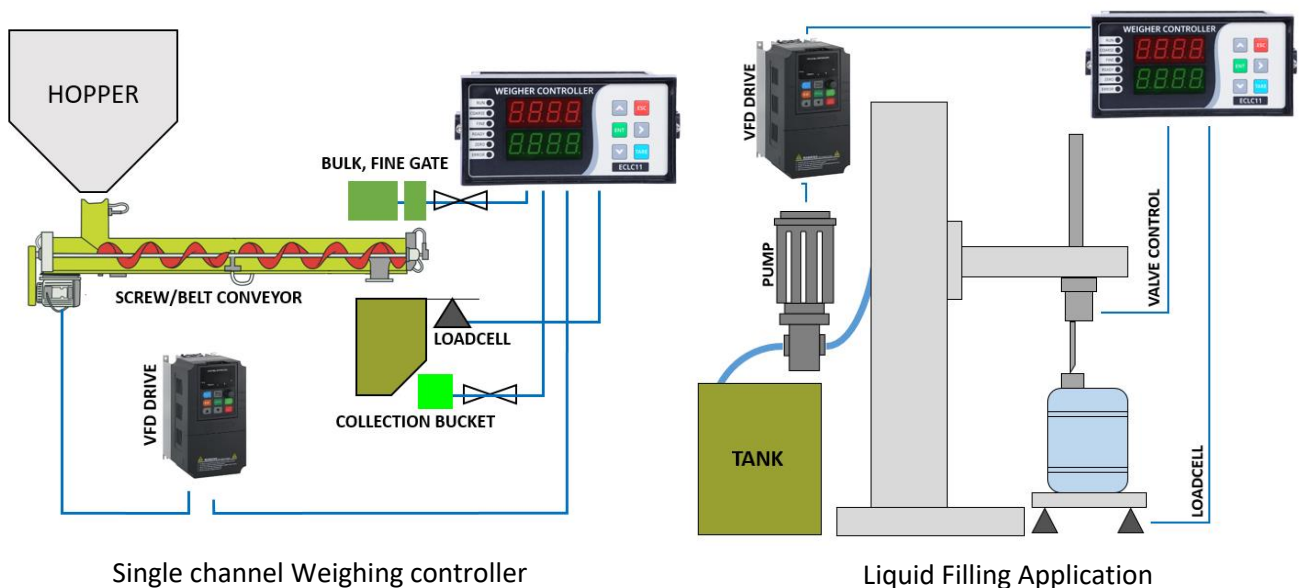
Analog output 1 (AOP1) can be used to control the Vibratory feeder controller.

Bulk Speed AOP1 > Medium speed AOP1 > Fine Speed AOP1.



Similar application:

The controller can control a VFD (AOP: 0-10Vdc) to drive a belt conveyor, Screw conveyor or a pump in replacement to Vibratory Feeder.



Single channel Weighing controller

Liquid Filling Application



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Dual Vibrator in Series model:

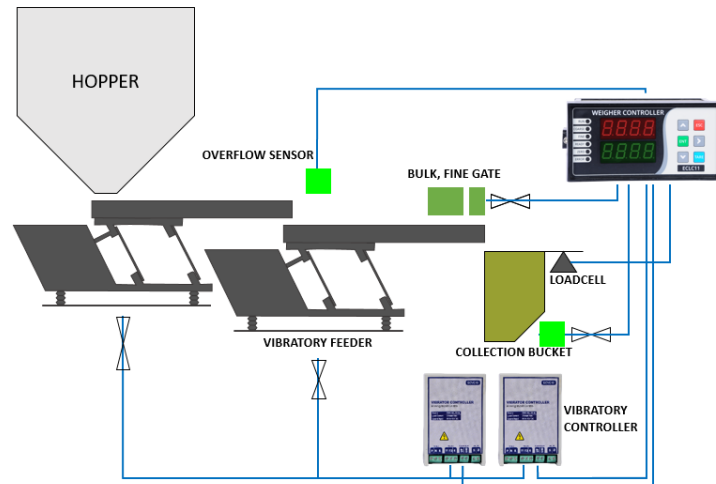
Compared with single vibrator model, material in the hopper will be transferred from back vibrator to front vibrator only when the front vibrator does not have material in it. Overflow sensor is placed above the front vibrator for material detection.

Analog output 1 (AOP1) can be used to control the front vibrator.

Bulk Speed AOP1 > Medium speed AOP1 > Fine Speed AOP1.

Analog output 2 (AOP2) can be used to control the back vibrator.

Bulk Speed AOP2 = Medium speed AOP2 = Fine Speed AOP2.



Dual Vibrator in Parallel model:

Compared with dual vibrator in series model, material in the hopper will be transferred from both vibrators to collection bucket. After bulk weight is reached, bulk vibrator will be stopped and remaining material will be filled through fine vibrator.

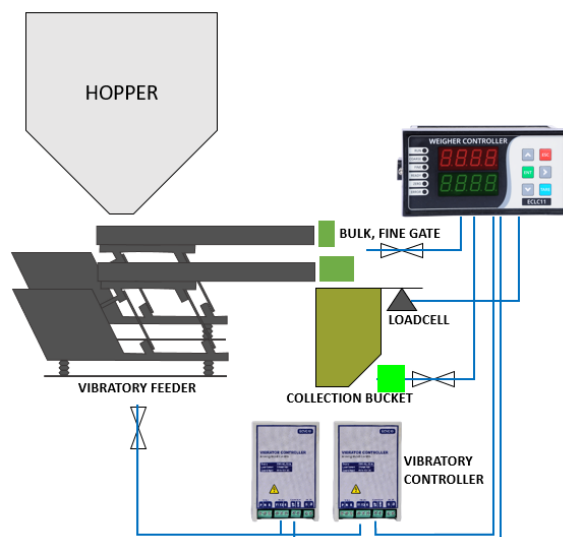
Analog output 1 (AOP1) can be used to control the BULK vibrator.

Bulk Speed AOP1 > 0

Medium speed AOP1 = Fine Speed AOP1 = 0.

Analog output 2 (AOP2) can be used to control the FINE vibrator.

Bulk Speed AOP2 = Medium speed AOP2 = Fine Speed AOP2.

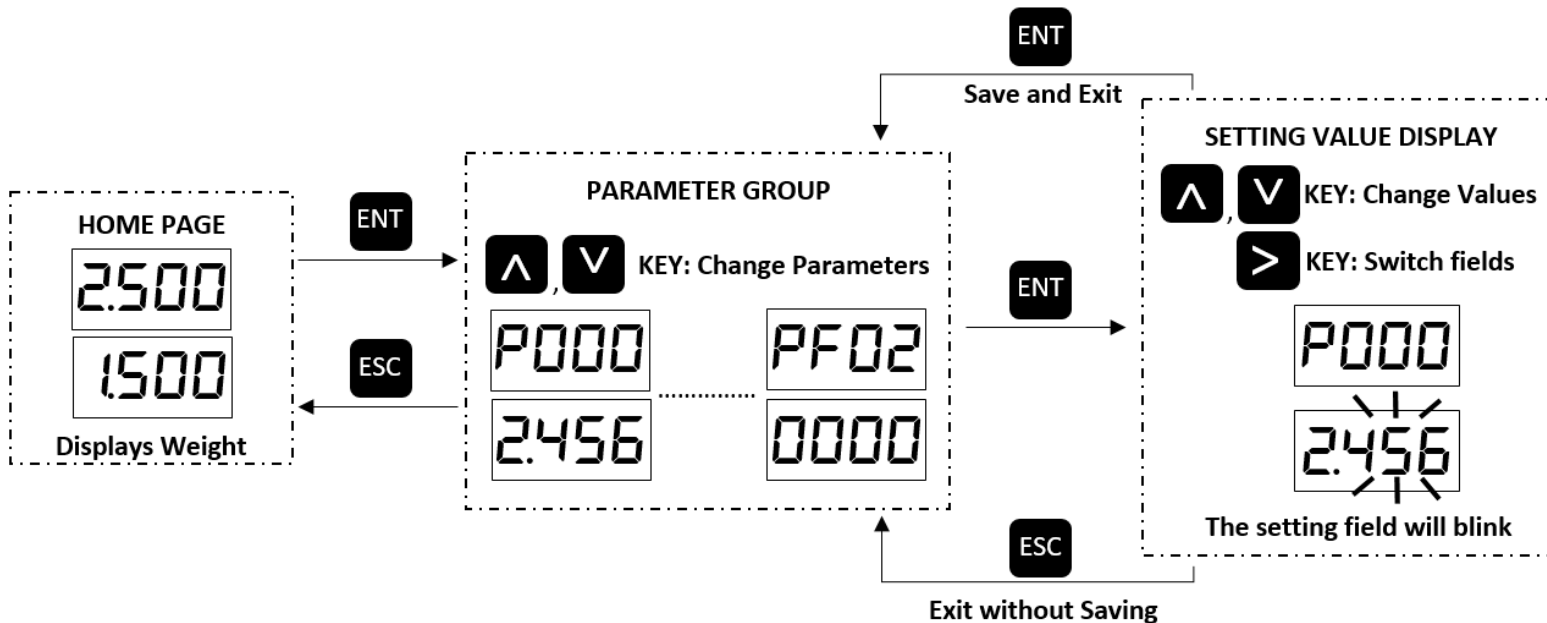




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OPERATIONAL STEPS:



- ⊗ Press the ENT key after changing the values in parameter setting to save the setting value and move to next parameter.
- ⊗ When there is no key input for 60 seconds while in setting value mode or parameter groups, the unit will return to Home page automatically.

MODBUS REGISTER DETAILS:

WEIGHT SETTING REGISTERS:

Display Parameter	Function	Hex Address	PLC Address	R/W	Range
P0 00	Bulk Weight	000DH	40014	R/W	0-65535
P0 01	Medium Weight	000EH	40015	R/W	0-65535
P0 02	Target Weight	000FH	40016	R/W	0-65535

SPEED SETTING REGISTERS:

Display Parameter	Function	Hex Address	PLC Address	R/W	Range
P1 00	Bulk speed AOP1	000AH	40011	R/W	0-100
P1 01	Medium speed AOP1	000BH	40012	R/W	0-100
P1 02	Fine speed AOP1	000CH	40013	R/W	0-100
P2 00	Bulk speed AOP2	0007H	40008	R/W	0-100
P2 01	Medium speed AOP2	0008H	40009	R/W	0-100
P2 02	Fine speed AOP2	0009H	40010	R/W	0-100



WEIGHT STABILITY TIME REGISTERS:

Display Parameter	Function	Hex Address	PLC Address	R/W	Range
P3 00	Weight Stability time(ms)	0006H	40007	R/W	0-65535

BUCKET DELAY TIME SETTING REGISTERS:

Display Parameter	Function	Hex Address	PLC Address	R/W	Range
P4 00	Filling Start Delay(ms)	0012H	40019	R/W	0-65535
P4 01	Bucket open On Delay(ms)	0013H	40020	R/W	0-65535
P4 02	Bucket open Off Delay(ms)	0014H	40021	R/W	0-65535
P4 03	Clamp open Delay(ms)	0026H	40039	R/W	0-65535
P4 04	Clamp Close Delay(ms)	027H	40040	R/W	0-65535

AUTO TARE SETTING REGISTERS:

Display Parameter	Function	Hex Address	PLC Address	R/W	Range
P5 00	Auto Tare (on/off)	001FH	40032	R/W	0 or 1
P5 01	Auto Tare Delay Time(ms)	0015H	40022	R/W	0-65535
P5 02	Auto Tare Cycle Count	0016H	40023	R/W	0-65535

AUTO DUMP SETTING REGISTERS:

Display Parameter	Function	Hex Address	PLC Address	R/W	Range
P6 00	Auto Dump (on/off)	0023H	40036	R/W	0 or 1
P6 01	Auto Dump Delay (ms)	0017H	40024	R/W	0-65535
P6 02	Double Dump (on/off)	0024H	40037	R/W	0 or 1

CONTROL REGISTERS:

Display Parameter	Function	Hex Address	PLC Address	R/W	Range
P7 00	Bucket Open Command	001DH	40030	R/W	0 or 1
P7 01	Material Drain Command	0020H	40033	R/W	0 or 1
P7 02	Clamp Open Command	0025H	40038	R/W	0 or 1

PRODUCTION REGISTERS:

Display Parameter	Function	Hex Address	PLC Address	R/W	Range
P8 00	Production count	00CBH	40204	R/W	0 to 65535
P8 01	Production Reset	00CCH	40205	R/W	0 or 1

RECIPE REGISTERS:

Display Parameter	Function	Hex Address	PLC Address	R/W	Range
P9 00	Recipe number	00D3H	40212	R/W	1 to 9



LOADCELL DATA REGISTERS:

Display Parameter	Function	Hex Address	PLC Address	R/W	Range
Home Page	Actual Weight	0000H	40001	R	-32768 to 32767
PA 00	Load Cell Actual value	0001H	40002	R	-32768 to 32767
PA 01	Load Cell Tare value	0002H	40003	R	-32768 to 32767
PA 02	Load Cell Zero value	0003H	40004	R	-32768 to 32767
-	Filling Complete Status	0004H	40005	R	0 or 1

CALIBRATION REGISTERS:

Display Parameter	Function	Hex Address	PLC Address	R/W	Range
PB 00	Tare Command Register	0019H	40026	W	Default: 0 0 or 1
PB 01	Calibration Command Register	001AH	40027	W	Default: 0 0 or 1
PB 02	Reference Weight for Calibration	0010H	40017	R/W	Default: 100 1 to 65535
PB 03	No of Decimal Places	-	-	-	Default: 3 0 to 3

*Calibration has to be performed when a new load cell is connected or replaced.

ADC CONFIGURATION REGISTER:

Display Parameter	Function	Hex Address	PLC Address	R/W	Range
PC 00	ADC Sampling Time	0032H	40051	R/W	Default: d4 d0 - 12.5 ms d1 - 25 ms d2 - 50 ms d3 - 75 ms d4 - 100 ms
PC 01	Moving Average	0033H	40052	R/W	Default: d0 d0 - No Average d1 - 2 Average d2 - 4 Average d3 - 8 Average d4 - 12 Average d5 - 16 Average

ERROR REGISTER:

Display Parameter	Function	Hex Address	PLC Address	R/W	Range
PE 00	Error Code	0021H	40034	R	Default: 0 0 to 64*
PE 01	Error Reset	0022H	40035	W	Default: 0 0 or 1

*Refer the table below for Error code explanation.



RS485 CONFIGURATION REGISTER:

Display Parameter	Function	Hex Address	PLC Address	R/W	Range
PF 00	Slave Address of RS-485	07D0H	42001	R/W	Default: 1 1 to 100
PF 01	Baud Rate of RS-485	07D1H	42002	R/W	Default: d0 d0 - 9600 d1 - 14400 d2 - 19200 d3 - 38400 d4 - 56000 d5 - 57600 d6 - 115200
PF 02	Stop Bits of RS-485	07D2H	42003	R/W	Default: d0 d0 - 2 d1 - 1

ERROR CODE EXPLANATION:

Each bit in the error code represents each error. Only the binary-coded decimal value will be displayed on the module.

Error Code	Binary value	Explanation
1	0b0001	AOP Speed Error: This error occurs when the AOP Speed registers are not in range.
2	0b0010	Weight Setting Error: This error occurs when the Weight setting values are not correct.
4	0b0100	Load cell Error: This error occurs when load cell value is out of range.
8	0b1000	Calibration Error: This error occurs when the calibration procedure is done wrong.
32	0b100000	Internal Error. (Return to Factory)

LOADCELL CALIBRATION PROCEDURE:

- Fix the load cell correctly.
- Tare the dead weight (recommended dead weight minimum 20% of the load cell rated capacity) in the load cell by writing '1' on **0019H** (Tare command register). And write back '0' to stop Tare.
- Keep a standard known weight (recommended weight minimum 20% of the load cell rated capacity) above the dead weight and enter the same weight in **0010H** (Reference weight for calibration Register).
- Write '1' on **001AH** (calibration command register) to calibrate the load cell. And write back '0' to stop Calibration.
- After successful calibration, the Actual weight can be read on **0000H** Register.

Note:

- Initial zero/Tare is necessary after power on to ensure the correct weight.
- Calibration has to be performed when a new load cell is connected or replaced.