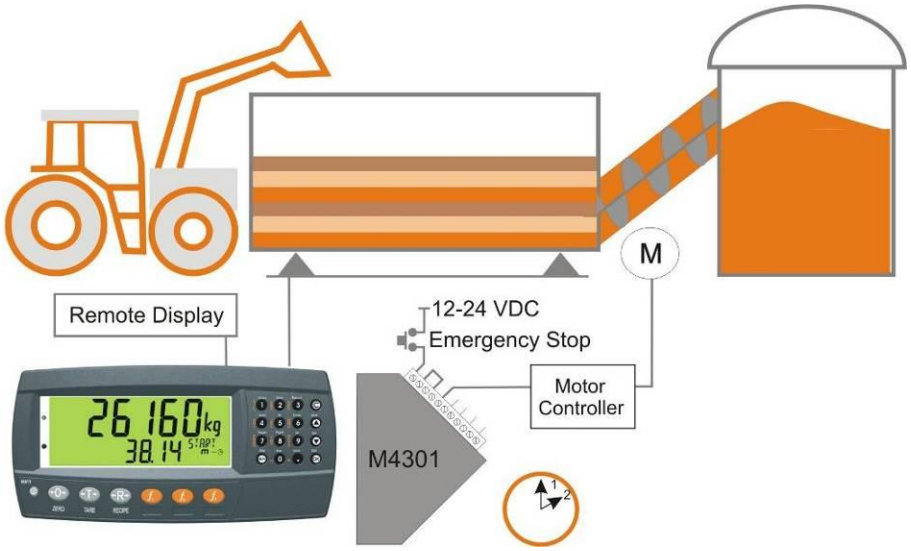
Application Note: Weigh-In/Weigh-Out by Time - R400 Series – K411

Application:



IO	Use
IO1	Emergency Stop Batch Interlock
IO2	Over Set point
IO3	Stage 4 – Fill Interlock
IO4	Stage 4 – Slow Fill
IO5	-
IO6	-
IO7	-
IO8	-

Function Keys	
f1	Start
f2	Pause
f3	Abort

Remote Display	
Ser1B	RS485

A K411 is used as a controller for a process that does a weigh in, using a front end loader, and weigh out at given time intervals. An example of this would be a bio gas application that uses a weigh in of various materials followed by a weigh out of the mixture on a timed basis into a fermenting silo. The main vessel is filled in this application using a front end loader filling three materials. The mixture in the main vessel is batched out in 1t increments each hour.

Weigh IN – Filling the main vessel

- Recipe 1 is for loading the material into the main vessel using a front end loader
  - It uses 3 Stages each of which are a FILL stages
  - Stage 1 – Fill material 1 – Corn (3t)
  - Stage 2 – Fill material 2 – Silage (3.5t)
  - Stage 3 – Fill material 3 – Liquid (3.5t)
- Each of these fill stages are Weigh In.
- Each fill is done manually by the operator using a front end loader, so no IO is used
- At the end of Recipe 1 there is 10t of material in the main vessel
- Recipe 1 is repeated twice more to reach 30t

Weigh OUT – Timed batch out of material into the fermenting silo

- Recipe 2 is selected by the operator to start the timed batch out of material into the fermenting silo
  - Recipe 2 uses one Stage which is a fill stage.
  - Stage 4 - Material 4 – Mixture (1t)
  - Weigh Out
  - Slow Fill IO4
- In this example 1t is set to batch out each hour.

Safety – Protect the motor doing the batch out

An over set point is used on the main vessel to ensure that the batch out will not proceed unless there is sufficient material in the main vessel. IO2 is an over set point (greater than 2t) that is connected to the Stage 4 Fill Interlock (IO3). Should the weight of material in the main vessel drop to below 2t the set point will go low making the interlock go low which halts the batching process. A fill interlock must be high at all times during the fill stage, otherwise the process will halt.

Safety – Emergency Stop

An emergency stop is connected to the batch interlock (IO1). Should the batch interlock be removed the batch process will halt. When used the emergency stop in the example cuts power to the IO module - shutting down the power to all outputs. By wiring it into the interlock the software can pause to coincide. When the emergency stop is released, the operator can restart the batch with the Start key to safely resume batching.

Weigh IN - Weigh OUT Feature

A FILL stage can be defined as Weigh IN or Weigh OUT.

Time of day Batch Start Feature

A batch can be defined to run on a time basis. It is set to run at a given time of day and set to repeat at a given time interval

Start Time (TM.STRT): The time to start batching for timer based batching (24 hour clock)
Repeat Time (TM.RPT): The time between batches for timer based batching (up to 168 hours)
Stop Time (TM.STOP): The time to stop batching for timer based batching (24 hour clock)

Components:

R420-K411-A
Or
R423-K411-A
R400 Batching Indicator
VDC

M4301
8 I/O
Module**

A10010
Power Supply,
12VDC, 2A DIN
Rail

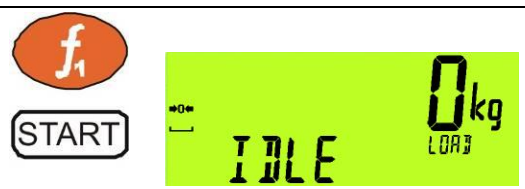
Large Remote Display
D640-6A-C
Or D740-6A-C

M4203
RS485/485
Module
For an extended communications run to a remote display the isolated M4203 module using SER2B would be recommended – otherwise the built in RS485 on SER1B can be used.

*Note1 Either R420s ABS or R423s flush stainless steel housing could be used – a panel mount installation has been assumed, other mounting and housing options are available.
**Note2 Suitable external power supply required for M4301 for example the A10010

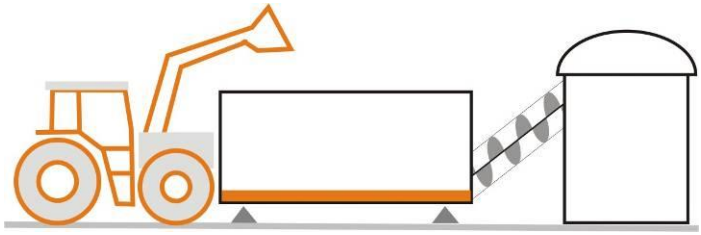
Weigh IN

Weigh IN using FELs (Recipe 1)

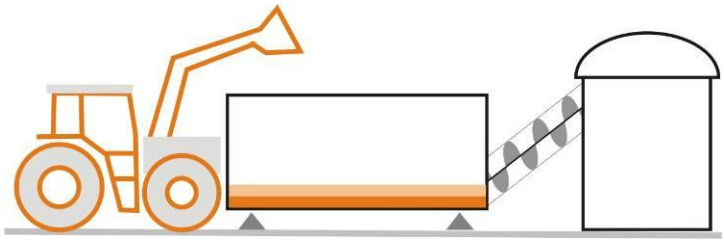
Operator selects Recipe 1 (Product) called LOAD	
Check Recipe 1 LOAD – check targets for each material and check time start, end and interval times.	
Start Recipe 1 LOAD – Press Start Function key	

Recipe 1 LOAD

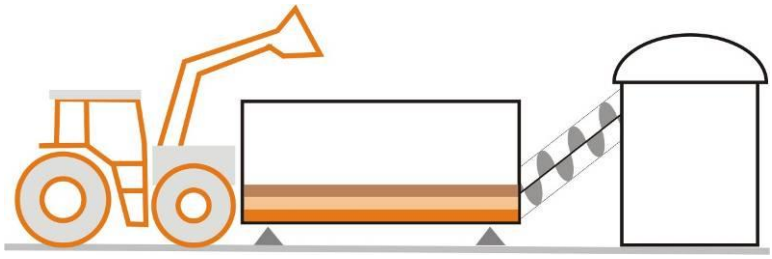
Stage 1 is a fill of 3000kg of Corn



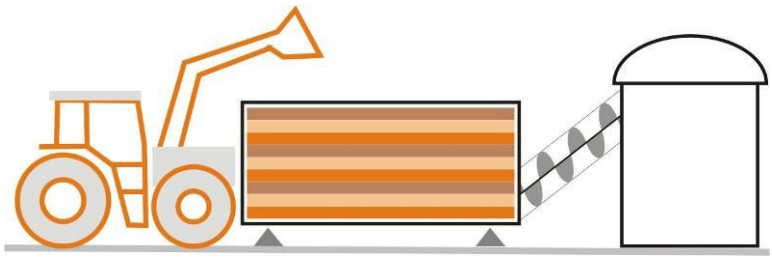
Stage 2 is a fill of 3500kg of Silage



Stage 3 is a fill of 3500kg of Liquid



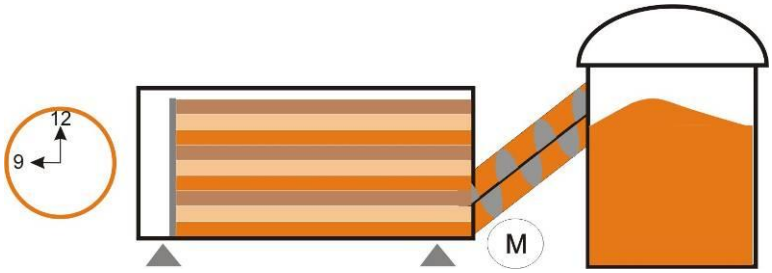
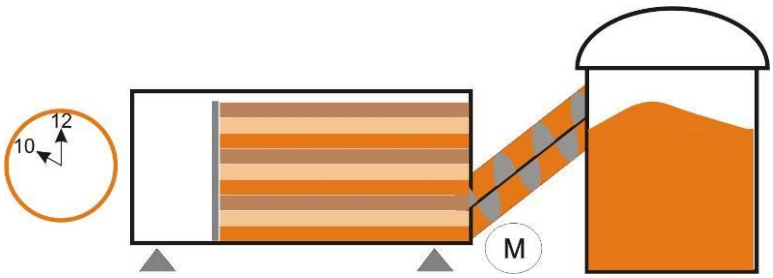
Recipe 1 called LOAD is complete at approx 10t.



As the main vessel is 30t, Recipe 1 is repeated two more times.

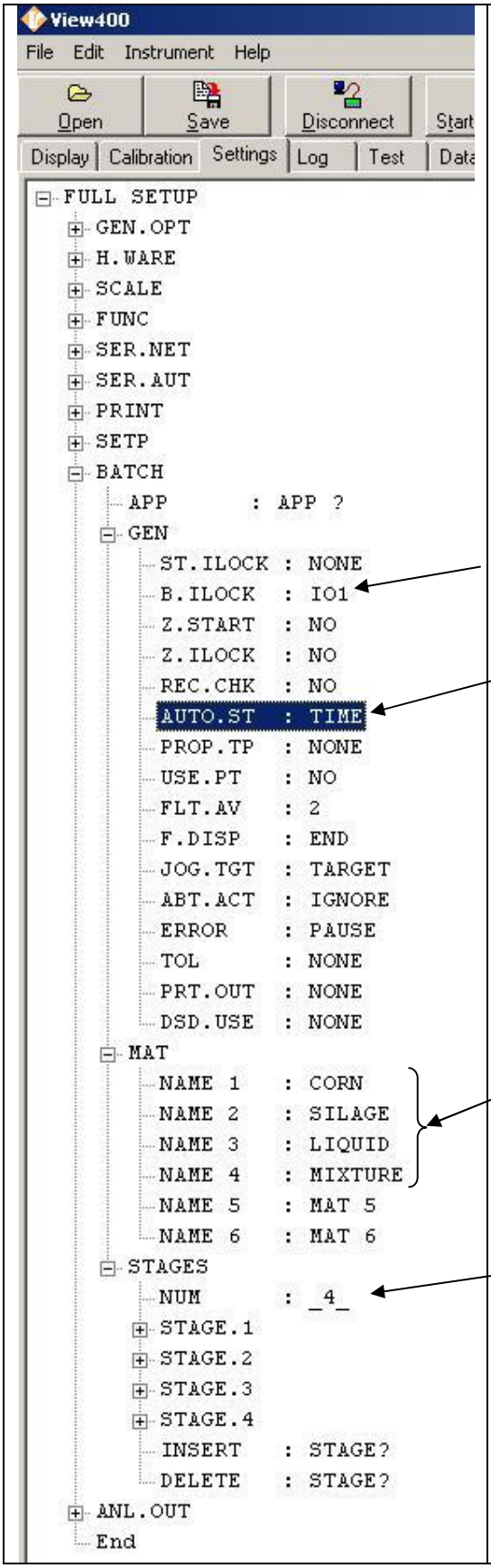
Weigh OUT

Weigh OUT using timer based batching (Recipe 2)
1000kg of product (called MIXTURE) is to be batched out each hour.

Operator selects Recipe 2 (Product) called OUT	 
Check Recipe 2 OUT – this recipe batches out the mixture in 1t increments each hour.	 
Start Recipe 2 OUT– Press Start Function key. The screen shows the current weight of the vessel and displays TIMED to indicate that the Recipe will start at a certain time.	  
 In 14min the batch out will start. The target is displayed as -1000kg (NET)	  
 In 4min the next batch out will start.	 
 Recipe 2 will repeat based on time. It will start each hour on the hour, as defined in this application setup.	

Indicator Set up

General Batching Set up

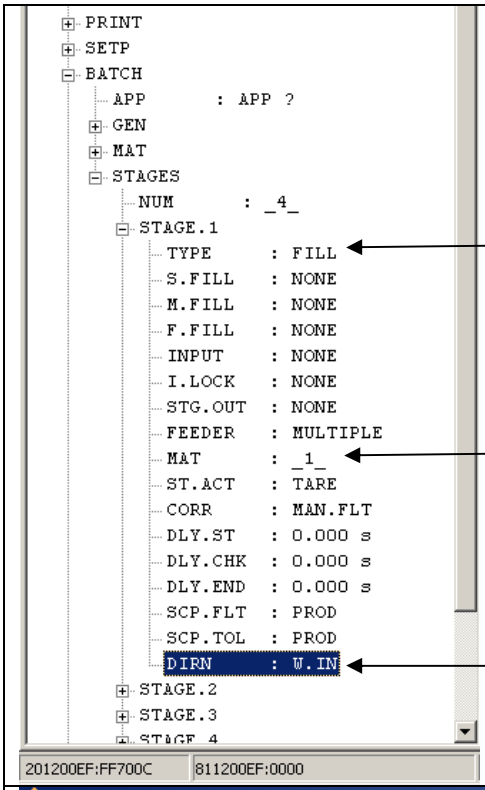


Batch Interlock on IO1 connected to emergency stop.

Auto Start set to TIME

Material Names

4 Stages



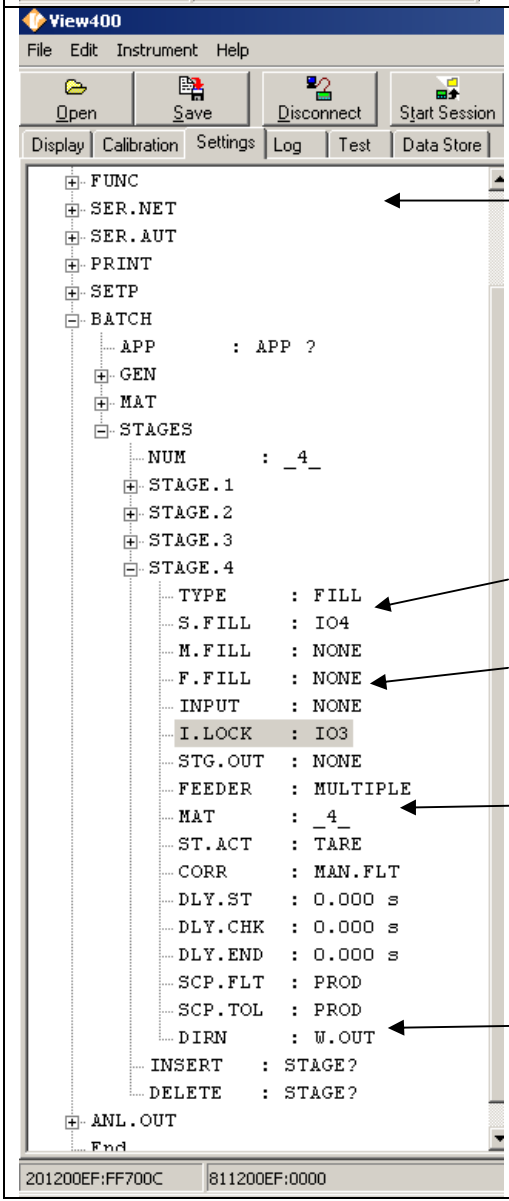
Fill Stages 1,2,3 set up

Stages 1,2,3 are all FILL stages, one for each material, Corn (1), Silage (Mat 2) and Liquid (3), all weighing.

FILL stage type

Stage 1 uses Material 1 Corn

Direction of fill is Weigh IN - the weight is increasing during this stage.



Stage 4 set up

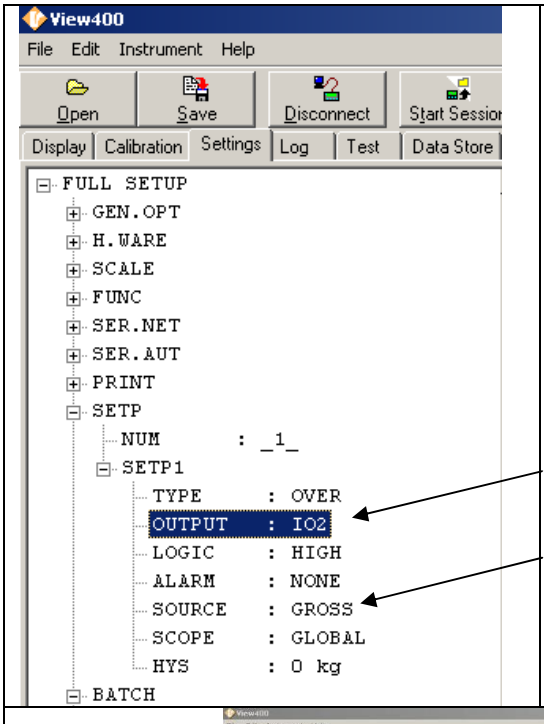
Stage 4 is **only** used in **Recipe 2** to weigh the mixture out. It is a FILL stage but the direction of fill is Weigh OUT, indicating that weight is decreasing.

FILL stage type

Interlock – the interlock set to IO3 must be high for the duration of this stage for it to proceed, if not it will halt.

Stage 4 uses Material 4 Mixture

Direction is Weigh OUT - the weight is decreasing during this stage.

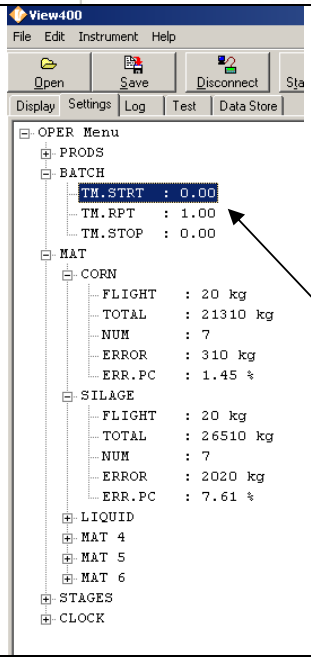


Set Point set up

Set points work independently to the batching stages.

Over set point created using IO2 output - it will provide a high level on IO2 while the weight is over the set point target defined by the operator (long press of 7 key Target).

Set to GROSS so as the check is against gross weight in main vessel staying over



The Batch Timer Details are available through the operator interface on the Recipe key. These can be seen and modified using Viewer by selecting the Session that is OPER.

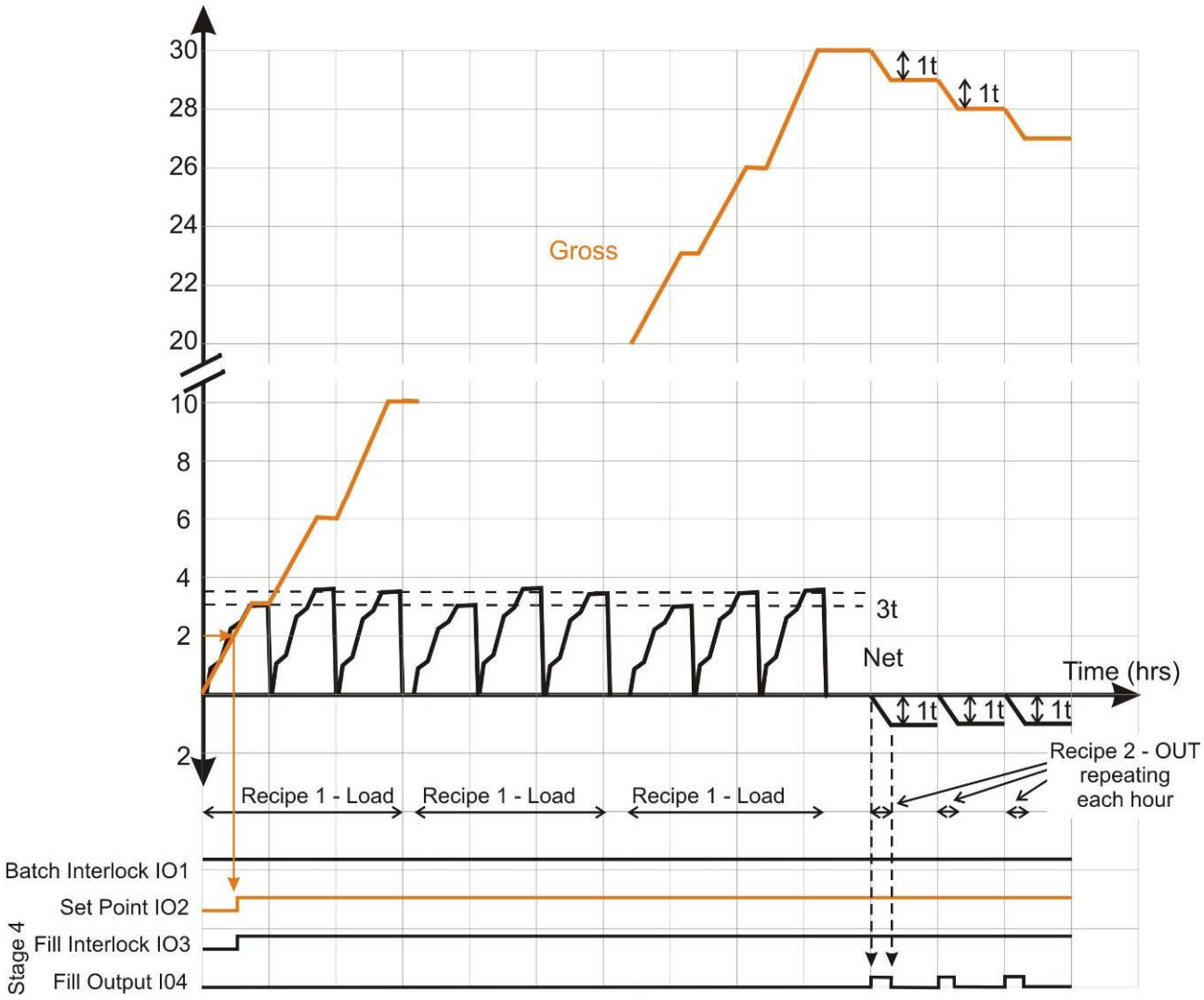
Start Time (TM.STRT): The time to start batching for timer based batching (24 hour clock) – set to 8am here

Repeat Time (TM.RPT): The time between batches for timer based batching (up to 168 hours) – set to repeat each hour

Stop Time (TM.STOP): The time to stop batching for timer based batching (24 hour clock) – set here to equal start time so the batch will run continuously.

The 1hr repeat time means the first batch will be at 9am and then repeat again at 10am and so on.

Timing Diagram



For more information refer to the Reference Manual for this product