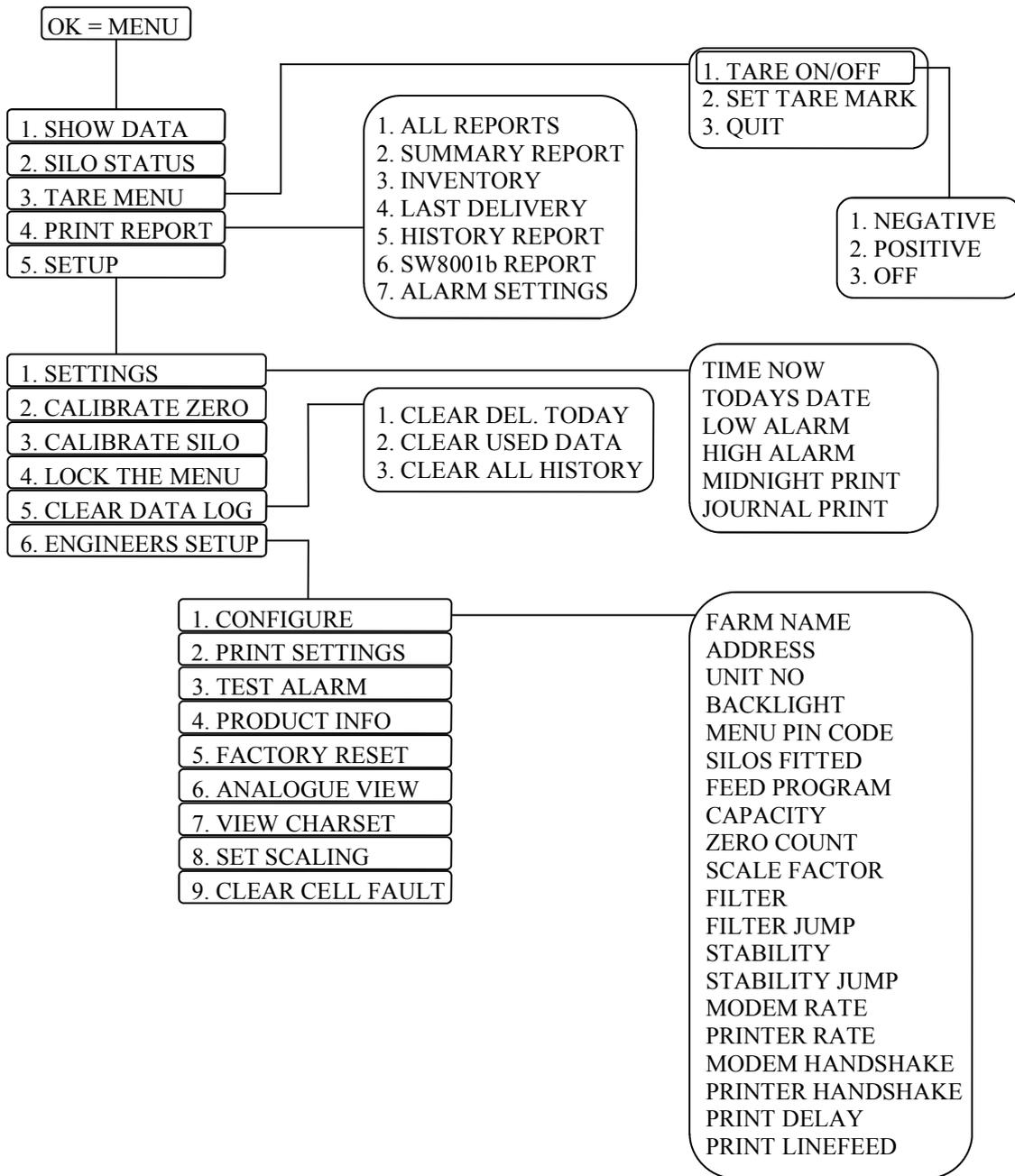


WELTECH INTERNATIONAL LTD

SW8011 SILO WEIGHER ver 0.96

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SW8011 MENU



INSTALLATION OF LOAD CELLS AND AMPLIFIER

A standard silo weighing system will have two or four load cells and one amplifier for each silo being weighed. The first procedure after unpacking is to install the load cells as follows:

1. Make sure that the silo is empty and all power to augers etc. is disconnected. This will ensure that no one can inadvertently switch them on and cause vibration when the silo legs are being cut, or the load cells are being fitted.
Safety procedures must be observed at all times. Do not attempt to fit load cells in adverse weather conditions. The silo will be unstable when the legs are cut, and to attempt to do this in bad weather is DANGEROUS. If you are fitting load cells to the silo using load cell shoes go to item 8.
2. Make sure that there is enough room for the load cells to fit at the bottom of the silo leg, below any cross members or supports, and mark a horizontal line to show the centre position of the load cell. Repeat for each of the silo legs.
3. **Do not lift the load cells by their leads, as this can cause damage that is not covered by the guarantee.** Using the centre line as a guide, hold a load cell against a silo leg, and mark the centre of one of the load cell bolt holes, make sure that there is enough room for the bolt head to fit on the inside of the leg **before you drill any holes.** Remove the cell and using a 12.5mm drill bit drill a hole through the leg.
4. Bolt the load cell to the leg and use the 12.5mm drill bit to mark the centre of the three remaining holes. Remove the load cell and drill through the leg at the three marks using a pilot drill and then the 12.5mm drill.
5. With a ten inch angle grinder or similar cutter, cut along the centre line, cutting through the face that the cell will be fitted to. Do not at this point cut more than about 30mm into the other face of the leg.
6. Bolt the load cell to the leg, making sure that there is a washer fitted between the silo leg and the load cell on all the bolts, also ensure that the shank (unthreaded portion) of the bolts is in the silo leg otherwise the thread may cut into the leg and let the gap close up. Cut through the remainder of the leg. The load cell should now be supporting the silo.
7. Repeat operations three to six on the remaining three legs.
8. To fit load cells using a shoe assembly. Assemble the shoe and load cell, and then measure the total height of the assembly. Using this measurement make sure that there is enough room to fit the complete assembly at the bottom of the silo legs, below any cross members or steel supports.
9. Using the measurement obtained in step eight measure up from the ground and mark the silo leg. Great care should be taken when marking as this is the line that will be used to cut the leg.
10. Using a jack or some thing similar support one of the silo legs and with an angle grinder cut along the line and remove the bottom of the silo leg and any studs in the ground.

11. Insert the load cell assembly and tack weld the top shoe to the silo leg, care must be taken not to heat the load cell as this can cause irreparable damage. Remove the load cell and complete the weld to the leg.
12. Remove the foot from the bottom of the cut off section of the silo leg, drill leg as required and refit foot to the bottom of the leg. Slide shoe assembly under leg and bolt to the newly fitted foot. Using Raw bolts or similar bolt the foot to the concrete base.
13. Repeat steps four to six on the remaining three legs.
14. The amplifier is supplied in a weather proof box with a connection PCB for the load cells. If possible fix to a wall by the silo making sure that the load cell leads will reach. (The amplifier and connection PCB can be supplied in separate boxes if required.
15. Bring the load cell leads to the amplifier or if fitted the junction box. If the leads are too short, or a junction box is fitted, they can be extended but all joints must be soldered, insulated and protected from the weather. The cable used to extend the load cell leads or connect the junction box to the amplifier should be six core screened and each core should be 7/0.2mm or greater. Connect as per the enclosed diagram.

Overview of SW8011 weigher.

The SW8011 is a unit that can display the contents of up to 10 silos, this information can be accessed at will via the screen or it can be sent to a computer or printer.

Functional description.

The unit monitors the weight of up to 10 feed silos. Silo weights are recorded and logged to memory. At midnight each day the data can be printed it is also archived and cleared for the next day. Data may also be printed or viewed on demand.

A PC may be connected (directly or via a modem) to interrogate the unit. Silo weights may be extracted using the Windows Datapol utility.

The unit stores the silo weights for several days, so there is no need to collect the data just before midnight. It is expected that daily data collection will be done after midnight.

Switching the unit on.

If the unit is powered up with the '7' key held, these functions are suspended for an hour. The alarm will not go off. During this hour the message 'INACTIVE MODE' is displayed.

It then monitors the silos for deliveries, and for exceeding pre-set weight limits.

Operator procedures.

The operator has access to silo weight information and alarm status. He can print reports, and set the Tare.

Beyond that, access to the Setup Menu is protected by a PIN. When activated by the PIN, the Setup menu stays open for an hour (unless locked sooner).

Tare setting.

The tare setting allows the operator to set a temporary mark of the weight. For example he might want to discharge 1000 kg. He can set the tare mark and a negative tare, so that the display will show the weight discharged.

When tared, the display announces 'TARE' instead of the usual 'SILO' heading.

After one hour, the tare mode is cancelled and the display reverts to showing the actual weight. However the tare weight mark is remembered for later use until reset by the operator.

This tare setting is distinct from the Calibrate Zero setting used when a silo is empty.

Alarms.

An alarm output is provided for the following:

1. Silo overload. Exceeded the high alarm weight for more than 10 seconds.
2. Under weight. Beneath the low alarm weight for more than 10 seconds.
But when the low alarm is set to **0** it is **disabled**.
3. Load cell fault. Extreme voltages were received for more than 10 seconds.

The over/under weight alarms will not re-trigger the alarm output until they have gone safe by at least 50 kgs (100 lbs). A broken load cell is ignored until the unit is re-powered.

Alarm information can be seen from 'Status' on the Main menu. First you see a summary of all the silos. A flashing character indicates a problem. Press a numeral to select the silo.

Pressing any key turns off the alarm output. Alarms will not happen if a silo is out of service, or if the unit is powered up holding the '7' key. The output can be tested using the Engineer menu item 'Test alarm'.

Setup menu.

The Setup menu is accessed from the Main menu and requires a PIN. The menu gives access to a number of settings, zero calibration, and datalog clearance etc.

It is also the route to the engineer menu, used for calibration and factory reset. The engineer can edit all the other farm and factory settings.

If you forget the PIN, you can set a new one with a computer via the RS232 terminal, or the keyboard can be unlocked for an hour with a RS232 command.

The PIN stays active for an hour, although you can relock the menu sooner.

Commissioning the silo weigher.

When first turned on, a factory reset is required and this leaves all silos disabled. The display will say 'OUT OF SERVICE' and shows uncalibrated weights.

You can turn on a silo manually with the Engineer setting 'Feed program'. It is also enabled automatically when you are calibrating the silo. Each silo is commissioned by the following steps in order, kept brief for clarity:

1. Begin with an empty silo.
2. Enter the low and high alarm settings from the Setup menu. A low alarm set to 0 disables the low weight alarm.
3. Select 'Calibrate zero' from the Setup menu to mark the empty silo point.
4. Wait for a delivery to complete. Note the weight on the delivery ticket.
5. Select 'Clear data log' from the Setup menu and then 'Clear history' etc.
6. Select 'Calibrate silo' from the Engineer menu to mark the weight scale with the delivery weight. After calibration you are asked whether to set this weight up as a delivery.
7. The silo program is automatically enabled at this point and will record deliveries and monitor the alarm weights.

Calibration constants can also be set by hand with the Engineer settings 'Zero count' and 'Scale factor'.

Set the nominal silo capacity (also used to scale the silo icons in the display). Also the Farm name and location can be set, this is easiest with a terminal.

Calibrate zero.

The Zero Calibration sets the zero weight point. The silo must be empty.

After calibrating the zero point, the weight will be displaced by a fixed offset across the scale. The scale factor will not be changed until you do a Calibrate Silo. This just sets the permanent Tare point. It can also be configured by hand with the Engineer menu setting 'Zero point'

If the amplifier gain changes after calibrating, the scaling factors become invalid.

Calibrate silo.

The Silo Calibration sets the scale or ratio of the load cell input. When the silo contains feed, you can calibrate it by dialling in its contents weight.

The voltage input must be more than a quarter way up the voltage range, and the operation takes account of the zero point previously set (see Calibrate zero).

If the amplifier gain changes after calibrating, the scaling factors become invalid.

After calibrating the silo with a load of feed, you get asked whether to set up a new datalog using this weight as the first delivery.

You can rescale the silo at any time, or repeat the job (providing the weight is known and there is enough of it). So after replacing a load cell and calibration is required, you can simply do so.

Auto detection of deliveries.

The deliveries are detected automatically by the change in weight - even when the weigher has been turned off.

The detection system is turned off when the weigher was switched on with the '7' key pressed, for an hour.

The minimum weight gain considered as a delivery is 150 kgs (300 lbs). To complete the delivery, the weight must remain within a 50 kgs (100 lbs) tolerance for 3 minutes.

Some silo systems suffer from amplifier creep during their initial warming up, leading to phantom deliveries. The SW8011 weigher uses a decreasing minimum delivery weight. At start-up the minimum weight is 500 kgs (1000 lbs) which decreases over a few minutes to the values stated previously.

Silo weights and statistics.

The unit has 2 recording functions:

- a) it records the silo weights at midnight.
- b) it detects deliveries from the weight rise.

The feed used is calculated by dead reckoning from the midnight weight, current weight and any delivery.

The average feed used is calculated over the last 7 days from the midnight weight history. The average excludes today, so will not change during its course - unless this is the first day of use.

Remote data collection.

The weigher will communicate with Datapol version 3.20 which will collect the weight information and maintain data files readable by spreadsheet programs.

7 days information history is stored in the weigher.

Settings.

There are two levels of settings: Operator and Engineer.
The settings are stored in Flash memory which survives loss of power.

Each level of settings is accessed from the Menu.

Operator settings from the Setup menu select 'Settings'.

Engineer settings from the Setup menu select 'Engineer' and then 'Configure'.

Operator settings.

Select the SETTINGS menu item.

Time now	Set the time
Todays date	Date set should not normally be necessary
Low alarm	To disable the low alarm, set to 0
High alarm	To disable the high alarm, set beyond reach
Midnight print	Enables midnight print of data summary
Journal print	Enables alarm and delivery log on the printer

Engineer settings.

Select the CONFIGURE menu item. The settings are arranged in three groups.

Units settings

Farm name	The farm name on the display and reports
Farm address	The farm address ditto
Unit number	The unit number used for remote comms
Backlight	Backlight is off, on, or tied to keyboard timeout
Menu PIN code	Needed to open Setup Menu unless PIN is 0000

Silo settings

Silos fitted	Up to 10 silos may be fitted
Feed program	Set to OFF disables the silo monitoring functions
Capacity	The nominal capacity of the silo for glyphs etc
Zero count	The zero calibration count to 1 decimal place
Scale factor	Calibration factor is weight at 50% of range
Filter	Silo weight filter steepness
Filter jump	Silo weight filter jump out count (n/a)
Stability	Repetitions within stability jump limit
Stability jump	Variation in ADC count considered stable

RS232 settings

Modem rate	Modem baud takes effect at next power up
Printer rate	Printer baud takes effect at next power up
Modem handshake	Enable CTS handshake, RTS output is strapped
Printer handshake	Enable CTS handshake, else use Print Delay
Print delay	Timed delay after newline when handshake off
Printer linefeed	Send line feed to the printer after a newline

In this unit the filtering and stability factors are no longer in weight units, i.e. they should not need altering for different weight ranges.

Initialisation settings.

Select the FACTORY RESET menu item.

Time now	Set the time
Todays date	Date only necessary after Rabbit core removed
Weight units	Set to KGS or LBS when unit initialised.
Serial number	On first use only.

Remote commands.

The following commands (examples for unit 1) are accepted at the modem port:

1,ID?	send id string
1,SER?	send serial number
1,PIN,nnnn	set the keyboard pin
1,MENU	unlock the setup menu
1,CANC	cancel the alarm output
1,ALARM	cancel the alarm output and send alarm statuses
1,PROFF	disable midnight printout
1,PRON	enable midnight printout
1,LGOFF	disable printer journal
1,LGON	enable printer journal
1,PROG?	send list of process control settings
1,PROG,c,n	set process control for silo c (1..) or All to 0 or 1
1,LOGD?	send list of logged dates
1,DATE?	send the date ddmmyy
1,DATE,ddmmyy	set the date ddmmyy
1,TIME?	send the time hhmm
1,TIME,hhmm	set the time hhmm
1,FARM?	send the farm name
1,FARM,ffffff	set the farm name to fffffff
1,ADDR?	send the farm address
1,ADDR,aaaaaa	set the farm address to aaaaaa
1,CLEAR,c	clear today silo c (1..) or All
1,GRAND,c	clear history silo c (1..) or All
1,WGTS?,c	Send the current reading silo c or All
1,LWGT?,c	Send the low alarm weight silo c or All
1,LOW,c,w	Set the low alarm weight silo c or All, to w
1,HWGT?,c	Send the high alarm weight silo c or All
1,HIGH,c,w	Set the high alarm weight silo c or All, to w
1,CAP?,c	Send the silo capacity for silo c or All
1,CAP,c,w	Set the silo capacity for silo c or All, to w
1,SUP	send today's data in comma format
1,SUP,Y	ditto for yesterday
1,SUP,ddmmyy	ditto for date given
1,PRINT,c	print standard reports for silo c (1..) or All
1,PRINT,c,Y	ditto for yesterday
1,PRINT,c,ddmmyy	ditto for date given
1,RPT,c,r	print report type r for silo c (1..) or ALL
1,RPT,c,r,Y	ditto for yesterday, for report type r
1,RPT,c,r,ddmmyy	ditto for date given

These are the report types for r above:

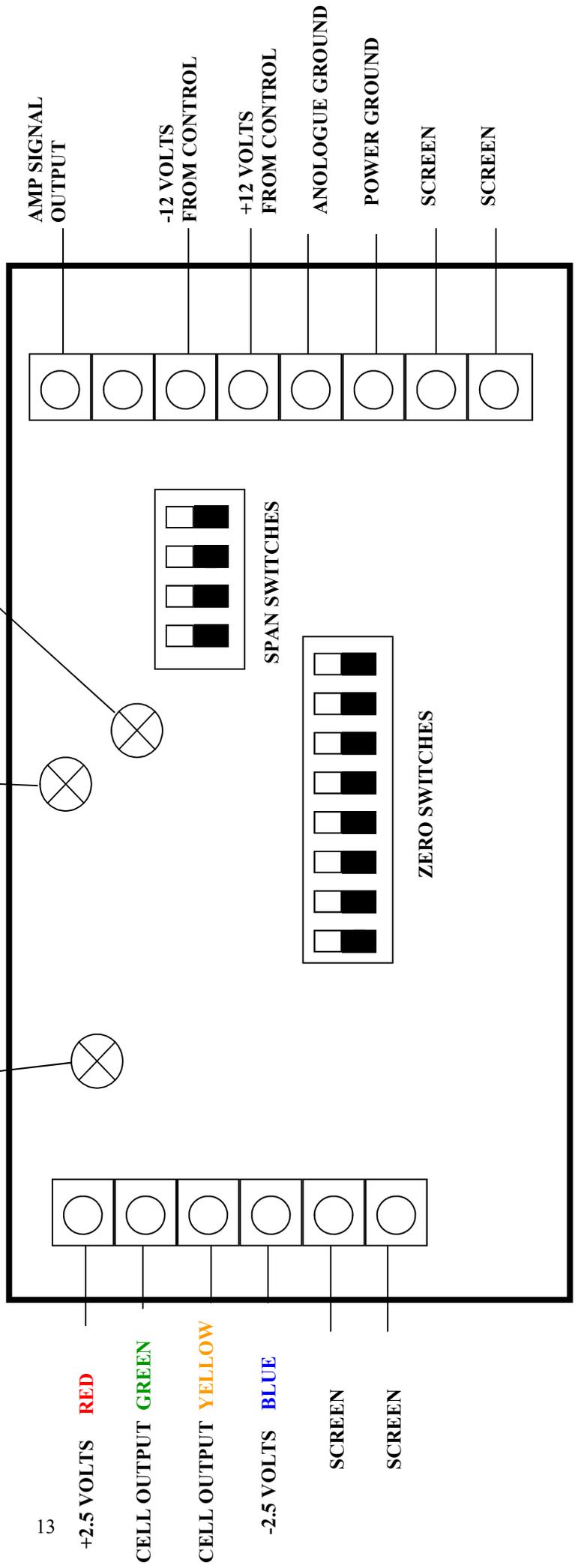
0	Standard report set
1	Settings report
2	Alarms report
3	Delivery report
4	Summary report
5	SW8001b facsimile report
6	Inventory report
7	History report

Specifications.

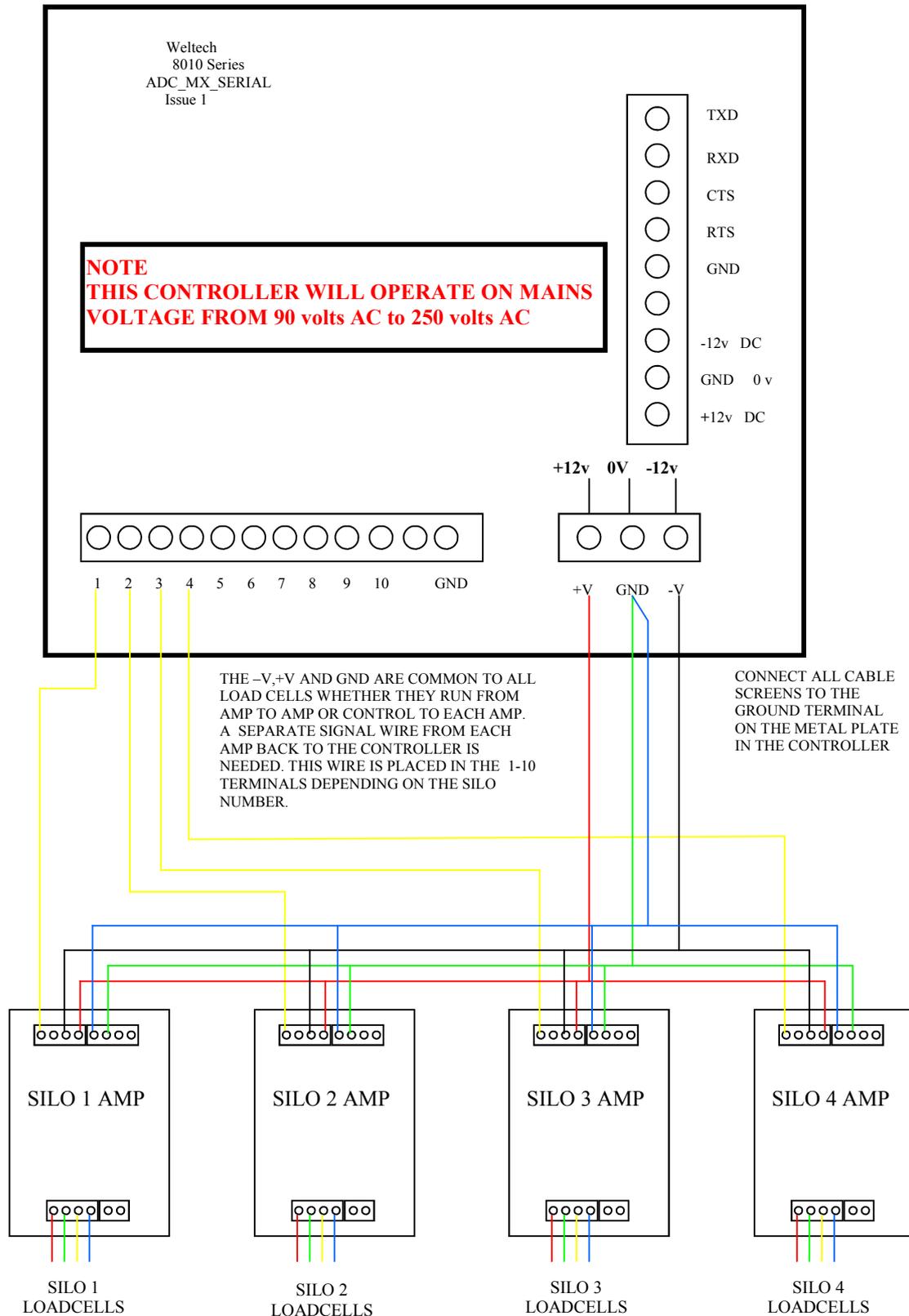
Program flash	256k
Datalog and RAM	128k
Silos	10
Weight units	Kgs or Lbs
Max weight	64000 Kgs or Lbs
Daily history	8 days (including today)
Max baud rate	19200 bps (possibly up to 115200)
Printer width	24 characters
Handshake timeout	500 milliseconds
Input range	0 - 2.4 volts

SILO AMPLIFIER

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SW8011 WIRING CONNECTIONS



AMPLIFIER AND JUNCTION BOX

