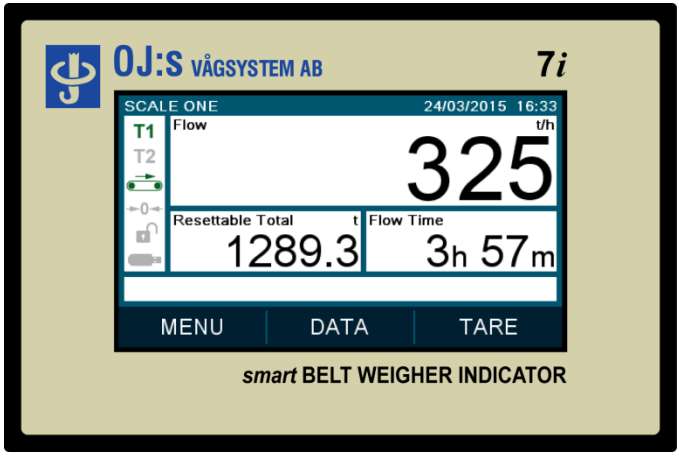
OJ1436 *smart* BELT WEIGHER INDICATOR



This document applies to software version 1.5.x

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1 Introduction

1.1 Overview

The OJ1436 *smart* Belt Weigher Indicator connects to a belt weigher mechanism in order to continually calculate the rate of flow of material over the belt weigher and the total quantity of material transferred.

A wide variety of belt weigher designs containing up to four load cells are supported, along with a range of speed sensor devices e.g. proximity switch with toothed wheel. Optionally, in applications where belt speed variations are insignificant, the indicator may operate from an internal speed simulator.

The colour touchscreen display provides the operator with a high visibility display of the process data and device status along with intuitive icon driven navigation and data entry.

A wide range of interface options are supported to allow for control of external devices and integration in to large scale systems:

- Digital Inputs and Outputs.
- Analogue Input and Output.
- Configurable RS232/485 Serial Interface.
- Network communications including: Ethernet, EtherNet/IP, Profibus DP and DeviceNet.

Comprehensive data logging features are included for both production reports and system diagnostics.

A USB flash drive can be used to assist with system setup, data logging and firmware updates.

The OJ1436 is able to interface to an inclinometer device, via its optional 4-20mA input, for applications where the conveyor angle may change during production. This eliminates the need for recalibration following a change in the conveyor angle.

1.2 Model Versions

The model identification reference is structured as follows:

OJ1436 x x 1 x

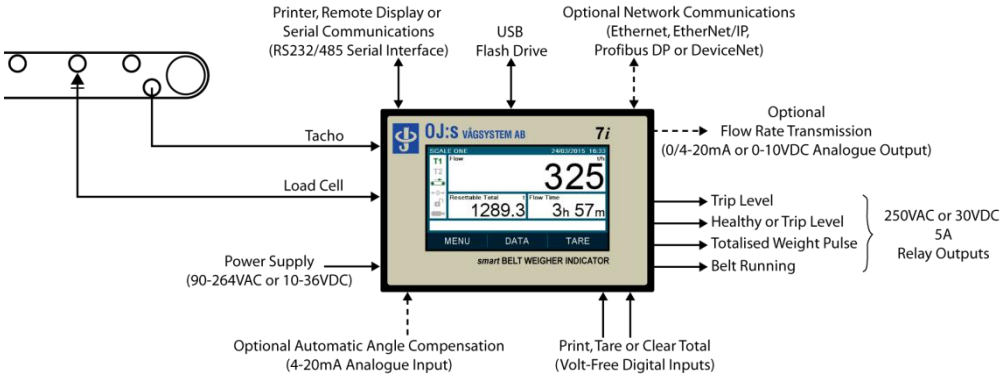
Power
Omitted - AC power
D - DC power

Analogue I/O
Omitted - None
AI - Analogue Input
AO - Analogue Output
AA - Analogue Input & Output

Network Comms.
Omitted - None
E - Ethernet
EIP - EtherNet/IP
P - Profibus DP
D - DeviceNet

If no Analogue I/O or Network Comms. options are fitted the reference locations are replaced by a single '-' i.e. the model reference for the basic AC powered unit is OJ1436-1.

1.3 System Interface



2 User Interface

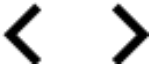
The colour touchscreen display provides the operator with a clear display of the process data and device status information along with intuitive icon driven navigation and data entry as detailed below.

2.1 Icon Navigation

The following icons will appear throughout the available screens to allow for navigation to other screens or associated actions to be performed.

Home
Touch Home to return to the Home screen.

Exit
Touch Exit to leave the current screen and move back one level within the navigation hierarchy.



Previous / Next
On screens where there are more than one page of data items to display touch Previous / Next to scroll through the pages of data items.

Menu Tile
Touch the Menu Tile to navigate to that menu item.

Button
Touch the Button to perform the associated action.

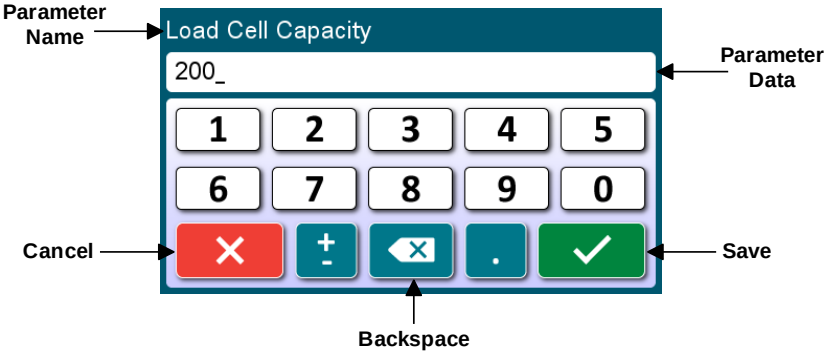
2.2 Data Entry

Editable data items may be presented in a number of different ways depending on the layout of the particular screen within which they are displayed.

In each case, simply touch the data item name or value in order to edit the current setting. Depending on the data item type, one of the following data entry screens will be displayed.

2.2.1 Numeric

When editing numeric data items the following data entry screen is displayed.

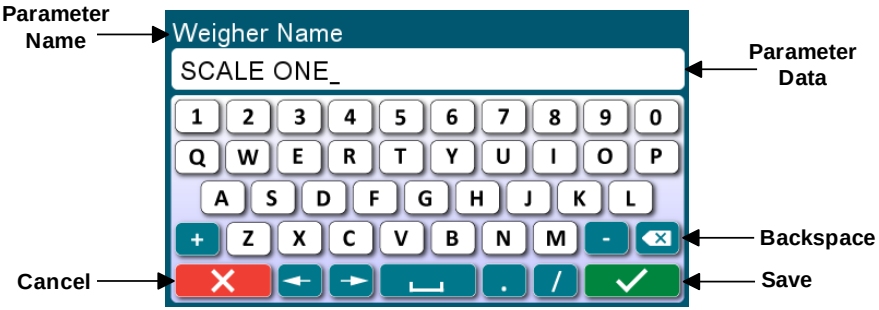


Touch the Save button to store the new value, or the Cancel button to exit the data entry screen and leave the original value unchanged.

If the value entered is outside the acceptable range for the associated data item then when attempting to save the value an error message will be displayed and the value will be discarded.

2.2.2 Alphanumeric

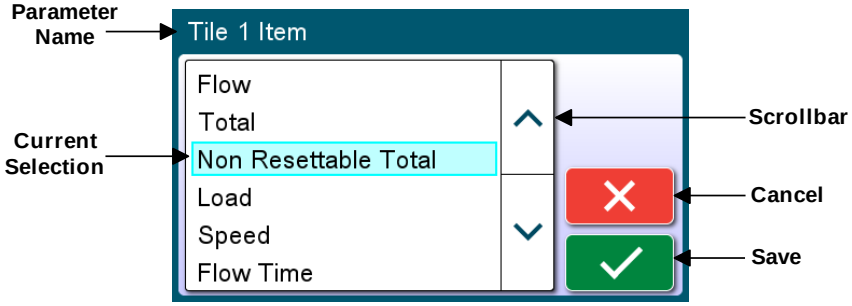
When editing alphanumeric data items the following data entry screen is displayed.



Touch the Save button to store the new value, or the Cancel button to exit the data entry screen and leave the original value unchanged.

2.2.3 List of Options

When editing data items that have a list of options available the following data selection screen is displayed.



If more than six items are available use the scrollbar to move the display window up/down the list of items.

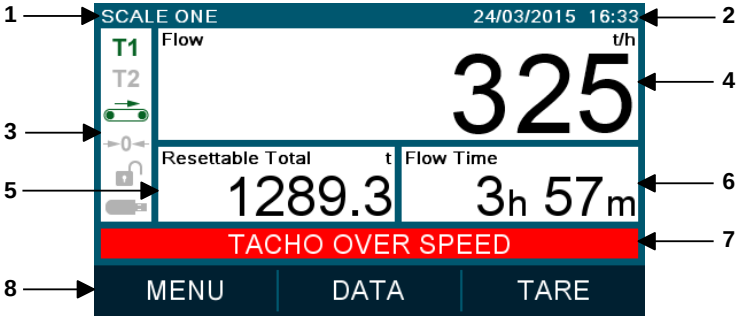
Touch the required item to move the selection highlight to that item.

Touch the Save button to store the new value, or the Cancel button to exit the data entry screen and leave the original value unchanged.

3 Operation

3.1 Home Screen

The Home Screen is displayed following power on or operation of the home icon and provides the main user interface.



1. **Weigher Name**
2. **Time & Date**
3. **Status Indicators**
4. **Data Tile 1**
5. **Data Tile 2**
6. **Data Tile 3**
7. **Message Tile**
8. **Function Keys**

The three data tiles can be configured to display the process data required for the application from a list of available process data items, refer to section 6.4 for configuration details.

If the data tile contains a resettable process value then this value can be reset by touching anywhere within the appropriate tile and following the onscreen instructions.

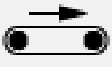
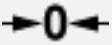
The message tile displays an error message whenever an error condition is present. Otherwise it will display the current material.

Touching the status indicator display area (apart from the USB flash drive) allows quick access to a diagnostic screen displaying live weight and speed signals along with calibration data, refer to section 3.2 for further details.

The function keys provide access to the Main Menu, Data Screen and Dynamic Tare routine. If the OJ1436 is configured for report printing then a PRINT key will also be displayed.

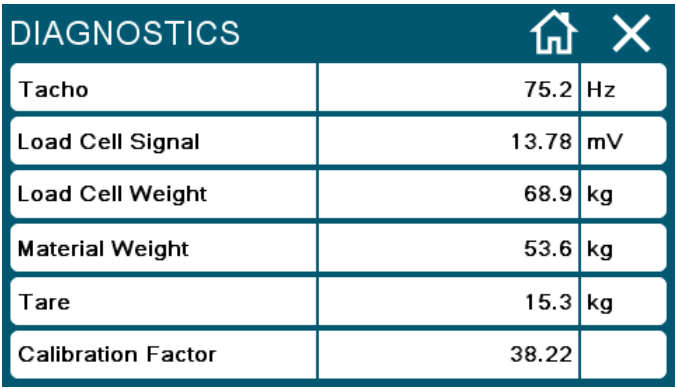
3.1.1 Status Indicators

The status indicators displayed on the home screen provide a graphical representation of the OJ1436 status as defined below.

Name	Icon	Colour	Status
Trip 1	T1	Grey	Trip 1 is OFF (relay output T1 open).
		Green	Trip 1 is ON (relay output T1 closed).
Healthy or Trip 2	T2	Grey	Healthy or Trip 2 output is OFF (relay output T2 open).
		Green	Healthy or Trip 2 output is ON (relay output T2 closed).
Belt Running		Grey	Belt Stopped (relay output T4 open).
		Green	Belt Running (relay output T4 closed).
Dead Range		Grey	The current flow rate is outside the dead range (see section 3.8.1).
		Green	The current flow rate is within the dead range (see section 3.8.1).
Security		Grey	The OJ1436 is locked i.e. engineer mode disabled (see section 3.7.2).
		Red	The OJ1436 is unlocked i.e. engineer mode enabled (see section 3.7.2).
USB Flash Drive		Grey	No flash drive inserted.
		Black	The USB port is disabled allowing safe removal of the flash drive.
		Green	A flash drive is inserted and idle.
		Red	A flash drive is inserted and is being written to or read from.

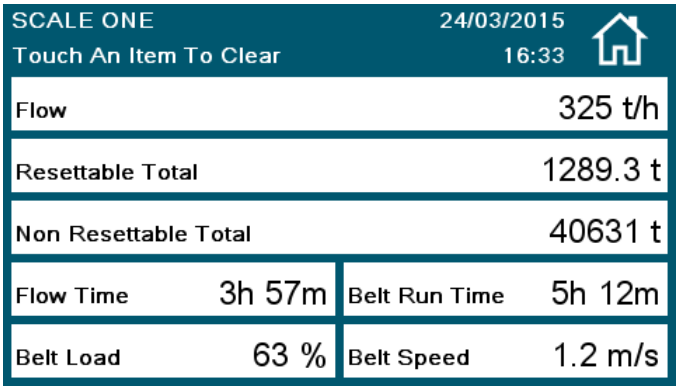
3.2 Diagnostic Screen

Touching the status indicator display area on the Home screen (apart from the USB flash drive) allows quick access to a diagnostic screen displaying live weight and speed signals along with calibration data, as shown below.



3.3 Data Screen

The Data Screen is accessed by touching DATA on the home screen. It displays the full set of available process data within a single screen, as shown below.



The resettable process values can be reset by touching anywhere within the appropriate tile and following the onscreen instructions.

3.4 Main Menu

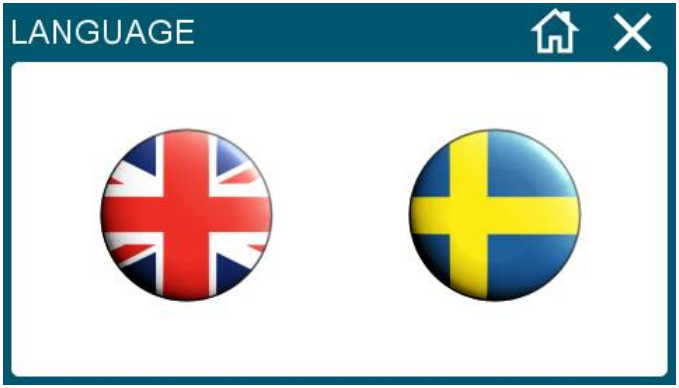
The Main Menu is accessed by touching MENU on the home screen. It provides access to the setup and diagnostic data, as shown below.

3.5 Language

The OJ1436 supports the following language options:

- English
- Swedish

To select the required language, operate MENU → Language and select the appropriate option, as shown below.

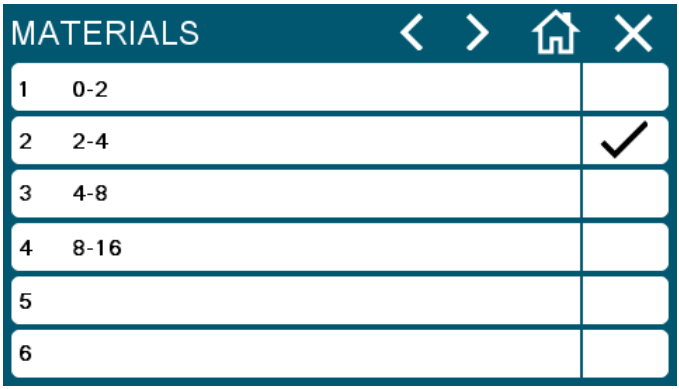


3.6 Materials

The OJ1436 is capable of storing 12 material names of up to 18 characters per name.

The currently selected material name will be displayed in the message tile on the Home screen.

The Materials screen, shown below, is accessed by operating MENU → Materials.



To edit the material name touch the appropriate line in the area where the material name is displayed and enter the required name.

To select the required material touch the appropriate line in the area to the right hand side of the screen. The tick will then move to the selected line to confirm the material selection.

Use the previous/next navigation arrows at the top of the screen to switch between materials 1-6 and 7-12.

3.7 Passcode Protected Data

3.7.1 Production Data

The following production data items are passcode protected in order to protect them against being reset by unauthorised personnel.

- Non Resettable Total
- Belt Run Time

The operator will be prompted to enter the Data Reset Passcode when attempting to reset these items.

The Data Reset Passcode is factory set to 1234, refer to section 8.2.3 for details of how to edit the passcode if required.

3.7.2 Calibration and Configuration Data

The Calibration and Configuration data can be viewed without entry of a passcode. However, the Engineer Passcode must be entered in order to edit parameters and run the calibration routines.

The following procedure should be used when performing tasks that require entry of the engineering passcode:

1. Navigate to the Security menu: MENU → Administration → Security and then select the Enable Engineer Mode option.
2. When prompted, enter the Engineer Passcode.
3. Perform the required tasks e.g. calibration, data changes etc.
4. Navigate to the Security menu: MENU → Administration → Security and then select the Disable Engineer Mode option.

Alternatively, proceed directly to the required task and enter the engineer passcode when prompted. However, Engineer Mode must still be disabled through the security menu upon completion of the tasks.

The Engineer Passcode is factory set to 1234, refer to section 8.2.2 for details of how to edit the passcode if required.

3.8 Flow Rate

The OJ1436 continually calculates the flow of material along the belt conveyor from the measured weight of material passing over the weigher and the speed of the belt movement.

The flow rate is displayed in either kg/h (kilograms per hour) or t/h (tonnes per hour) depending on the configuration.

The OJ1436 is capable of displaying the flow rate as a 7 digit value, including a decimal place e.g. -9999999 to 9999999, -99999.9 to 99999.9 etc. Any value outside this range will displayed as '*'s.

3.8.1 Dead Range

The Dead Range facility is provided to ensure that any possible fluctuation in the measured flow rate when the belt is running empty, due to mechanical vibration, does not affect the totalisers.

When the flow rate is within the Dead Range, i.e. +/- Dead Range setting, the status indicator will be lit and the flow rate will be zero.

If the flow rate is negative, due to the weight input being below the tare, by more than the Dead Range the display shows the amount of 'negative' flow.

3.9 Resettable & Non Resettable Totals

These totalisers represent the quantity of material in kg (kilograms) or t (tonnes), depending on the configuration, that has passed over the belt weigher since they were last reset.

They are displayed as a 7 digit value, including a decimal place e.g. 0 to 9999999, 0 to 99999.9 etc. If they exceed these limits they will automatically roll over.

The Resettable Total can be reset by the user without entry of a passcode. The Non Resettable Total can only be reset by the user following entry of the Data Reset passcode. The user is prompted to enter this passcode when attempting to reset the totaliser.

3.10 Flow Time

The Flow Time indicates the length of time that the flow rate has been above the configurable Flow Time Level.

The OJ1436 is capable of displaying the Flow Time up to a limit of 999h 59m. If it exceeds this limit it will automatically roll over.

This timer can be reset by the user without entry of a passcode.

3.11 Belt Run Time

The Belt Run Time indicates the length of time that the belt has been running. This accumulates whenever the tacho frequency is above the Belt Running Level when set for external tacho, or whenever the belt running signal is present when set for internal tacho.

The OJ1436 is capable of displaying the Belt Run Time up to a limit of 999h 59m. If it exceeds this limit it will automatically roll over.

This timer can only be reset by the user following entry of the Data Reset passcode. The user is prompted to enter this passcode when attempting to reset the timer.

3.12 Belt Load

The Belt Load is calculated as follows.

$$\text{Belt Load (\%)} = \left(\frac{\text{Material Weight}}{\text{Load Cell Capacity} - \text{Tare Weight}}\right) \times 100$$

The value is displayed in the range -100 to 100%.

3.13 Belt Speed

The Belt Speed is displayed in either m/s (metres per second) or m/m (metres per minute) depending on the configuration.

Using the Pulses per Metre parameter, the OJ1436 continuously converts the measured tacho pulse frequency (Hz) to belt speed as follows.

$$\text{Belt Speed (m/s)} = \frac{\text{Measured Tacho Pulse Frequency (Hz)}}{\text{Pulses per Metre}}$$

The Pulses per Metre parameter can be entered, calculated or measured using the belt speed calibration routine as detailed in section 0.

The Belt Speed is displayed in the range 0 to 999.9.

3.14 Dynamic Tare

A routine dynamic tare can be performed by touching TARE on the home screen and following the onscreen instructions.

Refer to section 5.2 for further details regarding the dynamic tare procedure.

3.15 Automatic Zero Adjustment

The Tare value is adjusted every 30 seconds by 0.01% of the configured Load Cell Capacity during periods of the belt running and the flow rate being within the Dead Range.

3.16 Incline Compensation

An inclinometer device can be fitted to the belt conveyor and interfaced to the OJ1436 to provide automatic compensation for changes in the measured weight signal due to a change in the conveyor angle.

The analogue input option is required to accept the 4-20mA signal from the inclinometer. This must then be matched to the inclinometer range using the inclinometer configuration parameters defined in section 6.3.

Once enabled, the live angle measurement can be observed within the sensors diagnostic screen, see section 7.2 for details.

The load cell signal is then continually compensated so that as the conveyor angle changes, and therefore the load cell signal changes, the weight measurement remains constant for a given load on the belt weigher.

If incline compensation is to be used, the inclinometer must be enabled before performing the tare and calibration routines.

3.17 Tacho

The Tacho input is normally connected to a remote tacho device to provide an accurate belt speed signal. However, it is possible to operate without a tacho device by means of the internal tacho simulator facility.

With the internal tacho selected the tacho connections may be wired to provide a belt running input, refer to section 13.6 for details.

The Belt Running status indicator will be lit green and the Belt Running relay output (T4) is set on whenever the tacho signal is present.

3.18 Analogue Output

If the analogue output option is fitted it provides a transmission of the live flow rate as a 0-20mA, 4-20mA or 0-10V signal, refer to section 13.9 for further details.

The output range, along with zero and full scale signal trimming, can be adjusted within the Analogue Output configuration settings, as defined in section 6.5.3.

3.19 Digital Inputs

Two digital inputs are provided, D1 and D2, which can be configured to perform one of the following functions:

- **Print** : Print a report (see section 10.1 for details).
- **Tare** : Perform a Dynamic Tare routine.
- **Clear Total** : Clear the Resettable Total.

The inputs are configured using the Digital Inputs configuration settings, as defined in section 6.5.1.

3.20 Relay Outputs

Four relay outputs are provided which function as detailed below.

Relay Output	Definition
T1	**Trip 1 Output** The relay output is set on (contacts closed) when the flow rate is above the configured Trip 1 Level setting, as defined in section 6.5.2.
T2	**Healthy or Trip 2 Output** This output can be configured as either a Healthy signal or a second trip output using the Output T2 Function parameter, as defined in section 6.5.2. **Healthy** The relay output is set on (contacts closed) when the unit is operating without errors and is displaying the Home or Data screen. **Trip 2 Output** The relay output is set on (contacts closed) when the flow rate is above the configurable Trip 2 Level setting, as defined in section 6.5.2.
T3	**Pulse Output** A pulse output for use with a remote totalising device. A configurable length pulse is generated for every pre-set unit of weight totalised, refer to section 6.5.2 for configuration settings.
T4	**Belt Running** The relay output is set on (contacts closed) whenever: External Tacho The tacho pulse frequency is greater than the Belt Running level. Internal Tacho The Belt Running input signal is present.

3.21 USB Flash Drive

A USB flash drive can be inserted in to the USB port in order to provide the following functionality:

- Backup & Restore of System Data
- Continuous Data Logging
- Copy Internal Production Data Logs
- Firmware Updates

The status of the flash drive can be observed using the USB Flash Drive Status Indicator displayed on the Home screen, refer to section 3.1.1 for further details.

The flash drive will be automatically detected when inserted in to the USB port and will then be available for use.

3.21.1 Safe Removal

To prevent possible data corruption when removing the flash drive, proceed as follows:

1. Touch the USB Flash Drive Status Indicator displayed on the Home screen to launch the safe removal confirmation pop-up.
2. Select ‘Yes’.
3. Confirm that the USB Flash Drive Status Indicator has now turned black.
4. Remove the flash drive from the USB port.

4 Commissioning Procedure

Once the installation of the OJ1436 and associated external devices has been completed, and all electrical connections have been made, follow the instructions below to ensure correct operation.

Perform a Dynamic Tare
Start the belt and press TARE on the home screen, then follow the on screen instructions.

Perform the Calibration
The calibration can be established using either the Material or Test Weight Calibration routine.

The Material Calibration routine is the recommended method but is not always possible.

Perform the appropriate calibration routine as detailed in sections 5.3 or 5.4 accordingly.

5 Dynamic Tare & Calibration

The dynamic tare and calibration routines are used to establish an accurate measurement of the flow rate of material along the belt conveyor from the weight and speed signals received by the OJ1436.

When performing the initial calibration, or when the calibration is suspected to be very inaccurate, follow the commissioning procedure detailed in section 4.

If an inclinometer device is connected to the OJ1436 then the Inclinometer Settings outlined in section 6.3 must be set prior to performing the dynamic tare and calibration.

5.1 Access to the Dynamic Tare & Calibration Routines

The calibration menu provides access to the routines and data required to establish the tare and calibration.

It is accessed by operating MENU → Calibration.

The following routines can be accessed from the calibration menu.

- Dynamic Tare
- Material Calibration
- Test Weight Calibration
- Manual Calibration
- Belt Speed Calibration
- Dead Range

The Dynamic Tare routine can be performed without entry of a passcode.

In order to perform all other calibration routines and data adjustment engineer mode must be enabled by entry of the engineer passcode, refer to section 3.7.2 for further details.

All dynamic tare and calibration routines are recorded in the event log, refer to section 7.7 for further details.

5.2 Dynamic Tare

The Dynamic Tare routine is used to establish the weight of the conveyor when running empty.

In order to run the Dynamic Tare routine, either:

- Operate TARE from the Home screen

OR

- Operate MENU → Calibration → Tare

and follow the onscreen instructions.

The belt must be running and empty before starting the Dynamic Tare routine.

The length of time required to complete the routine is determined by the Tare Period, as defined below. This can be adjusted if necessary before the Dynamic Tare routine commences.

Parameter	Range	Factory Setting
Tare Period – tacho pulses Specifies the number of tacho pulses over which the dynamic tare routine operates. **It should be set to a value that equates to at least one complete belt revolution.**	1 - 99999	1000

Whilst the Dynamic Tare routine is running the Tacho Speed, Load Cell Weight and Time Remaining will be displayed.

If the routine is aborted no adjustment will be made to the Tare value.

Upon completion of the Dynamic Tare routine both the Current Tare and New Tare values are displayed. If the New Tare is accepted the Tare value will be updated accordingly.

5.3 Material Calibration

The Material Calibration routine is based on passing a known weight of material over the belt weigher and is the recommended method of calibration.

In order to run the Material Calibration routine, operate MENU → Calibration → Material and follow the onscreen instructions.

The material passed over the belt weigher can be excluded from the production totals if required.

The known weight of material should be entered in kilograms (kg) regardless of the Weight Units setting.

By comparison of the known weight of material, entered during the routine, and the total recorded by the OJ1436 a New Calibration Factor is calculated and the following data is displayed for verification. If accepted, the Calibration Factor will then be updated.

Parameter	Range
Belt Weigher Total – kg The total measured by the OJ1436 for the material that has passed over the belt weigher during the calibration routine.	0 - 999999
Reference Total – kg The known weight of material passed over the belt weigher during the calibration routine. This is entered by the user.	0 - 999999
Difference – kg and % The error between the total measured by the OJ1436 and the known weight of material entered by the user.	0 - 99999.9
Current Calibration Factor The current calibration factor i.e. as used to generate the Belt Weigher Total above.	0 - 99999.99
New Calibration Factor The new calibration factor calculated as a result of the error between the Belt Weigher Total and Reference Total values above.	0 - 99999.99

5.4 Test Weight Calibration

The Test Weight Calibration routine can be used for applications where it is not possible to pass a known weight of material over the belt weigher. This is a less accurate method of calibration that uses a static test weight placed on the weigher.

In order to run the Test Weight Calibration routine, operate MENU → Calibration → Test Weight and follow the onscreen instructions.

During the step-by-step instructions information relating to the belt weigher and test weights being used must be entered in order for the OJ1436 to establish the calibration.

The following data must be entered, as detailed below.

Parameter	Range	Factory Setting
Weigh Length – mm The length of the weighed portion of the belt, distance to scale from roller before and after scale /2. i.e. 1110+980=2090/2=1045mm	1 - 999999	1000
Test Weight per Weigh Length – kg This is the portion of the test weight that is being measured by the belt weigher. If the test weights will be attached directly to the weigh frame then the total test weight should be entered here.	0 - 99999	0

The Calibration Period must then be specified, as detailed below.

Parameter	Range	Factory Setting
Calibration Period – metres Specifies the belt movement in metres over which the calibration routine operates. **It should be set to a value that equates to at least one complete belt revolution.**	0.01 - 9999.99	100.00

By comparison of the calculated Reference Total, derived from the data entered above, and the total recorded by the OJ1436 a New Calibration Factor is calculated and the following data is displayed for verification.

Parameter	Range
Belt Weigher Total – kg The total measured by the OJ1436 for the test weight applied to the belt weigher for the period of the calibration routine.	0 - 999999
Reference Total – kg The theoretical total based on the test weight and weigher data entered above.	0 - 999999
Difference – kg and % The error between the total measured by the OJ1436 and the calculated reference total based on the data entered by the user.	0 - 999999
Current Calibration Factor The current calibration factor i.e. as used to generate the Belt Weigher Total above.	0 - 99999.99
New Calibration Factor The new calibration factor calculated as a result of the error between the Belt Weigher Total and Reference Total values above.	0 - 99999.99

If the New Calibration Factor is accepted the Calibration Factor value will be updated accordingly.

5.5 Manual Calibration

The Manual Calibration option provides the facility to establish a theoretical calibration or directly adjust the tare and calibration factor values without running the dynamic tare or calibration routines.

The theoretical calibration can be useful in order to establish an approximate calibration before running either the Material or Test Weight Calibration routines.

The direct adjustment of the tare and calibration factor can be used when replacing a unit or attempting to make a calibration change due to a known error in production totals.

It is accessed by operating MENU → Calibration → Manual.

The current Calibration Factor and Tare values are displayed, as detailed below.

Parameter	Range	Factory Setting
Current Calibration Factor The Calibration Factor used to determine the flow rate and rate of totalisation. This parameter may be automatically determined using one of the calibration routines described above or it may be directly adjusted here.	0.01 - 9999.99	38.00
Current Tare – kg The weight of the conveyor when running empty. This parameter may be automatically determined using the dynamic tare routine described above or it may be directly adjusted here.	0 - 99999	0

5.5.1 Entering a value

To enter a new value for the Calibration Factor or Tare simply touch the appropriate displayed value and enter the required value in the usual way.

5.5.2 Enter % Calibration Adjustment

If there is a known percentage error between the total recorded by the OJ1436 and the actual total quantity of material that has passed over the belt weigher a calibration adjustment can be made by following the onscreen instructions.

Note : The percentage error should be calculated as follows.

$$\text{Percentage Error} = \frac{\text{OJ1436 Total} - \text{Reference Total}}{\text{Reference Total}} \text{ x } 100$$

Following entry of the required data both the Current Calibration Factor and New Calibration Factor values are displayed.

If the New Calibration Factor is accepted the Calibration Factor value will be updated accordingly.

5.5.3 Enter Totals

If there is a known error between the total recorded by the OJ1436 and the actual total quantity of material that has passed over the belt weigher a calibration adjustment can be made as follows.

The totals are displayed as detailed below.

Parameter	Range
Belt Weigher Total – kg The material total recorded by the OJ1436 over a given time period.	0 - 9999999
Reference Total – kg The actual amount of material passed over the belt weigher over a given time period.	0 - 9999999

Enter the totals by simply touching the appropriate total and entering the required value in the usual way.

Following operation of the 'Calculate New Calibration Factor' button both the Current Calibration Factor and New Calibration Factor values are displayed. If the New Calibration Factor is accepted the Calibration Factor value will be updated accordingly.

5.5.4 Theoretical Calibration

The data required is based on whether an external tacho device or the internal tacho simulator is being used. Therefore, it is important that the Tacho Source parameter is set before attempting the theoretical calibration.

5.5.4.1 External Tacho

If the Tacho Source parameter is set to External then the tacho specification data is required, as detailed below.

Parameter	Range	Factory Setting
Weigh Length – mm The length of the weighed portion of the belt, distance to scale from roller before and after scale /2. i.e. 1110+980=2090/2=1045mm	1 - 999999	1000
Speed Sensor Diameter – mm If using a toothed wheel speed sensor this would be the wheel diameter or if using a shaft encoder it would be the diameter of the pulley that the encoder is mounted to.	1 - 999999	150
Pulses per Sensor Revolution The number of pulses generated per revolution of the speed sensor device.	1 - 999999	20

5.5.4.2 Internal Tacho

If the Tacho Source parameter is set to Internal then the belt speed is required, as detailed below.

Parameter	Range	Factory Setting
Weigh Length – mm The length of the weighed portion of the belt.	1 - 999999	1000
Belt Speed – m/s The belt speed in metres per second.	0.01 - 999.99	2.00

Following entry of the required data items both the Current Calibration Factor and New Calibration Factor values are displayed. If the New Calibration Factor is accepted the Calibration Factor value will be updated accordingly.

5.6 Belt Speed Calibration

The Belt Speed calibration is used to determine the Pulses per Metre parameter value, which is subsequently used to convert the measured tacho pulse frequency (Hz) to belt speed in metres per second/minute.

Note : The flow rate calculation is based on the measured tacho pulse frequency and not the converted belt speed. Therefore, changing the Pulses per Metre value will have no effect on the Flow Rate value.

It is accessed by operating MENU → Calibration → Belt Speed.

The Pulses per Metre parameter is then displayed, as detailed below.

Parameter	Range	Factory Setting
Pulses per Metre The number of pulses received from the tacho device per one metre of belt movement.	0.01 - 999.99	42.44

The Pulses per Metre value can be entered, calculated or measured as detailed below.

5.6.1 Entering a value

To enter a new Pulses Per Metre value simply touch the displayed value and enter the required value in the usual way.

5.6.2 Calculation of Pulses per Metre

The Pulses per Metre value can be calculated by entry of the tacho specification data or belt speed depending on whether the Tacho Source parameter is set to External or Internal.

5.6.2.1 External Tacho

If the Tacho Source parameter is set to External then the tacho specification data is required, as detailed below.

Parameter	Range	Factory Setting
Speed Sensor Diameter – mm If using a toothed wheel speed sensor this would be the wheel diameter or if using a shaft encoder it would be the diameter of the pulley that the encoder is mounted to.	1 - 999999	150
Pulses per Sensor Revolution The number of pulses generated per revolution of the speed sensor device.	1 - 999999	20

5.6.2.2 Internal Tacho

If the Tacho Source parameter is set to Internal then the belt speed is required, as detailed below.

Parameter	Range	Factory Setting
Belt Speed – m/s The belt speed in metres per second.	0.01 - 999.99	2.00

5.6.3 Measurement of Pulses per Metre

The Pulses per Metre can be measured by the OJ1436 using the following routine.

Parameter	Range
Total Belt Movement – metres The distance that the belt has travelled during the period that the pulses were being counted.	0.01 - 9999.99
Pulses Counted The number of pulses counted between operation of the Start and Stop buttons.	0 - 99999999

Operating the Start button will reset Pulses Counted to zero and then initiate the pulse counting.

Operating the Stop button will stop the pulse counting.

Therefore, proceed as follows:

1. Mark the belt in one position if the total belt length is known or two positions a known distance apart if not.
2. Mark a point on the conveyor frame.
3. Start the conveyor.
4. When the first mark on the belt passes the mark on the conveyor frame operate the Start button.
5. When the second mark on the belt, or the single mark for one belt length, passes the mark on the conveyor frame operate the Stop button.
6. Enter the measured distance between the marks as the Total Belt Movement.
7. Operate the Update Pulses/m button.

5.7 Dead Range

The Dead Range parameter determines the band within which the flow rate will be considered to be zero.

It is important that the Dead Range is set accurately in order to avoid possible totalising when the belt is running empty whilst also ensuring that all material is totalised.

It is accessed by operating MENU → Calibration → Dead Range.

The following data is displayed, as detailed below.

Parameter	Range	Factory Setting
Flow Rate – kg/h or t/h This is a display of the live flow rate without the dead range applied.	0 - 999999	-
Dead Range – kg/h or t/h Specifies the band, above and below zero, within which the flow rate will be considered to be zero.	0 - 999999	6

To set the Dead Range parameter:

1. Observe the fluctuations in the displayed Flow Rate with the belt running empty.

2. Set the Dead Range to a value greater than the maximum flow rate reading observed above i.e. touch the Dead Range parameter and enter the required value in the usual way.

6 Configuration Data

6.1 Access to the Configuration Data

The configuration menu provides access to the configuration data.

It is accessed by operating MENU → Configuration.

The following configuration data sections can be accessed from the configuration menu.

- Belt Weigher
- Inclinometer
- General
- Interfaces
    - Digital Inputs
    - Digital Outputs
    - Analogue Output
    - Serial Interface
    - Network
- Data Logging
- Clock / Calendar

The configuration data parameters can be viewed without entry of a passcode.

In order to edit any of the parameter values, apart from the clock/calendar, engineer mode must be enabled by entry of the engineer passcode, refer to section 3.7.2 for further details.

All changes to parameter values are recorded in the event log, refer to section 7.7 for further details.

6.2 Belt Weigher

MENU → Configuration → Belt Weigher

Parameter	Range	Factory Setting
Load Cell Capacity - kg Set to the full capacity of the load cells e.g. for 2 x 100kg load cells set capacity to 200kg.	0 - 99999	300
Load Cell Input Range Determines the load cell input sensitivity from 0-20mV to 0-2.56V.	0 - 20mV - 0 - 2.56V	0 - 20mV
Weigh Filter Determines the number of load cell input readings over which the weight is calculated, from a rolling average, each time a reading is taken (every 50ms). **Setting** **Filter** 1 Corresponds to no averaging 100 Corresponds to max averaging	1 - 100	70
Tacho Source Determines whether an external tacho device is connected or the internal tacho simulator should be used.	Internal / External	External
Internal Tacho Speed – Hz Determines the speed of the internal tacho simulator when used to represent a fixed speed belt.	1 - 220	100
Speed Filter Determines the number of stored tacho input readings over which the belt speed is calculated, from a rolling average, each time a reading is stored (every 20ms). **Setting** **Filter** 1 Corresponds to no averaging 100 Corresponds to max averaging	1 - 100	40

Parameter	Range	Factory Setting
Belt Running Level – Hz Determines the external tacho frequency which must be exceeded in order for the belt to be considered as 'running'. This can be used to eliminate spurious pulses, generated from a stopped tacho device (due to vibration), registering as a low frequency tacho signal. **Does not apply to the internal tacho simulator or diagnostic data.**	0 - 220	10
Weight Units Determines whether to display the process data in tonnes or kilograms i.e. applies to flow rate, totals etc.	t / kg	t
Belt Speed Units Determines whether the belt speed will be displayed in metres/second or metres/minute.	m/sec m/min	m/sec
Flow Rate DP Determines the decimal point position for the display of data items with units of kg/h or t/h.	0 - 4	0
Resettable Total DP Determines the decimal point position for the display of the Resettable Total.	0 - 4	1
Non-Resettable Total DP Determines the decimal point position for the display of the Non-Resettable Total.	0 - 4	0
Static DP Determines the decimal point position for the static weight data items e.g. load cell capacity.	0 - 4	1
Flow Rate Increments - kg/hr or t/hr Determines the minimum value by which the flow rate display changes. Zero corresponds to no suppression.	0 - 99999	0

6.3 Inclinometer

MENU → Configuration → Inclinometer

Parameter	Range	Factory Setting
Enable Inclinometer Enables the weight correction in accordance with the inclinometer signal received on the 4-20mA input.	Yes / No	No
Angle at 4mA - degrees The angle that equates to a 4mA signal being received from the inclinometer device.	-90 to +90	0
Angle at 20mA - degrees The angle that equates to a 20mA signal being received from the inclinometer device.	-90 to +90	30

6.4 General

MENU → Configuration → General

Parameter	Range	Factory Setting
Weigher Name Assign a name to the indicator to allow it to be identified in applications where there are multiple indicators. This is displayed on the home screen, printed on reports and stored with the logged data.	Max. 18 characters	-
Tile 1 Item Determines which data value will be displayed in Tile 1 on the home screen from the list below. See section 3.1 for further details. • Flow Rate • Resettable Total • Non Resettable Total • Belt Load • Belt Speed • Flow Time • Belt Run Time	Flow / Total / Non Resettable Total / Load / Speed / Flow Time / Run Time	Flow
Tile 2 Item As Tile 1 Item above but for Tile 2.	As Tile 1 Item above.	Total
Tile 3 Item As Tile 1 Item above but for Tile 3.	As Tile 1 Item above.	Flow Time
Flow Time Level - kg/hr or t/hr Determines the flow level above which the Flow Time will accumulate. A zero setting is used to select the Dead Range as the flow rate, any other value is used to set an absolute flow rate.	0 - 99999	0

6.5 Interfaces

6.5.1 Digital Inputs

MENU → Configuration → Interfaces → Digital Inputs

Parameter	Range	Factory Setting
Input D1 Function Determines the operation performed by digital input D1 from the following options. • Print a batch report • Perform a Dynamic Tare • Clear the Resettable Total	None / Print / Tare / Clear Total	None
Input D2 Function As Input D1 Function above but for digital input D2.	As Input D1 Function above	None

6.5.2 Digital Outputs

MENU → Configuration → Interfaces → Digital Outputs

Parameter	Range	Factory Setting
Output Pulse – kg or t Determines the increase in totalised weight in either kg or t (as selected by the Weight Units parameter), for which an output pulse is produced on relay output T3. A zero setting disables the output.	0 - 99999	0
Output Pulse Length – seconds Determines the length of the output pulse produced on relay output T3.	0.1 – 9.9	0.1
Trip 1 Level - kg/h or t/h Determines the flow rate level at which the relay output T1 switches to on (contacts closed). A zero setting disables the output.	0 - 99999	0

Parameter	Range	Factory Setting
Output T2 Function Determines whether relay output T2 operates as a Healthy signal or a second trip level.	Healthy / Trip	Trip

Trip 2 Level parameter: shown only when Output T2 Function = Trip

Parameter	Range	Factory Setting
Trip 2 Level Determines the flow rate level at which the relay output T2 switches to on (contacts closed). A zero setting disables the output.	0 - 99999	0

6.5.3 Analogue Output

MENU → Configuration → Interfaces → Analogue Output

The Analogue Output screen provides the facility to set the required Output Range and also adjust the zero and full scale output signal if required.

The Output Range parameter, as defined below, can be edited in the usual way.

Parameter	Range	Factory Setting
Output Range – kg/h or t/h Set to the flow rate which is to correspond to the full scale analogue output.	0 - 99999	100

The Zero adjustment can be used to set the analogue output signal that equates to a zero flow rate (factory set to 4mA or 0V).

The Full Scale adjustment can be used to set the analogue output signal that equates to the flow rate set within the Output Range parameter above (factory set to 20mA or 10V).

To adjust the Zero or Full Scale output signal:

1. Operate the Zero or Full Scale button (displayed in green when selected).
2. Use the Up/Down arrows to adjust the analogue output signal to the required level (as might be shown on a multimeter or the remote device connected to the analogue output).

6.5.4 Serial Interface

MENU → Configuration → Interfaces → Serial Interface

Parameter	Range	Factory Setting
Serial Mode This allows the serial interface to be configured for one of the following: • Multi-drop communications to a PLC/PC via SABus, Modbus ASCII or RTU. • Periodically transmit the current flow rate or total. • Print reports of flow and totals with time and date stamp. Refer to section 10 for further details.	SABus / Transmit / Printed Report / Modbus ASCII / Modbus RTU	SABus
Baud Rate – bps Serial data transmission speed.	1200 - 19200	9600
Communication Standard Determines the serial link communication standard i.e. RS485/RS422 or RS232.	RS232 / RS485	RS485

Address parameter: shown only when Serial Mode = SABus or Modbus

Parameter	Range	Factory Setting
Address Sets the units address code number.	0 - 99	0

Parity parameter: shown only when Serial Mode = Modbus ASCII or RTU

Parameter	Range	Factory Setting
Parity Sets the serial data parity mode.	None / Even / Odd	None

Periodic transmit parameters: shown only when Serial Mode = Transmit

Parameter	Range	Factory Setting
Transmit Data Item Determines which data item will be periodically transmitted via the serial link from following options. • Flow Rate • Resettable Total • Non Resettable Total	Flow Rate / Resettable Total / Non Resettable Total	Flow Rate
Transmit Interval - Seconds The time between data transmissions.	0.1 - 99.9	1.0

6.5.5 Network

MENU → Configuration → Interfaces → Network

Parameter	Range	Factory Setting
Network Interface This should be configured to match the installed network interface option, if fitted.	None / Ethernet / EtherNet/IP / Profibus DP / DeviceNet	Ethernet

Please refer to the appropriate OJ1436 network interface user manual for further details regarding the configuration and operation of the network communications.

6.6 Data Logging

MENU → Configuration → Data Logging

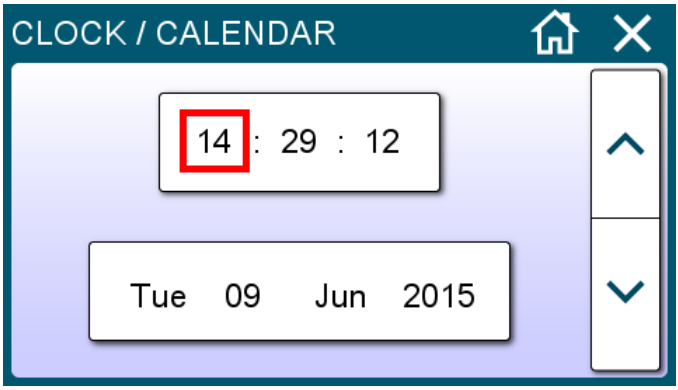
The following parameters are used to configure the data logging features, refer to section 9 for further details.

Parameter	Range	Factory Setting
Printed Report Log Determines whether the printed report logging is disabled, stored in internal memory only or is also automatically stored to a USB flash drive.	No / Internal / Internal + USB	Internal + USB
Production Report Log Determines whether the production report logging is disabled, stored in internal memory only or is also automatically stored to a USB flash drive.	No / Internal / Internal + USB	Internal + USB
Production Log Period Determines whether the end of one production log period and therefore the start of the next is triggered when the time passes midnight (Daily) or when the Resettable Total is cleared (Clear Total).	Daily / Clear Total	Clear Total
Periodic Logging Determines whether the periodic logging is enabled.	Yes / No	No
Periodic Log Time Determines the period of time between periodic logs (in conjunction with the units below).	1 - 999	1
Periodic Log Units Determines the units of time used in conjunction with the periodic log time above.	Seconds / Minutes	Minutes

6.7 Clock / Calendar

MENU → Configuration → Clock / Calendar

The Clock / Calendar screen provides the facility to adjust the time and date settings, as shown below.



Touch the appropriate data item to select it (as shown by the outline box) and then use the up/down arrows to set the required value.

7 Diagnostic Data

7.1 Access to the Diagnostic Data

The Diagnostics menu provides access to the diagnostic data.

It is accessed by operating MENU → Diagnostics.

The following diagnostic data sections can be accessed from the diagnostics menu.

- Sensors
- Digital I/O
- Test Outputs
- Serial Interface & Network Communications
- Registers
- Event Log

7.2 Sensors

MENU → Diagnostics → Sensors

The Sensors screen provides the facility to monitor the signals received from the load cells, speed sensor and inclinometer (if enabled) as detailed below.

Parameter	Range
Tacho – Hz (pulses per second) The tacho pulse speed in pulses per second. If operating from the internal tacho simulator the configured internal tacho speed will be displayed only when the 'belt running' input signal is present.	0 - 250
Load Cell Signal – millivolts This displays the millivolt signal received from the load cells.	0 - 2560
Load Cell Weight – kg This is the weight input signal displayed in kg before any tare adjustments have been made i.e. the weight applied to the load cells within the range defined by the Load Cell Capacity setting.	0 – Load Cell Capacity

Parameter	Range
Material Weight – kg This is the Load Cell Weight with the Tare removed i.e. the weight of material on the belt.	0 – Load Cell Capacity

Inclinometer Angle: shown only when Enable Inclinometer = Yes

Parameter	Range
Inclinometer Angle – degrees The current angle calculated from the 4-20mA input signal received from the inclinometer.	-90 - + 90

7.3 Digital I/O

MENU → Diagnostics → Digital I/O

The Digital I/O screen provides the facility to monitor the current states of the digital inputs and outputs.

7.4 Test Outputs

MENU → Diagnostics → Test Outputs

The Test Outputs screen provides the facility to force the digital outputs on/off manually i.e. overriding the normal operation.

Engineer Mode must be enabled in order to access this screen, refer to section 3.7.2 for further details.

Touching the appropriate digital output display line will cause the state of the output to toggle on/off.

Exiting the Test Outputs screen will cause the digital outputs to resume their normal operating state.

7.5 Serial Interface & Network Communications

7.5.1 Serial Interface

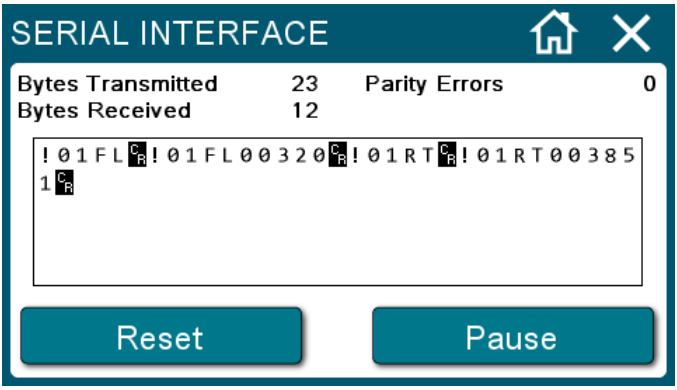
If no network interface is fitted and configured then the serial interface diagnostics screen is accessed by operating:

MENU → Diagnostics → Serial Interface

Otherwise, the serial interface diagnostics screen is accessed by operating:

MENU → Diagnostics → Communications → Serial

The Serial Interface screen provides the facility to monitor the serial data received and transmitted by the OJ1436, as shown below.



The counters at the top of the screen represent the total number of data bytes transmitted and received, along with any parity errors detected.

The data window displays a continuous stream of all transmitted and received data bytes as ASCII characters (control characters are shown as inverted blocks). If configured for Modbus RTU communication the data bytes are shown in hexadecimal number format. Invalid characters are displayed as blank inverted blocks.

Once the data window is full the oldest data will scroll off the top as new data is displayed at the bottom.

The Pause/Resume button allows the displayed data update to be stopped temporarily.

The Reset button will reset the counters and clear the data window.

7.5.2 Network Communications

If a network interface is fitted and configured the network diagnostics screen can be accessed by operating:

MENU → Diagnostics → Communications → Network

Please refer to the appropriate OJ1436 network interface user manual for further details regarding the network diagnostics screen.

7.6 Registers

MENU → Diagnostics → Registers

The Registers screen provides the facility to monitor the internal register values as detailed below.

An in-depth knowledge of the OJ1436 is required to analyse these register values. They may be requested when providing technical support.

Parameter	Range
ADC This is the analogue to digital converter output.	0 - 65535
Stored Zero Coefficient The ADC zero coefficient stored when the last dynamic tare routine was performed.	0 - 99999999
Stored Gain Coefficient The ADC gain coefficient stored when the last dynamic tare routine was performed.	0 - 99999999
Live Zero Coefficient The current ADC zero coefficient.	0 - 99999999
Live Gain Coefficient The current ADC gain coefficient.	0 - 99999999
Calibration Counter The number of calibrations performed to date.	0 - 99999

7.7 Event Log

MENU → Diagnostics → Event Log

The Event Log records significant events such as tare, calibration, configuration changes, errors, etc.

The OJ1436 is capable of storing 500 events within its internal memory. Once all 500 events have been filled the oldest event will be overwritten with any new ones.

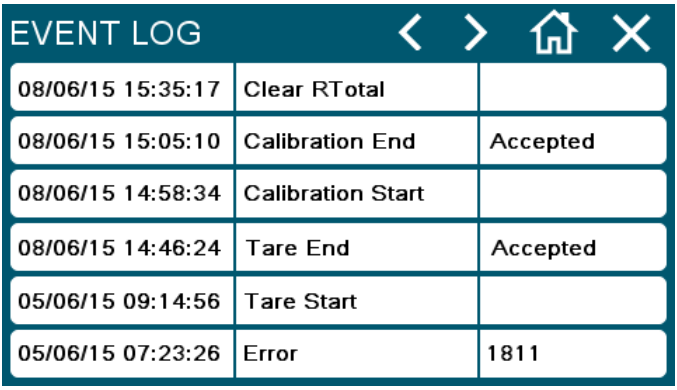
7.7.1 Event Types

The Event Log stores the following event types with associated data items.

Event Type	Description
Error	Error codes generated by the OJ1436.
Parameter Change	All parameter data changes performed via the display, communications interface or flash drive upload.
Tare Start	The start of a Dynamic Tare routine.
Tare End	The end of a Dynamic Tare routine i.e. once the operator has either accepted or rejected the new tare.
Calibration Start	The start of a Calibration routine.
Calibration End	The end of a Calibration routine i.e. once the operator has either accepted or rejected the new calibration.
RTotal Clear	The Resettable Total has been cleared from the display or communications interface.
NRTotal Clear	The Non-Resettable Total has been cleared from the display or communications interface.
Flow Time Clear	The Flow Time has been cleared from the display or communications interface.
Run Time Clear	The Belt Run Time has been cleared from the display or communications interface.
Factory Reset	A factory reset of the associated data parameters has been performed.

7.7.2 Event Log List

The Event Log List displays a summary of the events stored within the internal memory.

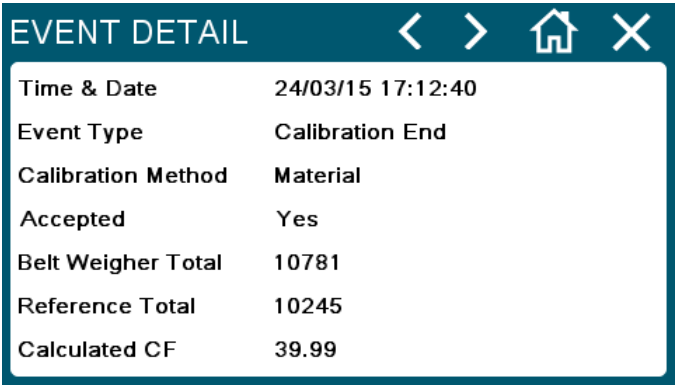


Use the arrow keys to cycle through the list of events.

To view the details of a particular event touch the appropriate event line to display the Event Detail screen.

7.7.3 Event Detail Screen

The Event Detail screen displays the data items associated with the selected event, as shown below.



Use the arrow keys to cycle through the stored events.

7.7.4 Storing to USB Flash Drive

If the OJ1436 is fitted with a USB flash drive the event log will also be stored on the flash drive. This offers the ability to store many more events.

Alternatively, a flash drive can be fitted temporarily to retrieve a copy of the events stored in internal memory. The events stored in internal memory will be automatically copied to the flash drive when it is inserted.

The data will be stored on to the USB flash drive in text format. A single file, event.txt, is appended to each time a new event is stored.

Refer to section 3.21 for further details regarding the use of a USB flash drive.

8 Administration

8.1 Access to the Administration Menu

The Administration Menu provides access to the administrative functions detailed below.

It is accessed by operating MENU → Administration.

The following functions can be accessed from the administration menu.

- Security
- Backup & Restore
- Firmware Update
- Factory Reset
- Firmware Version
- Production Logs

8.2 Security

MENU → Administration → Security

The Security menu provides the facility to enable/disable Engineer Mode along with passcode administration.

8.2.1 Enable/Disable Engineer Mode

Engineer Mode must be enabled in order to edit configuration data items and perform routines such as Calibration, Factory Reset etc.

In order to enable engineer mode through the security menu, select Enable Engineer Mode and then enter the Engineer Passcode.

Engineer Mode will remain enabled until it is either disabled through the security menu or power to the OJ1436 is removed.

In order to disable engineer mode through the security menu, select Disable Engineer Mode.

The security status indicator on the home screen reflects the state of the engineering mode, refer to section 3.1.1 for details.

8.2.2 Set Engineer Passcode

In order to edit the Engineer Passcode engineer mode must first be enabled.

A new passcode can then be entered by selecting Set Engineer Passcode. The new passcode must be entered twice and will be checked for consistency before being assigned.

The passcode entered must be in the range 0 to 999999.

8.2.3 Set Data Reset Passcode

The Data Reset Passcode is required in order to reset the Non-Resettable Total and Belt Run Time.

In order to edit the Data Reset Passcode engineer mode must first be enabled.

A new passcode can then be entered by selecting Set Data Reset Passcode. The new passcode must be entered twice and will be checked for consistency before being assigned.

The passcode entered must be in the range 0 to 999999.

8.3 Backup & Restore

MENU → Administration → Backup & Restore

The Backup & Restore menu provides the facility to backup and restore the OJ1436 system data items to and from a USB flash drive.

This facility can be used to copy data from one OJ1436 to another when carrying out the initial setup of a number of indicators or replacing a unit in the field.

The following data items will be copied to and from the USB flash drive:

- Configuration Data
- Calibration Data
- Production Totals and Times
- Event Log

During the Backup and Restore routines the progress will be displayed at the bottom of the screen.

8.3.1 Backup to USB

Operate Backup to USB to copy the data items from the OJ1436 to the USB flash drive.

The data will be stored on to the flash drive in a single file, backup.dat.

8.3.2 Restore from USB

Engineer Mode must be enabled in order to perform the Restore from USB function, refer to section 3.5 for further details.

Operate Restore from USB to copy the data items from the USB flash drive backup.dat file to the OJ1436.

The data stored within the OJ1436 will be overwritten by the backup data and cannot be retrieved.

8.4 Firmware Update

MENU → Administration → Firmware Update

The Firmware Update function provides the facility to update the installed firmware via the serial interface or from a file stored on a USB flash drive.

Refer to section 14 for further details.

8.5 Factory Reset

MENU → Administration → Factory Reset

The Factory Reset menu provides the facility to restore the associated data items to their factory default settings.

Engineer Mode must be enabled in order to access the Factory Reset menu, refer to section 3.7.2 for further details.

The following data groups can be individually reset by operating the appropriate menu item:

- Calibration Data
- Configuration Data
- Logged Data i.e. production and event logs.
- Passcodes i.e. Engineering and Data Reset Passcodes.

Alternatively, a complete factory reset of all system data can be performed by operating the All Data menu item.

The data stored within the OJ1436 will be overwritten and cannot be retrieved.

8.6 Firmware Revision

MENU → Administration → Firmware Version

The Firmware Revision screen provides information regarding the installed firmware.

8.7 Production Logs

MENU → Administration → Production Logs

The Production Logs item provides access to the stored production logs.

Refer to section 9.2 for details.

9 Production Data Logging

The OJ1436 is capable of storing production data in various formats either internally or to a USB flash drive as described below.

9.1 Printed Report Logging

The Printed Report Logging operates in conjunction with, or as an alternative to, producing printed reports. This provides the facility to maintain a duplicate copy of the printed reports or, as an alternative to printing, storing the reports electronically for later viewing and printing.

Printed Report Logging is enabled via the Printed Report Log parameter within the Data Logging items, as detailed in section 6.6.

Once enabled, a report will be logged whenever a print event occurs, as detailed in section 10.1.

The OJ1436 is capable of storing 500 reports within its internal memory. Once all 500 reports have been filled the oldest report will be overwritten with any new ones.

9.1.1 Storing to USB Flash Drive

If the OJ1436 is fitted with a USB flash drive and configured for USB storage a duplicate report will automatically be stored on the flash drive. This offers the ability to store many more reports.

Alternatively, a flash drive can be fitted temporarily to retrieve a copy of the reports stored in internal memory. If the Printed Report Log is configured for Internal + USB, the reports stored in internal memory will be automatically copied to the flash drive when it is inserted.

The data will be stored on to the USB flash drive in text format i.e. as it would be printed. A single file, print.txt, is appended to each time a new report is stored.

Refer to section 3.21 for further details regarding the use of a USB flash drive.

9.2 Production Report Logging

The Production Report Logging provides the facility to log production data accumulated over a configurable period of time i.e. daily or each time the resettable total is cleared.

Each log provides details of the production period along with the following production data accumulated during that period:

- Total
- Flow Time
- Belt Run Time

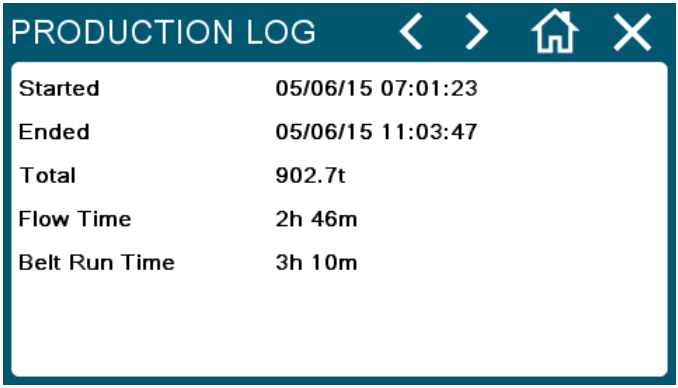
The Production Report Logging is configured through the Data Logging configuration items, as detailed in section 6.6.

The OJ1436 is capable of storing 400 logs within its internal memory. Once all 400 logs have been filled the oldest log will be overwritten with any new ones.

9.2.1 Viewing Stored Reports

The logs stored within the internal memory can be viewed onscreen by accessing:

MENU → Administration → Production Logs



Use the arrow keys to cycle through the available logs.

9.2.2 Storing to USB Flash Drive

The OJ1436 can be configured to store production logs to a USB flash drive in order to increase the available storage.

Alternatively, a flash drive can be fitted temporarily to retrieve a copy of the reports stored in internal memory. If the Production Report Log is configured for Internal + USB, the logs stored in internal memory will be automatically copied to the flash drive when it is inserted.

The data is stored on the USB flash drive in .csv (comma separated value) format. A single file, report.csv, is appended to each time a new log is stored.

The data is represented within report.csv in the following format:

Data Item	Format
Weigher Name	Max. 18 characters
Start Date	DD/MM/YYYY
Start Time	HH:MM:SS
End Date	DD/MM/YYYY
End Time	HH:MM:SS
Total	numeric, including decimal place
Weight Units	kg or t
Flow Time	HH:MM:SS
Belt Run Time	HH:MM:SS

Note : The weigher name and weight units are not logged within the internal data storage. Therefore, these will be the values held at the time of logging to flash drive and not necessarily at the time the log was created.

Refer to section 3.21 for further details regarding the use of a USB flash drive.

9.3 Periodic Logging

The Periodic Logging provides the facility to continuously log the process data on a configurable time basis.

It is configured through the Data Logging configuration items, as detailed in section 6.6.

The process data is logged directly to USB flash drive, therefore a flash drive must be permanently inserted in order for the periodic logging to operate.

The data is stored on the USB flash drive in .csv (comma separated value) format. A single file, periodic.csv, is appended to each time a new log is stored.

The data is represented within periodic.csv in the following format:

Data Item	Format
Date	DD/MM/YYYY
Time	HH:MM:SS
Flow Rate	numeric, including decimal place
Resettable Total	numeric, including decimal place
Non Resettable Total	numeric, including decimal place
Weight Units	kg or t
Flow Time	HH:MM:SS
Belt Run Time	HH:MM:SS
Belt Speed	numeric, fixed 1 decimal place
Speed Units	m/s or m/m
Belt Load	numeric, fixed 1 decimal place

Refer to section 3.21 for further details regarding the use of a USB flash drive.

10 Serial Interface

The OJ1436 is fitted with a software configurable RS232/485 serial interface that may be used to provide printed reports, communication to a remote display or network communication to a host system using a range of supported protocols.

Refer to the installation diagrams in section 13 and the configuration parameters in section 6.5.4 for details of how to connect and configure the serial interface.

The serial interface diagnostic screen detailed in section 7.5 should be used to diagnose serial communication problems.

10.1 Printed Report Option

10.1.1 Overview

The OJ1436 can be configured to produce printed reports by setting the Serial Mode parameter to Printed Report, as defined in section 6.5.4.

A printed report of flow rate and totals can be produced on demand by operation of the PRINT key on the home screen. Alternatively, a digital input can be configured to provide for connection to a remote pushbutton or volt-free contact to initiate printing, see section 6.5.1.

Also, events such as resetting totals and performing a dynamic tare cause a report to be printed automatically.

It is also possible to store the printed reports electronically, as a duplicate copy for additional security or as an alternative to a printer for poor environments where printer reliability may be compromised. Refer to section 9.1 for further details.

10.1.2 Print Format

Each printed report has up to 6 lines with up to 32 characters per line. A printer with a 32 column minimum width capacity will therefore be required.

The following events will produce a printed report.

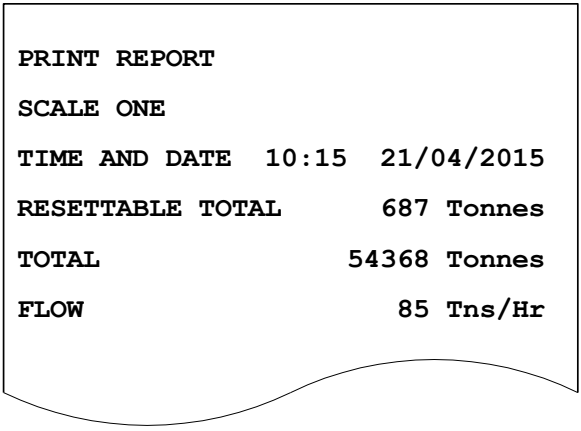
Print Report : Operation of the remote pushbutton input or selection via the PRINT function key on the home screen prints the report shown below.

Print Total : Selection via the PRINT function key on the home screen prints the resettable total with time and date stamp.

Clear Total : Upon resetting the total to zero, prints the report shown below followed by the cleared resettable total.

Dynamic Tare : Upon performing a dynamic tare, prints the report shown below.

Typical Printed Report:

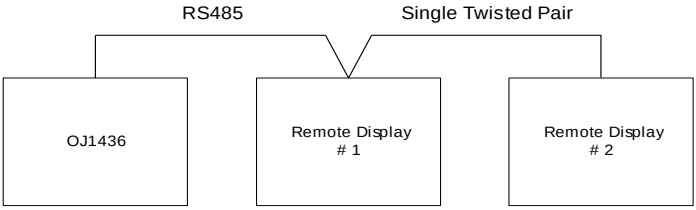


10.2 Remote Display Application

10.2.1 Overview

The OJ1436 can be configured to continuously transmit serial data to a remote display unit by setting the Serial Mode parameter to Transmit, as defined in section 6.5.4.

Configuring the serial interface for RS485 communications also allows for up to 31 remote display units to be connected to a single OJ1436.



The OJ1436 can be configured to transmit the Flow Rate, Resettable Total or Non-Resettable Total at a transmission interval of between 0.1 and 99.9 seconds. Refer to the Transmit Data Item and Transmission Interval parameters within section 6.5.4 for further details.

10.2.2 Data Format

The data item is transmitted as an ASCII string, including decimal place if configured, as follows:

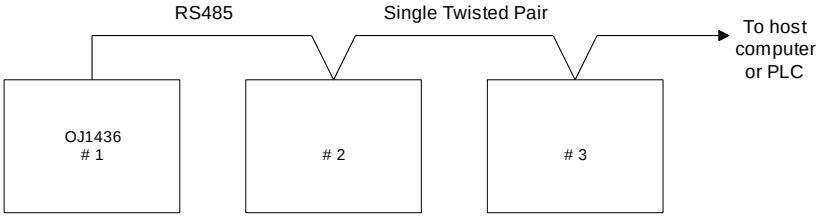
“1234567[CR]” or “12345.67[CR]”

with leading spaces and where [CR] is a carriage return.

10.3 SABus Communications

The OJ1436 can be configured for network communication to a host PC or PLC using the SABus protocol by setting the Serial Mode parameter to SABus, as defined in section 6.5.4.

Configuring the serial interface for RS485 communications then allows for up to 31 units to be connected to a host PC or PLC.



The serial data format is fixed as:

Parity = None Stop Bits = 1 Data Bits = 8

10.3.1 Protocol Definition

The SABus communication protocol uses ASCII character messages of the following format:

! aa CC nnnnnn [CR]

Where:

!	:	Delimiter character
aa	:	2 digits representing the station address
CC	:	2 letters representing the command
n to nnnnnnnnn	:	1 to 9 digits representing the data value associated with the command (if required). The value is scaled by the appropriate decimal place setting as no decimal place character is transmitted.
[CR]	:	Carriage return

Note : The number of digits is fixed for a given command. If an error is present then then the unit will return the error command and data instead of the command and data requested, as shown below.

Example of a request by the host for the current flow rate value from station 02.

Host Sends	OJ1436 Returns
!02FL[CR]	!02FL0000326[CR]
	Station 02 Flow Rate = 326
or	!02ER1810[CR]
	Station 02 Error condition
	Out of range load cell signal - negative

10.3.2 Command Definitions

Command	Data	Definition
FL	-999999 - 9999999	**Flow Rate** - kg/h or t/h Returns the current flow rate, scaled by Flow Rate DP e.g. if the flow rate is being displayed as 75.2 t/h then it will be returned as 0000752.
RT	0000000 - 9999999	**Resettable Total** - kg or t Returns the current resettable total, scaled by Resettable Total DP.
NT	0000000 - 9999999	**Non-resettable Total** - kg or t Returns the current non-resettable total, scaled by Non-Resettable Total DP.
DP	0 - 4	**Flow Rate Decimal Place** Returns the Flow Rate DP setting i.e. the flow rate decimal places.
RP	0 - 4	**Resettable Total Decimal Place** Returns the Resettable Total DP setting i.e. the resettable total decimal places.
NP	0 - 4	**Non-Resettable Total Decimal Place** Returns the Non-Resettable DP setting i.e. the non-resettable total decimal places.
SP	0 - 4	**Static Decimal Place** Returns the Static DP setting i.e. static weight decimal places.
BL	-99 - 100	**Belt Load** - % Returns the current Belt Load.
BP	00000 - 99999	**Belt Speed** - metres/second or metres/minute Returns the current Belt Speed multiplied by 100 i.e. scaled to 2 decimal places.
FT	00000000 - 35999999	**Flow Time** - seconds Return the current flow time in seconds.
BT	00000000 - 35999999	**Belt Run Time** - seconds Return the current belt run time in seconds.

Command	Data	Definition
BS	0 or 1	**Belt Status** Indicates the running status of the belt. 0 = stopped, 1 = running
HZ	0000 - 2200	**Tacho Frequency** - Hz Returns the current tacho frequency multiplied by 10 i.e. scaled to 1 decimal place.
MV	000000 - 256000	**Load Cell Signal** – mV (millivolts) Returns the current Load Cell Signal multiplied by 100 i.e. scaled to 2 decimal place.
LS	00000 - 99999	**Load Cell Weight** - kg Returns the current Load Cell Weight, scaled by Static DP.
GR	-9999 - 99999	**Material Weight** - kg Returns the Load Cell Weight with the Tare removed, i.e. the weight of material on the belt, scaled by Static DP.
IA	-999 - 0999	**Inclinometer Angle** - Degrees Returns the current inclinometer angle in the range -90 to +90 degrees, multiplied by 10 i.e. scaled to 1 decimal place.
ER	0000 - 9999	**Error** Returns the error code as defined by the table in section 11.2.
CT	-	**Clear Total** Sets the resettable total to zero.
CF	-	**Clear Flow Time** Sets the flow time to zero.
DT	-	**Dynamic Tare** Initiates the dynamic tare routine.

10.4 Modbus Communications

The OJ1436 can be configured for network communication to a host PC or PLC using the Modbus ASCII or Modbus RTU protocol by setting the Serial Mode parameter to Modbus ASCII or Modbus RTU accordingly, as defined in section 6.5.4.

Configuring the serial interface for RS485 communications then allows for up to 31 units to be connected to a host PC or PLC.

10.4.1 Modbus ASCII

Modbus ASCII uses the following serial data format:

Data bits: 7
Parity: None, Even or Odd (see section 6.5.4)
Stop bits: 2 if parity is set to none,
1 if parity is set to even or odd

With parity checking

Start	1	2	3	4	5	6	7	Parity	Stop

Without parity checking

Start	1	2	3	4	5	6	7	Stop	Stop

10.4.2 Modbus RTU

Modbus RTU uses the following serial data format:

Data bits: 8
Parity: None, Even or Odd (see section 6.5.4)
Stop bits: 2 if parity is set to none,
1 if parity is set to even or odd

With parity checking

Start	1	2	3	4	5	6	7	8	Parity	Stop

Without parity checking

Start	1	2	3	4	5	6	7	8	Stop	Stop

10.4.3 Function Codes Supported

Function Code	Description
0x01	**READ COILS** Used to read the Belt Status bit.
0x03	**READ HOLDING REGISTERS** Used for flow rates, totals, weights, error code, etc..
0x05	**WRITE SINGLE COIL** Used to set the "Clear Total", "Clear Flow Time" or “Start Dynamic Tare” bits to perform the appropriate action. These flags are auto-cancelling after the action has been performed.
0x2B	**ENCAPSULATED INTERFACE TRANSPORT** Used with MEI Type 14 to read the device identification object.

10.4.4 Bits (coils)

Coil Number	Address	Description
1	0x00	**Clear Total**. This bit is write-only.
2	0x01	**Clear Flow Time**. This bit is write-only.
3	0x02	**Start Dynamic Tare**. This bit is write-only.
4	0x03	**Belt Status**. This bit is read only.

10.4.5 Holding Registers

Register Number	Address	Description
1 – 2	0x00, 0x01	**Flow Rate**. This value is a 32-bit floating point number and therefore register addresses 0x00 and 0x01 together form the value. Address 0x00 contains the most significant 2 bytes.
3 – 4	0x02, 0x03	**Resettable Total**. This value is a 32-bit floating point number and therefore register addresses 0x02 and 0x03 together form the value. Address 0x02 contains the most significant 2 bytes.
5 – 6	0x04, 0x05	**Non-resettable Total**. This value is a 32-bit floating point number and therefore register addresses 0x04 and 0x05 together form the value. Address 0x04 contains the most significant 2 bytes.
7 – 8	0x06, 0x07	**Material Weight**. This value is a 32-bit floating point number and therefore register addresses 0x06 and 0x07 together form the value. Address 0x06 contains the most significant 2 bytes.
9 – 10	0x08, 0x09	**Load Cell Weight**. This value is a 32-bit floating point number and therefore register addresses 0x08 and 0x09 together form the value. Address 0x08 contains the most significant 2 bytes.
11 – 12	0x0A, 0x0B	**Belt Load**. This value is a 32-bit floating point number and therefore register addresses 0x0A and 0x0B together form the value. Address 0x0A contains the most significant 2 bytes.
13 – 14	0x0C, 0x0D	**Flow Time**. This is the current flow time in seconds. This value is a 32-bit integer and therefore register addresses 0x0C and 0x0D together for the value. Address 0x0C contains the most significant 2 bytes.

Register Number	Address	Description
15 – 16	0x0E, 0x0F	**Belt Run Time**. This is the current belt run time in seconds. This value is a 32-bit integer and therefore register addresses 0x0E and 0x0F together for the value. Address 0x0E contains the most significant 2 bytes.
17 – 18	0x10, 0x11	**Tacho Frequency**. This value is a 32-bit floating point number and therefore register addresses 0x10 and 0x11 together form the value. Address 0x10 contains the most significant 2 bytes.
19 – 20	0x12, 0x13	**Belt Speed**. This value is a 32-bit floating point number and therefore register addresses 0x12 and 0x13 together form the value. Address 0x12 contains the most significant 2 bytes.
21	0x14	**Error code**. The current error code will be cleared after this register is read. See section 11.2 for a list of error codes.
22 – 23	0x15, 0x16	**Load Cell Signal.** This is the current load cell signal in millivolts (mV). This value is a 32-bit floating point number and therefore register addresses 0x15 and 0x16 together form the value. Address 0x15 contains the most significant 2 bytes.
24 – 25	0x17, 0x18	**Inclinometer Angle**. This value is a 32-bit floating point number and therefore register addresses 0x17 and 0x18 together form the value. Address 0x17 contains the most significant 2 bytes.

10.4.6 Identification Object

The Basic Device Identification is implemented and is available as a stream and as individual objects.

Object ID	Description
0x00	Vendor name.
0x01	Product code / model number.
0x02	Software revision.

10.4.7 Exception Codes

The following exception codes may be returned by the OJ1436.

Code	Description
01	Illegal Function. The function code is not supported.
02	Illegal Data Address. The address of the register or the combination of address + number of registers is invalid.
03	Illegal Data Value. The value specified in the request is invalid, e.g. the data length is incorrect.

11 Equipment Faults

11.1 Error Message

When displaying the Home screen the error messages will be displayed in red within the message tile, as shown in section 3.1.

On all other screens any error condition detected by the OJ1436 will be displayed to the user by momentarily displaying the error screen, as shown below.

The display of continuous error conditions such as ‘loadcell saturated’ or ‘tacho over speed’ will be supressed within the data settings and diagnostics screens so as not to interfere with fault finding procedures.

All error conditions detected by the OJ1436 will be recorded in the Event Log, see section 7.7 for further details.

11.2 Error Code Definitions

Error Code	Message / Description
0810	**Number Too Small** When editing a configurable parameter, the value entered is less than the minimum allowable value for this parameter.
0811	**Number Too Large** When editing a configurable parameter, the value entered is greater than the maximum allowable value for this parameter.
1810	**Loadcell Saturated -** Indicates that the load cell input is outside the range in the negative direction i.e. the signal is below 0mV.
1811	**Loadcell Saturated +** Indicates that the load cell input is outside the range in the positive direction i.e. the signal is greater than the range specified by the Load Cell Input Range parameter as defined in section 6.2.
1818	**Regulator Fault** The load cell supply is overloaded due to a wiring or load cell fault, or the internal 10V supply regulator has failed.
1821	**Sense Error** The sense voltage (between the +SE and -SE load cell terminals) has varied by more than 3V with respect to the internal value which was stored at the last dynamic tare operation.
3001	**Tacho Over Speed** Indicates that the measured tacho speed is greater than the specified maximum of 220Hz.

Note: any other error code would be due to an internal error and should be reported if returning the unit for repair.

12 Specification

Power

Supply	: 90 – 264V AC 50/60Hz or 10 – 36V DC. Internal mains filter fitted.
Power	: 15VA max.
Fuse	: 1A anti-surge internal fuse.

Touchscreen Display

4.3” 16 million colour TFT display with resistive touchscreen.

Load Cell Input

Excitation	: 10V DC @ 125mA max, 1 to 4 x 350 ohm load cells may be connected in parallel, 4 or 6 wire remote sensing for volt-drop compensation in long cables.
Range	: 0 – 20mV min, 0 – 2.5V max.
Filter	: Adjustable 0.2 to 20Hz.
Accuracy	: Up to 65,000 internal divisions with negligible drift due to internal self-calibration.

Tacho Input

Supply	: 12V DC @ 120mA max, short circuit protected.
Type	: 3 wire NPN, or volt-free contact or Shaft Encoder – open collector or push-pull.
Range	: 0 – 220Hz.

Digital Inputs

2 x volt-free contact to switch internal 10V at 3mA.

Relay Outputs

4 x volt-free relay contacts with the following maximum ratings.

Voltage	: 250 VAC or 30 VDC
Current	: 5 A
Power	: 1250 VA or 150 Watts

Serial Interface

The serial interface may be configured for RS232 or RS485/422 by means of the Communication Standard parameter, see section 6.5.4.

USB Port

Communication	: USB 2.0
Connector	: Type-A
Max. Current	: 100mA

Optional Analogue Output

Isolation	: 1000 V DC
Current Range	: 0mA to 20.04mA into 500 ohm max
Voltage Range	: -0.05 to 10.05V
Accuracy	: ±0.012% max nonlinearity
Resolution	: 16 bit (1 part in 65000)
Drift	: ±5ppm/°C max.

The analogue output may be set for 0-20mA, 4-20mA or 0-10V operation using jumper links on the printed circuit board. Refer to section 13.9 for details.

Optional Analogue Input

Current Range	: 0 to 24mA into 50 ohm
Accuracy	: 0.025% (1 part in 4000)
Drift	: ±5ppm/°C max

Enclosure

144mm (w) x 96mm (h) x 154mm (d) DIN case with IP65 sealed fascia.

An optional transparent front cover is available to provide additional IP65 seal to the control panel door.

Environment

Operating : -20 to +50°C, 20 to 80% RH. Non-condensing.
Storage : -40 to + 80°C.

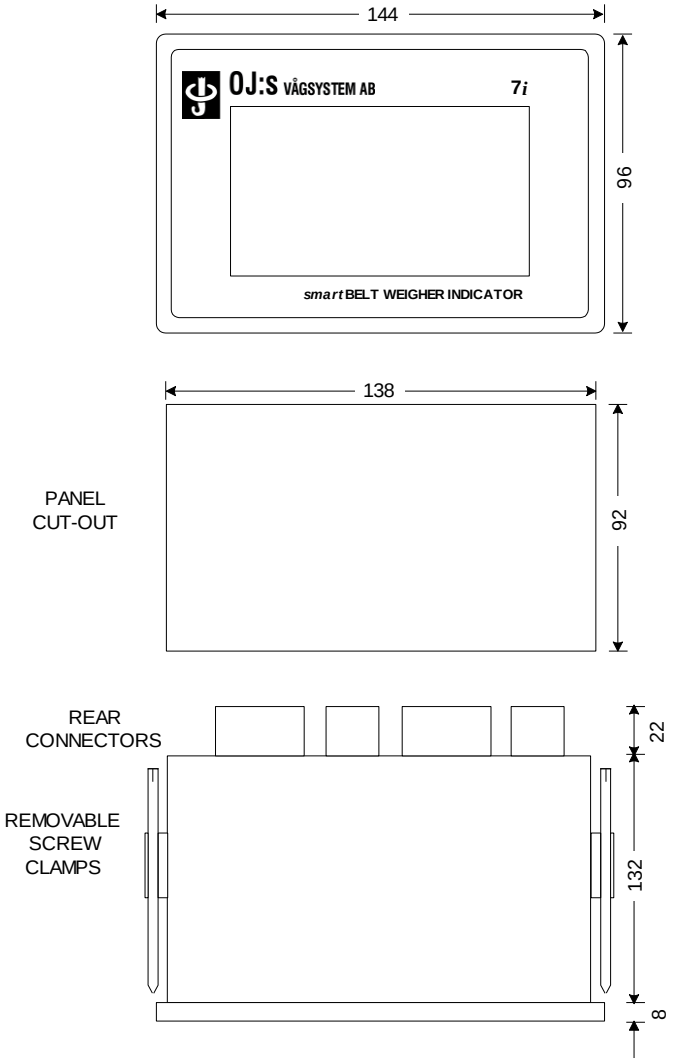
EMC

The OJ1436 complies with the European EMC directive 2014/30/EU and has been tested to the following standard:

EN 61326-1
Immunity & Emission Standard
Electrical Equipment for Measurement Control and Laboratory Use

13 Installation Diagrams

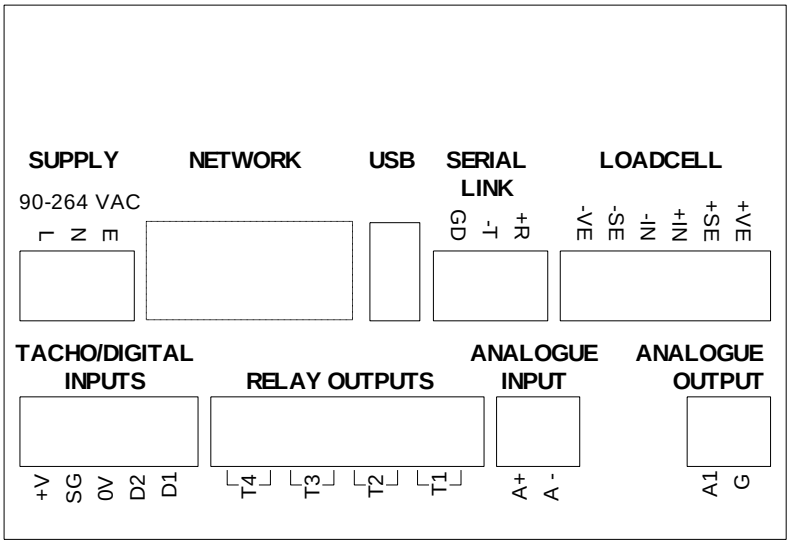
13.1 Enclosure



An optional transparent front cover is available to provide additional IP65 seal to the control panel door.

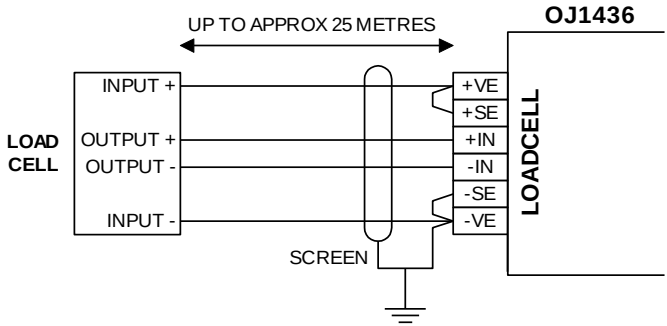
13.2 Connection Layout

All connections to the OJ1436 are made via pluggable screw terminal connectors on the rear of the unit.

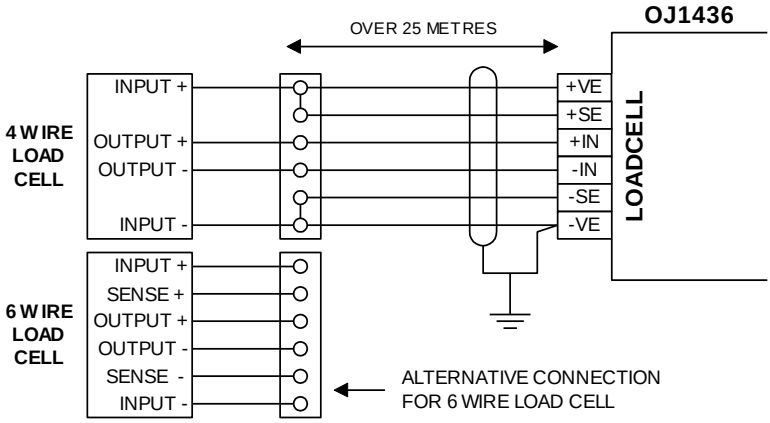


The network connection is dependent on the interface option fitted. Refer to the appropriate OJ1436 network interface user manual for further details regarding the connection, configuration and operation of the network communications.

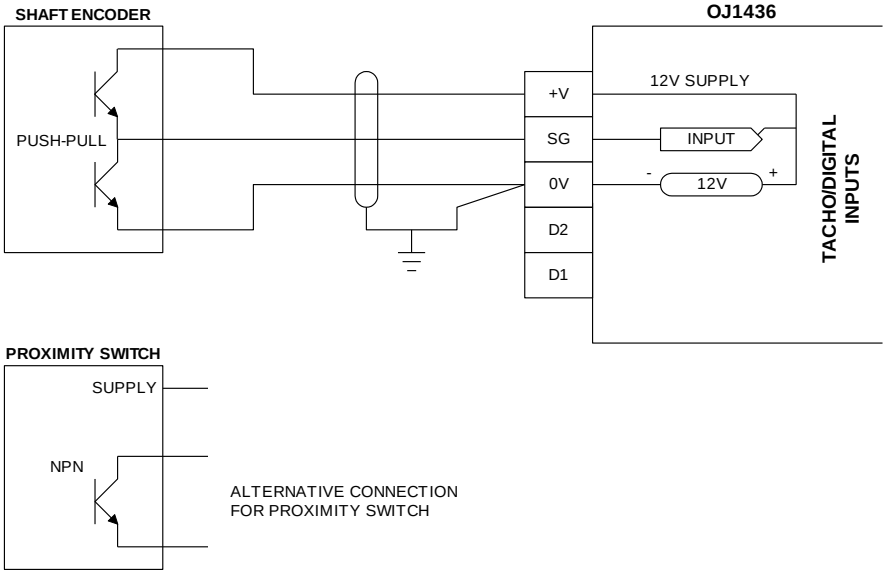
13.3 4 Wire Load Cell Connection



13.4 Remote Load Cell Sensing

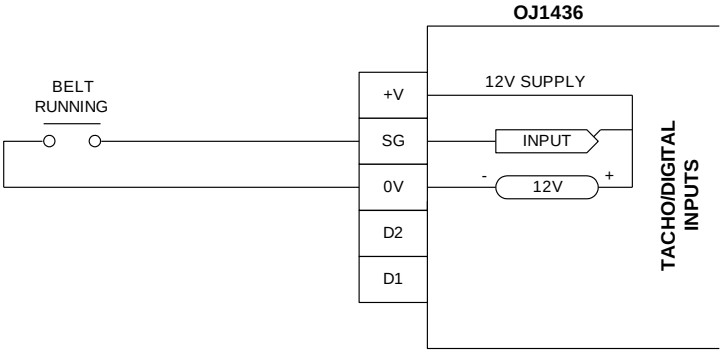


13.5 External Tacho Operation

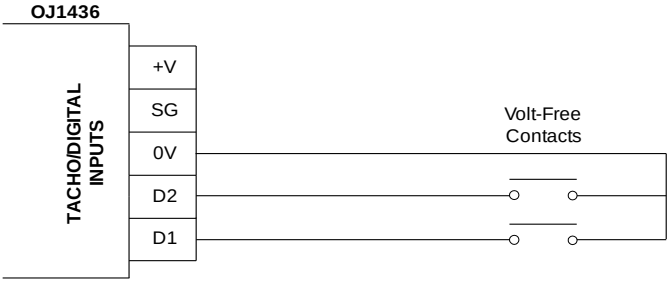


13.6 Internal Tacho Operation

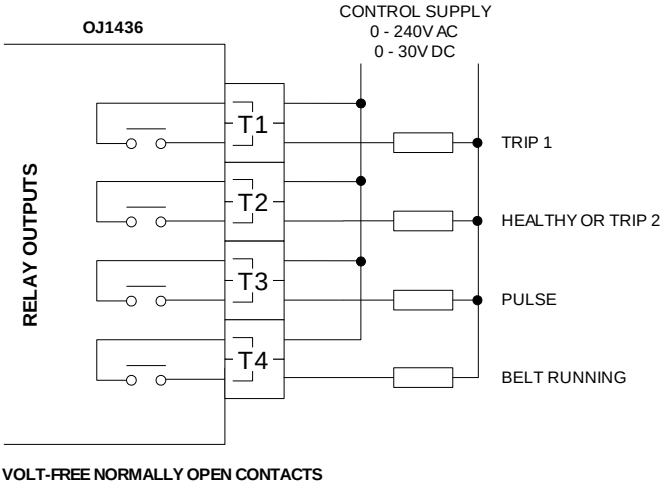
If an external tacho device is not used then a belt running signal is required to provide start/stop control over the internal tacho.



13.7 Digital Inputs

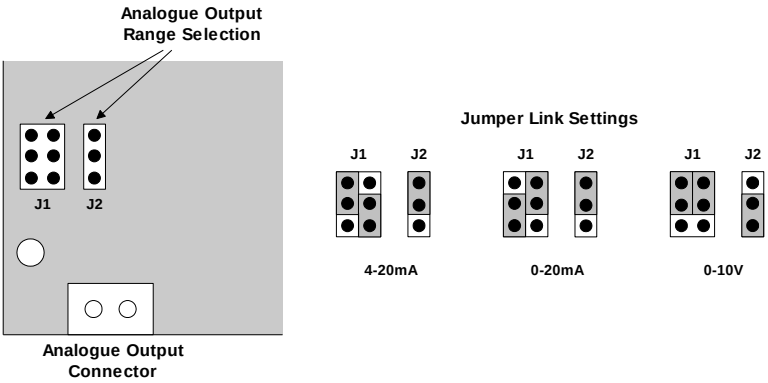


13.8 Relay Outputs



13.9 Analogue Output

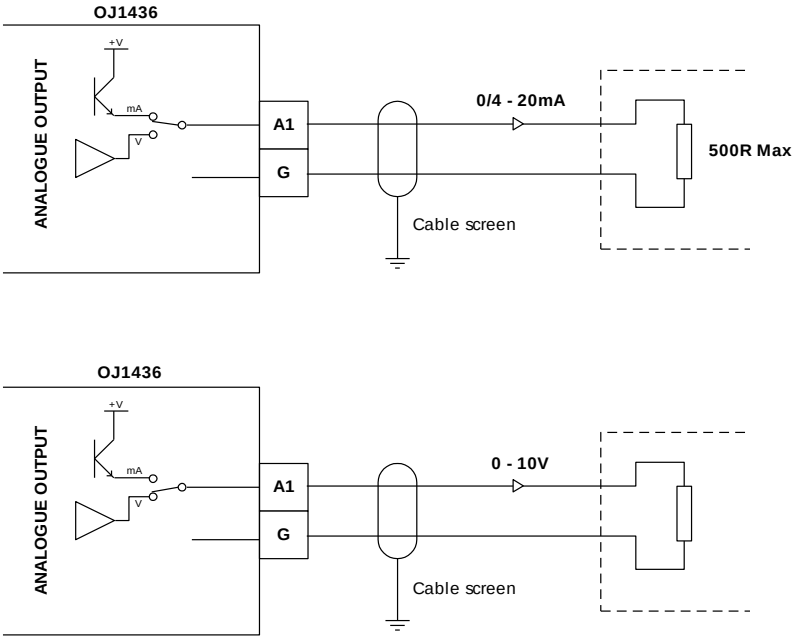
The analogue output may be set for 0-20mA, 4-20mA or 0-10V operation using jumper links on the printed circuit board.



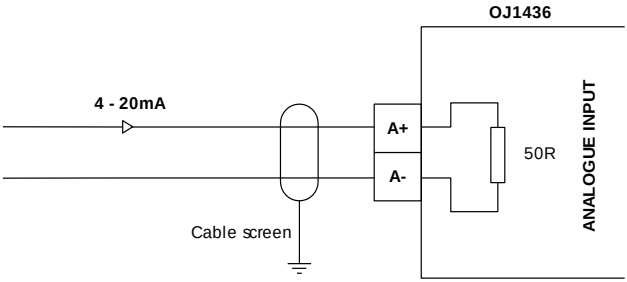
It will be set for 4-20mA operation when it leaves the factory. To change the selection, follow the procedure below:

1. Power off.
2. Unplug all rear connectors.
3. Remove the 4 x 6mm screws located in the corners of the rear panel and then remove the rear panel.
4. Note the slots in which the main circuit board is located (ready for refitting). Grip one of the green connectors and slide out the main board together with the additional interface board.
5. Locate the analogue output range selection jumpers and set accordingly, as shown below.
6. Refit the circuit boards into the correct slots previously noted and gently push them in until the connector on the leading edge locates with its mate on the front circuit board. Push fully home only when this connector is aligned.
7. Refit the rear panel, screws and plugs.

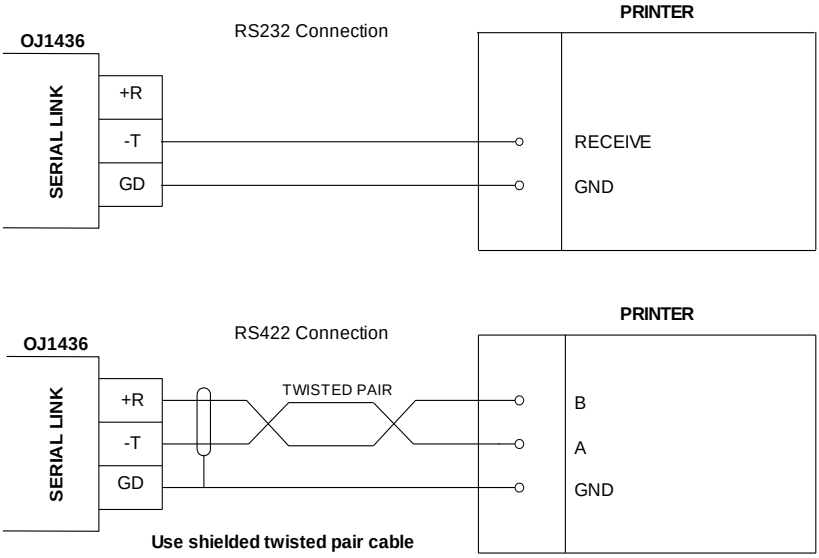
The analogue output connections should then be wired as shown below.



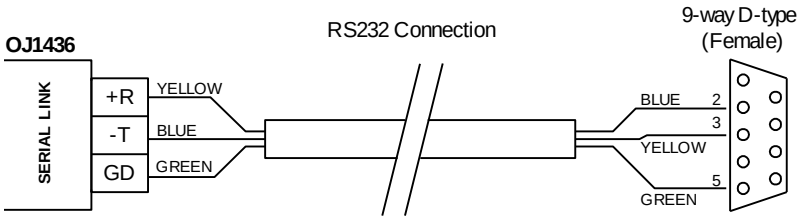
13.10 Analogue Input



13.11 Serial Link to Printer

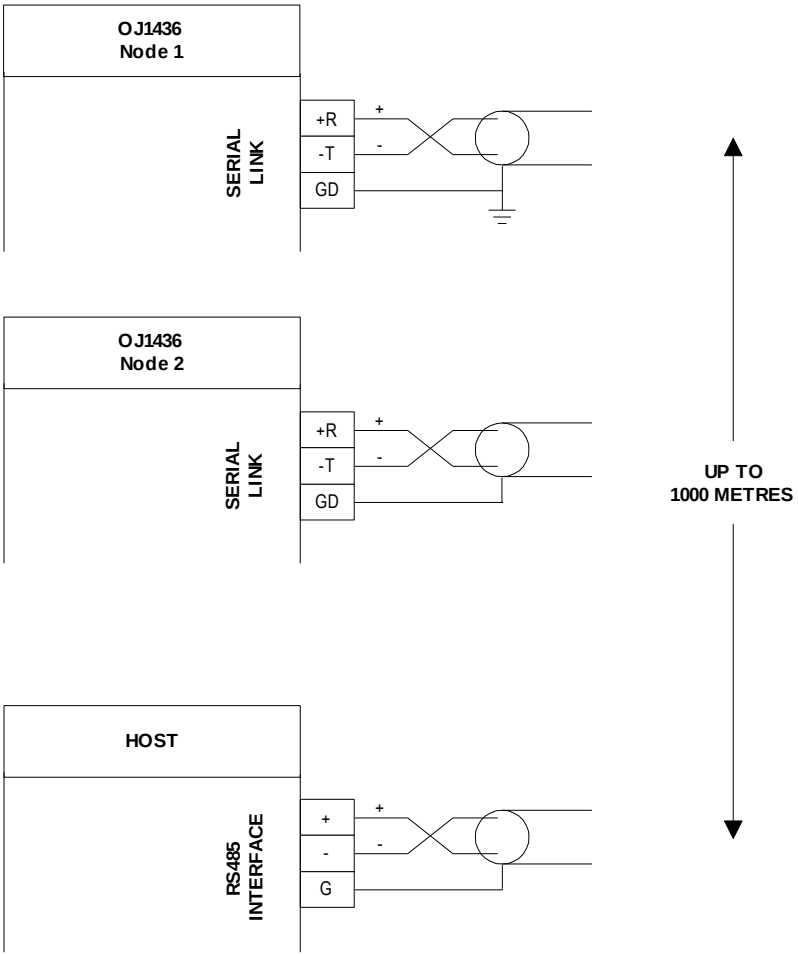


13.12 Serial Link to PC



4-core 7/0.2mm screened cable

13.13 Serial Link to RS485 Network



Bus Cable Specification:
Single twisted pair screened data transmission cable e.g. Belden 8761.

14 Firmware Update

The OJ1436 firmware can be updated from a file stored on a USB flash drive. The latest version can be supplied by us, upon request.

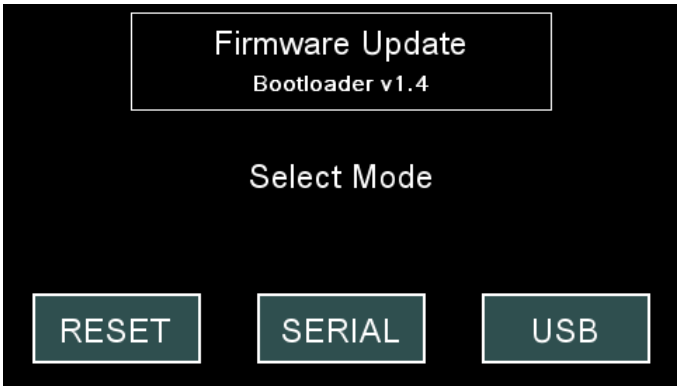
14.1 Update via USB Flash Drive

1. Insert the USB flash drive in to the OJ1436 USB port.

2. Navigate to the Firmware Update screen: MENU → Administration → Firmware Update (if Engineer Mode is currently disabled follow the onscreen instructions when prompted).

3. Select 'Yes' when prompted for confirmation.

4. The OJ1436 should now display the Firmware Update screen with the status displayed as 'Ready to program', as shown below.



5. Select the 'USB' option to initiate the reprogramming of the OJ1436.

6. The OJ1436 will display 'Erasing' followed by 'Programming /', where '/' will rotate during programming.

7. When programming is complete the OJ1436 will display ‘Complete’.

8. Select ‘RESET’ to resume normal operating mode.

9. The new firmware version can be viewed during the sign on message, displayed when the OJ1436 is reset.

10. Remove the USB flash drive, following the safe removal procedure detailed in section 3.21.1.