FWS 114

Digital Forklift Weighing System

Technical Manual

PRECAUTIONS

WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, CLEANING, OR SERVICING. FAILURE TO DO SO COULD RESULT IN BODILY HARM OR DAMAGE THE UNIT.

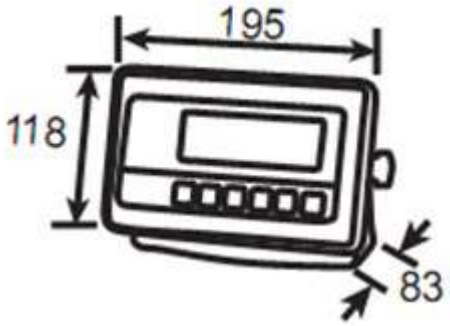
CAUTION

- **Permit only qualified persons to service the instrument**
- **Before connecting or disconnecting any components, remove the power.**
- **Failure to observe these precautions bodily harm or damage to or destruction of the equipment.**

- The weighing scale is a precision electronic instrument, handle it carefully.
- Verify the local voltage and receptacle type are correct for the scale.

SPECIFICATIONS

FWS-114 Forklift Indicator
DIMENSIONS



FWS-114 Model

Resolution	1/6,000
Indicator housing	Stainless Steel
Stabilisation Time	1-2 Seconds typical
Operating Temperature	-10°C ~ +40°C / 14°F - 104°F
Display	6 digits 22mm LCD display with white LED backlight
Interface	RS-232 Output Optional
Zero range	0mV~5mV
Signal input range	0~15mV
ADC	Sigma delta
Internal counts	600,000
ADC update	Max 60 times /second
Load cell drive voltage	Max 5V/150mA
Input Voltage	12V DC Negative Earth.

INSTALLATION

When you receive the scale, inspect it to make sure that it is not damaged and that all are parts are included:

Ø Remove the Indicator from the carton.

Ø Remove the protective covering.

Ø Store the packaging and use if you need to transport the scale later.

Ø Inspect the indicator for damage.

Ø Make sure all components are included (pictured below):

These are:
- 1 x FWS 114 Stainless Steel Display
- 1 x Hydraulic Pressure Transducer
- 1 x Hydraulic Hose
- 1 x Hydraulic Male Adaptor 1/8 BSPT – 7/17JIC
- 1 x 3A Glass Fuse
- 1 x Glass Fuse in- line fuse holder
- 1 x Sticker set (3 pieces)
- 1 x Operator Handbook

BUTTON NAMES & FUNCTIONS

KEY	FUNCTION
POWER	Turn the power On/ Off
ZERO	Used to reset the load to Zero.
CLEAR	Used to reset the accumulated values, and also to print the final accumulated weight to a printer if a printer is attached.
ADD	When this button is pressed, the weight is accumulated to the total and saved until the CLEAR button is pressed. Please note in order to save all weights the ADD button must be pressed for every weighing.
TOTAL	Used to display the current accumulated total in the indicator.
WEIGH	Once the correct Weigh cycle is completed this button is used to display the weight upon the screen. The weight will stay visible for approximately 5-6 seconds.

GENERAL OPERATION

INTRODUCTION

The FWS-114 digital indicator is specifically designed for installation into the Forklift Material Handling industry, featuring tailored functionality to assist the operator, and to provide stable and accurate readings.
The display and lock feature enables the operator to only be presented with a weight once the correct Weigh cycle has been completed. In the normal operation of the machine, no weight is displayed, hence the operator is not confused by unwanted readings whilst the machine is in motion.

Once the correct weigh cycle is performed by the operator, and the WEIGH key is pressed, the weight of the product will be displayed on the indicator for approximately 5 seconds, providing the operator with adequate time to record this weight.

HOW DOES THE FWS-114 WORK?

The FWS-114 weighing system basically works on a proportional ratio of the pressure in the hydraulic system compared to load applied on the machine.
A specialised pressure transducer is then responsible for converting this hydraulic pressure into an electronic signal, which can then be calibrated to a known weight.
In order to ensure repeatable accurate weights, it is imperative that the correct complete Weigh Cycle is performed each and every time.

PERFORMING A WEIGH CYCLE

First of all start the machine, then turn the indicator on by pressing POWER
There are two basic stages in producing the Weigh Cycle:

1. ZEROING the load
2. WEIGHING the load

To provide accurate weights, both of these steps are equally important.

ZEROING the load

With nothing on the forklift, please lower the forklift and press ZERO button to reset the display not to show any weight.

WEIGHING the load

After successfully Zeroing the indicator, pick up the load and raise to the marker ‘1’ (as pictured)

And then lower to the marker ‘2’ (as pictured)

Press WEIGH key to display the weight

ACCUMULATING WEIGHTS

Press 

after each weighing to add that weight to the accumulated total ('ADD 1', 'ADD 2', 'ADD 3' etc will be displayed) The 'ADD key must be pressed at every weighing to ensure the weight is added to the total.

TO DISPLAY THE CURRENT ACCUMULATED TOTAL

Press 

to recall the total weight so far, this will not add any weight to the current total or clear the weight

TO CLEAR THE TOTAL

Press 

to clear the accumulated weights and reset to '0'

Please Note: To ensure the Weigh System will not allow the same lifted weight to be added twice, the weigh system must "see" zero or no load on the forks before allowing another weight reading to be added.

IMPORTANT NOTE:

An error message **ERR 4** may appear on the Display on Power Up.

ERR 4 signifies that the input signal from the Transducer is different to the calibrated signal value for ZERO.
This could be because the forks are on the ground or that there is a load on the forks.
Please continue to use the Weigh system as described
Contact your local distributor if you experience any further difficulties.

3.2 MACHINE CONDITION:

To achieve an accuracy of approximately + /– 1 % of the capacity of the machine, the machine should be in the best possible mechanical and hydraulic condition.

NOTE:
Due to the potential safety hazards to personnel, it is strongly recommended that only qualified mechanics work on the machine.

3.3 INSTALLATION KIT:

To facilitate installation, a kit containing all necessary hardware has been included in the monitor-packing carton. Typically this includes the following components.

- **FWS 114** Display
- Sensor assembly
- Display Monitor mounting bracket
- Operation stickers
- Hydraulic hose and fitting
- Power cable

3.4 DISPLAY INSTALLATION

CAUTION!

(1) The **FWS 114** control unit has been designed to operate under adverse conditions of dust, temperature and water. It offers splash- proof protection to water ingress.

However, locating the control unit directly in sunlight, particularly behind the window in a cab, may cause the unit to be subject to extremely high temperatures, which may damage the electronic system.

Accordingly it is recommended that the unit be mounted in a sun shaded location or if this is not possible, a sunshade be erected over the unit to block direct sunlight.

(2) When the control unit has been mounted and orientated for convenient operation and display viewing, check that the cables and connectors are not under any mechanical stress and the cables are neatly secured away from accidental mechanical abuse.

(3) The control unit is mounted with a side pivot bracket. Ensure that the actual **FWS 114** case is not touching any part of the machine such that its movement within the bracket is restricted.

INSTALLATION OF THE PRESSURE SENSOR

GENERAL

(1) **CAUTION -** The electronic pressure sensor provided is an industrial grade device designed to be installed in an arduous environment. However, it must be remembered that it is still, essentially, a delicate electronic sensor, and accordingly, to ensure maximum life, reliability and accuracy, it must be treated with due care.

(a) **DO NOT** apply a spanner or similar tool to any part of the sensor except the 'flats' provided expressly for the purpose of tightening the hydraulic coupling.

(b) **DO NOT** mount the sensor in any location where it is liable to be subjected to physical or mechanical abuse of any kind.

(c) **DO NOT** mount the sensor where it will be repeatedly immersed or sprayed with water or oil.

(d) **DO NOT** mount the sensor where the cable entry and cable will be subject to physical abuse, liable to be stressed or subject to excessive movement.

(2) It is important that the pressure sensor be connected into the hydraulic lift circuit of the machine.

(3) Tapping any other line will result in the incorrect operation of the system. The line should be connected between the control valve and the lift cylinder. The connection can be carried out satisfactorily in a number of ways, either by inserting a hydraulic adaptor with tee off facility (example below) or by removing an existing hydraulic adaptor and using the l /8 BSPT hydraulic adaptor fitting supplied with the kit.

(4) (a) Lower the forks to the ground and stop the engine.
(b) Remove the cap from the hydraulic oil reservoir to release the pressure.
(c) Operate the 'lift' levers to ensure all pressure is relieved from the system.
(d) Remove the hydraulic hose where it is mounted to the lift cylinder (or some other convenient joint). Either fit a hydraulic adaptor or drill and tap hydraulic fitting and fit the 1/8 BSPT Adaptor supplied.
(e) Refit hose and connect 7/16 JIC hose to new fitting and feed line to sensor.

CAUTION!
Ensure hoses and cables are clear of moving parts that may cause damage.

ELECTRICAL INSTALLATION

(1) The **FWS 114** system is designed to operate on 12V – 48V DC powered lift truck.

(2) The control unit may be wired into the main electrical loom if there is a provision for additional connections via the ignition key circuit.

(3) However, it is advisable in many cases to connect the **FWS 114** unit directly to the ignition key circuit (including **3** AMP in-line fuse) to reduce the possibility of electrical interference from other apparatus connected to the electrical system.

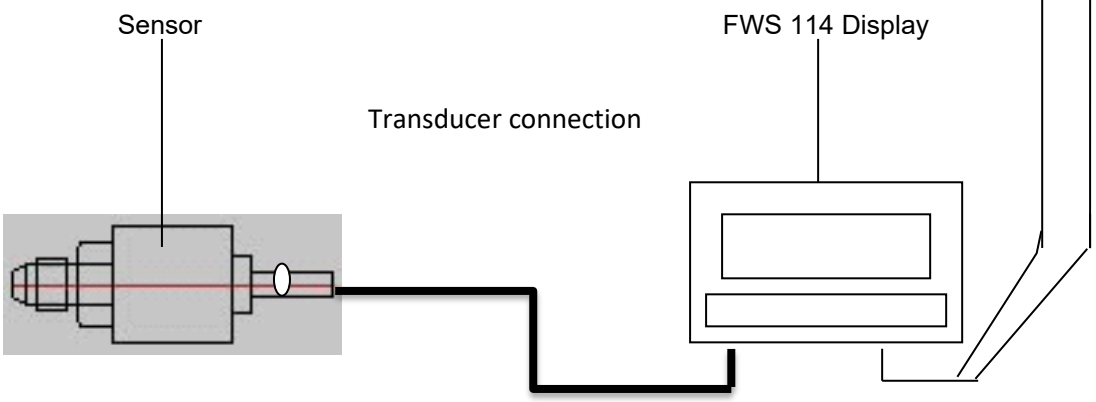
CABLE LOOMS AND CONNECTORS

The power/aux functions are connected to the FWS 114 unit via 2 cables one is a 2 core power input the other is 4 way sensor input.

CABLE COLOURS

(a) **Power Supply**: 12 volts D.C. + Red /Positive power input
- Black/Negative power input (ground)

(b) **Sensor connections:**	**FWS 114 Display**
(1) + Input (Red)	Red (+ input)
(2) - Input (Black)	Black (- input)
(3) + Output (Green)	Green (+ output)
(4) - Output (White)	White (- input)



Always make sure the sensor connection is good even if a terminal block is used. **An insulated solder joint for each wire is recommended to ensure reliability and minimize risk of fault.**

Avoid using in-line crimp wire joining connector as these are often the cause of faults, due to the output from the sensor being very sensitive and a poor connection creates high resistance. Therefore, as the output is very low, the slightest change in connection will affect the display readings.

FITTING INSTRUCTION STICKERS:

The kit includes three (3) operation and alignment stickers to assist the operator in normal operation. It is important that all the calibration and weighing be carried out in a repeatable fashion. The stickers assist the operator to weigh in the same position each lift.

Lift trucks

- **Operator instruction sticker:** Mount this on the dash of the Lift truck
- **Arrow Sticker →:** This acts as a pointer for the operator and is located on the back of the fork Carriage or moving mast slide.
- **Position Sticker (marked 1 - 2) :** This sticker is affixed to the Stationary Mast in a position such that when the forks of the lift truck are in the desired weighing position, the two (2) on the sticker is aligned with the **Arrow →** previously fixed to the fork carriage or moving mast slide. Generally, the forks are positioned around 300 mm to 400 mm off the ground for pallet weighing work.

TECHNICAL NOTE:

CAUTION - WELDING!

TO AVOID DAMAGE TO THE SENSITIVE ELECTRONIC COMPONENTS IN THE SYSTEM, THE POWER SUPPLY CONNECTOR SHOULD BE UNPLUGGED FROM THE **FWS 114** UNIT WHILST ANY ELECTRIC WELDING IS BEING CARRIED OUT!

Calibration Procedure for FWS 114 Hydraulic Digital Weighing System

There are basically 6 steps to complete the calibration process on the FWS 114 weighing system.

They are:
- Units of measure kg or lb Default is kg
- Machine Capacity Default is 2500
- Increments or divisions (what the scale counts in) Default is 10 kg
- Unload or Zero Calibration. Calibrating the system with no load on the forks
- Test weight; this is the known weight which is being used to calibrate the system
- Load or span Calibration. Calibrating the system using the known test weight.

Functions of the keys during the Calibration process:

POWER: Turns the unit on and off. No other function in Calibration Process.

ZERO: Accept/Confirm the action

TOTAL: Change setting in UNIT setup, and then increases numbers counting up from 0 -9

ADD: Moves the flashing digit from left to right as required

CLEAR: Clears all digits back to 00000

WEIGH: Used to access Calibration mode on power up.

CALIBRATION PROCESS

UNITS OF MEASURE

- Press the POWER key and then immediately press and hold the **WEIGH key.**
  002500 will show on the display for a few seconds and then the display will show

This denotes kg setting and is *default*.

Press the ZERO key to confirm that kg is the desired units of measure

To change to lb's press the TOTAL key once and the display will show

Press the ZERO key if this is the desired unit measure

MACHINE CAPACITY

- Default setting is 2500.

There are 2 methods to change this.
By pressing the ADD key and changing the required digits.
For example: To change from 2500 to 3000, press the ADD key once and the 2 will start flashing. Press the TOTAL key once and the 2 will change to a 3. Press the ADD key again and the 5 will start flashing. Press the TOTAL key until this digit is a 0.
Now press the ZERO key to accept and move to the next step.
Alternately, press the CLEAR key and the display will show 00000 with the left 0 flashing. Press the ADD key until the desired 0 is flashing and using the TOTAL key to change to required digit. Once this digit is correct, press the ADD key until the next digit that requires changing is flashing. Press the TOTAL key until the required number is showing and press the ADD key to move to the next digit or press the ZERO Key if the desired capacity is showing.

INCREMENTS

- Default setting is 10

To change, press the TOTAL Key until the required increment setting is displayed.
(The Increment choices are pre-programmed. So for example if the capacity is 2500kg, the system options will be 1,2,5,**10**,20,50. To select 1kg or 2kg increments will deliver very erratic and inconsistent readings. 5kg, not so erratic. 20kg or 50 kg will be very consistent but probably undesirable. Therefore we recommend 10kg increment on anything up to 3000kg capacity.)
Once the desired increment setting has been selected, press the ZERO key to move to the next step.

UNLOAD

- Zero Calibration

Make sure that there is no load on the forks and raise the forks to position 1 and then lower to position 2. Press the ZERO key and the Zero Calibration process is complete.

TEST WEIGHT

- Entering the known weight that will be used to calibrate the system. Default is 2500.

To change this is basically the same process as selecting the machine capacity, use the ADD key to move the flashing digit to the right and press the TOTAL key to change that digit to the required number

Once the weight has been entered, press the ZERO key to move to the next step.

LOAD

- Span Calibration

Place the test weight on the forks and raise the forks to position 1 and then lower to position 2. Press the ZERO key.

The display will show:

The calibration process is complete and normal weighing can now be done.

If the display shows the following:

Repeat the calibration process.

If the same message appears you can test the input signal from the transducer by the following process:

- Press the POWER key and then immediately press and hold the **ADD key.**

002500 will show on the display for a few seconds and then the display will show numbers counting up or down quite quickly. When the forks are raised the numbers should increase and should decrease when the forks are lowered. This means that the indicator is receiving and reading the transducer input.

If the display shows 0 (as per picture below) or a number is displayed but does not change when the forks are raised or lowered, there is a problem with the transducer input.

In this instance, check all transducer connections.

To return to normal operation press the POWER key once to turn off and then press the POWER key again to switch on. The system should start in normal operating mode.