XW Series

Operating Instructions

During normal operation the safe working load of a crane should not be exceeded. Therefore, the warning of overload should not be used as a normal operating facility. Certain statutory requirements do not permit the safe working load to be exceeded except for the purpose of testing.

This Rated Capacity Indicator is not suitable for use in explosive atmospheres. Adjustment by unauthorised persons will invalidate any warranty or certification supplied.

This manual covers the following XW Series products:

XW1   Height Limiter

XW2   Rated Capacity Indicator (RCI) with Height Limiter

XW3   Angular Slew Limiter

XW4   Height and Slew Limiter (Wall and Angular)

XW5   Rated Capacity Indicator with Height and Slew Limiter

Contact

Xwatch Safety Solutions Ltd,
Avondale Way,
Avondale Industrial Estate,
Cwmbran,
South Wales,
NP44 1TS

01633 987344

Document History

Version	Date	Change
V1.0	27-03-2019	Initial release
V1.1	02-05-2019	Addition of tele arm and offset boom monitor. Access to dig mode from height and slew limit pages. Fault description added.
V1.2	17-05-2019	Addition of Envelope Control. Revised startup graphic.
V1.3	25-07-2019	Post review corrections prior to printing
V1.4	10-10-2019	Addition of offset boom note on page 22

Contents

Contents

1. General information

1.1 Start up

The RCI will start automatically when the machine ignition is switched on. After a short delay, while the system transfers information from the I/O controller, the display above will appear. The RCI will operate after 10 seconds, or immediately if **ok** is pressed. The logo displayed may differ.

The functionality of the RCI is dependant on its set-up. The following additional features may be available:

- Height limiter

- Slew limited

- Envelope control

- Motion control on overload

- Multiple lifting duties (manual or automatic switching)

- Digging aid

If the XW Series device has an RCI, the page above will be displayed. The internal and external alarm will sound. If the system has hydraulic control, all motion will be inhibited.

Press **OK** to continue.

1.2 External beacons

The system supports two optional beacons (red and magenta are available). Beacon one is active when the RCI is enabled, and beacon two when either a height or slew limit is enabled.

1.3 Track lock

If the track lock function is enabled, the machine will not travel if either a height or slew limit is active.

1.4 Operating the system

1 **Radius** Horizontal distance from the machine slew centre to the lifting point, typically the bucket pin or quick hitch, in metres.

2 **SWL** Maximum safe working load for the current lifting point radius and height, in tonnes

3 **Hook Load** The load currently suspended from the lifting point in tonnes. Note: Will not be accurate if the boom cylinders are at full stroke.

4 **Capacity bar graph** The graph will 'illuminate' from left to right as the lifting capacity is used. The green zone represents 0 to 95% of capacity, the amber zone 95 to 105%, and the red zone 105 to 130%.

5 **Lifting duty** This is the current lifting duty selected. In a single duty system, the **DUTY** button label will not appear.

6 **Function buttons** The system is operated entirely by these four keys. Depending on the system set-up, some of the key labels may not appear. Button labels will change position depending on the operational mode. Buttons with no labels do nothing.

Data entry buttons These buttons are only active when height and slew limits need to be manually set and enabled.

This symbol will appear on the screen if the machine ignition is switched **on** but the engine is **not** running. This to prevent flattening the machine battery if the system has hydraulic motion control.

When this symbol appears on the screen, it indicates that any hydraulic motion control is disabled. This will only be during the setting of height and slew limits.

1.5 Settings key switch

The Settings key switch is an **option** and is mounted inside the machine cab. If fitted, the key must be in the unlocked position to allow the setting of limits and the enable/disable of the operational modes. If the switch is not fitted, all features are available to the operator.

2 RCI Page

The lifting capacity being used is indicated by the horizontal bar graph in the centre of the display. The following three sections show how the system will perform.

2.1 Safe Operation
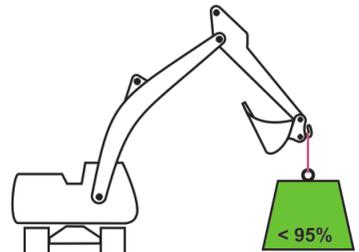
Internal alarm **OFF**

External alarm **OFF**

Motion control NO

2.2 Approaching Overload
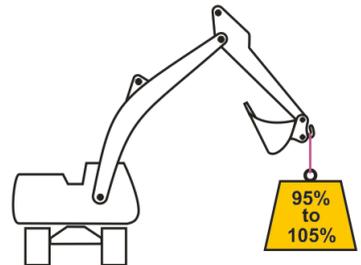
Internal alarm **ON**

External alarm **OFF**

Motion control **NO**

2.3 Overload
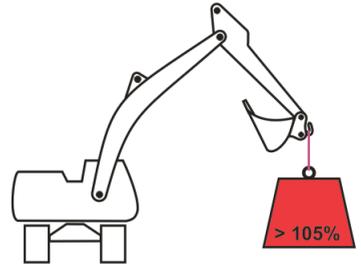
Internal alarm **ON**

External alarm **ON**

Motion control **YES**

2.4 Hydraulic Limitation

If the safe working load is limited by hydraulic capacity rather than stability, the offending service will be shown next the SWL label. Depending on machine type, this can be:

Boom

Artic

Arm

2.5 Page Switching

If a height or slew limit is approached while the RCI page is active, the display will automatically switch to the appropriate page.

Button operation

HGT   Go to the Height limiter page

SLEW   Go to the Slew limiter page

DUTY   Scroll through available lifting duties (manual duty selection only)

DIG   Disable the RCI and enter digging mode

2.6 Disabling the RCI

If digging mode is available, pressing **DIG** will disable the RCI and the Dig page will become active. No RCI monitoring will be performed. If digging mode is unavailable pressing **OFF** will Disable the RCI. The page below will then become active.

Systems equipped with a Data Logger will show the time on this page.

Button operation

HGT   Go to the Height limiter page

SLEW   Go to the Slew limiter page

RCI   Re-enable the RCI

2.7 Overriding the RCI

If the system is configured to provide motion control in an overload condition then all motions that would raise the load or increase the load radius will be prevented when overload is detected. Under normal circumstances the load can either be lowered or the radius reduced to clear the overloaded state. However, there are certain situations where the machine can become 'stuck' - to prevent this happening, an override function is provided.

Pushing the **O/R** button will release all the hydraulic controls. The internal and external alarms will continue to sound. The override will automatically clear when the machine becomes safe.

2.8 Offset boom

BOOM NOT STRAIGHT !

If the machine has an offset boom, the RCI can only operate correctly if the boom is centred. If the boom is off centre, the warning banner shown above will appear on the screen.

2.9 Digging mode

Digging mode provides a rudimentary digging aid. As no bucket angle sensor is fitted the displayed depth will only be accurate when the bucket in the same orientation as when the system was zeroed (referenced). Referencing is best made with the bucket flat on the ground - this guarantees that the bottom of any excavation performed will be accurate.
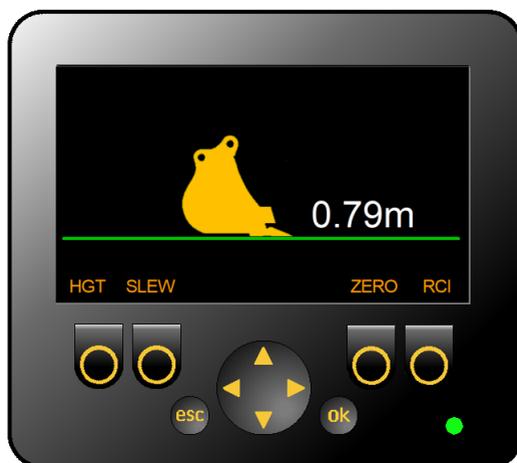
On initial entry to the dig page the depth displayed will be the current lifting point height (usually the bucket pin). Place the bucket flat at the reference elevation and press **ZERO**.
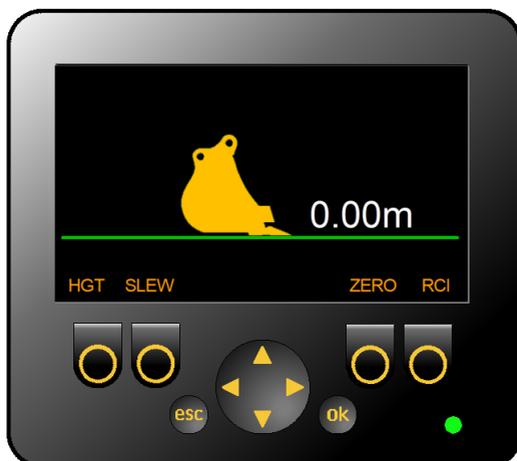
Once referenced, the displayed depth value will represent the true elevation of the excavation base as long as the bucket is in the flat orientation.

Once the desired depth has been achieved, the system can be re-zeroed at the base of the excavation - now the correct depth will correspond to 0.00m on the screen.

Button operation

HGT   Go to the Height limiter page

SLEW   Go to the Slew limiter page

ZERO   Reference the depth at the current elevation

RCI   Go to the RCI page

3 Height Page

Depending on the machine configuration, the diagrams below show the equipment points monitored for height limitation.

3.1 Standard Monoboom
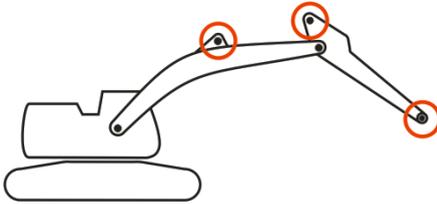
3.2 Rehandling Monoboom
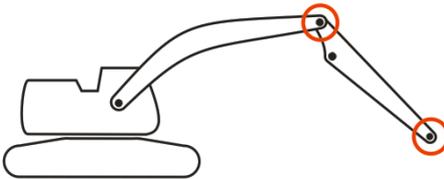
3.3 Articulated Boom (forward cylinders)
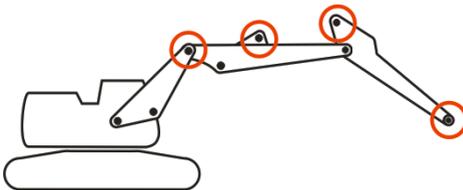
3.4 Articulated Boom (rear cylinders)
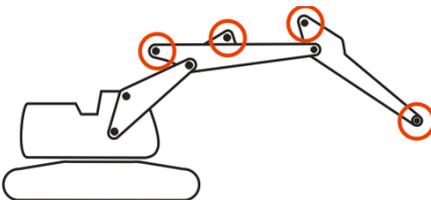
3.5 Conditions of limitation

The system is only aware of the pin positions indicated on the previous page. Any attachment or equipment mounted pipes and hoses should be taken in consideration when setting a height limit. Instead of manually setting a maximum height, it is often better to use the **HERE** function described in section 3.8. Any attachment (normally a bucket) should be put in the least favourable position when setting a limit, as shown below.
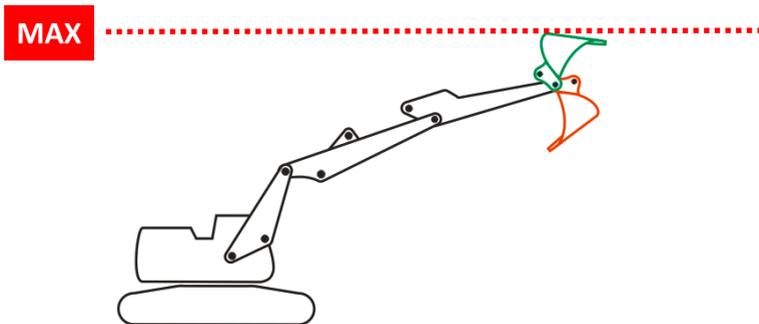
Always check the operation of the height limiter before commencing work.

3.6 Height limiter operation

Active height limit in metres

Current distance **between** the highest part of the equipment and the height limit

Button operation

RCI   Go to the RCI page

SLEW   Go to the Slew limiter page

SET   Set a new height limit

OFF   Disable the height limiter

3.7 At a height limit
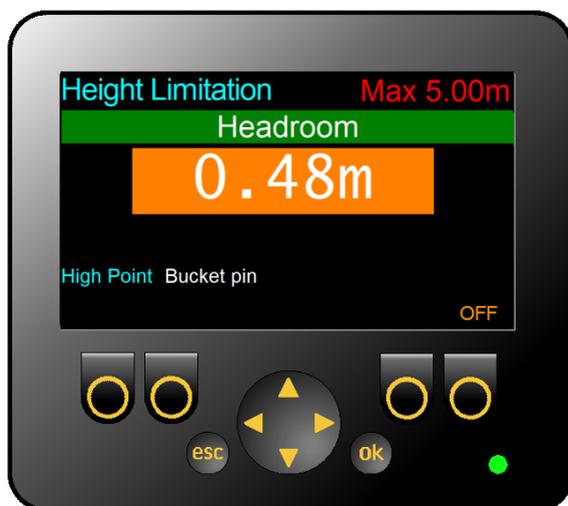
Approaching a height limit

When the highest point on the machine is within **0.5 metres** of the height limit the 'Headroom' value will change colour and the internal alarm will pulse. Any equipment motion that could increase the height will be **slowed down**. All buttons except **OFF** will become unavailable.

At a height limit

When the highest point on the machine is within **0.1 metres** of the height limit all motions that could increase the height will be **stopped**.

3.8 Telescopic arm

The XWatch series systems provide two methods for monitoring telescopic arm extension. If the system is equipped with a reeling drum the true length of the extension will be used in all height monitoring operations. If the system has just a proximity switch monitoring the tele arm fully retracted position, then the message shown below will appear **if** extending the tele arm would exceed the height limit. If a motion control valve is fitted, any further extension will be inhibited.

DON'T TELE OUT

3.9 Setting a height limit

Current height limit in metres

Current highest point in metres

Button operation

Select a digit to adjust

Adjust selected digit

HERE   Set the height limit at the current highest point and exit

ok   Set the height limit as manually edited and exit

ESC   Abandon any changes and exit

3.10 Disabling the height limiter

If **OFF** is used from an active height limitation page the display will change as shown above and all motion control will be released. Equipment height is no longer monitored.

Button operation

RCI   Go to the RCI page

SLEW   Go to the Slew limiter page

ON   Re-enable the height limiter

If digging mode is enabled, **DIG** will also be available.

3.11 Envelope Control

If **Envelope Control** is available, pressing **HGT** from any of the other available operational pages will access the page shown below. This feature provides full motion control for maximum height, maximum reach, and minimum reach (basic cab protection).

Please regard the conditions of limitation outlined in section **3.5**

Maximum height setting

Maximum reach setting

Distance to appropriate limit

Minimum reach setting
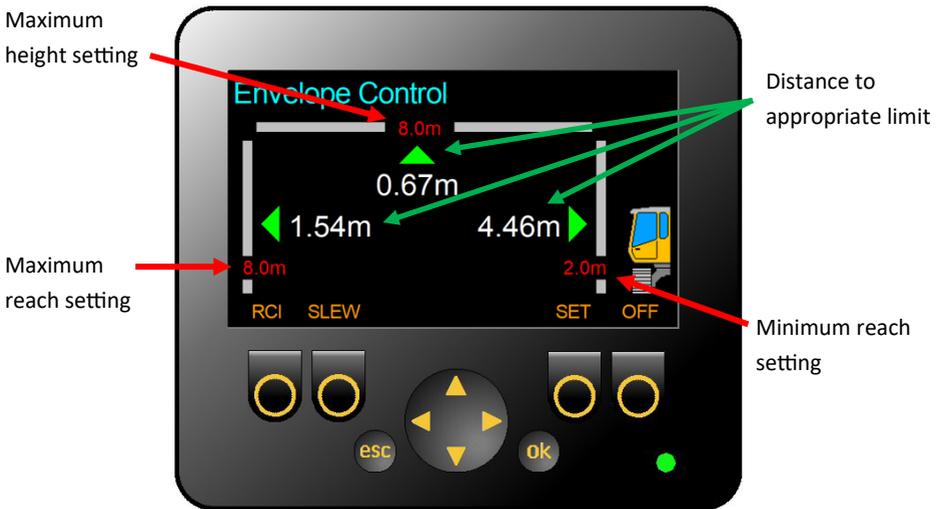
Button operation

RCI   Go to the RCI page

**SLEW**   Go to the Slew limiter page

SET   Set a new envelope limit

**OFF**   Disable the height limiter

The **SET** operation is similar to section **3.9** but with the addition of a **SEL** button. This allows the limit select to cycle through maximum height, maximum reach, and minimum reach. Manual setting and 'HERE' operations are available.

4 Slew Page

The diagrams below show the equipment points monitored for slew limitation.
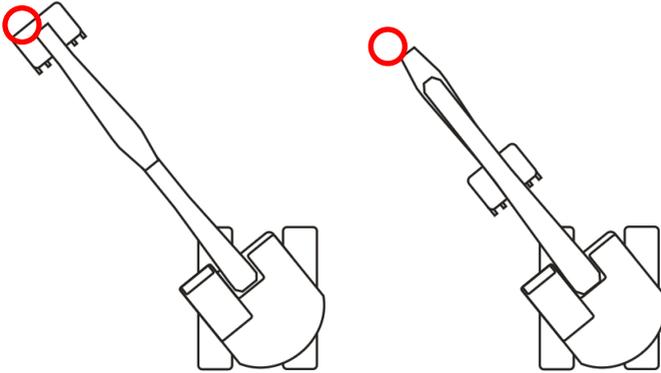
4.1 Conditions of limitation

4.1.1 Slew walls
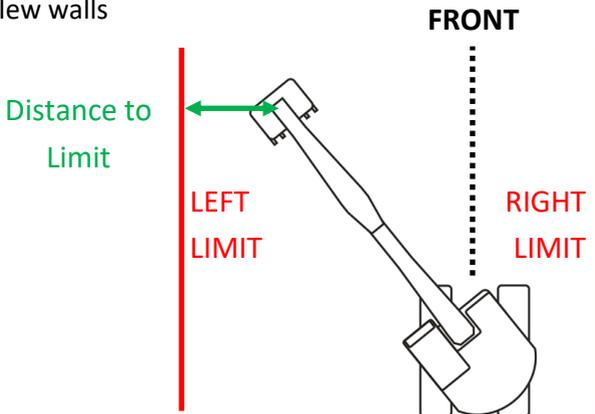
The system is only aware of the pin positions indicated above. Any attachment should be taken in consideration when setting a slew limit. The attachment (normally a bucket) should be put in the least favourable position when setting a slew limit. The left and right sides shown above are with respect to the undercarriage, not the turret.

Note: If slew limits are active and the machine has an offset boom sensed with a single proximity switch, both slew left and right will be disabled if the boom is not central.

4.1.2 Angular slew

FRONT

LEFT LIMIT

RIGHT LIMIT

Distance to Limit
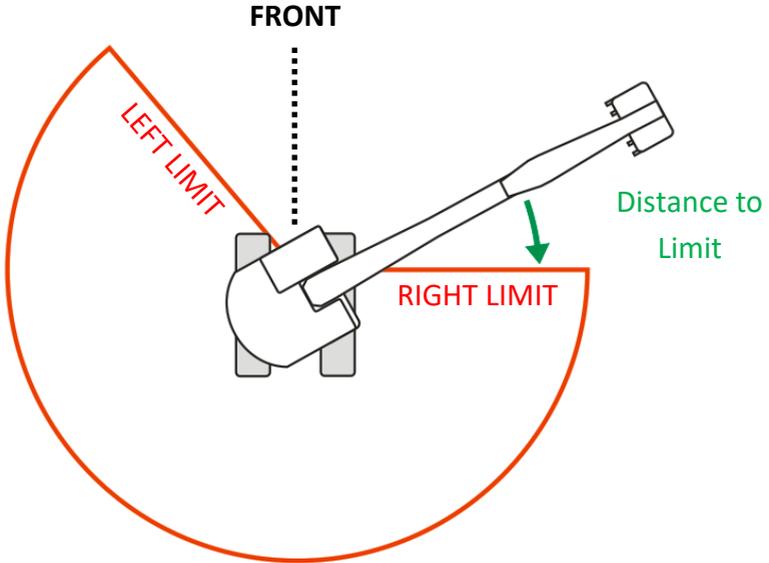
4.2 Selecting the limit type
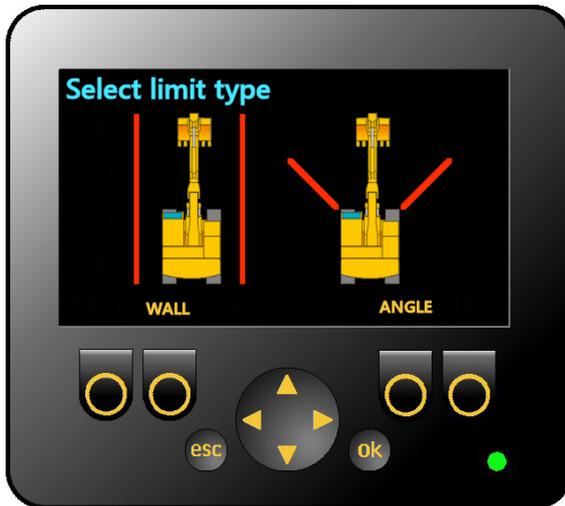
With the exception of XW3, the slew limit type page will appear when the slew limiter is first enabled. Press **WALL** for left and right slew walls, or **ANGLE** for left and right angular limits.

4.3 Slew limiter operation

Limits

Distance to the left slew limit

Distance to the right slew limit

If angular limits have been selected, the distance and limits shown above will be in whole degrees.

Button operation

RCI   Go to the RCI page

HGT   Go to the Height limiter page

SET   Set a new slew limits

OFF   Disable the slew limiter

4.4 At a slew limit

Approach to a slew limit

If either of the two monitored points comes within **0.5 metres (or 15°)** of a slew limit, the internal alarm will pulse, and the slew motion towards the limit will be **slowed** down. Slew speed away from the limit is unaffected.

At a slew limit

If either of the two monitored points comes within **0.1 metres** of a slew limit, the slew motion towards the limit will be **stopped**. When **slew walls are in use**, any equipment motions that would increase the radius are also **stopped**. Slew speed away from the limit is unaffected.

4.5 Setting slew limits

4.5.1 Setting slew walls

Current slew limit in metres

Current lateral distance in metres

When setting slew walls when the machine is slewed over the rear of the machine, the left limit will actually be on the operators right hand side. This is because the walls are with respect to the undercarriage.

Button operation

 Select a digit to adjust

 Adjust selected digit

HERE Set the slew limit at the current lateral distance and exit

SIDE Select left or right side limit set

ok Set the slew limit as manually edited and exit

ESC Abandon any changes and exit

4.5.2 Setting slew angles

Setting slew angles requires physically slewing the machine to the left angular limit and then the right angular limit, as shown below.

1. Slew to the required left slew limit and press **SET**.

2. Slew to the required right slew limit and press **SET**.

4.6 Disabling the slew limiter

If **OFF** is used from an active slew limitation page the display will change as shown above and all motion control will be released. Equipment slew is no longer monitored.

Button operation

RCI   Go to the RCI page

HGT   Go to the height limiter page

ON   Re-enable the slew limiter

If digging mode is enabled, **DIG** will also be available.

5 Fault Page

The system continuously monitors the health of the sensors and the IO Controller inputs and outputs. If a problem is detected, the screen shown above will appear. If the system has motion control valves fitted, the system will failsafe and close all the valves. The failed sensor(s) will be shown in red.

If a fault occurs with IO Controller a further line of text will be shown at the base of the screen. If there is more than one fault, the messages will cycle.

Possible IO Controller faults are:

- Fault: Output 0 (Boom up)

- Fault: Output 1 (Boom down)

- Fault: Output 2 (Artic up)

- Fault: Output 3 (Artic down)

- Fault: Output 8 (Arm up)

- Fault: Output 9 (Arm down)

- Fault: Output 10 (Slew left)

- Fault: Output 11 (Slew right)

- Fault: Input 5 (Engine on)

- Fault: Input 6 (Duty lo)

- Fault: Input 7 (Duty hi)

- Fault: Input 8 (Limit key)

- Fault: Input 9 (Access link)

- Fault: Output 4 (Ext alarm)

- Fault: Output 5 (Beacon)

- Fault: Output 6 (Int alarm)

- Fault: Input 11 (Override)

- Fault: Input 10 (Auxiliary)

- Fault: Output 7 (Auxiliary)

If the **optional** override key is fitted, the motion control valves can be temporarily overridden by turning the key switch mounted in the IO Controller cover clockwise.