# TWIN SYNCHRO FUNCTIONALITY

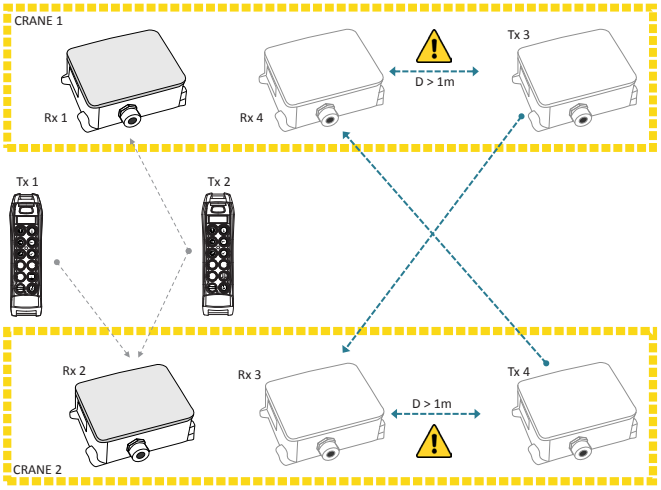
## The most compact Tandem Solution

The Twin Synchro functionality consists of a system conformed by a master transmitter (Pushbutton or Console box) which controls by the use of radio signals simultaneously and in a syncronized way the movements of two cranes working in tandem mode.

## ¿Which are the differences between the traditional system and the Twin Synchro?

The system does not require an additional set of Fix-to-Fix system.
The same receivers used to control both cranes in Tandem operation mode are **used to receive and to manage the limit switch / contactors signals of both cranes to synchronize also the movements.**

**Advantages:**
-Downsizing the number of radio frequencies in the working area, reducing the saturation of the radioelectric spectrum.
-No need to use the synchronization electrical cubicle, simplifying/reducing the number of connections and additional wirings.




*TRADITIONAL TANDEM SYSTEM SCHEME*

## Regulatory background

The EN 15011:2011 + A2:2014 regulation, which affects specifically "Overhead and Gantry Cranes" in Industrial hoist lifting.

It says that when two or more cranes/trolleys are used for handling a single load from a single control station, the control systems of the individual cranes shall be interconnected to ensure that during tandem operation:

a) the hoisting speeds are the same within the tolerances required for the particular application.

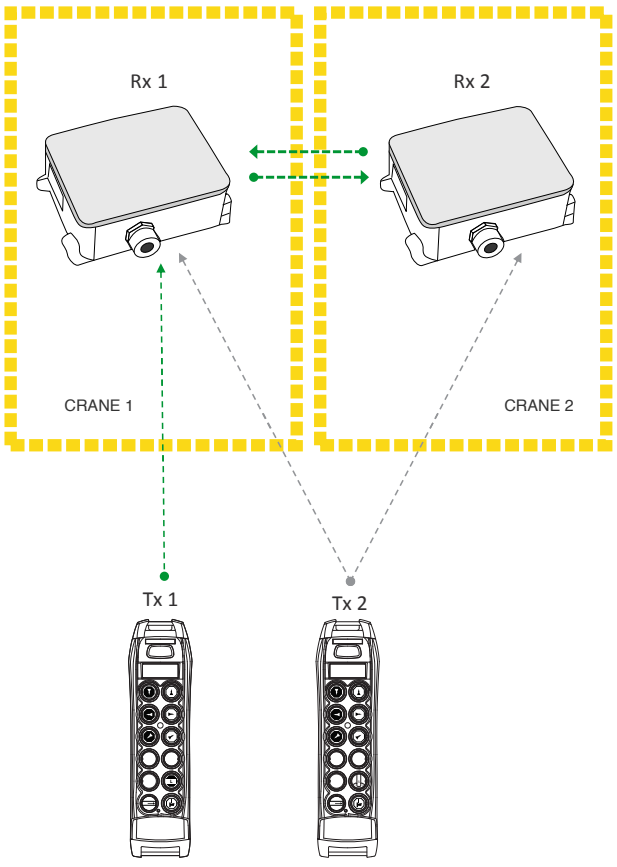
b) the horizontal speeds are the same within the tolerances required for the particular application.

c) any interruption of the operation on one crane/trolley shall have a corresponding effect on the other.

At horizontal speeds exceeding 60 m/min or hoisting speeds exceeding 20 m/min, **the relevant motion control shall provide self-correcting synchronization and any interruption in the operation on one crane/trolley shall have a corresponding effect on the other.**

## Twin Synchro system goals:

SECURITY in the movements where two or more cranes work in tandem mode.




*TWIN SYNCHRO SCHEME*

# Specifications of the functionality

## -Temporally inhibited surveillance

When working in tandem mode, the Twin Synchro brings the opportunity to watch the inputs status, activating firstly the contactors, in stead of activating directly the appropiate limiters.
In order to work this way, we activate the contactor without surveillance, and after some time with the inhibited surveillance, it starts monitoring the status of the inputs and it continuous the movement or it stops it.

Depending on the movement, they have stablished times without surveillance. These times are configurable:

| Movement | Direction | Speed | Time without surveillance |
|---|---|---|---|
| Hoist | Down | Slow | -- seconds |
| Hoist | Down | Fast | -- seconds |
| Hoist | Up | Slow | -- seconds |
| Hoist | Up | Fast | -- seconds |
| Cross Traverse | Left | Slow | -- seconds |
| Cross Traverse | Left | Fast | -- seconds |
| Cross Traverse | Right | Slow | -- seconds |
| Cross Traverse | Right | Fast | -- seconds |
| Long Travel | Reverse | Slow | -- seconds |
| Long Travel | Reverse | Fast | -- seconds |
| Long Travel | Forward | Slow | -- seconds |
| Long Travel | Forward | Fast | -- seconds |

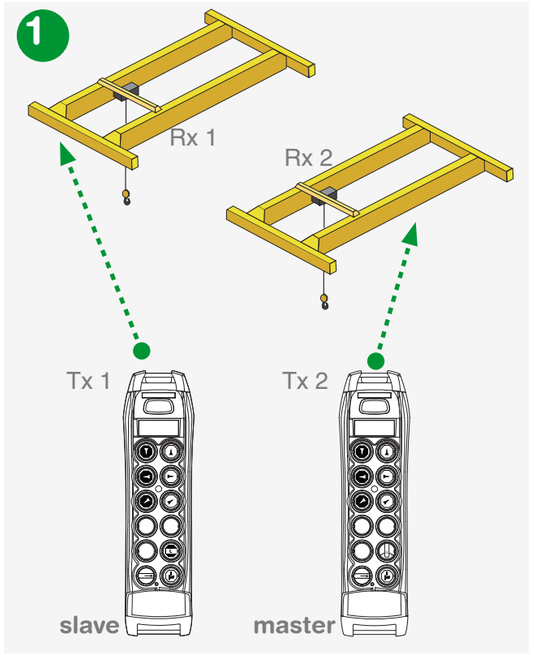
## -Drives

In order to perform an initial load of the drive, the “drive OK” relay is activated during 10 seconds. At that time, no movement is allowed. When this period passes, it starts controlling the remote receiver signal’s drive status. If the signal of the drive OK is ON is maintained active and it also activates and remains active an additional relay, which indicates that the stablished loading time is over.

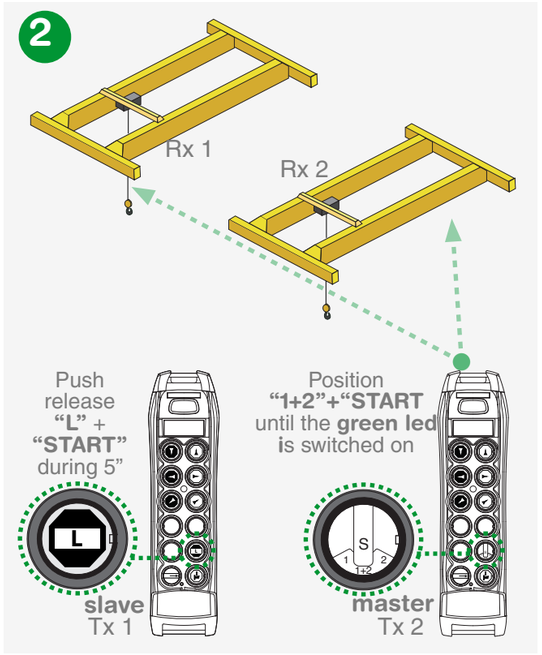
## -Receivers configuration example

| Inputs | Outputs | | | |
|---|---|---|---|---|
| | Local | Remote | Scheme | Meaning |
| K3 | DI2 | 1RDI2 | 903 | DOWN |
| K5 | DI1 | 1RDI1 | 904 | UP |
| K4 | DI3 | 1RDI3 | 905 | FAST HOIST |
| K6 | DI4 | 1RDI4 | 906 | LEFT |
| K8 | 1DI1 | 1RDI5 | 907 | RIGHT |
| K7 | 1DI2 | 1RDI6 | 908 | FAST CROSSTRAVEL |
| K11 | 1DI3 | 1RDI7 | 909 | FORWARD |
| K9 | 1DI4 | 1RDI8 | 910 | REVERSE |
| K10 | 2DI1 | 1RDI9 | 911 | FAST LONG TRAVEL |
| K13 | 2DI2 | 1RDI10 | 912 | ONLY CROSSTRAVEL 2 |
| K14 | 2DI3 | 1RDI11 | 913 | ONLY CROSSTRAVEL 1 |
| 1K8 | 2DI4 | 1RDI12 | 914 | DRIVE OK |
| K12 | - | - | - | SYNC. FAIL |
| 1K6 | - | - | - | HOIST DONE |
| K15 | | | | TWIN SYNCHRO |

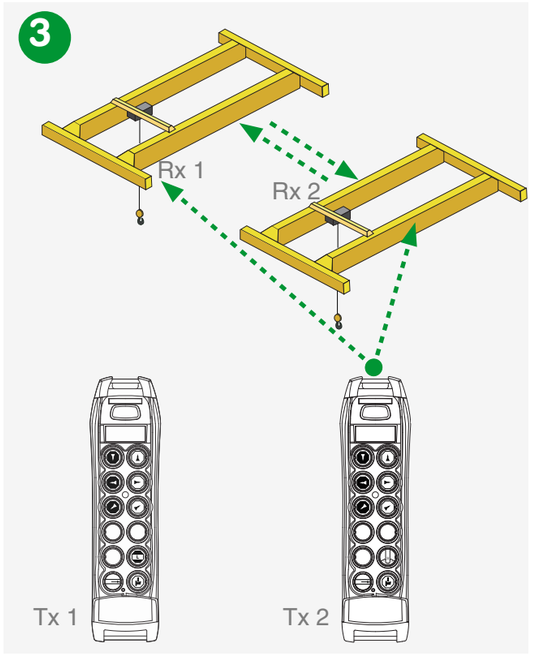
## Operational mode:



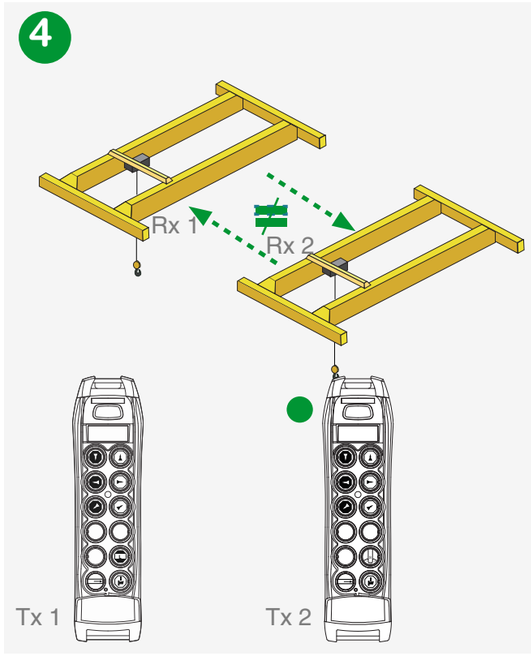

*1- Cranes operate independently. Each crane has its transmitter and receiver, and each one responds to the orders of the corresponding system.*



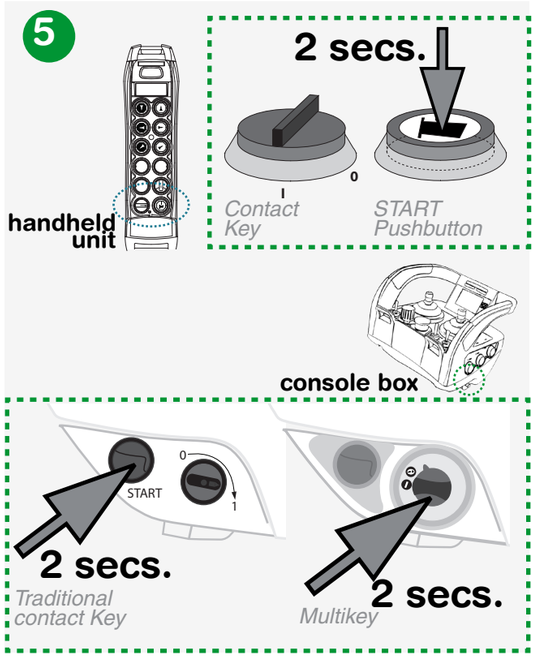

*2- To activate the Tandem mode, we release the ID of the slave transmitter. At this stage, the Master transmitter must choose the 1+2 or a+b position (depending on the setting up). This way, the two receivers will be controlled from a single control station.*



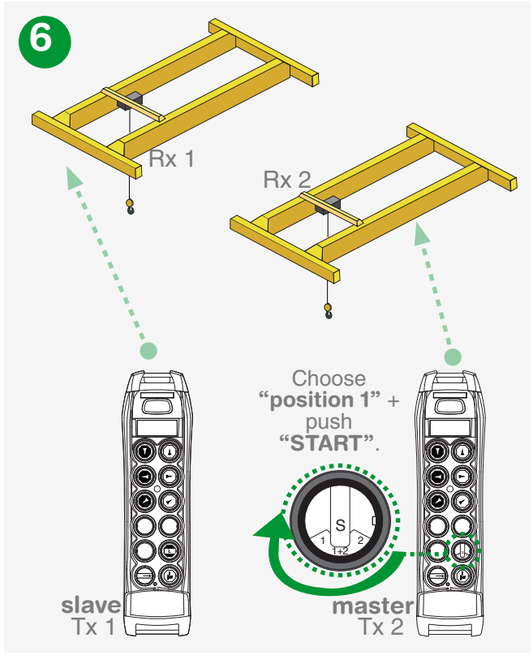

*3- Once the Tandem mode has been activated, both cranes are operated from a single control station (controlled by the Master transmitter). The Slave transmitter could not perform any movement.*




*4 - **DESYNCHRONIZATION WARNING.***
*When making a movement the systems detects that the status of both receivers is different, the desyncronization locks the system until the syncronization is again reseted.*




*5- **SYNCRONIZATION RESET***
*If you do not want to exit from the Tandem mode and continue working in spite of the desyncronization, you must push the START button during 2”.*




*6- When the operation has finished, we choose “Position 1” in the Master transmitter and push “START”. This way, the Receiver 1 (Rx1) is already available to be used by the Slave transmitter.*