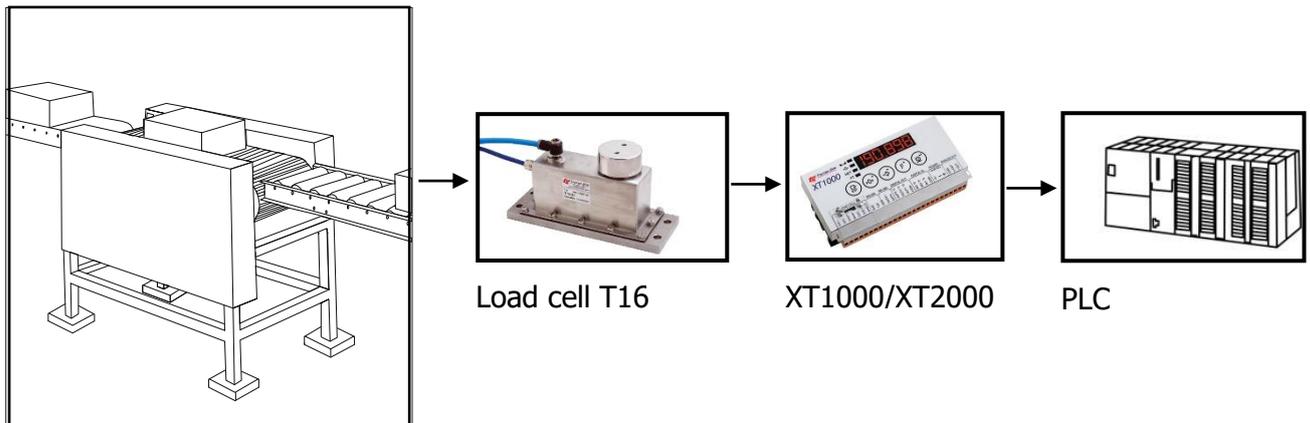


XT1000 / XT2000 CHECK-WEIGHER APPLICATION

Introduction

When working with dynamic weighing applications such as check-weighing, the instability produced by the mechanical motor & transmission, as well as the weight peaks caused by the fast entry and exit of products on the conveyor belt, could add errors into the weight signal. Use of the integral check-weigher application within the XT1000 / XT2000 indicator can dramatically reduce those errors by discriminating the individual weight peaks and calculating the mean weight value using the configured high-performance digital filters. The check-weigher application can be started ("triggered") by pressing a key on the keypad, receiving a serial command, a digital input (from a sensor or button) or by setting a weight band that will trigger the application to start when the weight is within the defined margin.

The integral check-weigher application will calculate the true weight of each product and send the resultant weight value through the communication ports, therefore assisting the check-weigher manufacturer in reducing the costs of development and time to market of their machinery.



Check-weigher

Configuration of the XT1000 / XT2000

The XT1000/XT2000's integral check-weigher application function has been specially designed for industrial dynamic weighing processes.

To set up the device for Check-weighing, the first step is to configure its basic weighing parameters such as the definition of the scale, the device options and then perform a static scale calibration.

To use the XT1000/XT2000 in check-weigher mode, select the Check-weigher option within the application menu and then select the method of starting the



application (the **StArt** command) by pressing of a key on the keypad, a digital input being activated, by automatic weight detection or by presence detection through an external sensor.

For the last 2 of these methods, the following pages give specific examples of how to configure the parameters of the XT1000 / XT2000 to achieve successful check-weighing performance.

(a) TRIGGERING BY AUTOMATIC WEIGHT DETECTION (StArt: nEt)

Using this triggering method allows the check-weigher process to begin automatically when the weight is above the programmed value on the **tr 19** parameter. Configuring the **bAnd** parameter determines the weight level below which the next check-weighing process to start (i.e. when the current product has left the belt of the check-weigher and the next product is about to enter).

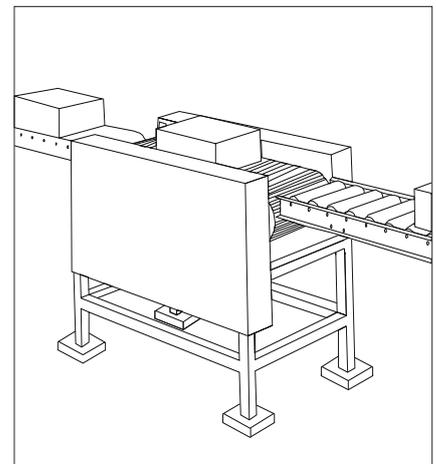
Example:

Within an industrial production line with conveyor belts, there is a need to perform a product quality control check by weight. The product to be checked is 10 kg boxes. The maximum capacity of the scale is 15 kg with a minimum division of 10 g. The installed load cell is a 20 kg capacity load cell.

Firstly, the **dEf** menu (to define the scale) will be configured as follows:

Scale configuration values

CAP	15 kg (Maximum capacity of the scale)
d i	10 (Value of the scale division)
dP	0.010 (Decimal point position)
0-trAct	0.5d (Zero follower band)
0-top	1.9 (Limit allowed for the  key)
0-StArt	OFF (auto zeroes when it's turned on)
UndErL	-20d (Lower range equal -20 divisions)
Un it	kg (Units)



Check-weigher application

The **APPL 1** menu will be configured as follows:

Check-weigher application configuration (APPL 1)

Parameter	Value
APP	CHECK
StArt	nEt
tr 19	2.500

bAnd	1.500
t_dEL	0.500
t_ACC	0.500
t_d IS	1.000
CANCEL	off
totAL	off
PC	rS-232

Details of the process and its graphical representation

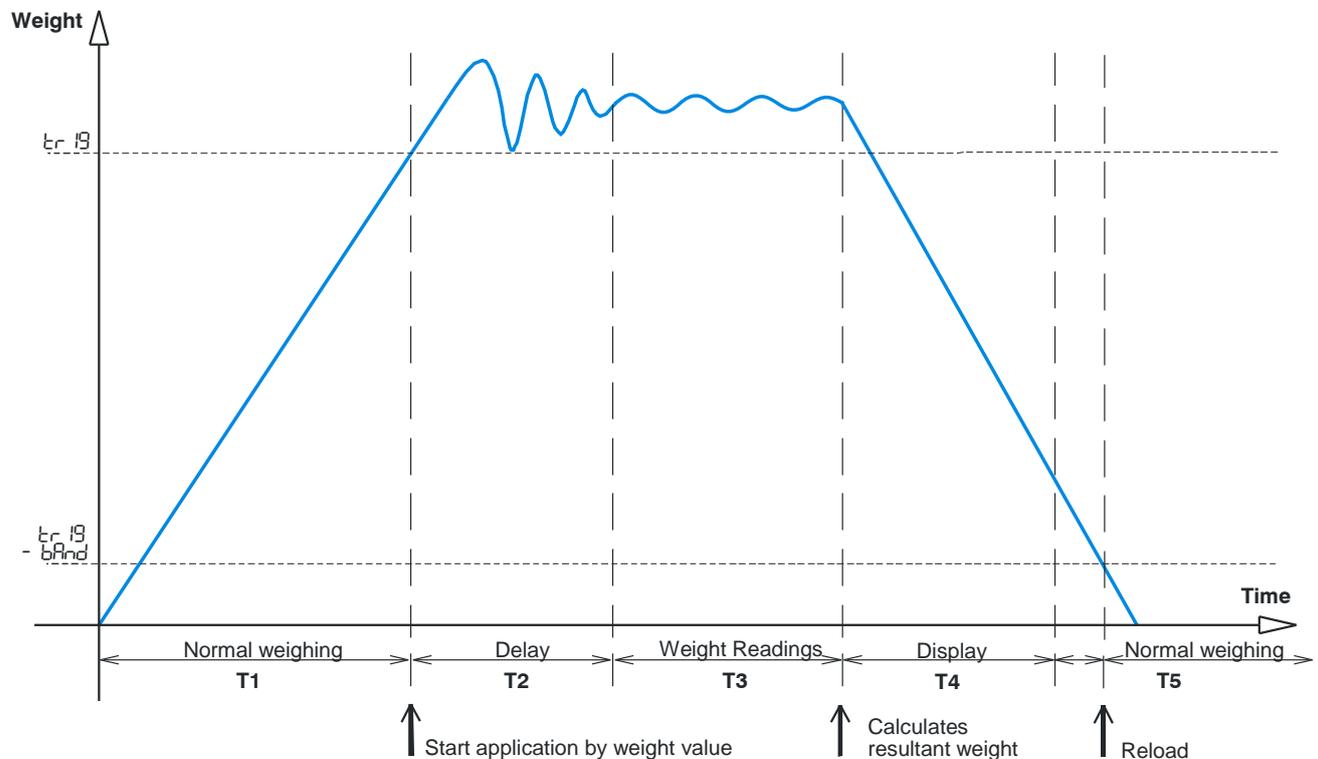
The application will trigger when the weight on the scale is above 2.5 kg, then it will wait 0.5 seconds (t_{dEL}) to ensure that the box is ready for weighing. The time period t_{dEL} is programmed by the user to ensure the box will be in the correct location on the belt for accurate weighing. This time period can be determined using the product dimensions, belt dimensions and belt velocity.

When the waiting time has passed, the XT1000 / XT2000 will acquire weight data for a duration of 0.5 seconds (t_{ACC}). It is often the case that the t_{dEL} is equal to t_{ACC} because most checkweighers are designed to have a length of approximately 3 times the longest (diagonal) dimension of the largest product.

When the time period t_{ACC} has passed, the XT1000 / XT2000 will calculate the average (mean) of the accumulated weight data and send the result through the serial port.

Finally, it will show this weight value on the LED display for 1 second ($t_{d IS}$). The next weighing process cannot begin until the weight has fallen below 1.0 kg ($t_{r IS} - bAnd$). While the XT1000 / XT2000 is in the "Normal weighing phase" (see the graph below) the weight value shown on the display is the current value of weight on the scale.

The following graph shows the different steps of the process:



Description of the steps:

- T1:** The Device (XT1000 / XT2000) is in *normal weighing* mode. When the weight is above 2.5 kg (parameter **tr 19**) the waiting phase starts.
- T2:** When the programmed waiting time of 0.5 seconds has passed (parameter **t.del**) the reading phase starts.
- T3:** During the “weight readings” phase of 0.5 seconds duration (parameter **t.ACC**) the average (mean) weight is calculated and then displayed.
- T4:** The final phase in the process, of programmed duration 1 second (as per parameter **t.d 15**). After this time the XT1000 / XT2000 returns to the “normal weighing” phase, and during which it will display the current weight on the scale.
- T5:** When the weight on the scale falls below the trigger value less the band value (ref. parameters **tr 19** and **bAnd**) (in this case, 2.5kg – 1.5 kg = 1.0 kg) the system reloads to allow a new weighing process to begin. If the reload weight value is not reached, a new weighing process will not start even if the weight exceeds 5 kg (the **tr 19** value).

Configuration of the menus

Press  +  (first press  and hold, then press ) then the device will ask for the PIN code. It's not necessary to enter the PIN code because we will not be changing any protected parameters, so press  and enter the configuration menu, then press the  key twice. Now the **APPL :** menu will be visible.

APPL :



APP



none



Start



tr 19



band



t.del



t.del



t.del



t.del

Press 

Press 

This is the application selection menu. Using the ← and → buttons the Check-weigher application (**CHECK**) can be selected

Press  and then 

Press  and use the ← and → buttons to select the process start method: **net**

Press  and then 

Press  and configure the weight level to start the process. With the ↑ button the value can be set and using the ← and → buttons the digit can be changed.

Press  and then 

Press  and configure the weight level that will allow a new check-weighing process to start. To reload a new process, the weight needs to be below (**tr 19 - band**). With the ↑ button the value can be set and using the ← and → buttons the digit can be changed.

Press  and then 

Press  and configure the time in seconds (with a resolution of milliseconds) during which the system will wait until the scale is ready for weighing. With the ↑ button the value can be set and using the ← and → buttons the digit can be changed.

Press  and then 

t_Acc

Press  and configure the time in seconds (with a resolution of milliseconds) that the system will be acquiring weights to calculate the average and obtain the result. With the ↑ button the value can be set and using the ← and → buttons the digit can be changed.

t_d IS

Press  and then 

Press  and configure the time in seconds (with a resolution of milliseconds) for which the system will show the resultant weight value on the display. With the ↑ button the value can be set and using the ← and → buttons the digit can be changed.

CANCEL

Press  and then 

Press  and using the ← and → buttons it's possible to ensure that the process cannot be cancelled. This is as per the setting: **OFF**

total

Press  and then 

Press  and using the ← and → buttons it's possible to ensure that the weight results are not totalized. This is as per the setting: **OFF**

PC

Press  and then 

Press  and using the ← and → buttons it's possible to select that the weight data is sent via the **RS-232** serial port.

Press 

Press  3 times to exit the configuration menu.

Normal weighing mode

The application is now ready for check-weighing to begin and it will perform according to the parameters configured by the user.

(b) TRIGGERING BY PRESENCE DETECTION (DIGITAL INPUT) (StArt: InP)

Using this triggering method allows the check-weigher process to begin automatically when a digital input is triggered, for example if a signal is received from an external sensor that detects the presence of a product on the weighing belt.

Example:

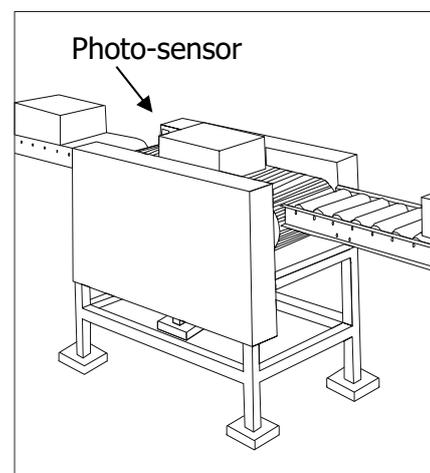
Within an industrial production line with conveyor belts, there is a need to perform a product quality control check by weight. The product to be checked is 10 kg boxes. The maximum capacity of the scale is 15 kg with a minimum division of 10 g. The installed load cell is a 20 kg capacity load cell.

The detection of the product is performed by a photo-sensor that will trigger when a box crosses the photo-sensor's activation zone. In this example, the sensor will always send an activation signal (the indicator's digital input will receive a logic value of '1') and when a box is detected the sensor will deactivate the signal (such that the indicator's digital input will receive a logic value of '0'). The definition of this behaviour is important for configuring the **Func** parameter of the digital input **d_{in}** as "High" or "Low".

Firstly, the **dEF** menu (to define the scale) will be configured as follows:

Scale configuration values

CAP	15 kg (Maximum capacity of the scale)
dI	10 (Value of the scale division)
dP	0.120 (Decimal point position)
0-trACT	0.5d (Zero follower band)
0-toP	1.9 (Limit allowed for the key)
0-StArt	OFF (Auto zeroes when it is turned on)
UndErL	-20d (Lower range equal -20 divisions)
Un It	kg (Units)



Check-weigher application

The **APPL 1** menu will be configured as follows:

Check-weigher application configuration (**APPL 1**)

Parameters	Values
APP	CHECK
StArt	InP
t_dEL	0.500
t_ACC	0.500
t_d IS	1.000
CAnCEL	oFF
totAL	oFF
PC	rS-232

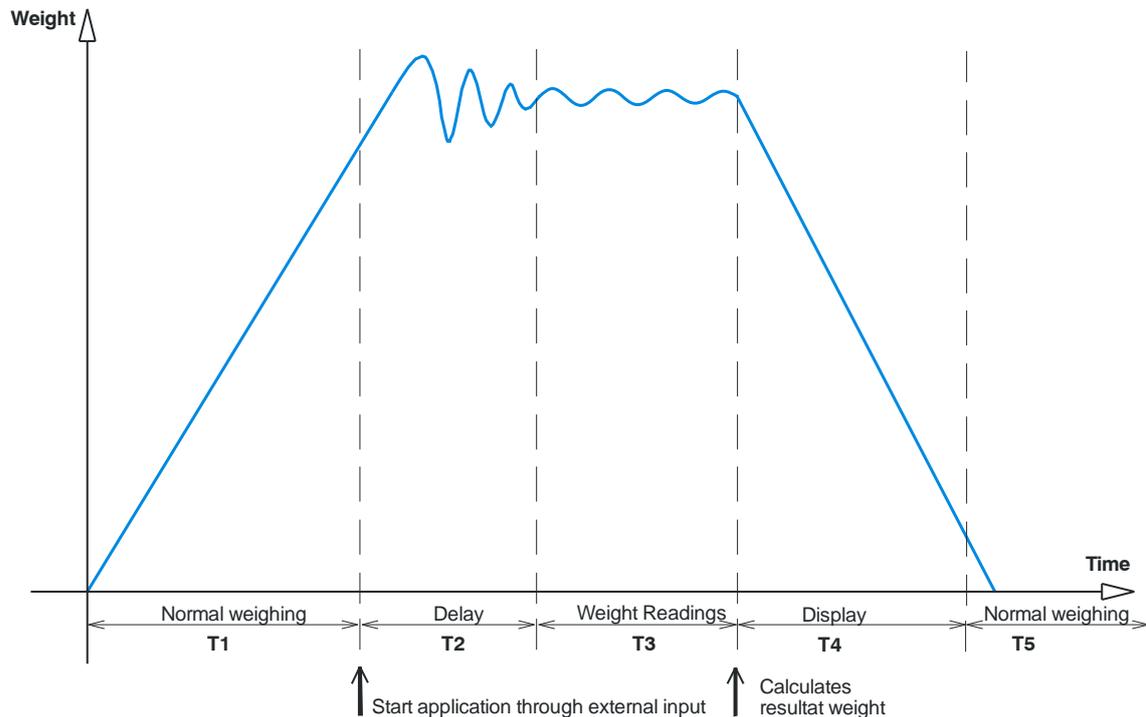
Details of the process and its graphical representation

The application will trigger when the sensor detects that there is a box on the scale. After that moment, the check-weigher application will wait 0.5 seconds (**t_dEL**) – as programmed by the user – to ensure the box will be in the correct location on the belt for accurate weighing. This time period can be determined using the product dimensions, belt dimensions and belt velocity.

After the 'waiting time' has passed, the XT1000 / XT2000 will acquire weight values from the load cell during a user-programmed period of 0.5 seconds (**t_ACC**) – this can be programmed from the product dimensions, belt dimensions and belt velocity. It is often the case that the **t_dEL** is equal to **t_ACC** because most checkweighers are designed to have a length of approximately 3 times the longest (diagonal) dimension of the largest product.

After the time **t_ACC** has passed the device will calculate the average of the accumulated weight values and then it will send the resulting weight value through serial port. Finally, it will show the result on the display for a user-programmed period of 1 second (**t_d IS**). The application will then wait for the next digital input signal from the photo-sensor to begin weighing the next box.

The following graph shows the different steps of the process:



T1: The XT1000 / XT2000 is in the normal weighing mode. The check-weighing application is triggered by the digital input changing its state (caused by the detection of a box) and the waiting phase begins.

T2: After the waiting time of 0.5 seconds has passed (parameter t_{DEL}) the weight reading phase begins.

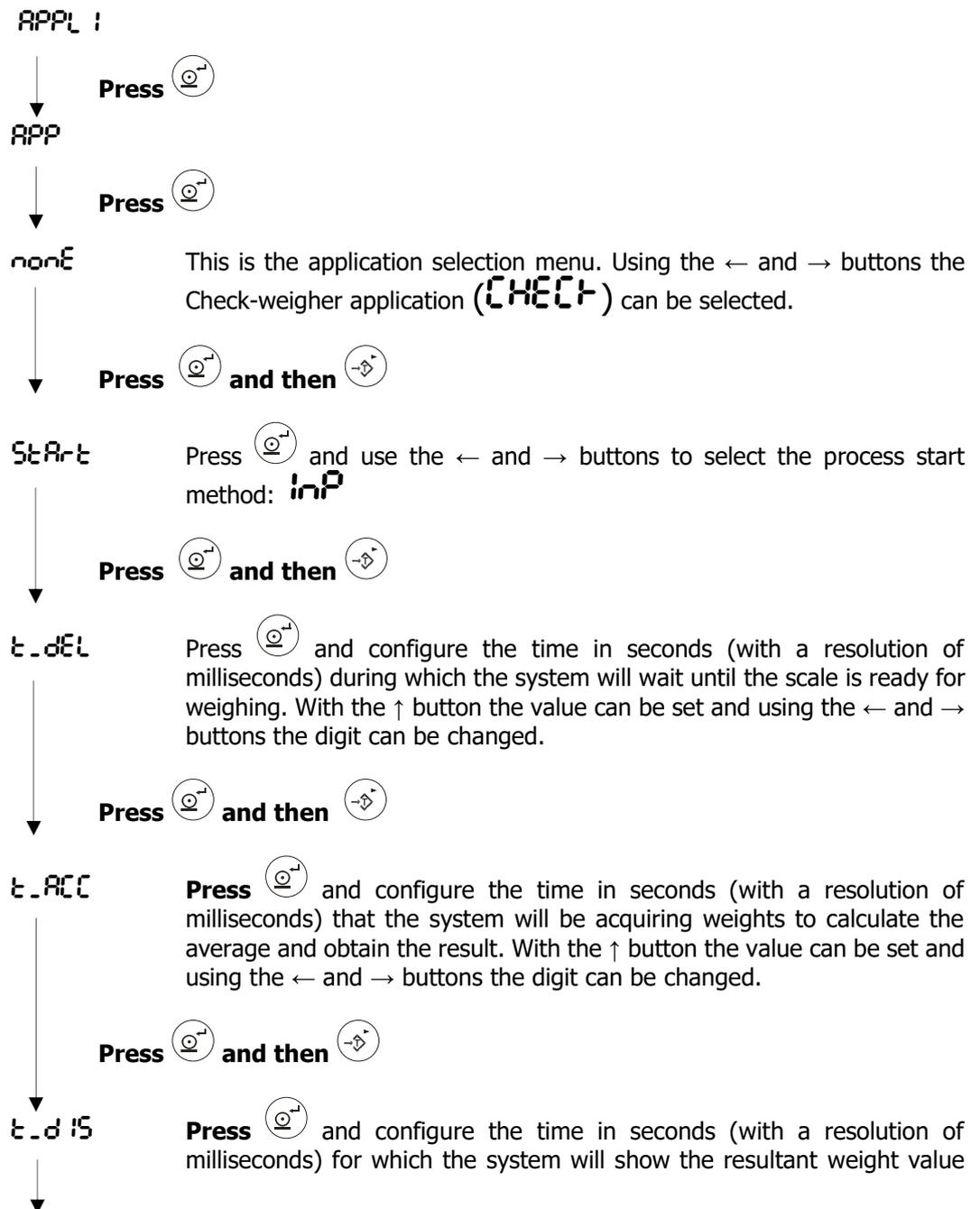
T3: The weight reading phase, of 0.5 seconds duration (parameter t_{ACC}), ends and the weight value is calculated and displayed.

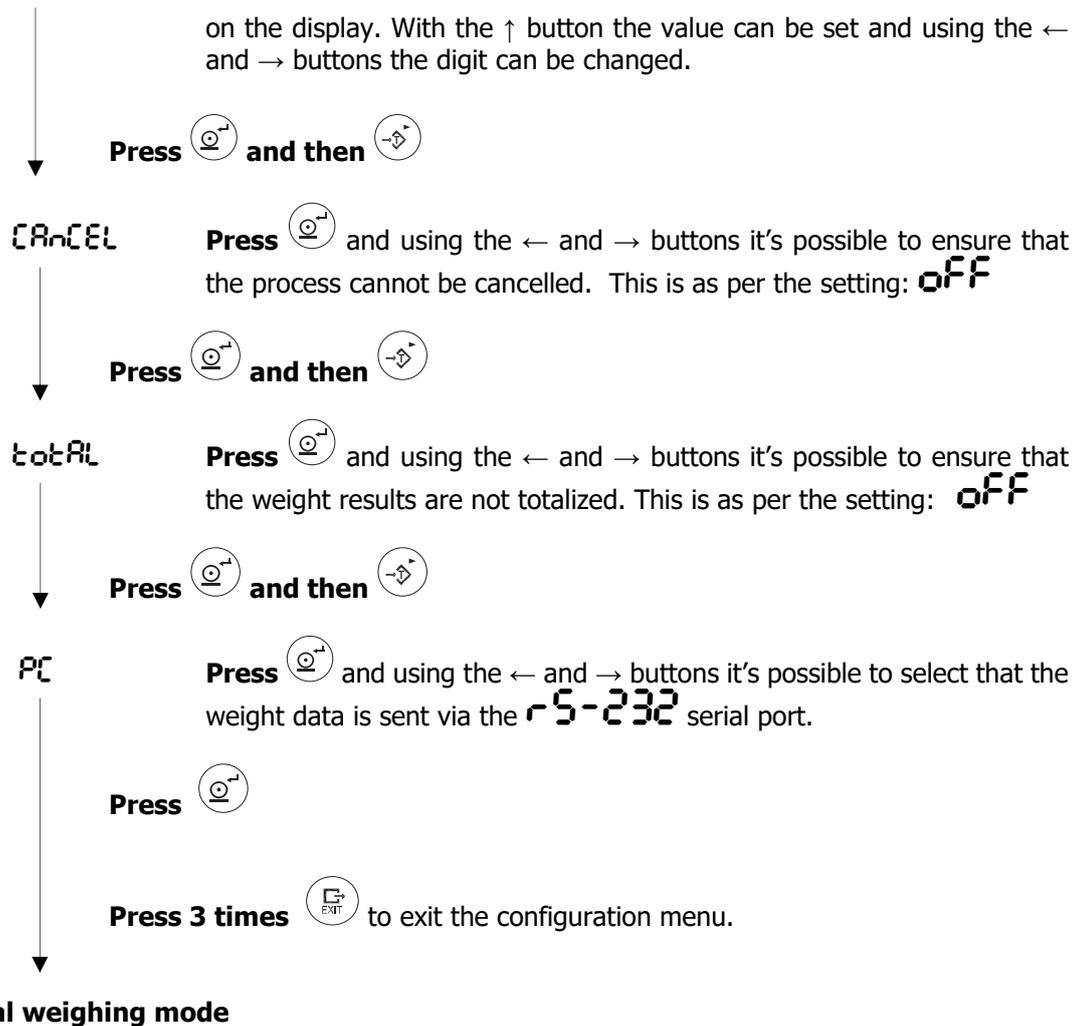
T4: After the weight has been displayed for 1 second (parameter t_{DIS}), the XT1000 / XT2000 returns to the normal weighing phase, displaying the current weight on the scale.

T5: The XT1000 / XT2000 is now waiting for the detection of another box by the sensor, to begin a new check-weighing cycle.

Configuration of the menus

Press  +  (first press  and hold, then press ) then the device will ask for the PIN code. It's not necessary to enter the PIN code because we will not be changing any protected parameters, so press  and enter the configuration menu, then press the  key twice. Now the **APPL I** menu will be visible.





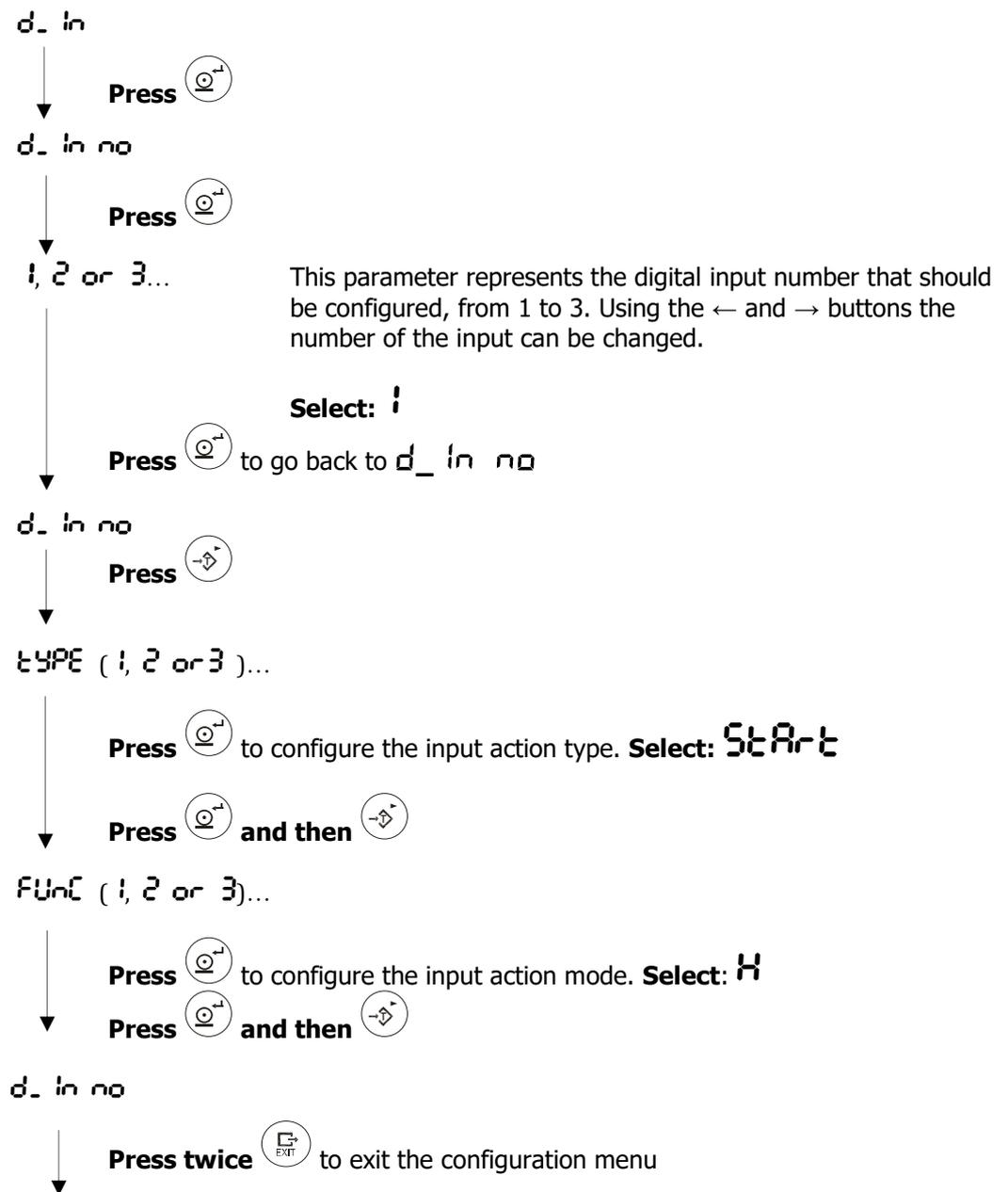
Configuration of the digital inputs

To perform the triggering of the application by the external sensor, the values that should be selected in the **d_in** (digital inputs) menu are as follows;

d_in n	i
TYPE	StArt
FUnC	H

Digital Input menu configuration

Press  +  (first press  and hold, then press ) then the device will ask for the PIN code. It's not necessary to enter the PIN code because we will not be changing any protected parameters, so press  and enter the configuration menu, then press the  key seven (7) times. Now the **d_in** menu will be visible.



Normal weighing mode

The application is now ready for check-weighing to begin and it will perform according to the parameters configured by the user.

Disclaimer: It is anticipated that this technical note is of assistance. Please note: it is only a guide and it does not form a part of any contractual specification. Thames Side Sensors Ltd. reserves the right to amend the content of this technical note at any time without prior notice. We are happy to assist if further information is required.