Check Point 4

Version 1.24 and later

User and installation manual

Jan. 19, 2024

1 Introduction

The CHECK POINT measures and monitors the force exerted **or** displacement travelled by a press suitably equipped with a transducer.
It can also command the press to stop at a programmed value.
The interface to the user is the control panel consisting of an alphanumeric display (20x2 characters) and a membrane keyboard.

Figure 1

1.1 Operation of the instrument

The CHECK POINT has two operating conditions *WAIT* and *MEASURE*. In wait, the instrument waits for the **start** command to begin measurement. In measurement it checks the measured value until the **stop** which returns the instrument to wait.

1.1.1 WAITING

When the instrument is in waiting, the menu can be accessed by pressing the **ENTER** key  . In the menu you can change the operating parameters.
The instrument switches to the measurement phase following a **start** command.

1.1.2 MEASURE

When the instrument is in measurement, the measured value is checked.
The instrument terminates the measurement phase following a **stop** command.
When the measurement phase is over, the *good or rejected* result of the measurement will be reported.
During the measurement, pressing the **ENTER** key will interrupt control, and with a short delay the menu can be accessed.

1.2 Notes

If the value of a control parameter is entered equal to **zero,** the instrument will not use it.

You cannot accidentally change configuration values without entering the *configuration password*.

A second password can be entered to prevent changing control parameter values. Password management is possible through the *Check Point 4 setup* program.

1.3 Password

The configuration of the instrument is protected by the *configuration password* which is initially 9724.
A second password allows protection of control parameters.

Management of these passwords is possible through the Check Point 4 setup program.
Memory formatting is protected by password 9724, which cannot be changed.
When you enter a password, the instrument remains unprotected for one minute or until you press **RESET** 

out of the menus.

1.4 Introduction on the use of the CHECK POINT

When the instrument is turned on, the display lights up and shows the value measured by the transducer.

If you press the **ENTER** key  , the display shows the menu, that is, a list of items. With the up arrow and down arrow keys  you can scroll through the list displaying one by one, all the items in it. To change a value, press the **ENTER** key  .

If you want to exit the menu or if you want to cancel changing a value, press the **RESET** key 

. There is also an **Exit** item in the submenus that allows you to return to the upper menu in exactly the same way as the **RESET** key.

1.5 Entering a value

A small blinking rectangle representing the cursor appears when a value is to be entered. Using the keyboard, it is possible to change the value, which must always be confirmed with the **ENTER** key  . The arrow keys, when entering a value, have the following functions:

 Increases the digit pointed to by the cursor.

 decreases the digit pointed by the cursor.

 moves the cursor to the left.

 moves the cursor to the right.

To change the sign of the value, when it exists, move the cursor to the sign and press the arrow key  or  .

2 Menu Description

If you press **ENTER**, the display will show the menu, which you can scroll through with the up and down arrow keys  .

The following paragraphs show the menu items with a description of their function. To change the operating parameters, press the **ENTER** key.

2.1 Max value reached

This item reports the maximum value reached in the last processing i.e. the peak value.

2.2 Result

This item reports the result of the last processing i.e., it indicates whether the part is good or any reasons why it is rejected. If there are more than one reason for rejection you can use the arrow keys  to display them in succession.
Items that may appear depending on the case are:

- **GOOD PIECE*:*** the piece turned out to be good.
- ***Lower peak****:* the maximum value reached did not exceed the set minimum limit.
- ***Upper peak****:* the maximum value reached has exceeded the maximum set limit.
- ***Measure interrupted***: indicates that the measure has been interrupted.

2.3 Good pieces

This item reports the total number of good parts performed. The counter remains in memory even when the instrument is turned off. To reset the counter to zero, press the **ENTER** key. When confirmation is required, press the  key to cancel the command or press the  key to execute the command.

2.4 Rejected pieces

This item reports the total number of scrap pieces executed. The counter remains in memory even when the instrument is turned off. To reset the counter to zero, press the **ENTER** key. When confirmation is required, press the  key to cancel the command or press the  key to execute the command.

2.5 Lower limit on peak

This item allows you to set the minimum limit. The minimum limit must be exceeded for the piece to be classified as good.

2.6 Upper limit on peak

This item allows you to set the maximum limit. The maximum limit must not be exceeded for the piece to be classified as good.

2.7 Stop value

This item allows you to set the stop value. When the stop value is exceeded, the press stop is commanded.

2.8 Output value *n*

This item allows you to set the threshold value for the activation of the relative output. The deactivation of the same output will occur when the value falls below the threshold minus the hysteresis value **V.HYSTERESIS**.

2.9 Configuration

This item gives access to a submenu that allows configuration of the instrument. See chapter 3.

3 Configuration menu

In the configuration menu you can set up the instrument for your needs. The items that make up this menu are listed in the following paragraphs. To change the configuration values, the configuration password is required (chap. 1.3).

3.1 Start value

This item reports the value of the **V.START** threshold. The CHECK POINT uses the start threshold to decide when to switch from the wait phase to the measurement phase. To move from the approach phase to the work phase with two-stage cylinders. To end the measurement and switch to the wait phase during cylinder return.

3.2 Test inputs/outputs

Through this command, diagnostics of input and output signals can be accessed.

3.3 Digital offset

This value changes the calibration of the instrument: it is the number that is subtracted from the transducer value.

3.4 Gain value

This value changes the calibration of the instrument: it is the number that multiplies the value of the position transducer to obtain the correct measured value.

3.5 Decimals

Allows the setting of the number of digits after the decimal point that are shown on the display.

3.6 Unit of measure

Allows the setting of the unit of measurement to be used.

3.7 Hysteresis of levels

This item reports the value used as the hysteresis for deactivating **V.HYSTERESIS** signals. The CHECK POINT subtracts this value from the threshold values to find the new threshold below which the relevant signal is deactivated.

3.8 Firmware version

Shows the firmware version of the instrument.

4 Introduction to installation

This manual describes the steps required to connect the CHECK POINT to the machine and to make it operational.
The CHECK POINT is powered by 24VDC.
Check the supply voltage before connecting the instrument.

Figure

4.1 Features of the instrument

The CHECK POINT has two operating conditions *WAIT* and *MEASURE*. In wait, the instrument waits for the **start** command to begin measurement. In measurement it waits for the **stop** to return to the wait phase. The **start** and **stop** events depend on the configuration of the instrument.

4.1.1 WAITING

When the instrument is in standby, menus can be accessed to change operating parameters.
The instrument switches to the measurement phase following a **start** command.

4.1.2 MEASURE

When the instrument is in measurement, the measured value is checked.
The instrument terminates the measurement phase following a **stop** command.
When the measurement is finished, the *good or rejected* result of the measurement will be reported.

4.1.3 START

If an input is configured to switch to the measurement phase this signal will be used to give the start to measurement and control. Conversely, if an input is not configured to perform this step, the transition to the measurement phase will occur when the measured value exceeds the programmable threshold value **V.START**.
Note that when the instrument is configured to reject a start, that is, when at least one *output* is configured with activation *on start*, then the start command is not accepted in the following cases:
- If the last measurement was unsuccessful and the instrument has not yet been **reset**.
- If *enabling inputs are* configured and these inputs are not all active.

4.1.4 STOP

Stop commands the outputs to stop the work of the machine. Stop occurs when the stop value is reached or, if a stop input is present, when this input is commanded. After stopping, the instrument waits for the measurement to stop, that is, it waits for the measured value to go below **V.START** as described below.

4.1.5 END

The end determines the end of the measure; the end does not coincide with the stop. Ending will lead to the stop of the measurement. The measurement will be terminated when the measured value falls below the programmable value **V.START** minus the value **V.HYSTERESIS**. Note that if at least one *output* with *stop* switching has been configured, then the measurement will terminate only if the stop value **V.ARRESTO is** reached first.

4.2 Inputs and outputs

The CHECK POINT has twelve digital ports: four inputs, four outputs, and four bidirectional. If one bidirectional port is to be used as an output, an internal jumper must be inserted.

4.2.1 Input configuration

In the current version, inputs can be configured in one of the following ways:

START SIGNAL

Activation of this input commands the transition from the wait phase to the measurement phase. The measurement continues until it stops. If this input is taken off during measurement, control is interrupted and the part is reported rejected. If multiple start inputs are configured, the transition to the measurement phase occurs only if all inputs are activated "simultaneously" (two-hand control management).

START/STOP SIGNAL

Activation of this input commands the transition from the wait phase to the measurement phase. The measurement continues until it is stopped. If this input is removed during measurement, the stop command is given.

RUN PULSE

Activation of this input commands the transition from the standby phase to the measurement phase. Measurement continues even if this input is deactivated. If multiple start inputs are configured, the transition to the measurement phase occurs only if all inputs are activated "simultaneously" (bimanual management).

RESET REJECTED

Activation of this input resets the instrument after a failed measurement.

T.D.C.

Backward cylinder signal, ends measurement. This input is also used for encoder zeroing.

ENABLE

Enabling input. If even one of the configured inputs is missing, the instrument will not accept the start command.

NOT-EMERGENCY

Enable input. When the input so configured is not active, the instrument displays "Auxiliaries disengaged" on the display and does not accept the start command.

BARRIER

Input of active or closed barrier.

NOT AIR PRESSURE

Enable input. When the input so configured is not active, the instrument displays "Low air pressure" on the display and does not accept the start command.

4.2.2 Output configuration

Each output can be configured in one of the following ways:

GREEN LIGHT

Useful for connecting a green good part light. It will be activated at the end of the measurement if successful until the next start command.

RED LIGHT

Useful for connecting a red rejection part light. It will activate intermittently at the end of the measurement if with rejection result to become to fixed with reset and deactivate at the next start command.

BEEPER

It will be activated at the end of the measurement if with rejection result and will be deactivated by reset.

GREEN/STOP LIGHT

Useful for connecting a green light of good part and force reached when the instrument is connected to manual presses. It will be activated when the set minimum force is reached and will remain active with good result until the next start command.

ENABLE/STOP VALVE

This signal is activated when the instrument is ready and deactivated when stopped or if the instrument is not ready. Useful for connecting the press enable solenoid valve.

GO/PRESS VALVE

Activated when a start command is accepted and deactivated when the programmed stop value is reached. Useful for connecting the press down solenoid valve.

WORKING

Activated during measurement.

BOOSTER/CONTACT

Triggered when the start value is exceeded. This signal is used to control the working stroke of Alfamatic cylinders.

CLOSE THE DOOR.

Mobile protection closing command.

OPEN THE DOOR

Mobile protection opening command.

SETPOINT 0..3

Generic output activated when the value exceeds a programmable value and deactivated when it falls below the same programmable value minus the **V.HYSTERESIS** value. Four programmable thresholds are available. Control of these outputs occurs at all times, whether in the standby phase or in the measurement phase.

5 Electrical connections

Please read these notes:

Always check the supply voltage required by the instrument before wiring the instrument.

This manual refers ONLY to the version with CP4CPU2 and CP4BUS2 electronic boards. Check the wording on the boards themselves.

This tool is not (and could not be) a safety device: the movement of the machine must be entrusted to elements external to it. The tool can simply synchronize the startup of the machine for its own operation.

It is very important that the end of the unshielded transducer shielded cable be as short as possible.

When the machine has electric motors these must be equipped with a noise filter and must be controlled by semiconductor devices.

5.1 Power supply

The CHECK POINT operates at 24VDC. Check the polarity of the power supply very carefully.

5.2 Transducers and signals

Caution: the CHECK POINT is not (and could not be) a safety device: starting the machine must be entrusted to elements external to it.

The CHECK POINT has an input for connecting a transducer, twelve digital ports and an RS232 communication port.

There are two versions of the instrument:

- Version for analog transducers.
- Incremental encoder version.

The function of each **digital input** and **digital output** is configurable.

5.2.1 Version for analog transducers.

This version can be configured by jumper to accept different types of signals as described in the table below.

Signal	Jumper
Resistive bridge 2mV/V, power supply 10 Vdc. One-way.	J10 absent J11 absent J12 inserted J13 absent J14 absent J15 position A J16 position B J17 position A
Resistive bridge 2mV/V, power supply 10 Vdc. Bidirectional.	J10 absent J11 absent J12 absent J13 absent J14 position B J15 absent J16 position B J17 position A
0-10 V input, 10 Vdc power supply	J10 position B J11 present J12 absent J13 absent J14 absent J15 absent J16 position B J17 position B

The transducer can be connected directly to the instrument. In fact, the CHECK POINT has the necessary amplifiers and power output.

5.2.2 Incremental encoder version.

Two-phase quadrature input with multiplication x4. This signal is used by the encoder and the optical scale (position transducer). The encoder can be connected directly to the instrument. In fact, the CHECK POINT has the power supply for direct connection of the transducer. You can request 5 VDC or 12 VDC power supply for the encoder.

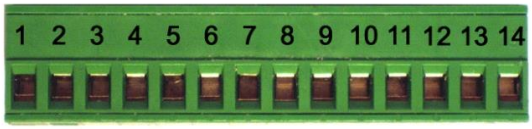
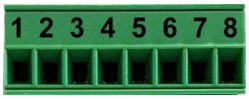
5.3 Wiring instructions

The signals that go to the input of the CHECK POINT can be either *dry contact* or 24VDC positive logic, i.e., PNP transistor output.

The outputs of the CHECK POINT, when active, provide a voltage of 24VDC. The maximum load of each output is 15 watts provided the power supply is sufficient.

To connect the instrument directly to a PLC, the PLC must therefore be 24VDC positive logic (PNP type inputs and outputs).

The wiring relies on several removable terminal blocks that may or may not be present depending on the instrument model. The terminal blocks are numbered (X1, X2, X3, X24). Each terminal of each terminal block is also numbered. For example, when terminal X1.7 is indicated, it refers to the seventh terminal of terminal block X1. The numbering is shown in Figure 4.

X1	X2	X3	X24
			

Figure

5.3.1 Power supply terminal block (X24)

24 VDC power supply.

Name	Clamp	Description
0VDC	X24.1	Negative power supply
+24VDC	X24.2	Positive power supply

5.3.2 Input and output terminal block (X1)

Inputs for dry contact signals or with 24 VDC PNP transistor output.

PNP outputs for 24 VDC consumers.

For inductive loads, such as valves and relays, a diode or filter must be mounted in parallel with the coils to eliminate surges.

Name	Clamp	Description
Input 0	X1.1	
Input 1	X1.2	
Input 2	X1.3	
Input 3	X1.4	
Port 4	X1.5	Input 4 or digital output 4 if J1 is plugged in
Port 5	X1.6	Input 5 or digital output 5 if J2 is plugged in
Port 6	X1.7	Input 6 or digital output 6 if J3 is plugged in
Port 7	X1.8	Input 7 or digital output 7 if J4 is plugged in
Output 0	X1.9	
Output 1	X1.10	
Output 2	X1.11	
Output 3	X1.12	
0VSDC	X1.13	Output for utility power supply
+24VSDC	X1.14	Output for utility power supply

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Current of each input:                          12 mA
Maximum current of each output:                 0.5 A
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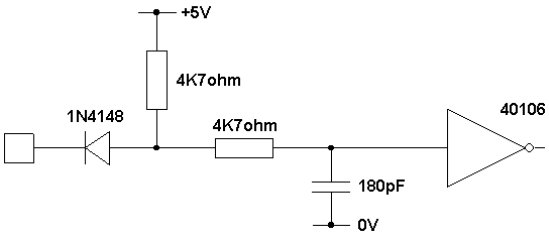
5.3.3 Encoder terminal block (X2)

Name	Clamp	Description
Phase Z	X2.1	Zero mark signal
Phase A	X2.2	PHASE A signal
Phase B	X2.3	PHASE B signal
+VE	X2.4	Encoder power supply
0V	X2.5	Encoder mass
0V	X2.6	Shielded cable braid
DAC1	X2.7	
DAC2	X2.8	

Encoder power supply:	5 VDC ±20% or 12 VDC ±20%
Continuous supply current:	200 mA

Encoder signal inputs (terminals X2.1, X2.2 and X2.3):



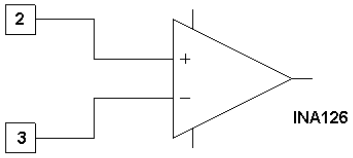
5.3.4 Analog signal terminal block (X3)

Input for analog signals.

Name	Clamp	Description	AEP TC4 cell
IN+	X3.1	Positive input	Yellow
IN-	X3.2	Negative input	White
0VL	X3.3	Shielded cable braid	Sock
0V	X3.4	Mass load cell or potentiometer	Black
+VA	X3.5	Positive power supply	Reds

Supply voltage for load cell at 5 VDC:	5 V ±10% 60mA
Supply voltage for load cell at 10 VDC:	10V ±10% 60mA
Supply voltage for potentiometer at 10 VDC:	10V ±0.5% 10mA

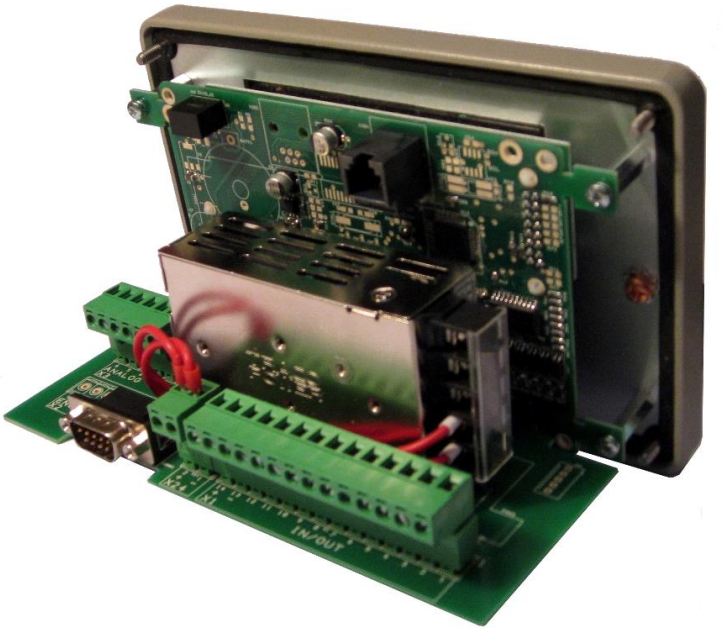
Analog input (terminals X3.1 and X3.2):



Note: It is very important that the end of the unshielded shielded cable be as short as possible:

5.4 Assembly instructions

To attach the instrument to the machine you can drill holes in the box. If attaching at the bottom, it is necessary to take into account the board that is to be inserted into the lowest slot. Therefore, the fixing screws cannot be inside more than 7 mm protruding.



Figure

To open the CHECK POINT unscrew the four screws located in the corners of the back panel and front panel.

Disassemble the terminal block assemblies.

Pull out the electronic boards from the front (Figure 5).

Mount the necessary grommets and plugs (Pg 9).

Thread the wires through the grommets and begin wiring as per the wiring diagram.

To know the numbering of the terminal block groups, you can look at the Figure 4.

When the wiring is finished, insert the board.

Insert the terminal block assemblies respecting their insertion direction.

5.5 Encoder alignment

To position the encoder in the correct way, you must first reset the offset and then follow the instructions below:

5.5.1 For Alfamatic MOP-type presses.

Turn on the instrument and remove the cover that covers the encoder the rack and the top dead center limit switch by unscrewing the two screws. While holding down the limit switch, lower the cylinder with the press lever, in this way, on the instrument display, you will see the elevation change, which will return to zero at some point. This is the exact position of the encoder zero mark. Now pull the encoder back to disengage the pinion from the rack, hold it in this position, and bring

the cylinder back to top dead center. Keeping the encoder disengaged from the rack, lower the cylinder about one millimeter. At this point you can release the encoder. Raise the cylinder to top dead center and verify that the instrument indicates an altitude between -3 and -1 millimeters.

To verify exact positioning, turn the instrument off and on again: at this point the elevation should be zero. Lower the cylinder with the lever and return it to top dead center: at this point the instrument should display a negative altitude of a few millimeters.

5.5.2 For standard Alfamatic presses

First press the emergency mushroom on the press, turn on the instrument, and open the top cover of the rack block, which is closed by two self-tapping Phillips-head screws. Inside you can see the encoder pinion. Unscrew the two screws that secure the encoder and move it upward, so on the instrument display you will see the elevation change, which will return to zero at some point. This is the exact position of the encoder's zero mark. Now move the encoder about one millimeter down so that the display shows -1 millimeter. By pulling the encoder back you are able to disengage the pinion from the rack, so you can return the encoder to its original position without the instrument changing the elevation. In practice, you should be able to fix the encoder and display a value between -3 and -1 millimeters as the elevation.

To verify exact positioning, turn the instrument off and on again: at this point the elevation should be zero. Start the press and return it to top dead center: at this point the instrument should display a negative elevation of a few millimeters.

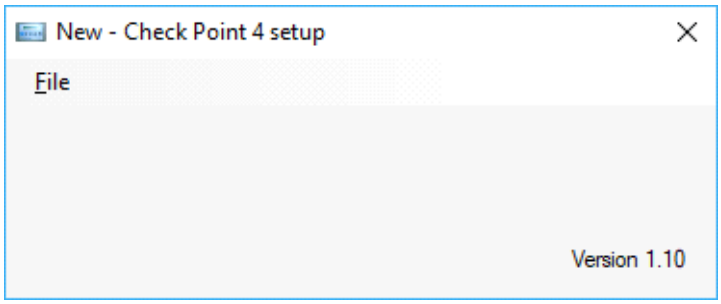
6 Configuration program

The ***CheckPoint 4 setup*** program allows you to configure the instrument, set passwords, and perform internal Check Point software updates.

6.1 Firmware upgrade

To update the instrument firmware, it is necessary to start the bootloader and use the ***CheckPoint 4 setup*** program. To start the bootloader, it is necessary to turn off the instrument, press together the **RESET** keys 

and  , turn on the instrument again while holding down these two keys.



Figure

Start the ***CheckPoint 4 setup*** program.

Choose the Update firmware command in the file menu.

Choose the communication port.

Open the update file with the extension *.atm*

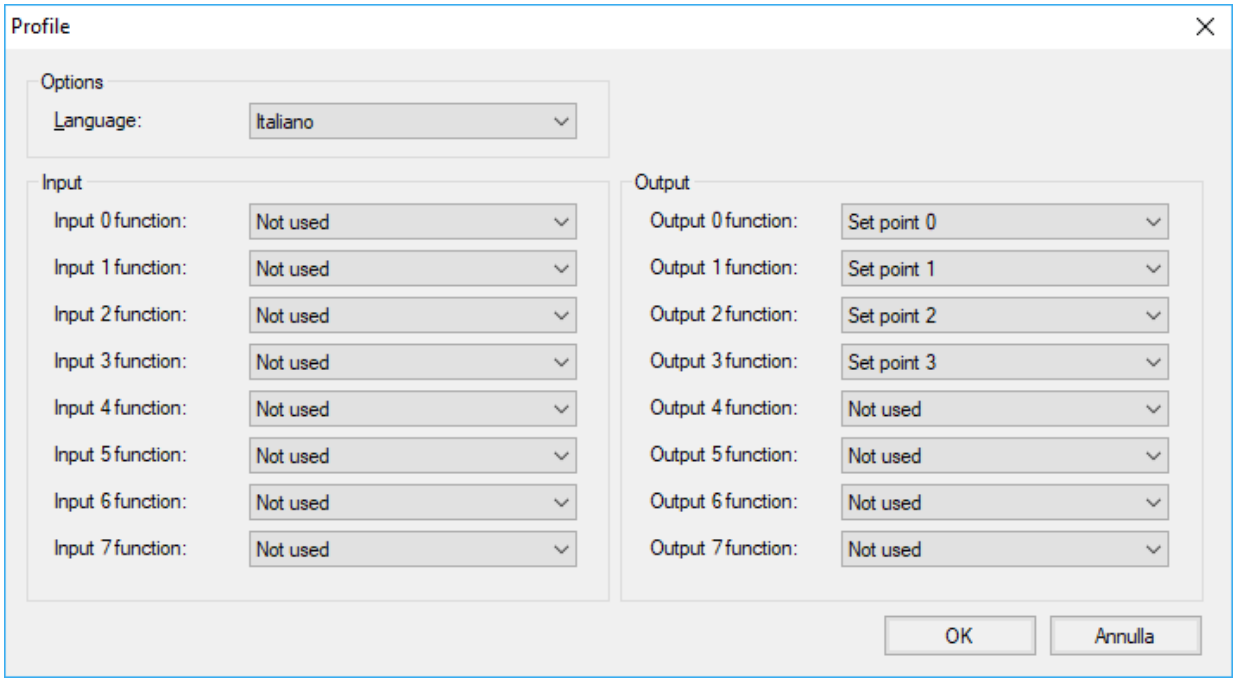
Wait for the end of the transfer.

Note: To update the instrument, the update file is required to be requested from Alfamatic.

6.2 Instrument setup

The configuration of the instrument is stored in the profile. The profile can be saved, uploaded, edited and sent to the instrument via the ***CheckPoint 4 setup*** program.

The following figure shows the initial configuration of the instrument as it is set at the factory:



Figure