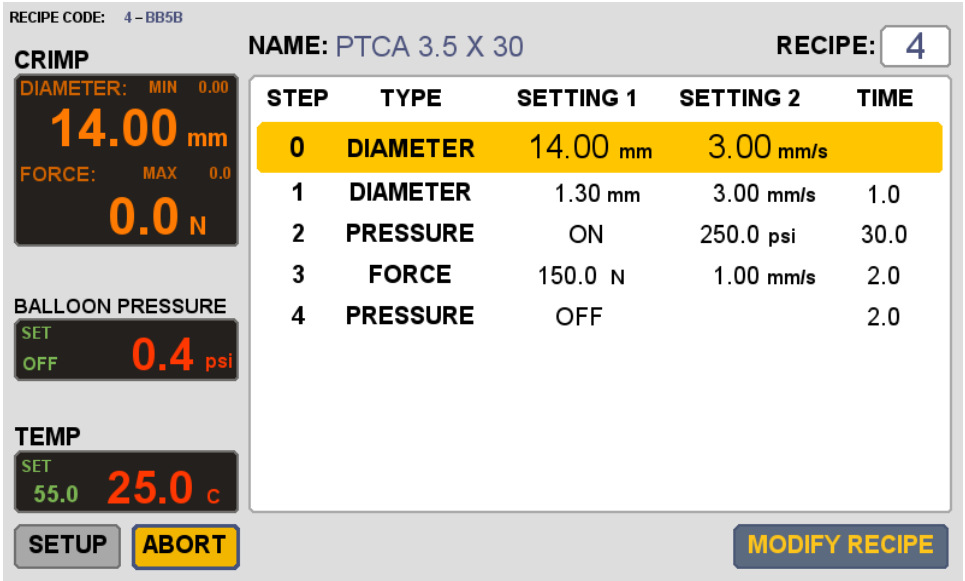
CX Crimper Screens and Recipe Setup

Blockwise Engineering LLC
www.blockwise.com

Blockwise's workhorse stent crimping equipment, the **model CX crimping machine**, includes a touchscreen Human-Machine Interface (HMI) that is used to program and operate the machine. This document briefly describes how the touchscreen is used to program, calibrate and operate the machine.

RUN SCREEN – The most-used screen. It displays live indications of diameter, force, temperature, pressure and the selected recipe's number, name and steps.



This screenshot shows recipe number 4, which is named "PTCA 3.5 X 30". There are 5 steps in the recipe. Step 0 is the "home" position, the diameter prior to starting execution of the recipe. When the operator presses the START button, the machine moves to Step 1, then sequences through all the steps. When the last step is complete, the machine returns to Step 0 and waits.

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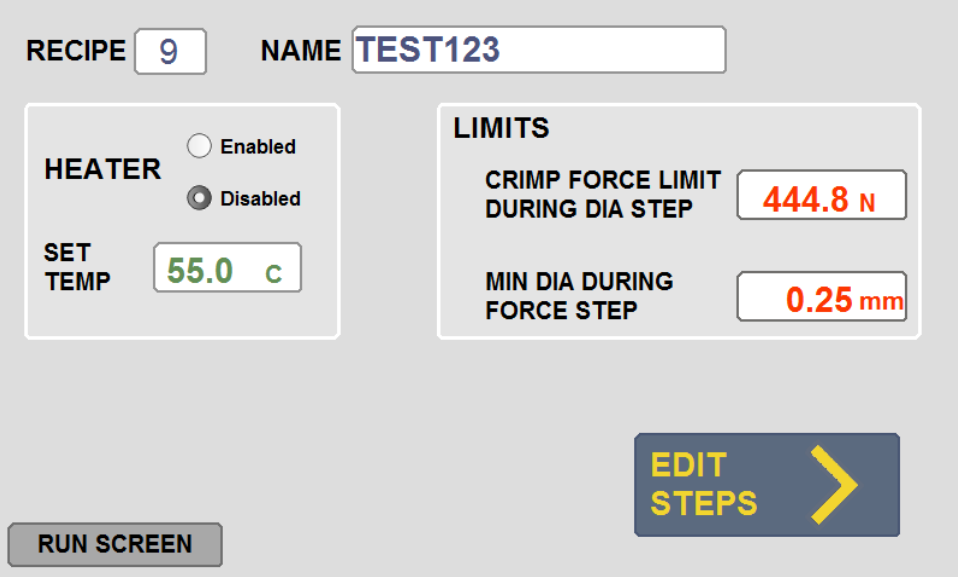
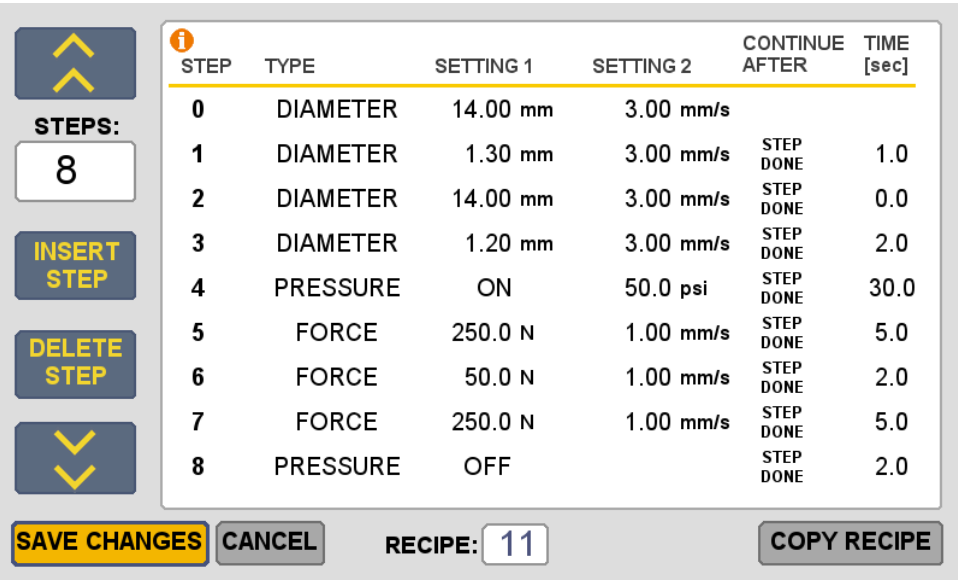
MODIFY RECIPE SCREEN – Displays and allows changes to the *Recipe General Parameters* of the currently-selected recipe.



EDIT STEPS SCREEN – Displays and allows changes to the *Recipe Step Parameters* of the currently-selected recipe. There can be up to 50 steps in a recipe, and up to 100 recipes.



For each step, the user can specify whether to continue after STEP DONE (with a delay time), or after START BUTTON is pressed. For example after a “precrimping” step, the machine can wait for the operator position the stent, then press START.

Each step can be one of 7 types. The limits of the settings depend on what type of compression station is installed.

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STEP TYPE	*DESCRIPTION*	*SETTING 1*	*SETTING2*
Diameter	Moves the compression actuator until the encoder-measured diameter equals the set diameter	Diameter setting [mm or inch]	Speed [mm/s or inch/s]
Force	Moves the compression station in the closing direction until the transducer-measured compression (actuator) force equals the set force.	Force setting [N or lbf]	Speed [mm/s or inch/s]
	Note: this is ACTUATOR FORCE, NOT radial force. Speed setting is an upper limit. Actual speed may be much slower, depending on the force setpoint.		
Pressure	Balloon pressure (through Simpluer connector)	ON or OFF	If ON, Pressure setting [psi or bar]
	Turning pressure ON terminates vacuum. Allowable range is 0 to 300 psi, but the machine cannot create a balloon pressure higher than that supplied to the "High Pressure Gas" connection on the back of the machine. If pressure and vacuum both OFF, then balloon is vented to atmosphere.		
Vacuum	Balloon vacuum (though Simpluer connector)	ON or OFF	
	There is no vacuum level setting. The level of vacuum is the full capability of the venturi-type vacuum pump. Turning vacuum ON terminates pressure. If pressure and vacuum both OFF, then balloon is vented to atmosphere.		
Leak Check	Isolates the balloon and checks pressure change	Allowable pressure change [psi or bar]	
	This step type must be preceded by a Pressure or Vacuum step. Valves are closed to isolate the balloon, then the controller waits 0.5sec, then measures the balloon pressure, then the controller waits for a period equal to the CONTINUE AFTER time, then measures the balloon pressure again. The difference between the 2 measurements is calculated. If preceded by VACUUM step, then pressure INCREASE greater than the Allowable pressure causes a LEAK CHECK FAILED error, shown on a pop-up screen at the time of the failure. If preceded by PRESSURE step, then pressure DECREASE greater than the Allowable pressure causes the error.		
Verify Diameter	Check of diameter within limits	Minimum diameter limit [mm or inch]	Maximum diameter limit [mm or inch]
	Measured diameter outside the limits causes a DIAMETER VERIFICATION FAILED error, shown on a pop-up screen. This can be used as gross check of the size of the product, to reduce errors such as "wrong product inserted".		
Verify Force	Check of force within limits	Minimum force limit [mm or inch]	Maximum force limit [mm or inch]
	Measured actuator force outside the limits causes a FORCE VERIFICATION FAILED error, shown on a pop-up screen. This can be used as gross check of the size of the product, to reduce errors such as "wrong product inserted".		

Pressure or Vacuum steps do not affect the action of Diameter or Force steps. Diameter or Force steps do not affect the action of Pressure or Vacuum steps.

SETUP SCREEN – Displays and allows changes to the machine setup parameters.

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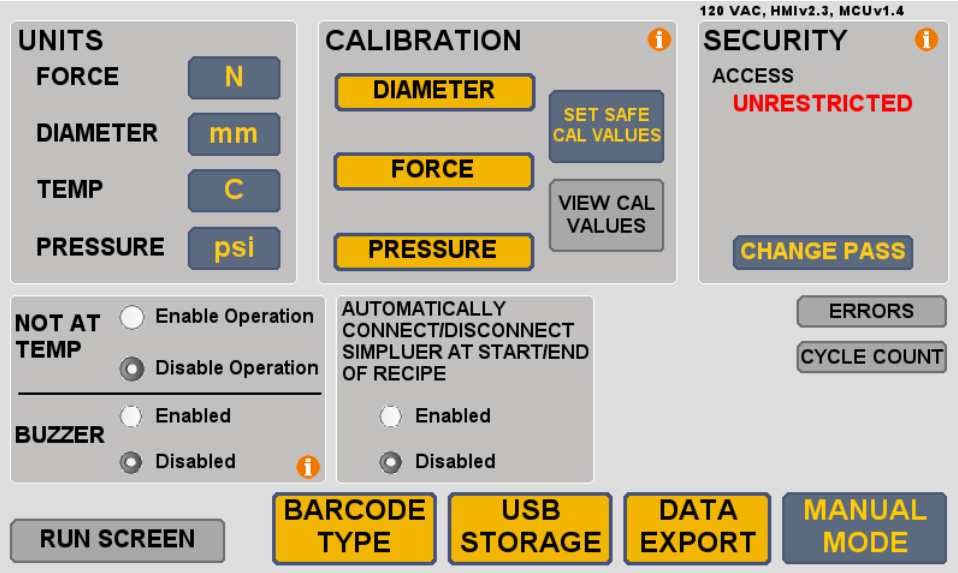
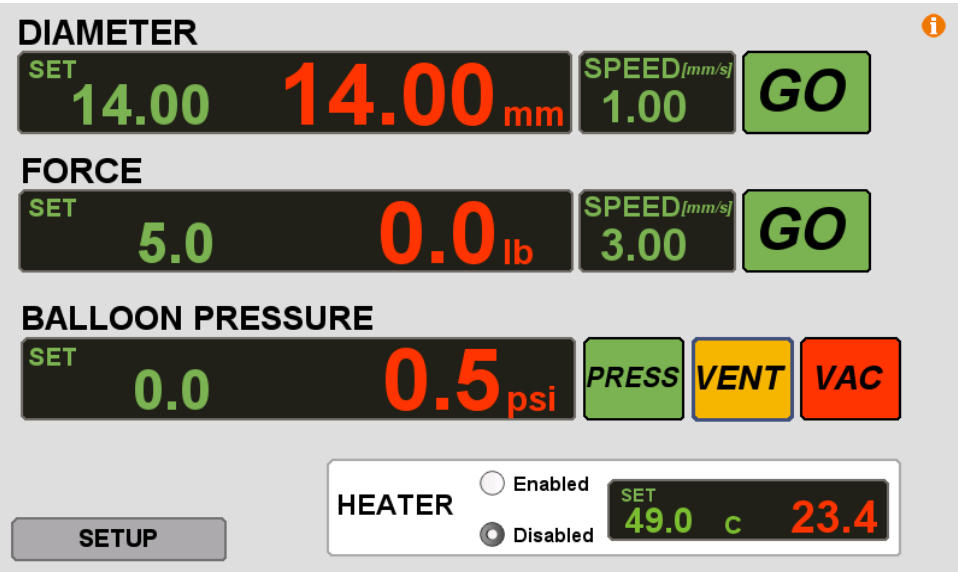


The SETUP screen allows changing of parameters that apply to the whole machine (not just one recipe), and allows access to other functions such as:

- Calibration of the machine's measured values
- Administering the machine's security levels and passwords
- Viewing the error history
- Setup for export of data to an external computer
- Copying and restoring recipe and setup data (for backups or for cloning machines)
- Setup for barcode scanning to select recipes

MANUAL MODE SCREEN – Allows machine functions to be commanded manually (instead of executing a recipe sequence).



In this screen the operator can type setpoint values and command the machine functions of diameter, force, pressure, and temperature.