TMS-Pro Hardware Reference Manual

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Introduction

The TMS-Pro test stand generates the tensile or compressive force needed to test your product. Electronics within the test stand control the motor driving the crosshead. It also controls both the communication between the test stand and the PC. Although the operator would normally control the test stand via the PC, some basic motion controls are available on the control panel of the test stand.

The Intelligent Load Cell converts the mechanical load applied to the test sample and converts it to an electrical signal readable by TMS-Pro and the software on the PC.

Texture Lab Pro software communicates with the TMS-Pro test stand via a serial port or USB port on the PC. The TMS-Pro can deliver a synchronous data acquisition rate of up to 2000 readings per second of both force and position.

Various test cells and fixtures are available to perform the desired stress action to the sample under test. Shear, compression, extrusion, puncture and bending are a few examples.

System Set-up & Operation

This section describes the hardware in general terms. It will also be necessary to refer to the Start-up Manual and any other documentation that was supplied with your system. The general information about safety precautions should also be read in conjunction with the Start-up Manual and any other documentation and hardware information that was supplied with your test system.

Connecting Load cell to Test Stand

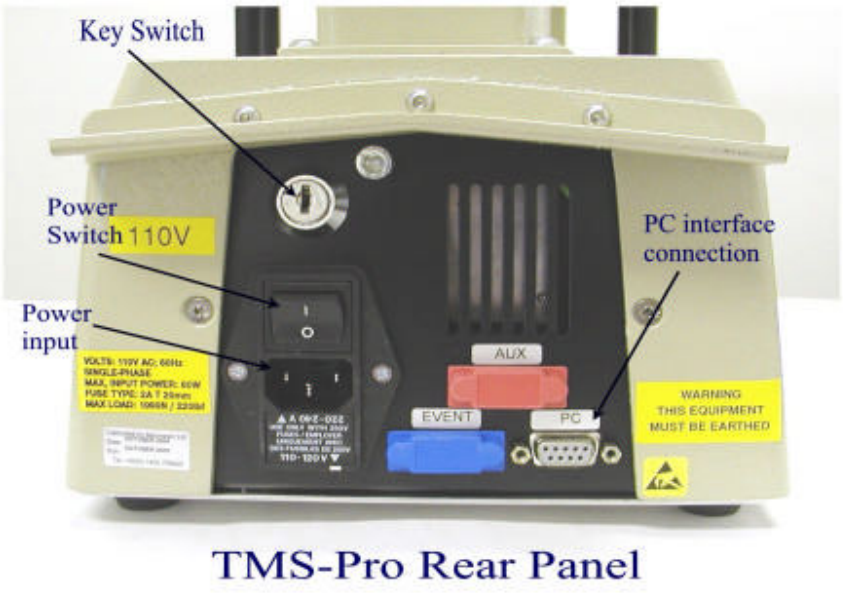
Slide the load cell sideways onto the dovetail bracket at the front of the crosshead. Tighten the grip by turning the ratcheting lever clockwise and thus expanding the dovetail bracket. Note: to turn the lever without turning the tightening threads, depress the orange button on the top of the leaver. Turn off the test stand, using the black rocker switch on the back panel. Align the connector on the load cell cable with the socket at the top of the test stand column. Push on it gently while turning to align the pins, and then tighten by screwing the knurled ring in a clockwise direction. Turn on the test stand, using the black rocker switch on the back panel.

Changing Load Cells

Turn off the test stand using the black rocker switch on the back panel.
When the message 'Motor drive has been disabled' is displayed, click on Abort button. When the message 'Test system has gone into limited functionality. You will now need to reconnect before testing can continue' is displayed, click on OK
Remove the installed load cell; this procedure is the reverse of the installation procedure.
Turn on the test stand using the black rocker switch on the back panel. Reestablish the communication from the software Tools Menu.

When a load cell has reached the scheduled recalibration date, and during the three weeks prior to that date, TMS -Pro will display a recalibration reminder.

Power Supply to Test Stand



TMS-Pro Rear Panel

Connect the mains supply lead to the three-pin power inlet connector at the rear of the test stand. The LEDs on the control panel indicate whether it is powered up. Supply of power is controlled by the black rocker switch above the power input connector. The required power supply voltage (110V–120V or 220–240V) is indicated by the value on the bottom line of the fuse cartridge

The cable for communication between the test stand and the PC will be connected to the 9-pin D-connector. The event input port allows the TMS-Pro to monitor switch actuation on an external device. The auxiliary input port will allow for future expansion of system capabilities.

The Key-Switch

The back panel of the test stand includes a key-switch. It is strongly recommended that the key should not be left in the switch, but kept in a safe place by the person responsible for the test stand. Inserting the key and turning it 90° clockwise will put the test stand into over-ride mode. In this mode, all microprocessor safety control facilities are disabled, but the crosshead can be moved by using the arrow keys on the control panel. The release-key is a 'service tool' that should never be used without consulting the person responsible for the test system and/or your local Food Technology Agent. The only occasion when it will be necessary to use the release-key will be in the unlikely event of the microprocessor failing. Then this can be used to switch the system to over-ride mode enabling a 'trapped' test sample to be released from the test stand. This is a short-duration service facility, as soon as the crosshead has been moved to the required position, the switch should be returned to its original (vertical) position switching the system from over-ride mode back to normal operation mode. Then the key should be removed and stored safely. Under no circumstances should testing ever be carried out in over-ride mode - failure to observe this restriction can seriously damage your system. The key-switch is an emergency recover feature and not a security feature. It should not be confused with the lockout facility provided on some instruments to prevent unauthorized personnel from obtaining access.

Connecting the Test Stand to the PC

After connecting one end of the supplied communication cable to the panel at the rear of the test stand, the remaining end must be connected to your PC. Your PC will need to have at least one spare RS232, COM port connector. If a spare 9-pin connector is available, connect the communication cable directly to it. If there are no legacy com ports available then FTC can supply a USB adaptor for your system. The TMS-Pro software will need to know which COM port the data from the test stand will be available; this can be accomplished via the Set-up menu. The PC must have at least one spare COM or USB port. The operating system of the PC should be Windows 98 or higher and should also be capable of at least 800x600 resolution and High (16bit)' colors. When operating at 800x600 the Test window will fill the screen at starts up. With higher resolutions it will be necessary to click on the maximize icon to ensure that the window fills the screen

The Limit Stop

Loosen the knurled knob on the lower limit stop by turning it counter-clockwise. Slide this limit stop to the position appropriate to restrict the downward travel of the crosshead, and then re-tighten. This adjustment will restrict crosshead travel, on an absolute basis, for all tests. When the crosshead reaches the limit stop, the crosshead will automatically be driven back 5mm from the limit stop position, and TMS-Pro will display an appropriate message. Travel, load and speed restrictions can be imposed more precisely by using the Preferences facility within TMS-Pro. However, this will restrict travel relative to the crosshead position at the start of the test.

The Control Panel

Basic control of crosshead movement is possible from the test stand itself. Operators can control both the up/down movement and the limits of travel. These controls are however only intended for initial coarse set-up of test parameters.

The Emergency Stop Button

With the test stand in normal operation mode, pressing this will by-pass all other controls, stop the crosshead if it is moving, and prevent it from being moved further. The test stand can be re-activated by twisting the button about 30º in either direction. Note, when the test stand is in the key enabled over-ride mode, the up/down control keys can be used to drive the crosshead, even when the emergency stop button has been pressed down.

Power LEDs

The LEDs will all be illuminated when the test stand is in normal operation mode. Note that if only one of the LEDs is illuminated, the test stand is in over-ride mode. Turn the release-key 90°, remove it and store it away from the stand.
The up/down control keys. If the test stand is in normal operation mode, pressing either of these keys will drive the crosshead in the appropriate direction at 100 mm/min (4 in/min). The crosshead will stop moving when the key is no longer being pressed.

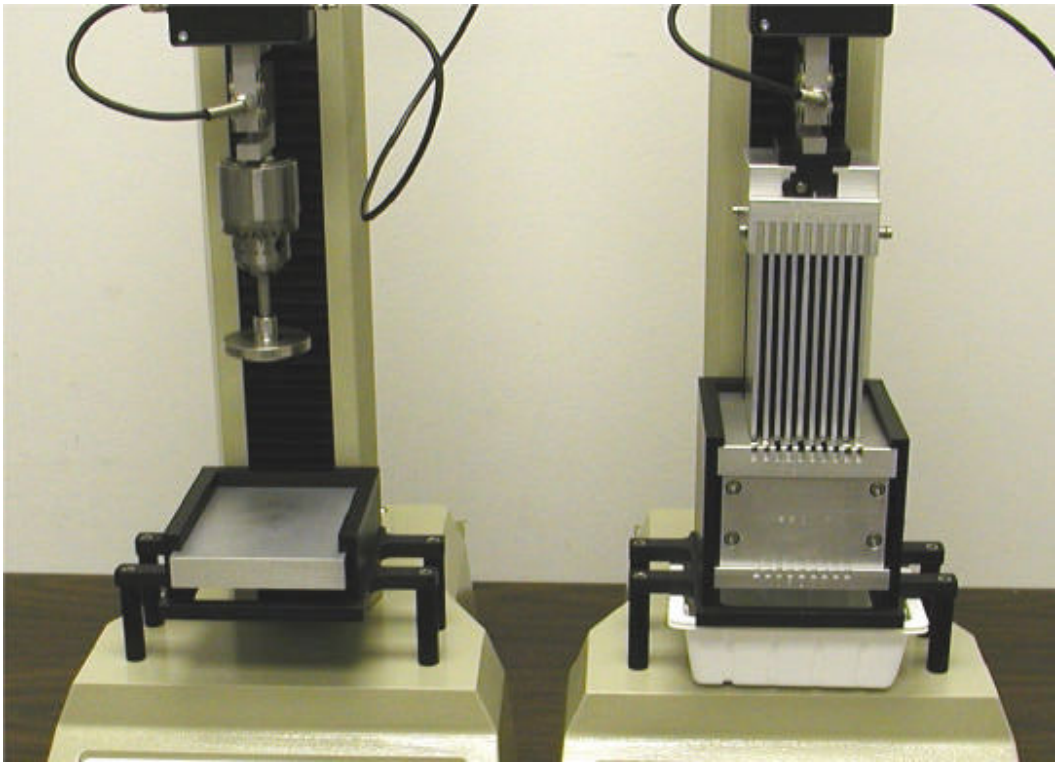
Adjusting Crosshead Position

A test sample will need to be placed in the correct position on the test stand, appropriate fixtures may need to be attached, and the crosshead will sometimes need to be re-positioned, before a test program can be run. It is therefore necessary, for an operator to be able to adjust the position of the crosshead manually. The crosshead position can be adjusted from the control panel on the test stand, or from the PC.

Test Cell Set Up and Installation

The TMS-Pro system comes with mounting hardware for the various test cells ordered with your system. There are 2 standard fixture holders. One for the larger test cells, such as the CS-1(shown on the right), and another smaller holder for the penetration, tensile and compression cells (shown on the left).

All of the cells have a moving portion that attaches to the cross head and a fixed part that is mounted below on the base of the instrument. Both holders are easily installed or removed.



For information on the full range of test cells available for the TMS-Pro, please contact your local distributor or Food Technology. FTC can also manufacture customized test cells to your specifications.

Important Safety Considerations

Your TMS-Pro test stand has been designed and manufactured to ensure compliance with generally accepted manufacturing practices as well as international standards. However, motorized test frames by their very nature, and the nature of the tests for which they are used, have the capacity to inflict serious injury. It is absolutely essential before operating a test frame to ensure that the following precautions have been, or will be, observed:

The Emergency Stop button on the control panel should never be obstructed

Fingers, hands and other parts of the body should be kept away from the moving crosshead

No attempt should be made to dismantle the TMS-Pro; there are no user-serviceable parts inside.

No operator should be allowed to use the machine without receiving adequate training. Training can be arranged by contacting Food Technology Corporation or their Authorized Agent

An operating test stand should never be left unattended. Before starting any work on or around the test frame, ensure that the mouse is not left with the cursor positioned over any of TMS-Pros buttons that can start the crosshead moving – the mouse button could accidentally be pressed! Windows can initiate similar anomalies without the operator being aware. Consult your IT department about possible effects associated with, screensavers, virus scanners and auto-backups. Windows is a multi-tasking operating system. Any situation which involves other software competing with TMS-Pro for the attention of the processor or the serial port should be avoided whenever possible (otherwise a data buffer overflow could occur.) A test could, at least in principle, be started, then the TMS-Pro window could be minimized, and an attempt made to run other software. FOOD TECHNOLOGY STRONGLY RECOMMENDS THAT THIS PRACTISE BE AVOIDED UNDER ALL CIRCUMSTANCES. Ideally TMS-Pro should be controlling test systems via a dedicated PC.

The test frame should only be serviced by Food Technology Corporation approved calibration and service personnel.

Attempting to test samples without using fixtures specifically designed for the purpose is not recommended. Food Technology's application engineers will be pleased to give advice on accessories pertinent to particular testing requirements

Operators/observers can be exposed to additional risks when test samples fail. Flying fragments from brittle fracture in compression, whiplash from tensile

failure, or spillage from container failure are typical examples. Food Technology Corporation or their Authorized Agent can give general advice on shielding to minimize such risks.

Movement of the crosshead of the test stand can be stopped via the TMS-Pro software in several different ways. However, in an emergency the best option is to press the red [Emergency Stop] button that is physically located on the control panel of the test stand.

Safety-related Software Features

It will often be necessary to tare out loads associated with the weight of test cells, grips, compression plates, jaws or other fixtures. It may be necessary to use a Zero button to back off a pre-load that is not part of that load of interest to the user. Therefore, it is possible for the software display to lead an operator to believe that a sample is not under load, when, in reality, it is under considerable load. TMS-Pro does however have a true load display facility that always displays the total load, which is being applied to the load cell.

It is not essential for the operator to monitor the total load display. TMS-Pro does enable the maximum total load sustained by a test sample, whatever is indicated on the main display, to be specified and controlled; simply use the 'Maximum Load:' feature within the general preferences setting.

There is also a potential risk associated with a stand being turned off while the test sample is under load. Then when the test stand is used again, if TMS-Pro is allowed automatically to tare out the residual load, the operator might be unaware that considerable energy remains stored within the test sample. Consequently when TMS-Pro is shutdown a warning will be displayed if the sample is under significant residual load; under these circumstances the operator will be given the opportunity to remove that load. Similarly, when TMS-Pro is booted-up, with a sample under significant load, a warning will be displayed; the operator will be prompted to choose whether that load should be displayed or automatically zeroed-out.

When a test is running, the system should never be left unattended. However, when a test program is executing a PAUSE command, this could create the false impression that the test stand is inactive. Clearly, at the moment when execution of this command finishes, execution of the next command could mean that the crosshead will suddenly start to move. Therefore, when the execution of a PAUSE command is nearing its conclusion, TMS-Pro can be programmed to generate an audio warning. The PC will of course need to be fitted with a sound card, and the volume will need to be adjusted to an appropriate level.