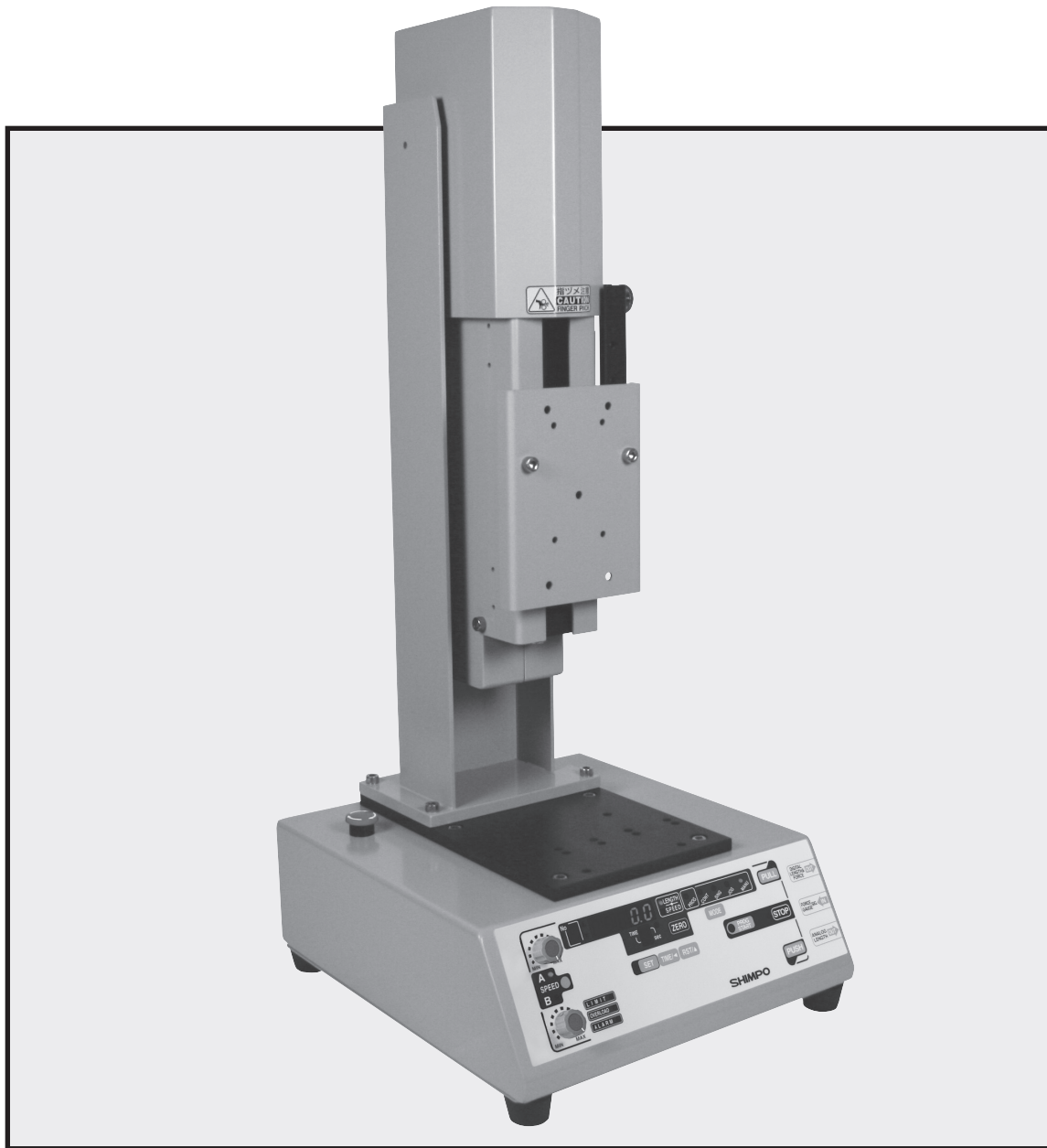


SHIMPO

Model FGS-100PVH / FGS-100PVL Programmable Motorized Test Stands

Congratulations on your purchase of the FGS-100PVH /FGS-100PVL series Shimpo test stand. This manual explains how to operate your equipment safely and correctly. Read the entire instruction manual before initial set-up and operation; the information contained herein will help you in operating your Shimpo Programmable Motorized Test Stand.



For questions and inquiries regarding our product(s), call your local Shimpo representative or contact Shimpo Instruments directly for assistance.

Nidec-Shimpo America Corporation
1701 Glenlake Avenue
Itasca, Illinois 60143
1-800-237-7079



Caution warning holds important safety information.



Reminder: holds important keep information for the product.

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Inspection/Standard Accessories

If any shipping damage is detected upon receiving the test stand, please do not unpack the unit. Notify your shipping carrier immediately for damage claim instructions.

Refer to the nameplate located on the back of the test stand to confirm model number ordered, record serial number for future reference.

MODEL	SPEED
FGS-100PVL	0.19 - 4.72 inch/min (5.00 - 120 mm/min)
FGS-100PVH	0.79 – 19.69 inch/min (20-500 mm/min)

- (3) M5 x 6 screws
- (1) 5mm Allen wrench
- (4) M4 x 8 screws
- (1) Force gauge to Test Stand Interface cable (FGV-FGS250P)
- (1) Analog output cable (FGS-ANALOG)
- Manual
- Warranty Card

1.0 Features and Benefits

Shimpo's FGS-100PVH (standard speed) and FGS-100PVL (low speed) Programmable Motorized Test Stand offers:

- All steel construction which guarantees durability and stability for production, laboratory and quality control applications.
- Programmable FORCE and Distance (length) limits.
- Dual speed controls are optimally positioned to adjust test and return travel rates of the drive assembly.
- Drive assembly accepts a universal mounting plate, enabling the interfacing of a large selection of force gauge models (contact Shimpo for specific models).
- 4½ digital LED display indicates displacement rate and distance of the drive assembly.
- Analog output (10mV/mm) is convenient for data acquisition requirements.(used with) FGS-ANALOG cable.

2.0 Important Safety Instructions



Read this section carefully before initial set up.

- Position test stand on a level, *heavy-duty* table.
- Confirm that the test stand case is properly grounded to the AC line.
- Keep hands, hair and jewelry away from stand when drive assembly is in motion.
- Operate the membrane keypad with care. Do not use sharp objects that may puncture the overlay.
- Always wear eye protection when testing materials.
- Do not store or use in oily, dusty, humid or wet areas.
- Ensure that AC power is removed (off) from test stand before making any adjustments.
- If ALARM LED indicates drive assembly has been overloaded, immediately switch the power switch to the off position and correct the overload condition. Wait at least two minutes before restarting the test stand.

3.0 Set up Procedures

1. Connect all the necessary cables and AC cord before applying power to the test stand.
 - IF communication between the force gauge and test stand is desired, using an FGV-X or FGV-XY force gauge, use cable part number FGV-FGS250PV to connect the force gauge to the test stand.
 - IF communication between the force gauge and test stand is desired, using a DFS force gauge, use cable part number FGS-50PCABLE to connect the force gauge to the test stand.
2. If communication between the force gauge and test stand is desired, turn on the force gauge before turning on the test stand; this is necessary for the test stand to recognize the connected Shimpo force gauge.
3. The power switch for the test stand is located on the rear of the unit. After power is applied, all the segments and LED's will execute a power up and self test. After the self test, the test stand will display 0.00 (inches - English) or 0.0 (mm – metric).



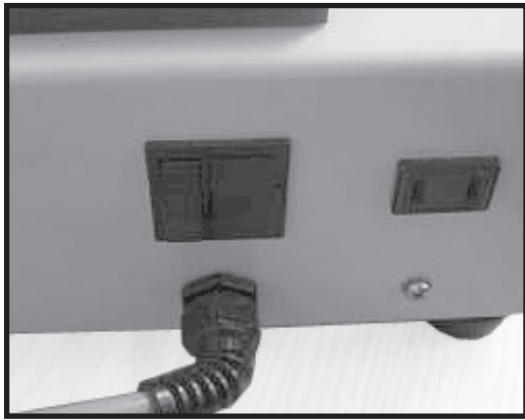
NOTE: If after power up, the test stand takes longer to initialize and a “no_F” display is observed from the display, check the (force gauge to test stand) cable, FGV-FGS250PV, and the baud rate setting for the FGV-X or FGV-XY force gauge (19200 baud). (See your force gauge manual for baud rate communication and set-up). The FGS-100PVH/100PVL test stands communicate at 19200 baud with the Shimpo FGV-X and FGV-XY force gauges. As noted above, if using a Shimpo DFS force gauge, (9600 baud max) use cable part number FGS-50PCABLE, which provides DFS to test stand and PC communication capability.

NOTE: The FGS-50PCABLE cable incorporates a segment of cable that attaches to the test stand and another that attaches to a PC.

4. Units of Measure: English or Metric



To switch from English to metric units, push the “Speed” and “RST” buttons while turning the power on. To return to English units turn the stand off and push the “SPEED” and “Time/>>” buttons while turning the power back on.



AC Power cord and AC plug for the Force gauge, located on the back of the rear of the test stand.



Emergency Stop button located on the side of the test next to the column. Turn the button Clockwise to release.



Optional Part number FGS-Length-H (length meter) sold separately. Mounting brackets provided.



To identify whether the stand is in metric or English units, turn the power on. (power switch is located in the back of the unit), **Metric units will show one decimal place (0.0), while English units show two decimal places (0.00)** To change to metric units, push “A/SPEED/B” and “RST/^” switches while turning the power on. To change to English units, push “A/SPEED/B” and “TIME/<” switches while turning the power on.



Caution warning holds important safety information.



REMINDER: holds important keep information for the product.

Adjustment

You can easily adjust the clearance (the distance between the force gauge adapter and test sample) by adjusting the drive assembly in six 30mm increments.

1. Position the test stand on its side with the cable ports facing up.
2. Loosen the three slot bolts, but do not remove them (this helps in sliding the test stand motor position easily).
3. Remove the set bolt (bolt insert on the column) and adjust the drive assembly to the desired clearance. Reinsert the bolt and tighten all the four bolts.
4. Allen bolts hold the drive assembly in place, use the 5 mm Allen wrench for adjustments.



4.1 Display Panel



4.1 Display Panel

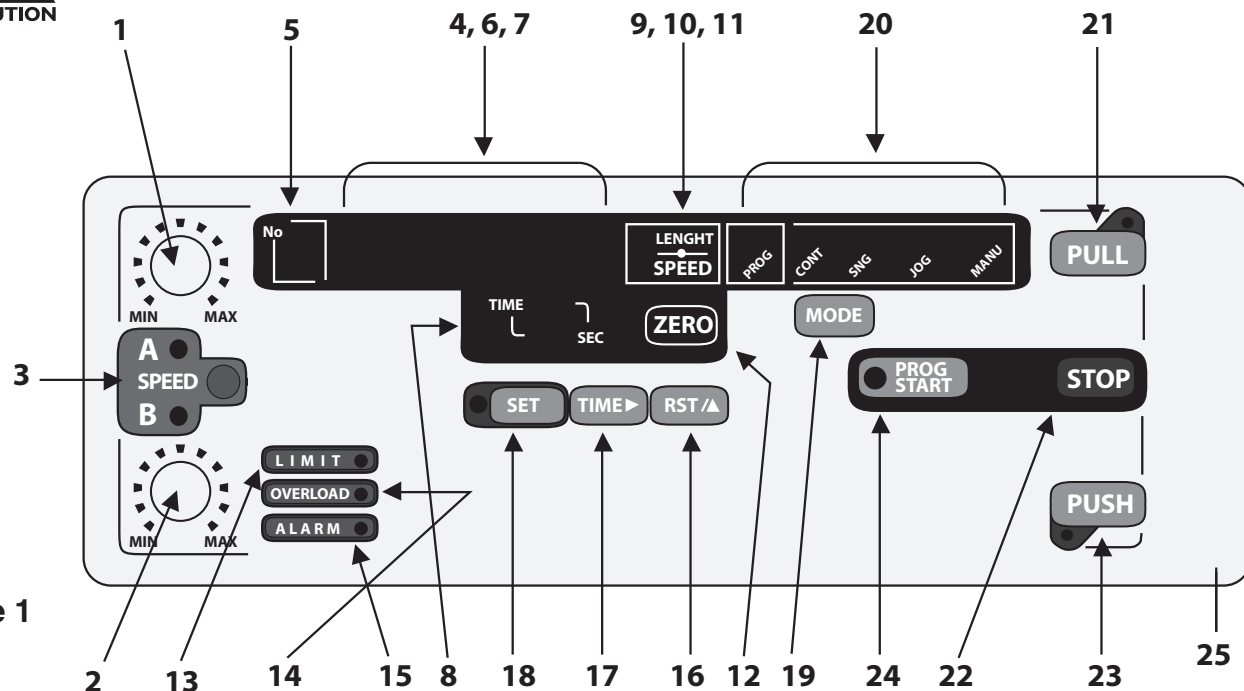


Figure 1

1. A Speed: Changes the left movement or upward speed (Continuous and Program Mode).
2. B Speed: Changes the right movement or downward speed. (Continuous and Program Mode).
3. Speed: Selects speed control knob A or B.
4. Length, Speed or Cycle Display: Displays length, speed or cycle of a program when power is on.
Note: Cycle Display can only be selected in mode SING, CONT or PROG.
5. No: Displays program cycle (0-9).
6. ▲ : Indicates high limit value in all modes.
7. ▼ : Indicates low limit value in all modes.
8. TIME: Displays programmed delay time between program cycles.
9. LENGTH, SPEED, or Cycle: Selects display of length, speed or cycle of a program.
10. LED LENGTH Indicator: Indicates that length is being displayed.
11. LED SPEED Indicator: Indicates that speed is being displayed. Cycle display is indicated when both Length and Speed LED's are off.
12. ZERO: Resets length measurement to zero.
13. LIMIT LED: Indicates one of the manual limit switches has been tripped.
14. OVERLOAD LED: Indicates that the force gauge has been overloaded.
15. ALARM LED: Indicates test stand's motor has been overloaded.
16. RST/▲: Changes the increment point upward.
17. TIME/► : Changes digit position when programming force limits, also changes delay between cycles.
18. SET: Stores a program cycle to a value that the user selects using RST/▲ and TIME/► .
19. MODE: Selects mode of operation: Manual, Jog, Single, Continuous or Program.
20. Operation Display: Informs user of current mode of operation.
21. PULL: Test stand moves in the left movement or upward direction.
22. STOP: Stops test stand movement.
23. PUSH: Test stand moves in a tight movement or downward direction.
24. PROG START: Start the program.
25. Emergency Stop (located on the top of the test stand).

5.0 Operation Modes

- 5.1 Manual (Manu)
- 5.2 Jog (Jog)
- 5.3 Single (Sing)
- 5.4 Continuous (CONT)
- 5.5 Program (Prog)

5.1 MANU (Manual Mode)

The **MANU (Manual Mode)** of operation is ideal for manually recording force measurements. The test stand will only operate between the limits that are set by the test stand user. These limits may be manually adjusted distance limits or programmed Force Limits when using a Shimpo FGV-X or FGV-XY force gauge. (If using a Shimpo model DFS force gauge, see DFS Force Limit instructions below).

Note: In this mode of operation, when using either a Shimpo “FGV-X” or “FGV-XY” or Shimpo “DFS” force gauge, no RS232C output is produced.

MANU (Manual Mode): The test stand can display Length or Speed. You may display Length by pressing the “LENGTH/SPEED” button until the LED adjacent to the indicator “LENGTH” is illuminated. To display Speed, push the “LENGTH/SPEED” button until the LED adjacent to the indicator “SPEED” is illuminated.

Distance Limits: Manual

To manually adjust distance limits, partially unscrew each of the two knobs on the metal plates that control the test stand (force gauge) platform movement from top to bottom.



IMPORTANT:

Limit switch knobs are located on the side of the drive assembly. The distance limit switches engage and stop the test stand (force gauge platform) when the upper distance limit is set with the lower knob and the lower distance limit is set with the upper knob.

5.2 JOG (Jog Mode)



This mode of operation is identical to “MANU”, except that the movement in any direction will occur ONLY while the “PUSH” or “PULL” buttons are continuously pressed.



NOTE: In this mode of operation, no RS232C output is produced.

FORCE LIMITS

How to program Force Limits:

If using a Shimpo FGV-X or FGV-XY model force gauge, you may program a **Force Limit** on the test stand. The DFS force does not utilize this test stand function since it has a 9600 baud rate maximum. The DFS force limits are only set from the force gauge itself by utilizing the HI/LO comparator feature.

Setting Force limits w/ FGV-X or FGV-XY force gauge:

First make sure that communication exists between the force gauge and the test stand. If the FGV-X or FGV-XY force gauge is not connected with the FGV-FGS250P cable, a force limit programmed into the test stand will not function.



Remember to first, turn on the **force gauge before turning on the test stand**. This will ensure that the test stand recognizes the attached force gauge.

When using an FGV-X or FGV-XY force gauge, to program a force limit, press the “SET” button on the front panel display. Note that the display “No” box shows “F  ”. The “F” and the two arrows indicate that it is ready to accept the force limits for both push and pull operation. (The programmed force limits are the same for JOG and SING modes.) Use the “TIME/>” to change digit position and “RST/^” to increment each digit until the desired limit force is displayed.



Press the “TIME/<” button until no digits are blinking. This allows the user to select a negative sign by pressing the “RST/^” button. IF there is no negative sign displayed,(-) the test stand force limit is programmed as a compression force limit. IF the negative sign is displayed, the test stand force limit is programmed as a tension force limit. Press “SET” to store the force limit in memory.

Setting Force limits w/ DFS force gauge:

If using the DFS force gauge, force limits are set on the force gauge using the DFS HI/LO comparator feature. To stop the stand at a force limit using a DFS force gauge, you will need the FGS-50PCABLE cable. This cable permits the DFS to send a signal to stop the stand’s movement when the DFS HI/LO comparator force limits are activated.

The test stand will move in the down or up direction when the respective “PUSH” or “PULL” button is selected. The stand will continue to move in the selected direction until one of the following events occurs: “STOP” button is pushed, one of the manual limit switches are tripped, the emergency reset button is pushed, or a force limit is reached.

5.3 SING (Single Mode)

This mode of operation is ideal for completing one cycle between manual distance limits and/or force limit. The initial starting direction can be either in the compression or tension direction depending on whether the “PUSH” or “PULL” buttons are pressed.

If using a Shimpo FGV-X or FGV-XY force gauge, you may set a force limit on the test stand.



Front panel display indicating force limit for both direction.



To program the force limit, press the “SET” button on the front panel display while in the “SING” mode. Note that the display adjacent the “No” box shows “F♦”. Use the “TIME” and “RST” buttons to select the desired force limit. Press “SET” to store the force limit into memory.

TIME DELAY:

A time delay in seconds can be programmed between changes in direction by cycling the “TIME” button through “0”, “1”, “2”, “3”, “4”, or “5”.

In this mode of operation the user can display 1 length, speed or cycle count. Display length by pressing the “LENGTH/SPEED” button until the LED adjacent “LENGTH” is illuminated. To display speed, push the “LENGTH/SPEED” button until the LED adjacent “SPEED” is illuminated. Finally, to display Cycle count, press the “LENGTH/SPEED” button until there are no LED’s illuminated. When the stand is moving in the “**pull**” direction, the LED next to “SPEED A” is active. When the stand platform is moving in the “**push**” direction the LED next to “SPEED B” is active.

The test stand will move down or up when the respective “**PUSH**” or “**PULL**” button is selected. The stand will continue to move until one of the following events occurs: the “STOP” button is pushed, one of the manual limit switches are tripped, the emergency reset button is pushed, or a force limit is reached.



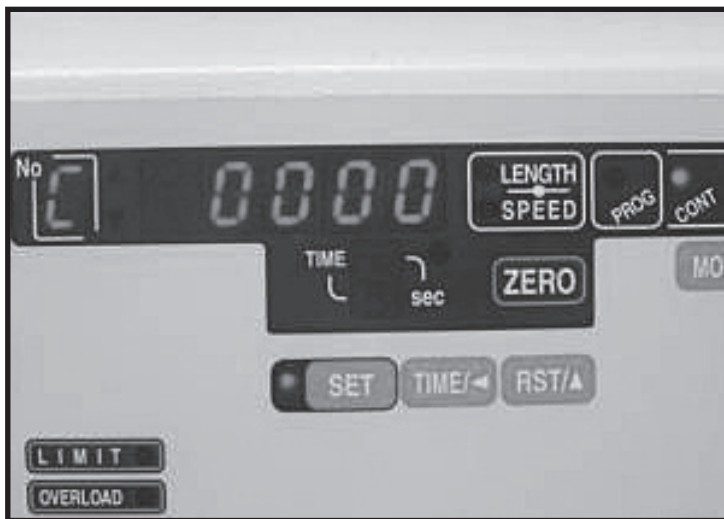
NOTE: An RS232C output is produced when using this mode of operation; see RS232C Output Section 6.0 for details.

5.4 CONT (Continuous Mode)

This mode of operation is ideal if the user wants the test stand to repeatedly cycle up or down continuously or for a user-programmed number of times. The stand will start in either direction depending on whether “PUSH” or “PULL” is selected.

Length, speed or cycle count can be displayed as described in **5.3 SING** mode of operation.

To begin programming the test stand, press the “SET” key. The display will indicate a “C” in the “No” box. The “C” designates that the digits programmed into the adjacent LED’s will determine the number of cycles (number of times) a program will run. Using the “TIME/<” and the “RST/^” buttons select the number of cycles you want the program to complete (0001-9999) or select four “0’s” if you want the program to run continuously. Press “SET” to go to the next step.



The letter F appears in the LED’s in the “No” box. This indicates that it is ready to accept the upper force limit. Use the “TIME/<” and “RST/^” buttons to select the desired force limit.



NOTE: Pressing the “TIME/<” button until no digits are blinking. Allows the user to select a negative sign by pressing the “RST/^” button.

Set up for continuous cycle

With no negative sign displayed, the test stand platform is programmed to move downward. With the negative sign displayed, the test stand platform will move upward. Press “SET” to store the upper force limit in memory. The down arrow LED (F ▼) will light, indicating that the test stand is ready to have its lower force limit programmed. Program the force limit using the “TIME/>” and “RST/^” buttons.

Note: The upper force limit must be greater than the lower force limit ($F_{upper} > F_{lower}$). Again press “SET” to store the lower force limit into memory. You may delay the time between upward and downward movements by selecting 0, 1, 2, 3, 4 or 5 seconds using the “TIME/>” button. You may view distance traveled by pressing “LENGTH/SPEED” until the LED adjacent “LENGTH” is lit. Speed can be displayed by pressing “LENGTH/SPEED” until the LED adjacent to the indicator “SPEED” is lit. Finally, the number of cycles completed can be displayed by pressing “LENGTH/SPEED” until no LED’s are lit.



NOTE: An RS232C output is produced when using this mode of operation; see RS232C Output Section 6.0 for details.

5.5 PROG (PROGRAM Mode)

Press the “MODE” key until the light emitting diode, LED, adjacent “PROG” is lit.

Length, speed or cycle count can be displayed as described in **5.3 SING** mode of operation.

Cycles

To begin programming the test stand, press the “SET” key. The display will indicate a “C” in the “No” box. The “C” designates that the digits programmed into the adjacent LED’s will determine the number of cycles (number of times) a program will run. Using the “TIME/<” and the “RST/^” buttons select the number of cycles you want the program to complete (0001-9999) or select four “0’s” if you want the program to run continuously. Press “SET” to go to the next step.

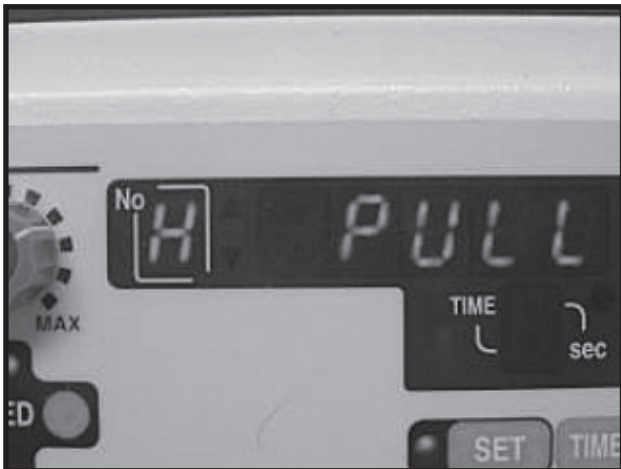
Entering four zeros on cycle allows the test stand to perform the same programmed test continuously until one of the three events occurs, the “STOP” button is pushed, emergency stop button is pressed, or an overload condition is detected.

Force Limits

The display in “No” box now shows “F” with two arrows. The two arrows adjacent the “F” indicates that the test stand is ready to accept compression or tension force limits. To program a force, use the “TIME/<” and “RST/^” buttons to select a force value, and then press “SET”.

Home Position

The display in “No” box now shows “H”. The “H” designates the home position. Select “PUSH” or “PULL” button to set the HOME position. Press “SET”. The test stand platform will automatically move to the selected home direction, it will travel the set distance until the limit switch is activated.



Home position set to pull direction. Test stand will “look” for the upper limit switch.

Force “Zero”

The display in “No” box now shows “F”. The “F” designates the auto zero function. This function is only available when using the Shimpo FGV-X or FGV-XY force gauges. Use the “TIME/<” and “RST/^” buttons to program the “zero” force.



NOTE: The recommended minimum zero force that the user should program into the test stand is 0.2% of the full scale (rating of the force gauge), i.e. if using an FGV-50X or FGV-50XY force gauge, the programmed “zero” force should be 0.1 lb ($0.002 \times 50 = 0.1$).

If no force is programmed in this step and the display reads all zeros, the test stand will not zero the distance and this feature is inoperative.

Press the “SET” button to move on to the next step. This is a very useful function that allows the operator to reset the distance display and RS232 output data to zero once the force gauge senses a force measurement.

Tare

The display in the “No” box now shows “t”. The “t” designates the tare function at “0” position. Select “on” or “off” by using the “RST/^” button and press the “SET” button.



The tare function allows the user to use attachments on the force gauge and then set the force gauge display to zero. This function is useful as some attachments weigh more than others and this function sets the display to zero, provided that the attachment does not weigh more than 50% of the gauge’s capacity.

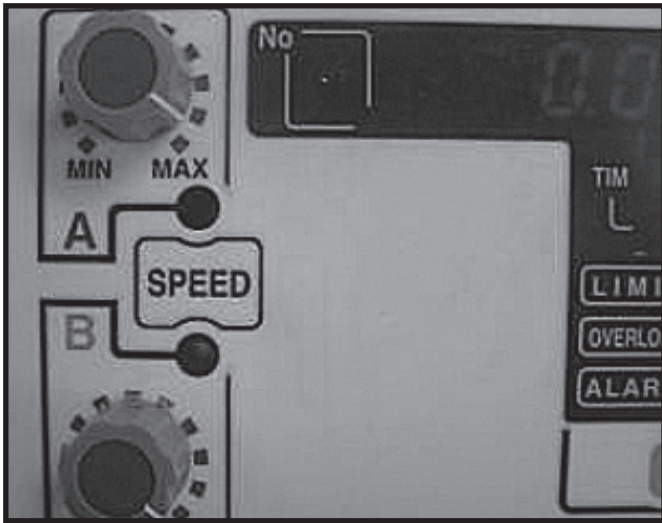
Note: Shimpo recommends taring not more than 20% of the gauge’s rated capacity; this guarantees the availability of the force gauge’s full capacity.

The display in the “No” box shows “0”, and the “LENGTH, SPEED, CYCLE” display shows “----”. The “0” designates that the test stand begins each cycle from this position. Using the “PUSH” or “PULL” and the “SPEED A” or “SPEED B” buttons, adjust the test stand to the position from which the force gauge will begin force/distance tests. A time delay (pause) up to 5 seconds can be programmed between programmed points. Use the “TIME/<” button to cycle through “0”, “1”, “2”, “3”, “4”, “5” or “P”. If “P” is selected, the user must press the “PROG START “, key to restart the test stand program. Position “0” is called the set point zero position, the test stand will return to this position at the beginning of each cycle. The FGV-X or FGV-XY force gauge will also tell the test stand to stop and return to the set point zero position if a programmed force limit is reached. If the force does not attain a programmed force limit, the test stand will execute an entire cycle, then return to the set point zero position and begin the next cycle. To delete an unwanted set position, press “RST/^”. Then, press the “SET” key to move to the next programming step.



The force gauge plate will only go back to HOME position after all the cycles are completed. Each cycle returns to the zero set point position.

The display in the “No” box shows “1”, and the “LENGTH, SPEED, CYCLE” display shows “----”. The “1” designates the next position of a cycle that the test stand will move to. This position is defined as set point 1. Ensure that the correct LED indicator for “Speed A” or “Speed B” is illuminated so that the test stand will travel at the intended speed. (see photo)



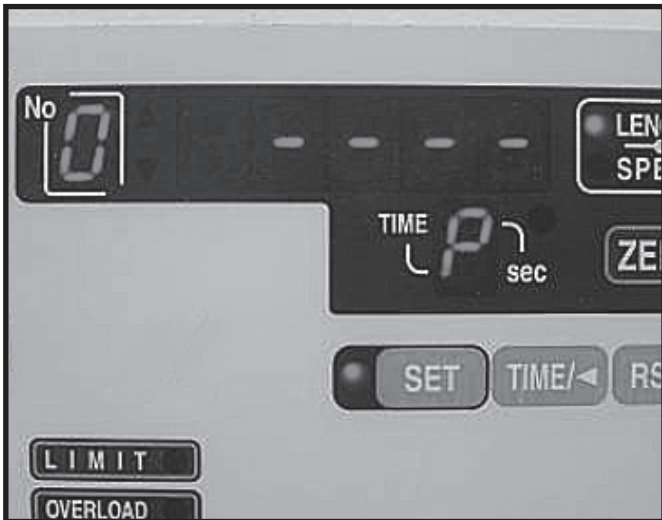
Speed knob A and B. Desired speed can be selected by pressing the “Speed” Button.

Using the “PUSH” or “PULL” button, move the test stand force gauge platform to position 1. Press the “SET” key. (Note: If a programmed force limit is detected by the force gauge, the test stand will not move through the entire programmed distance and the test stand will then return to set point zero.)

The display in the “No” box shows “2”, and the “LENGTH, SPEED, CYCLE” display shows “----”. The “2” designates the next position of a cycle that the test stand will move to. This position is defined as set point 2. Using the “PUSH” or “PULL” and the “SPEED A” or “SPEED B” control knobs move the force gauge to position 2



NOTE: If the programmed force limit is detected by the force gauge the test stand will not move the entire programmed distance and the force gauge will return to set point zero.



Shown point zero ready to accept entry. Use Push and Pull button to increment and decrement value.

If no more steps are desired, press the “SET” key while the “LENGTH, SPEED, CYCLE” display shows “----” to finish programming the test stand.



It is not necessary to provide entries for all 5 set points. The test stand will work with one set point. If more than two set points are entered and a change in the value of the second set point is required, re-enter the set points for both entries. The distances (length) for the test stand program are accumulative, and dependent on the previous set point.

PROG Mode

Z	1	+	1	2	3	.	4	-	1	2	3	.	4	+	1	2	3	.	4	cr
	↑	Plus Peak					Minus Peak					Distance								
		Point Number																		

Data will be sent when the test stand force gauge platform reaches every set position or if a force load exceeds the force limit.



Note: If the auto zero function is selected, data will be outputted at the first zero position, when the test stand platform reaches every set position or if the force gauge exceeds a force limit.

“CR” means carriage return or Enter

7.0 Troubleshooting

Stand does not turn on: **FIRST INSPECT** all parts for physical interference

- **Check all electrical components**
 - Check for correct AC power source, power cord condition, fuse condition, power switch (should be “ON”), Emergency cut-off switch setting.
 - Inspect test stand fixtures and force gauge for overload conditions. To disengage emergency switch, carefully press and turn clockwise.
- **The force gauge mounting platform does not move:**
 - Check manual limit knobs and adjust accordingly.
 - Check to see if the full travel range has already been achieved.
 - Check test stand for correct operating mode.
 - Check Emergency cut-off switch setting.

Force set points are not stopping the test stand (force gauge platform) movement

- Check that communication exists between the force gauge and the test stand.
- Check that correct cable is firmly attached.
- Check if the proper baud rate for communication is set from the force gauge. Required baud rate is 19200 baud rate for FGV-X, FGV-XY. Communication with Shimpo DFS force gauges bypasses the test stand to the PC when using the FGS-50PCABLE.

Display indicates “no_F” after power up

- Check for proper force gauge cable (only for FGV-X and FGV-XY models).
- Check for proper baud rate from the force gauge.
- Reset the whole system, powering up in this particular order Force Gauge>Test Stand.

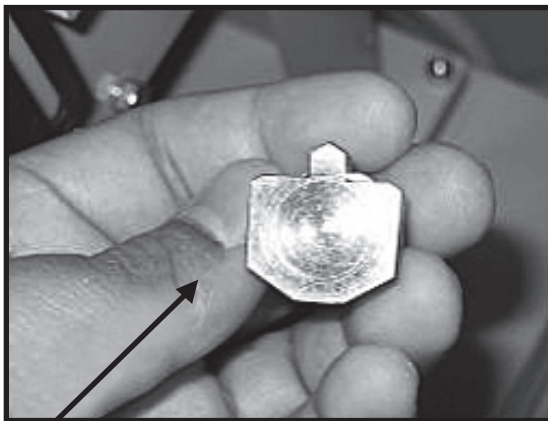


Initialization takes longer and a no_F display indicates there is no communication established between the test stand and the force gauge.

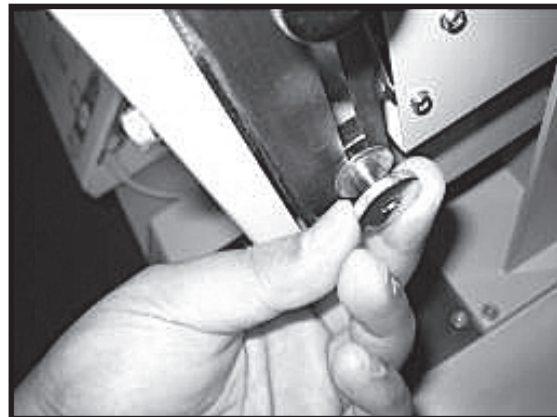


Shimpo DFS models transfer data directly using the FGS-50PCABLE. Length/Distance of the test is programmed in the test stand. When using Shimpo DFS force gauge, “MANU” and “SING” (modes) function the same.

Limit switch not stopping the test stand/force gauge from moving Check if the limit switch shoe behind the knob has been turned in the wrong position. (See photos for proper orientation and installation).



Actuator limit switch rollers should hit this side of the shoe limit switch.



Insert the washer before the knob.



The limit switch shoe has a lip guide preventing it from spinning. Orient the Limit switch shoe properly before installation.

Getting incorrect distances during a test

- Re-enter all the test points distances (Remember that the distance is dependent on previous set points and set points are accumulative).
- Check if a previous or incorrect force limit is set in memory.

RS-232 output not working correctly

- Check that proper cables are selected and attached to the force gauge test stand and PC.

Cable	DESCRIPTION
FGV-FGS250P	Communication cable between the test stand and the force gauge. (for FGV-X and FGV-XY Models) (provided with stand)
FGS-50PCABLE	DFS cable for transferring data directly from the Shimpo DFS force gauge to PC.
FGV-RS232	Interface cable for data output from test stand to PC. (for FGV-X and FGV-XY Models)
FGS-ANALOG	Analog output cable for data acquisition requirements. (provided with stand)

8.0 Test Stand Specifications

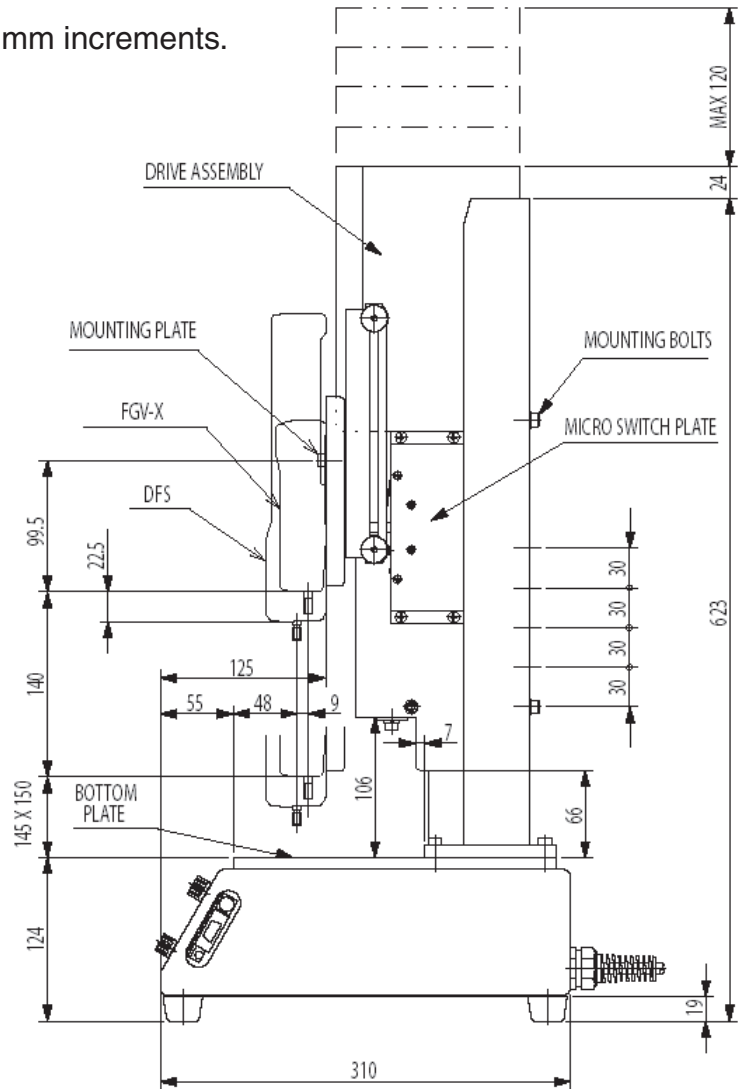
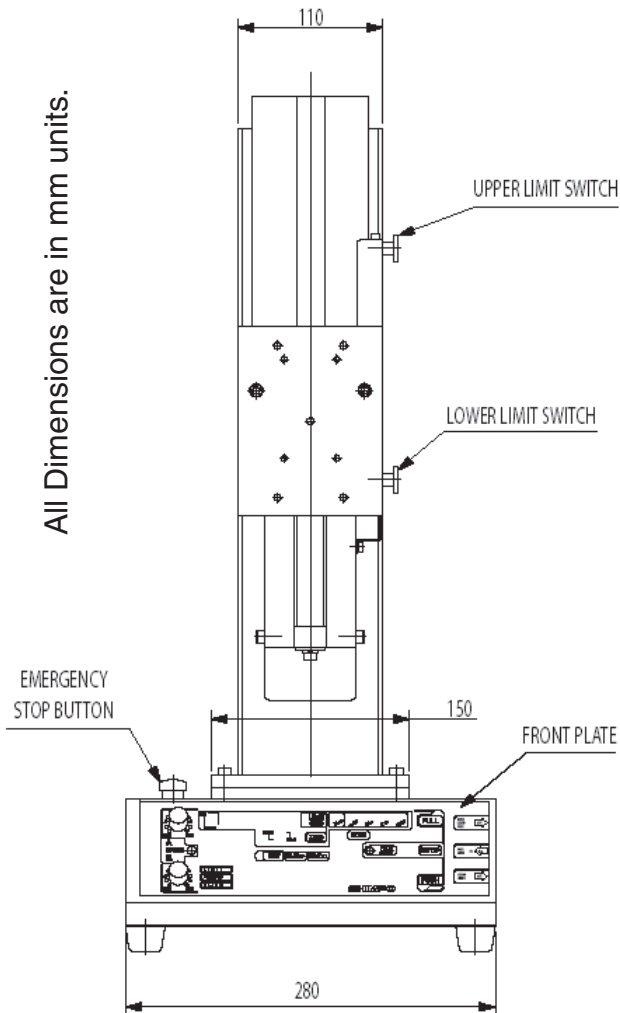
Model		FGS-100PVL Low speed	FGS-100PVH High speed
Capacity		110 LB (500N, 50kgf)	
Travel speed		5 - 120mm/min	20 - 500mm/min
Stroke		140mm(with mechanical backlash 0.2 - 0.5mm)	
Display	Speed	5.0 -120.0mm/min	20.0 - 500.0mm/min
	Distance	0.0 -140.0mm	
	Repetition number	0-9999	
Operation mode		Manual, Inching, Single cycle, Continuous cycling, Program mode,	
Output signal	Analog voltage	Output the displacement of the stand 10mV/mm MAX: $\pm 1.4V$	
	RS-232C	Yes	
Input	Overload input	Stop the operation of the stand due to the overload of DFS, FGV-X and FGV-XY	
Alarm		Stop the motor due to the motor overload of the stand.	
Height adjustment range		61-181mm (5 levels per 30mm)	
Measuring table		150 × 145mm	
Operation Temperature		0-45C (non condensing)	
Power supply		AC115V	
Weight		40 lbs (23 kg)	
Standard Parts		120Vac outlet for force gauge, FGV-FGS250PV cable for FGV-X and FGV-XY, FGS-Analog cable, gauge, mounting screws, Allen wrench, wire guide, 6mm x 20mm all thread,	
Optional		Grips, fixtures, data cables, digital and mechanical force gauges, data collection software	

9.0 Dimensions and Drawings

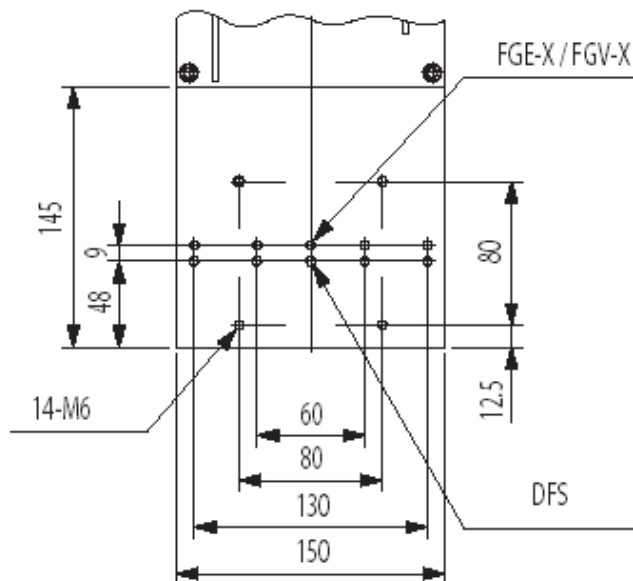
Test Stand Dimensions

Additional clearance available in six 30 mm increments.

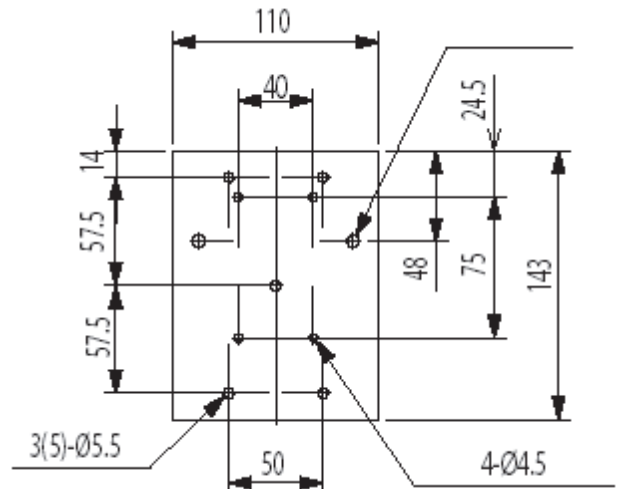
All Dimensions are in mm units.



Bottom Plate Dimensions



Force Gauge Mounting Plate Dimensions



Warranty

LIMITED EXPRESS WARRANTY

Shimpo Instruments warrants, to the original purchase of new products only, that this product shall be free from defects in workmanship and materials under normal use and proper maintenance for one year from the date of original purchase. This warranty shall not be effective if the product has been subject to overload, misuse, negligence, or accident or if the product has been repaired or altered outside of Shimpo Instruments authorized control in any respect which in Shimpo Instruments judgment, adversely affects its condition or operation.

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