

# *Instruction Manual*

## **Semi-Automatic, Welded Frame Concrete Compression Testing Machines**

*Models: 2412011/2412012 (1200kN)*

*Model: 2415011/2415012 (1500kN)*

*Models : 2420011/2420012 (2000kN)*

*Models : 2430011/2430012 (3000kN)*



Please read this instruction before moving and installing this machine and attempting to run it. Remember this machine is extremely heavy and may be unstable before installation completed. Therefore, without using proper equipment may result in severe injuries. Appropriate lifting or hoisting equipment of sufficient capacity must be used to be safe and secured. For better repositioning, use the hook installed on the upper plate of machine.

- Do not decline the machine more than 30 degrees while moving or installing.
- Check out any accessories you have received with your packing list.
- The machine should be located in an area of laboratory without dust, moisture or contaminating fumes, which could possibly affect and accelerate corrosion to machine surface or electrical contacts.
- For service work and calibration on the machine, it should be left sufficient space at the rear and sides of machine (minimum space: 80 cm).
- The machine should be **levelled (aligned)**.
- The power should be connected to earth wire for electrical shock proofing.
- The machine is stood on a heavy duty steel table for appropriate height of putting concrete specimen into machine.

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## 1. Introduction

As we have mentioned, this machine is made based on ASTM C39. It consists of steel frame, hyd. System and digital indicator.

They can be separated from each other easily for better service work, repair and when they need to be replaced by new substitutional one.

## 2. Specification and Accessories of Hardware

- Expect the main steel frame, hyd. system and digital indicator, it should be included 2 pcs of steel spacers, heavy duty steel stand and safety aluminum frame doors, wire diagram and operational manual.
- Digital Touch Screen 7" LCD surface is sensitive and should not be scratched or teared and should not be exposed by sunlight.
- Capacity of machines are 2000 kN or 3000 kN depend on model of machine. These have been operationally tested and calibrated at the *Cantrol* factory.
- Heavy duty dual stage piston pump, 600 bar (8,700 psi) capacity. The piston and plunger elements are made of Bosch Company.
- Capability of connect to PC by RS232.
- 600 bar (8,700 psi) stainless steel Pressure Transmitter, WIKA Germany brand Company.
- Equipped with Limit Switch to prevent extra stroke of loading Piston more than 50mm.
- The best and high quality PTFE-BRONZE Seal and Guides for long service time and operation.
- 55 HRC hardened and grinded Loading Plates.
- Strong Powdered Painted for steel frame and other steel parts.
- 15 Litres (4 gal.) steel tank with oil level indicator.
- Heavy duty and safe Anodize Aluminum Frame Doors for front and rear of machine, with 8 mm thickness transparent Plexiglas windows.
- Front door equipped with electric micro-switch for shooting down the machine operation when it was opened.
- 0.75 kW (1 Hp), 110/220 V, 60/50 Hz, 1ph, 1750/1450 rpm, aluminum body motor.
- Dimension for 2000 kN, L\*W\*H: 770\*410\*1250 mm (30"×16"×49" inch), and Weight: 490 kg.
- Dimension for 3000 kN, L\*W\*H: 850\*560\*1380 mm (32"×18.5"×53" inch), and Weight: 850kg.

*For more details and updating visit: [www.cantrol.ca](http://www.cantrol.ca)*

### **3. Software Specification**

- Ability to inserting data like dimensions of specimen, selecting cubic or cylindrical concrete a specimen, loading pace rate,
- Choosing language (English, Spanish and Portuguese) and Engineering Unit (ISO, USA).
- Retrieving the data from History Bank.
- Setting of Date & Time.
- Printing the results of any test.
- 500 data storage of testing results.
- 10 selected (or user selection) point calibration method.
- Tool bar display for accurate loading pace rate adjustment.
- Using USB for transferring data to PC.

#### **3.1 Accuracy of the Digital Indicator**

- Based on ASTM C39, if the testing machine load is indicated in digital form, the numerical increment must be equal to or less than 0.10 % of the full scale load of a given loading range.
- The *Control* digital compression machines accuracy for 2000 kN is 0.05 % (1kN), twice accurate than ASTM standard. And for 3000 kN is 0.05% (1kN), three times accurate than ASTM standard.

### **4. How to Use and Work Digital Indicator?**

- Plug the indicator to nearest outlet. Be sure that the outlet support 110V, 60Hz. 15A or 220V,50Hz., 10A.
- Turn on the digital indicator by pushing on/off button which is at the back of digital indicator.
- When testing specimens be sure the front door was closed.
- When the indicator turns on, this page will be shown.

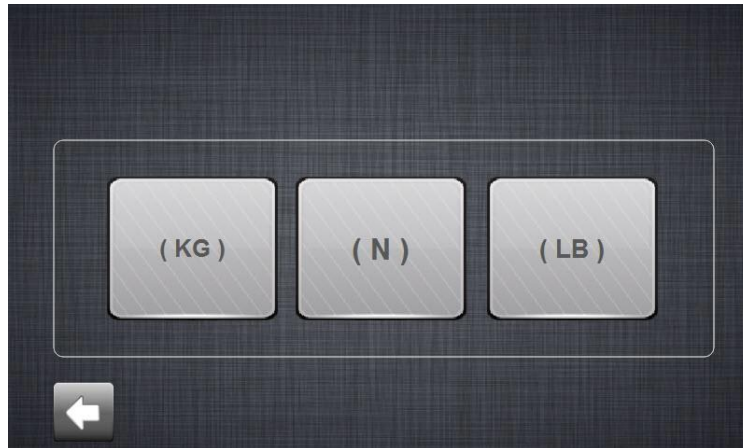


## 4.1 The Keys and Their Functions

- Press the <start to test > key to follow the next Engineering Units.



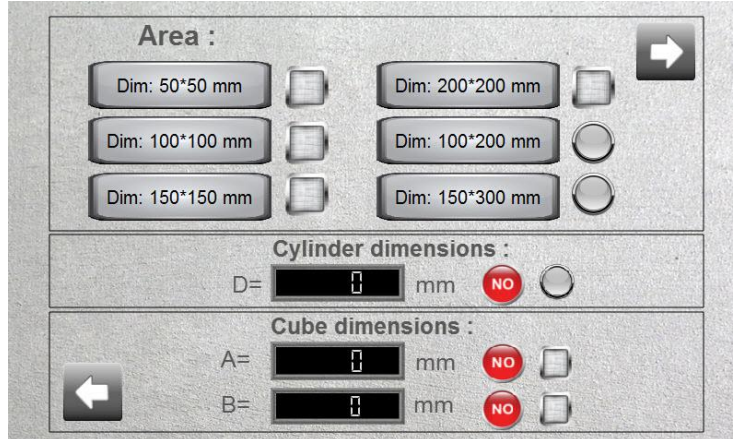
- If the door was opened, the door status warning would be seen on screen, for deactivating this, click on “door status”.



- Click on any engineering unit to be selected.
- Click on the <Arrow> key to go new or previous pages.

### How to Use and Input Data into the Indicator?

- In this page user can select the pre-selected Area of specimen (cubic or cylindrical types) or inserting any new dimensions.



- Click on the right hand<Arrow> to go next stage.
- Click on the < start> key to start the test based on the inserted data. Click on the < stop>key to stop the test any time.

**NOTICE:** The loading/unloading valve lever should be at “loading” position while starting the test. And for lowering piston of hydraulic cylinder the machine should be off and the lever should be at “Unloading “position

### Screen of indicator while testing



- < F> key indicates the amount of PEAK FORCE in real time of testing.
- < T> key indicates the amount of PEAK STRESS in the same time of test

### 4.2 Choosing a Language

- Click on any keys to select language.



### 4.3 Loading Pace Rate Setting

- The loading pace rate (LB/sec or N/sec) should be set before starting, the amount of rate based on ASTM C39 is 20-50 psi/sec( 0.15 to 0.35 MPa/sec) and depend on the area of specimen, it can be calculated and inserted. For example, for a 6"dia. Concrete cylinder the loading should be 565-1413 LB/sec.



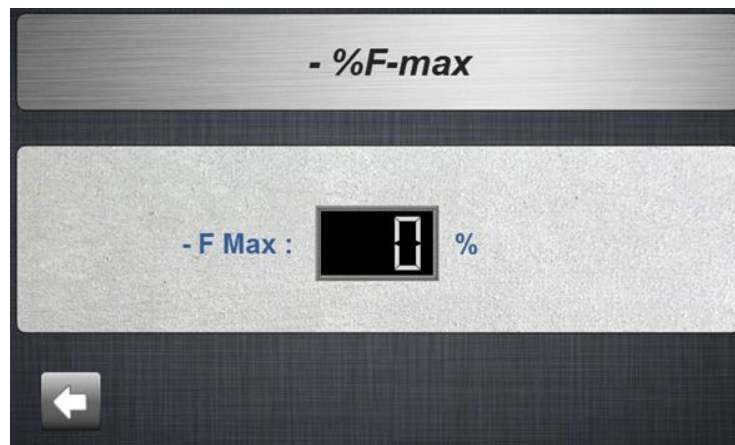
- Based on ASTM C39, during the application of the first half of the anticipated loading phase a higher rate of loading shall be allowed.

#### 4.4 What is Loading Pace Rate (LPR) and how does it Work?

- Tool Bar Indicator (TBR), help the user to adjust and keep maintain the preset Loading Pace Rate (LPR) while testing. Without this tool the LPR cannot be easily fixed.
- At the first of starting the test, the Indicator of toolbar is at middle, but when the machine is started and the specimen is loaded at first, the indicator may go to left or right side of the Bar. so to adjust in the middle position and set the required LPR, slowly turn the Rating Knob( Flow Control Valve) to clockwise to increase LPR or counterclockwise to decrease the LPR. All the changes in LPR can be seen on the LPR in Real Time (as the same time). The minimum LPR for Cantrol compression machine is 1 kN/sec (225 LB/sec).

**NOTICE:** In Automatic Compression Machine 2000 kN or 3000 kN, the LPR is adjusted by servomotor automatically and supported by software and will be fixed while testing and breaking the specimens.


#### 4.5 What is -%Fmax (Sample Break Point), (SBP) and how does it Work?



- -%Fmax (SBP) is defined as a percentage of sample yield strength and functions to define the end of test.it means when the SBP is set to 20%, and the max peak load applied to the test sample is 100,000 LB (444.8kN) the indicator will terminate the test when the internal load value falls below 800,000 LB (-20% of peak load).

- **Important Notice:** The %-FMax parameter is not practical for force amount less than 100kN, as the machine might not stop after breaking of the specimens. Please make sure the technician monitors the compression or flexural devices while working.
- The amount of SBP is 10%- 80%.

#### 4.6 Data History of Testing and How to Print?

Press <  > key to open history data page

	F-Max	T-Max	Area	Pace	Unit
•Recipe0	0.0	0	0	0	
Recipe1	0.0	0	0	0	
Recipe2	0.0	0	0	0	
Recipe3	0.0	0	0	0	
Recipe4	0.0	0	0	0	
Recipe5	0.0	0	0	0	
Recipe6	0.0	0	0	0	
Recipe7	0.0	0	0	0	
Recipe8	0.0	0	0	0	
Recipe9	0.0	0	0	0	

	F-Max	T-Max	Area	Pace	Unit
Recipe0	0.0	0	0	0	

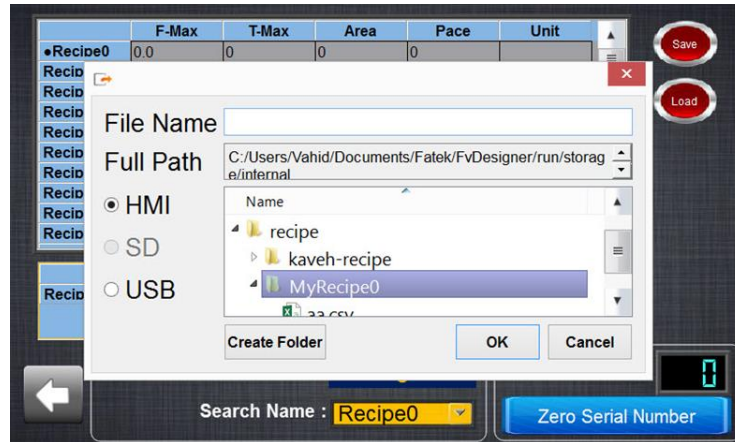



Search No. :   
Search Name :

  
Zero Serial Number


- If the Search No. was touched, the Row of the data will be highlighted to be seen better and if each test was touched in history chart, the search name can be revised easily.
- Insert USB device into the USB Port which is in front of digital indicator and wait until the contacting message was shown. click on the Save Icon, the browser will be opened. Select the USB option and continue the rule. Click on the < OK> key to end the saving process.



Click on <  > key to take picture of the page

**NOTICE:** to take picture of any pages at any time, the UBS should be inserted to USB port.

## 4.7 History Data Page

	F-Max	T-Max	Area	Pace	Unit
•Recipe0	0.0	0	0	0	
Recipe1	0.0	0	0	0	
Recipe2	0.0	0	0	0	
Recipe3	0.0	0	0	0	
Recipe4	0.0	0	0	0	
Recipe5	0.0	0	0	0	
Recipe6	0.0	0	0	0	
Recipe7	0.0	0	0	0	
Recipe8	0.0	0	0	0	
Recipe9	0.0	0	0	0	

	F-Max	T-Max	Area	Pace	Unit
Recipe0	0.0	0	0	0	

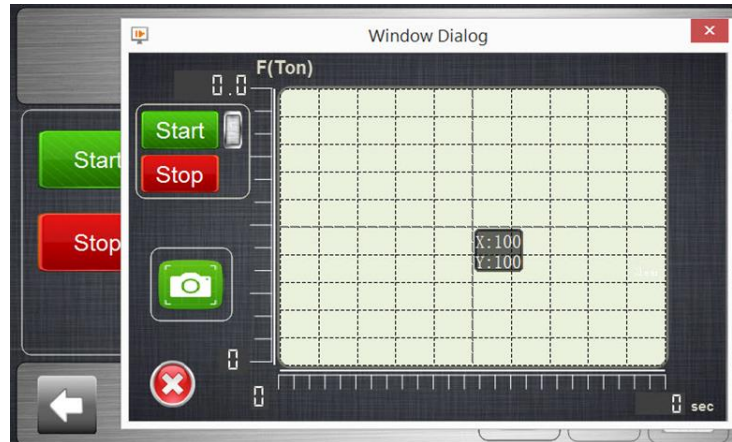
Search No. : 0

Search Name : Recipe0

Zero Serial Number

In this page user can find the peak force, peak stress, area of specimen, loading pace rate, engineering unit, and code No. of specimen.

## 4.8 Force-Time (N/sec) graph




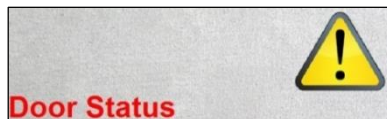


- Press < F/T > on above page to see the real time force/time graph, user can take a picture at any time (screen shot). Also user can stop the motor.
- If user touches the any point of this graph, he or she can see the amount of force related to similar time.

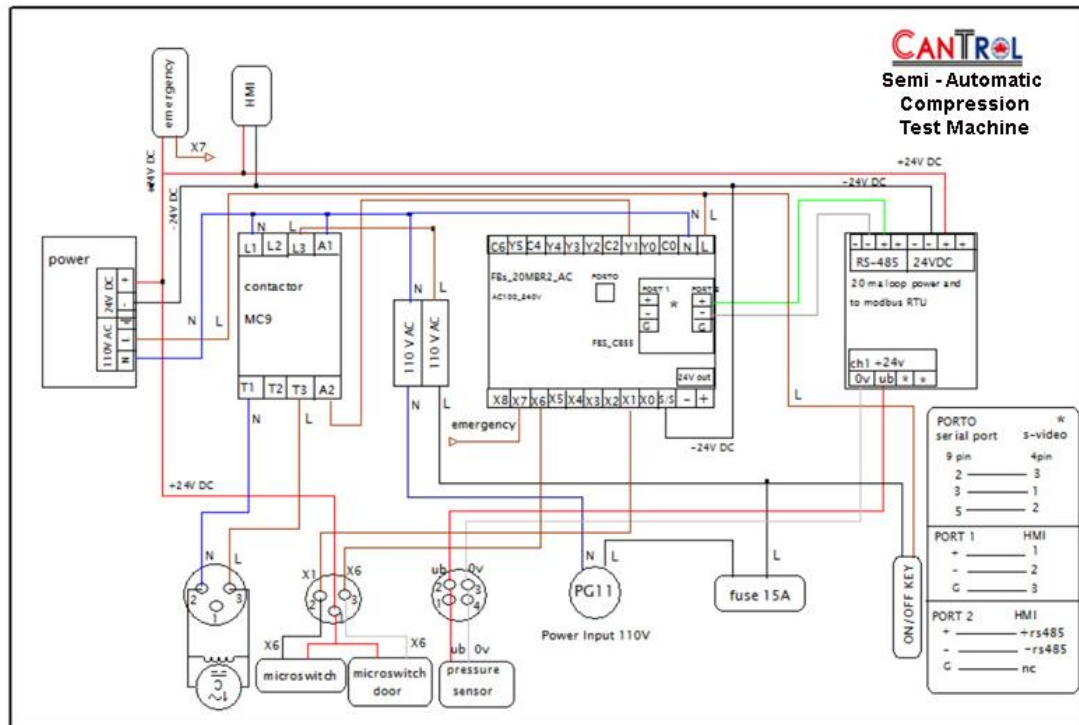
#### 4.9 Date and time setting

- Choose the “time and date” Icon to change or set the local day/time/year easily.

### 5. Troubleshooting

Alarms	Trouble	How to fix?
	The Emergency button is shutdown. All the performance of the machine is stop.	Turn the button to right.
	The force is reached the Max.Force (Overload).	Place the loading lever in the unloading position.
	The piston of cylinder is in the upper position so that, limit switch is activated.	Place the loading lever in the unloading position.
	Machin cannot be started.	Door is opened. You must close the door.

## 6. Wiring Diagram



## 7. Maintenance and periodically Inspection

- Clean up loading bearing platens and around the stroke limit switch from crushed concrete pieces.
- Check the oil level regularly when the lower bearing platen is in the lowest position. If needed, add Dextron 3 Automatic Transmission Fluid (or any AW32 or AW46) till to oil level indicator.
- Check the oil leakage from cylinder or hose connections regularly. Never attempt to grasp a leaking hose under pressure with your hands, because the force of escaping fluid could damage and cause serious injury.
- Inspect the hose for wear, if the weariness is major, call Cantrol with your machine model no. for replacing.
- Check if the bearing platens` roughness are out of ASTM standard regulations. Call Cantrol for platens replacement.
- Be careful of extra (abnormal) noise of machine while working, contact Cantrol for some advices.
- The air into hyd. System cause the performance and read out results of machine and may cause abnormal noise. For Dearing the hyd. System, run the piston to its full stroke and then retract it to initial position, do it two or three times to ensure the air is gone.

## 8. Calibration Process

Compression machines have been operationally tested and calibrated at CANTROL factory.

in order to fully comply with ASTM C39 and ASTM E4, these machines must be calibrated in new location again. For any assistant contact [info@cantrol.ca](mailto:info@cantrol.ca)

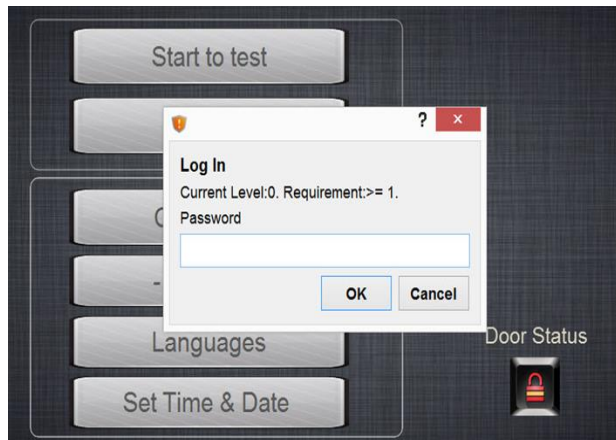
**This example of calibration is for 2000Kn Semi-Automatic compression machine.**

- For calibration of compression machine click on the <Calibration> key.






- By clicking on the <Calibration> key the following page will be opened. Insert the password at the apace. Click on the <Ok> key. (Password will be given to the customer since the purchasing have completed.)



- Enter the password, then click on the <ENT> key to appear the calibration page.  
This page has three parts:
  - Force Calibration
  - Overload Setting
- 1. Set Parameters: Specifying of Display Limitations and machine Calculations. Do not change any digits at “set parameters” section! These parameters were set at factory.




- Click on the <overload> key to insert the overload amount.
- Click on the <ENT> key to confirm the overload amount.
- Click on the <  key to return to main calibration page.
- **Note:** according to the last step of the calibration should be equal to the maximum power of the machine (for example, 2000kN), so before calibration, set the overload number to  $(2000\text{K}\text{n} \times 1.05 = 2100\text{kN})$  so that, the machine does not reach the maximum point during calibration. It causes the loading process to stop in the device. Then after the calibration was done, insert the overload number at (1950kN).



### How to start calibration process?

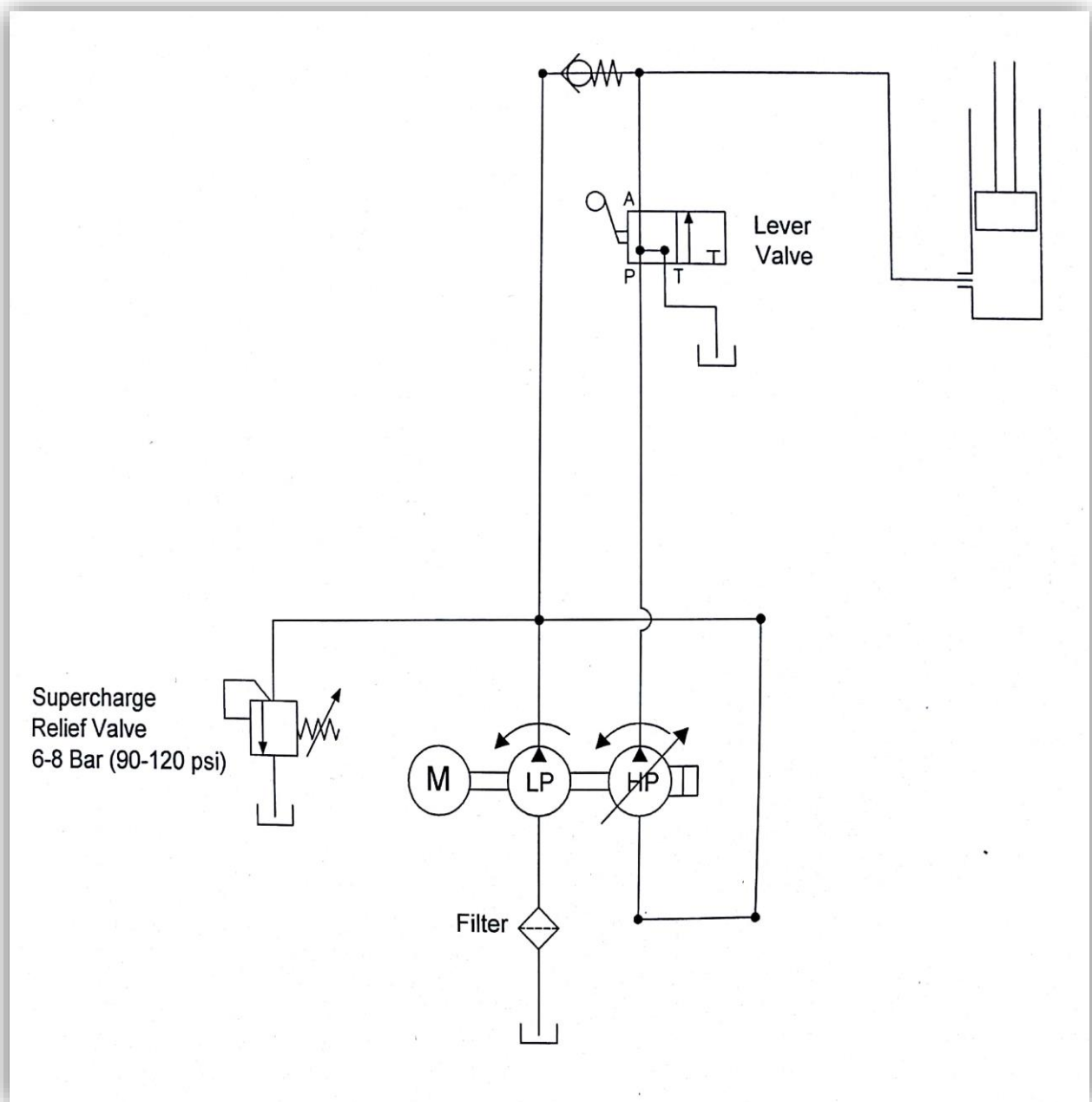
2. First, click on the <Zero> key, before starting the machine to make 10 to 0.
3. Insert the 10 set points based on kN into (2) columns.
4. Put the calibration device in the center of lower bearing plate of machine.
5. Start the machine with the lowest pace rate to control the rate of force amount that we can see easily on calibration device and machine display.
6. Click on **check** button just after starting machine (zero force step 1).
7. When the amount of first step of force (kN) is being seen on calibration device correspondence to amount force (kN), be inserted, touch the <check> key (step2).



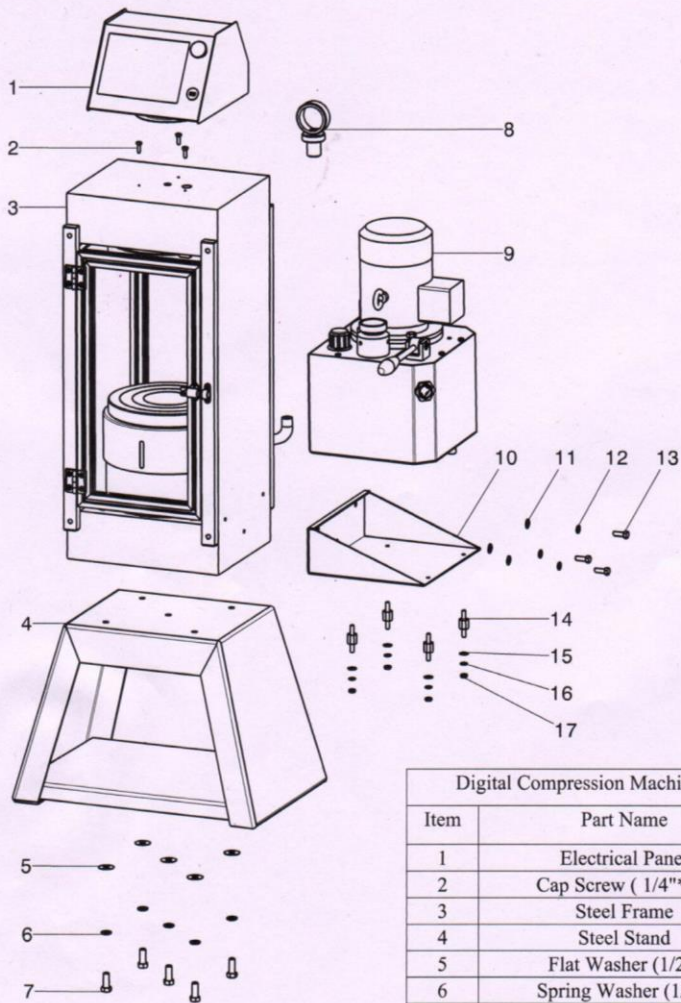
8. Continue each step until all the steps till to step 9, for step 10, just put the loading & unloading lever at unload position (discharging oil and letting piston to come down to initial position) after the force exceed than last step (more than 1900Kn), in this case the step 10 will be chosen by software automatically. In this time, the machine will stop (shout off) automatically.
9. click on <  > button to return to main calibration page.
10. To save the calibration data into memory, click on <save to memory> button, the green light will be on and it will be off after a few second.
11. When green light was off, the calibration process is finished.
12. Do not change any digits at “set parameters” section! These parameters were set at factory.



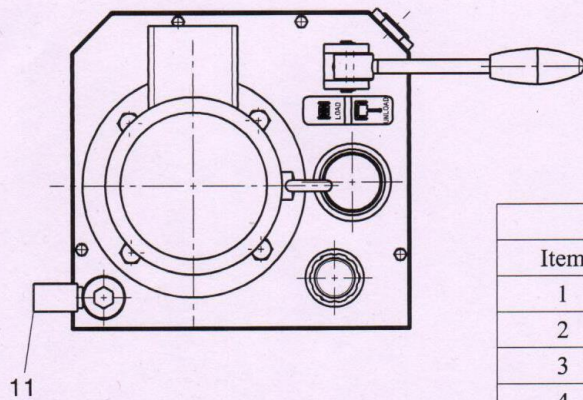
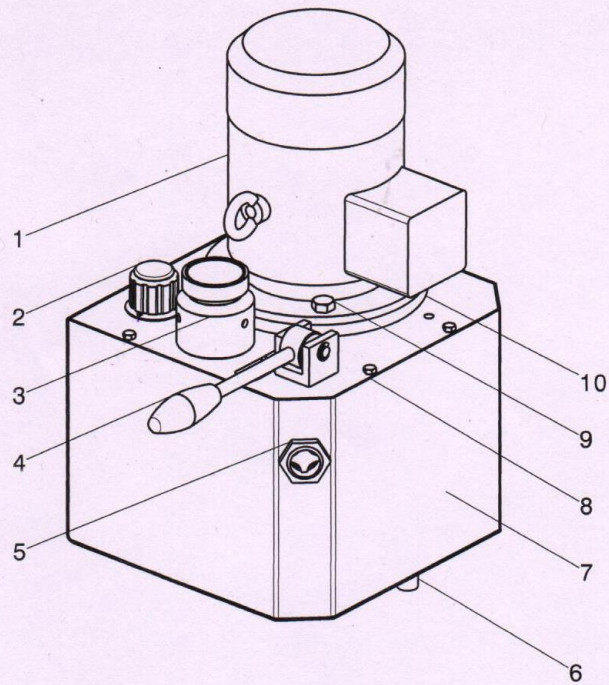
## 9. Hydraulic Schematic



## 10. Schematic Drawing

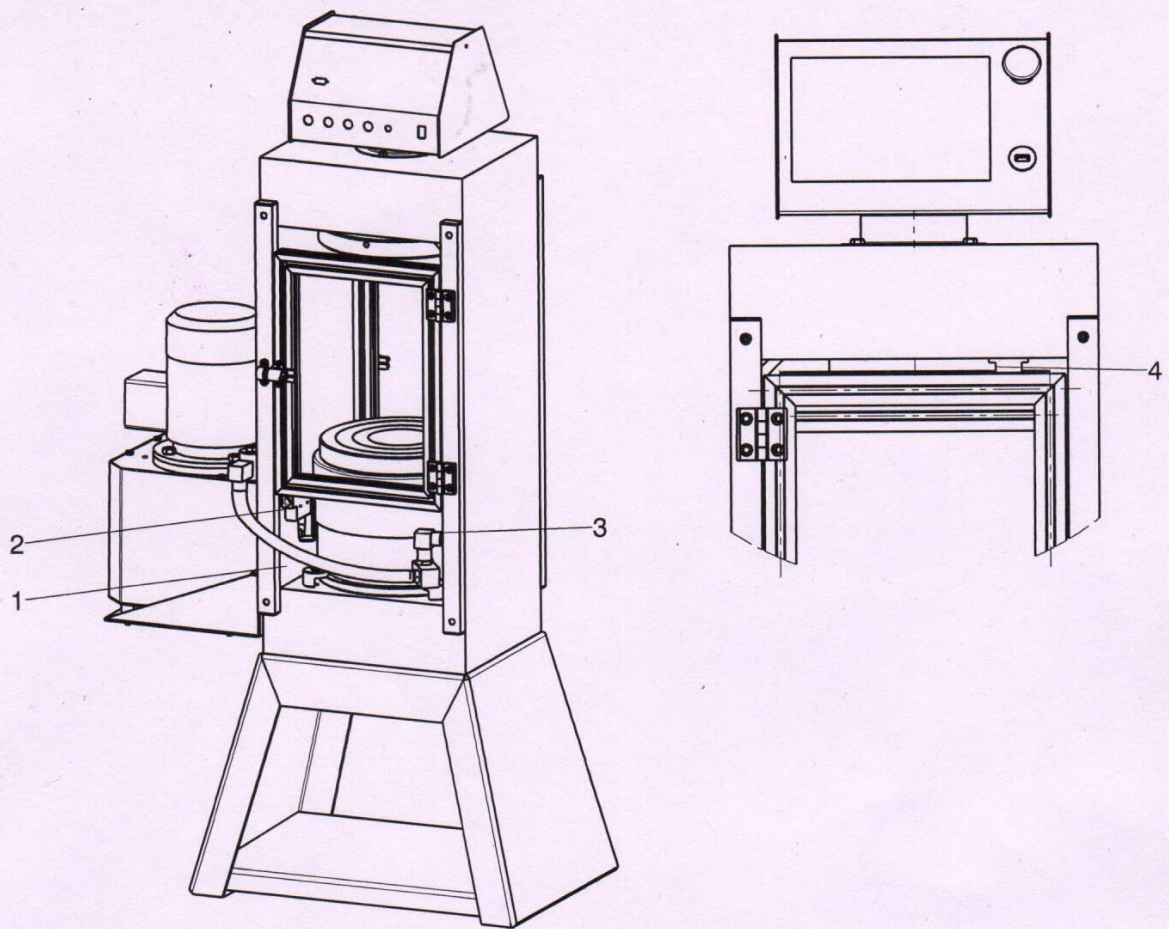


Digital Compression Machine Diagram		
Item	Part Name	QTY
1	Electrical Panel	1
2	Cap Screw ( 1/4"*1")	3
3	Steel Frame	1
4	Steel Stand	1
5	Flat Washer (1/2")	5
6	Spring Washer (1/2")	5
7	Cap Screw (1/2"*1")	5
8	Lifting Hook	1
9	Hydraulic System	1
10	Hyd. System Stand	1
11	Flat Washer (3/8")	3
12	Spring Washer (3/8")	3
13	Cap Screw ( 3/8"*1")	3
14	Rubber Shock Absorber (5/16")	4
15	Flat Washer (5/16")	4
16	Spring Washer (5/16")	4
17	Nut( 5/16")	4



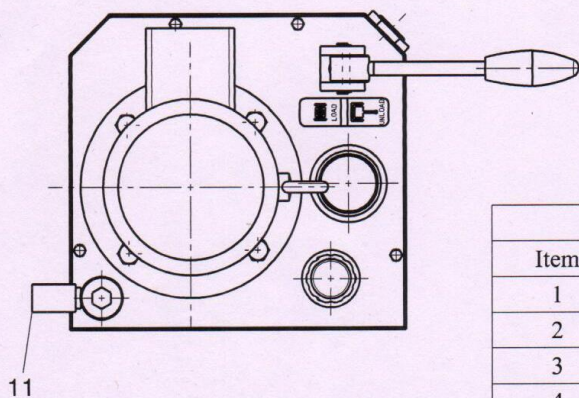
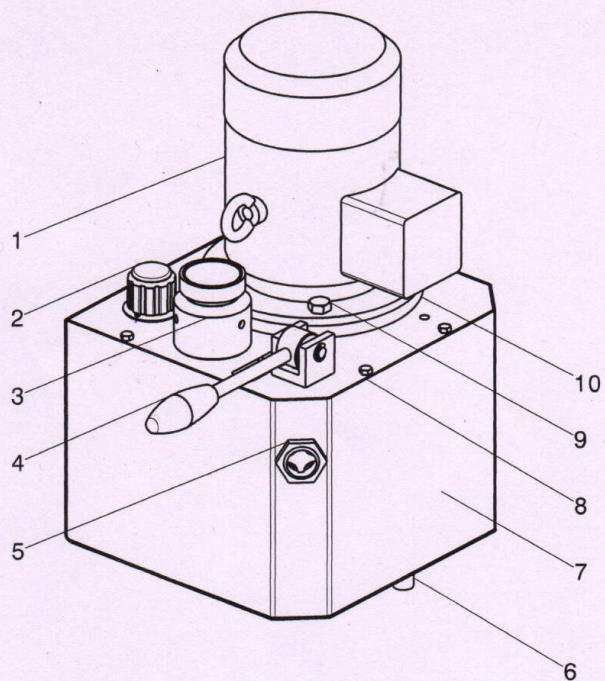
Hydraulic System Diagram		
Item	Part Name	Qty
1	Motor	1
2	Oil Filling Inlet	1
3	Rating knob	1
4	Loading/Unloading Lever	1
5	Oil Level Indicator	1
6	Oil Outlet (1/2" BSP)	1
7	Oil Tank	1
8	Cap Screw (1/4"*3/4")	4
9	Cap Screw (1/2"*1")	4
10	Motor Flange	1
11	Outlet Port to Cylinder	1





Sensors Diagram

Item	Part Name	QTY
1	High Pressure Hose (600 Bar)	1
2	Micro Switch	1
3	Pressure Transmitter (600 Bar)	1
4	Door Sensor	1



Hydraulic System Diagram

Item	Part Name	Qty
1	Motor	1
2	Oil Filling Inlet	1
3	Rating knob	1
4	Loading/Unloading Lever	1
5	Oil Level Indicator	1
6	Oil Outlet (1/2" BSP)	1
7	Oil Tank	1
8	Cap Screw (1/4"*3/4")	4
9	Cap Screw (1/2"*1")	4
10	Motor Flange	1
11	Outlet Port to Cylinder	1