Computer Control Electromechanical

Universal Testing Machine

Load Frame of Model WDW-10

Serial No.: 021360

Operation Manual

TE Forcespeed Corporation
The People's Republic of China

Foreword

Thank you for choosing our WDW-10 Computer Control Electromechanical Universal Testing Machine.

In order to make you use our product more conveniently, we offer this “Operation Manual”. According to the different type you choose, this manual should contain catalogue, safety warning, measuring & control system, mechanical system, important information, etc.
This handbook arrangement aims to be comprehensive and effective, in which you can get the necessary information about installation, setting, operation, principle and other aspects. Please read it carefully before using.

The machine configuration is determined according to the purchase contract and the technical agreement, and the related content involved in the operating manual is just for the reference. The company will revise the content of this handbook periodically to adapt the new function and new characteristics of the product. In addition, any modification will be integrated into the new edition, but the company will have the right not to give the notice about the modification of the product.

Thank you for using this testing machine again!

Notice: the argentous and black covers around the testing machine is dust cover, it cannot bear any external force. Do not load it when carrying.

Catalogue

1. Safety Warning

Notice the following warnings to avoid injuring the operator & other personnel and prevent the machine parts from damaging.

■ The following signs for danger & warning are marked according to the extent of accident danger.

◇,! DANGER"	Indicating a potential danger, if not be avoided, there will be serious damage.
△,! WARNING	Indicating a potential danger, if not be avoided, there will be light damage or substance damage

■ The following sign here is indicated that which are forbidden and which are complied.

○,×	To be forbidden to operate
○,√	To be operated necessarily
◇,B	Necessary parts
◇,P	Optional parts

1.1◇,! Danger

○,×	After starting machine, don't touch the motor, drivier, belt conveyer and lead screw
○,×	Do not open the cover of the machine when operating, or there will be personal injuries and machine damage.
○,×	Do disconnect the power supply plug before opening the cover of the machine, or there will be personal injuries and machine damage.
○,×	Do not insert or remove any electronic parts in the servo amplifier when the power supply being connected, or there will be personal injuries and machine damage.
○,×	Do disconnect the main power supply first and wait for above 2 minutes before touching or removing the circuit board card & plug-in units of the servo amplifier. Some inner capacitance can keep a dangerous voltage for over 2 minutes after switching off the power supply. Do measure the voltage of the intermediate circuit for keeping safe and wait until the voltage reducing to below 36V.

1.2△,! Warning

○,√	Don't operate the machine until you master the basic skills, if you use this system for the first time
○,√	Please press the button"emergency stop" at once, if there is some disorders when using it.
○,√	Please don't switch on/off the power supply frequently. If you switch the power consistently, please control it one time per minute at most.

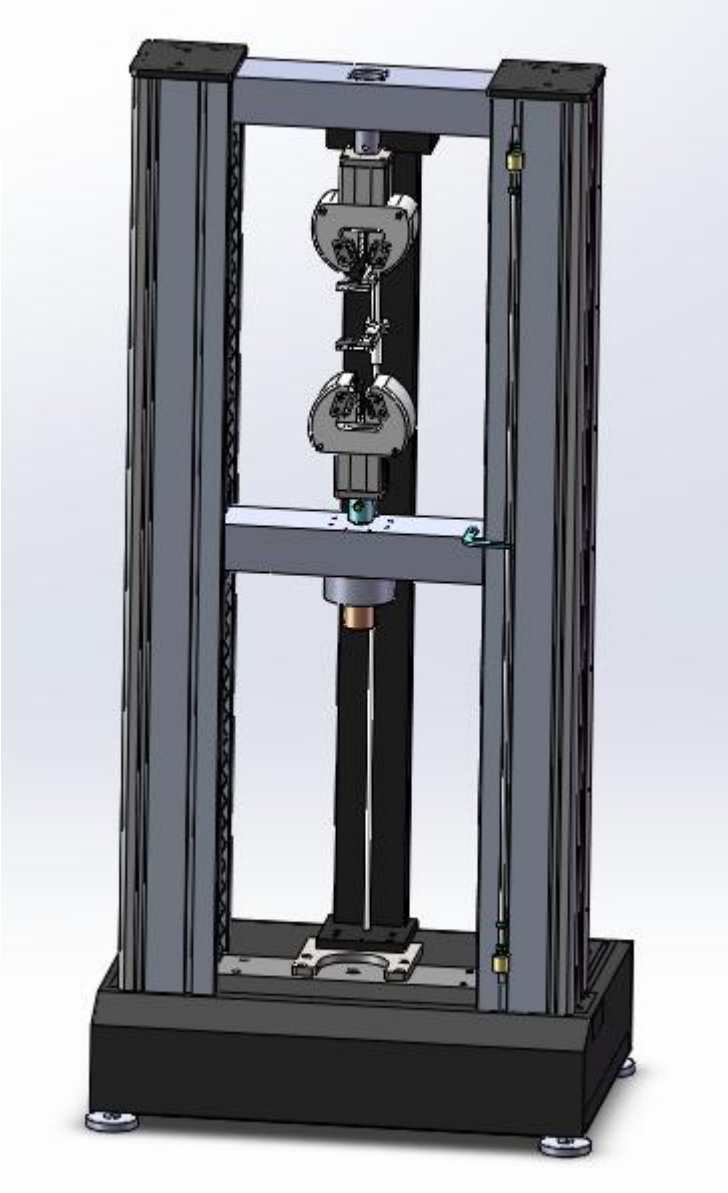
2. Attention

2.1 Transportation of the testing machine

After removing the packages, you can hoist the testing machine using the two slings fixed in the upper crosshead. Please do not use the stick bar to pry the machine to avoid the irreparable damage.
The testing machine is fixed on the bottom bracket of the wooden packing box. Please be more careful so as not to damage it when opening the packages.

Checking whether the machine is damaged or not during transportation. If there are disagreeing contents or the parts are damaged yet, please contact our company.

2.2 Installation of the Testing Machine



Installing Environment

☺ It should be fixed on a stable working table or smooth & firm rigid ground;
☺ It should be far from the door, window or other places with strong air fluidity;
☺ There is not obvious disturbance from electromagnetic field in environment;

☺ Prevent it from the isolation or near the air conditioning equipment and so on;
☺ Environment Temperature: 10~35℃;
☺ Relative Humidity: ≤80%;
☺ Power Supply Frequency: 50/60Hz;
☺ Power Supply Source: AC 220V±10%, 1PH
☺ Power and current: 1kW, 5A

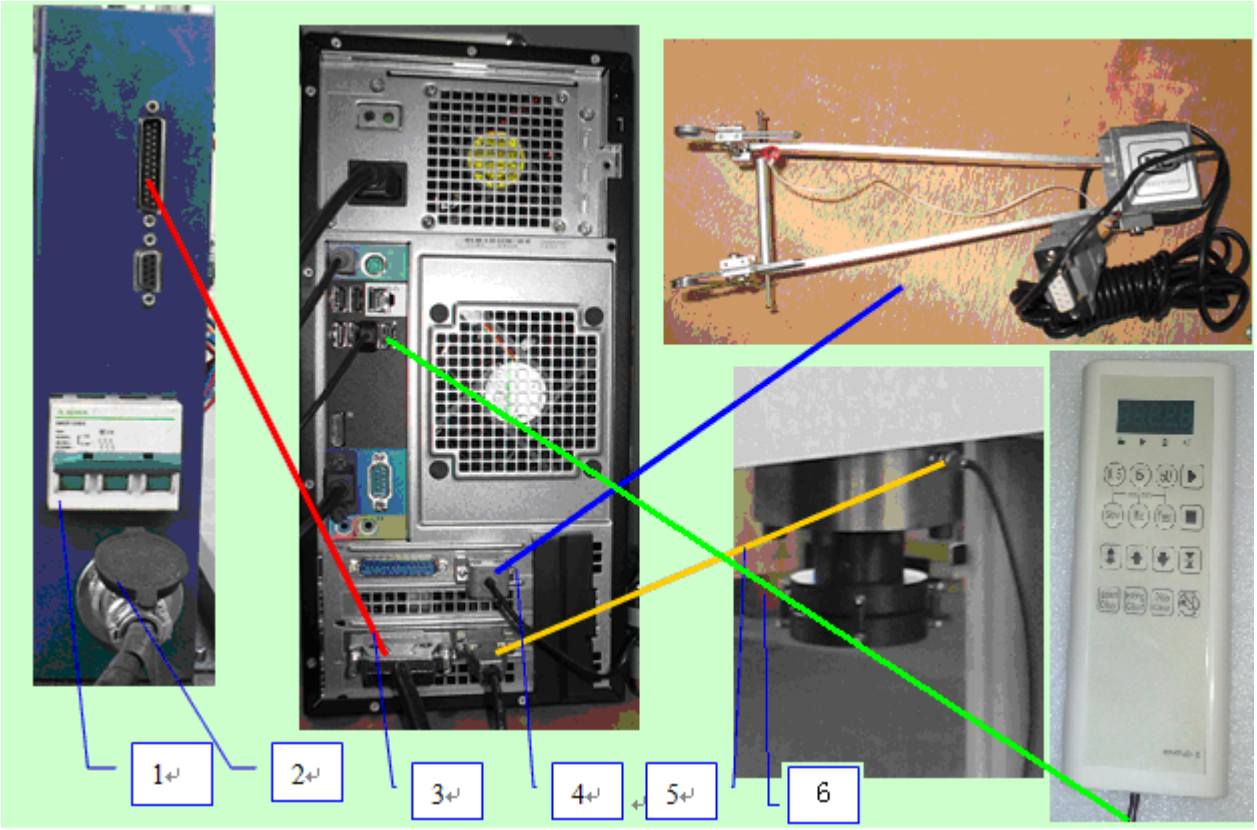
Note: The user must pay attention that the power supply must have ground lead. Since this machine has the ground protection, if the user does not use the power supply with ground lead, it may be hurt someone once it leaks electricity.

Levelness Adjustment

Put the level meter on the testing machine platform and adjust the below four adjustable supporter, to keep the platform at level condition. Then the installation of the load frame is finished.

Testing Machine Running

Please correctly connect the following ports between load frame and other parts



1. Air switch 2. Power supply cable 3. Computer control cable interfaces
4. Extensometer connecting port (optional) 5. Load cell connecting port
6. LCD Control box

The user should connect the all wires well before connecting the power supply cable, then insert the power supply cable into the electric outlet, push the air protection switch behind the load frame up to operating position and turn on the main power switch on the front face of the load frame. Then the power supply provides the testing machine with electricity.

2.3 Check of the Testing Machine

Check label:

TE Forcespeed Corporation Add: Bldg 4-B-3, Energy Valley Ind. Zone, No.5577, Industrial Road (N), Jinan, 250109, China Tel: +86-0531-86510531 Post Code: 250101 www.testingequipmentie.com
Universal Testing Machine Model: WDW-10 Accuracy: 0.5% Voltage: 110V, 1PH, 60Hz Power: 1.5kW Serial No.: 021360 Date: 2023-11

Check goods:

Find out the plastic file cover in the packing box with Packing List, Quality Certificate, Calibration Certificate, and the CD that contains operation manual and software backup. Please check the goods carefully according to the packing list and especially keep the technical documents & small parts carefully.

3. Introduction of the whole machine

3.1 Application of the machine

WDW-10 computer controlled electronic universal testing machine is mainly used to test various metallic and non-metallic materials for tension, compression, bending, shearing, stripping, tearing and other mechanical performance test. Equipped with relevant accessory, it can also be suitable for creeping lasting test, stress relaxation test, etc. under high & low or room temperature.

It is widely used in scientific research, teaching and quality examination fields of metallurgy, building, machinery, astronautics aviation, petrochemical, rubber, plastic, spinning and weaving, medicine and other industries.

3.2 Features of Load Frame

High Accuracy:

* Accuracy of load is ±0.5% of 0.4% to 100% of F.S.
* Accuracy of Deformation is ±0.5% of 0.4% to 100% of F.S.
* Adopting Japan Yaskawa AC Servo System, speed-adjusting range can be upto 1: 100000, and speed accuracy of moving crosshead can be ±0.5%.

Good Reliability:

* Table type pre-loaded load frame is constructed by welded parts with high stiffness and lightweight.
* New design wedge tensile grip can hold the specimen tightly and without axial load applied to specimen.
* Adopt arc synchronous belt wheel for speed reducing, ball lead screw for transmission without backlash, more stable & small noise.
* Adopt CE electrical elements make electrical parts stable in performance and good in reliability.

High automation in operation:

* Measuring range can be shifted automatically according to test load and deformation during testing
* The control mode of constant stress rate, constant strain rate and constant speed etc can be shifted automatically
* Test condition and result can be saved automatically.
* After setting parameters, a batch of specimens can be tested continuously.
* Test curves in same group can be superposed for comparison.
* Any part of test curve can be zoomed in for analysis
* Template of test report can be edited as per customer's request.
* Parameters can be amended or added if required after testing, and the new test curve or result can be shown as per such setting.
* It can automatically judge and display the system malfunction and operation error.
* It has functions of constant test load, constant deformation, constant strain rate and constant stress rate etc.
* It has wide application ranges.
* All kinds of grips can be attached with this machine to meet the tests not only for non-metallic materials, but also for some big metallic materials.
* Load cells with different load ranges can be attached with this machine to extend the load measuring range.
* Both clip-on extensometers and non-contact type like laser extensometer and video extensometer can be equipped with this machine.
* This machine with multiple functions can meet various test requirements.

3.3 Technical Parameters

Test load measurement	
Max. test load	10KN
Accuracy	±0.5%
Effective measuring range	0.4%-100% of F. S.
Movable moving speed	
Speed range	0.001-1000mm/min
Accuracy	±0.5%
Test space	
Width of test space	420mm
Max. crosshead travel	1560mm
Power supply	
110V, 1 phase, 60Hz	
Power	
1kW, 5A	

Dimension	
Load frame (L×W×H)	780×520×2210mm
Weight	
Load frame (Kg)	350

3.4 Structure

It is mainly consisted of load frame, AC servo motor and driving system, measuring and control system, computer system and test fixtures etc.

3.5 Operational Principle

Load frame:

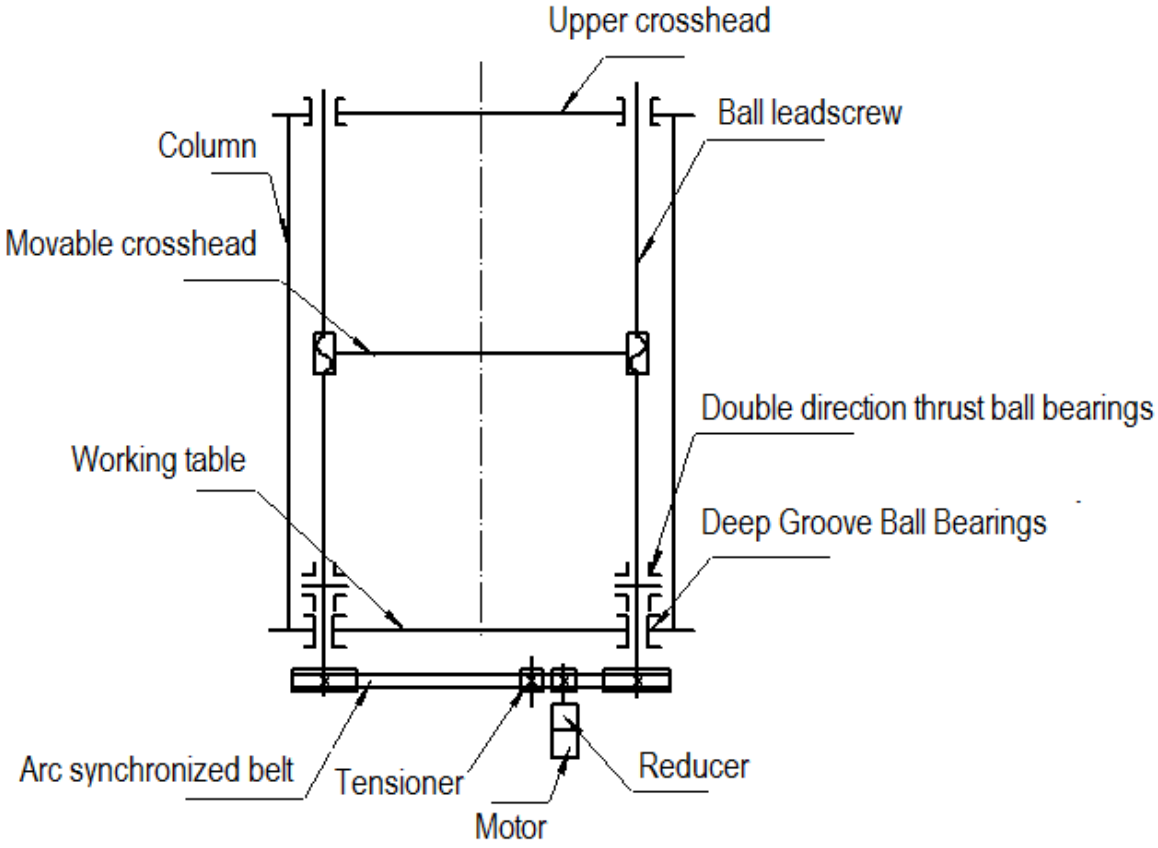


Fig. 1.2 Load Frame Structure

It mainly includes the upper crosshead, movable crosshead, working table etc; the top end of the column supports the upper crosshead, the lower end of the column is fixed to the working table, which forms to a frame structure for loading. The driving ball lead screw is connected with upper crosshead through deep grove ball bearing and fixed with screws; the lower end of the driving ball lead screw is connected to the working table with Tapered roller bearing;

Normally the compression and bending testing are carried out in the lower testing space, while tensile testing in the upper testing space;

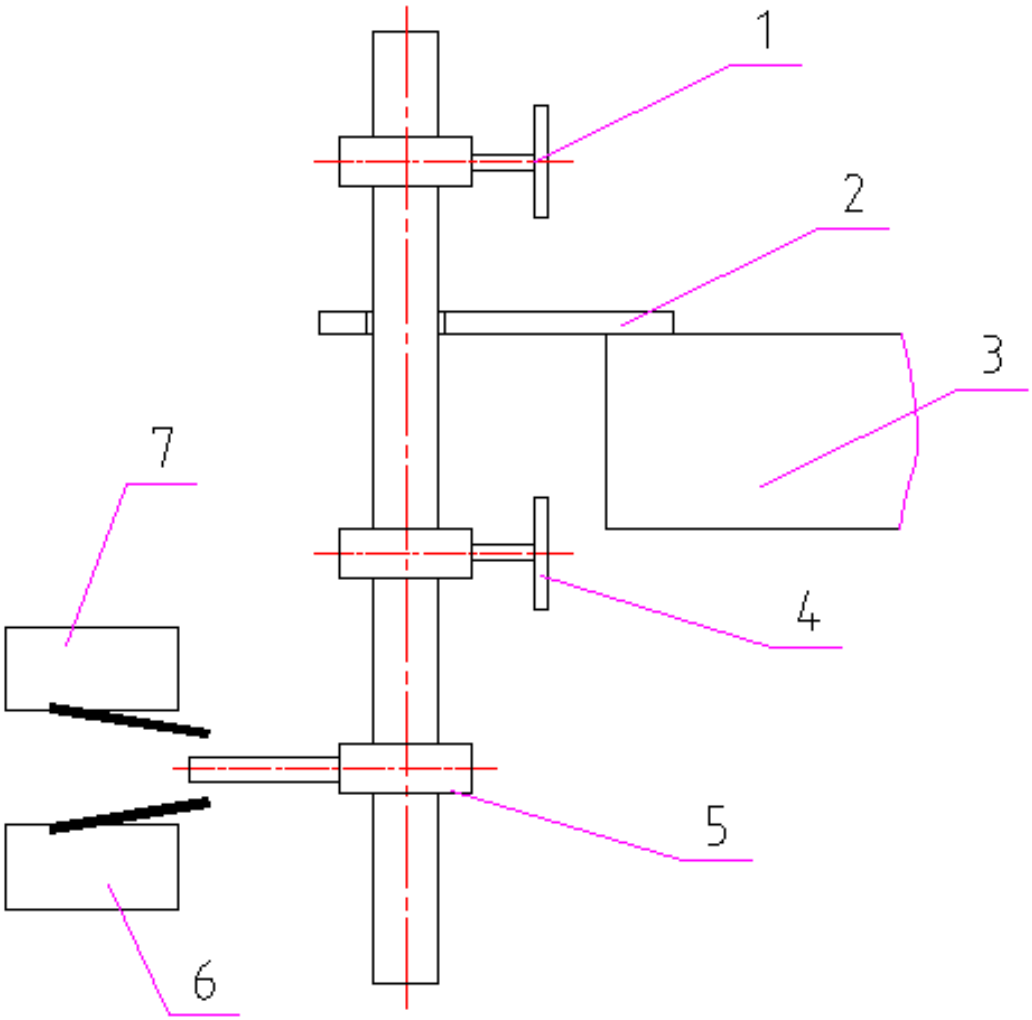
The stiffness of the load frame is decided by its key components, such as the upper crosshead, movable crosshead, working table and the driving ball screw etc; the key components adopt the steel plate welded structure;

Limiting device:

There is a synchronous belt installed at the end of the driving ball screw, it drives the

movable crosshead by the motor and the reducer; to avoid the mechanical accident for crosshead over-travel the upper and lower limit position, a limiting device is design at the left cover of the load frame, as shown below;

It includes the upper and lower limiting plates, movable handle and switch etc; when the movable crosshead moves close to the limiting plate, the switch will generate signal to stop the testing machine;



1. Upper limitation 2. Limitation plate 3. Movable crosshead；
4. Lower limitation 5. Limitation pushing plate 6. Lower limitation
7. Upper limitation switch

3.6 Starting procedure

1. Connect the cables for the system, and make sure the connection is correctly done
2. Turn on the switch of the general power supply.
3. Turn on the power supply switch of the computer and display.
4. Turn the power supply switch on the right of the base of load frame to ON.
5. Double click the software icon of MaxTest.exe that exits on the main interface of the computer, operate the computer according to the ***Software Manual,*** and then enter into the work interface.

6 Press the start-up button of the load frame, prepare for the test.
7 Run the Max. Test software(for software operation, please refer to the software manual)

Note: Because the machine is complex for operation and there are many test parameters, so the technical personnel adjusted and calibrated it before the machine leaved the factory. Hope the user not changing the inner special parameters of the machine. You can normally use this machine according to the manual operation. If there is any question, please carefully read the ***Software Manual.***

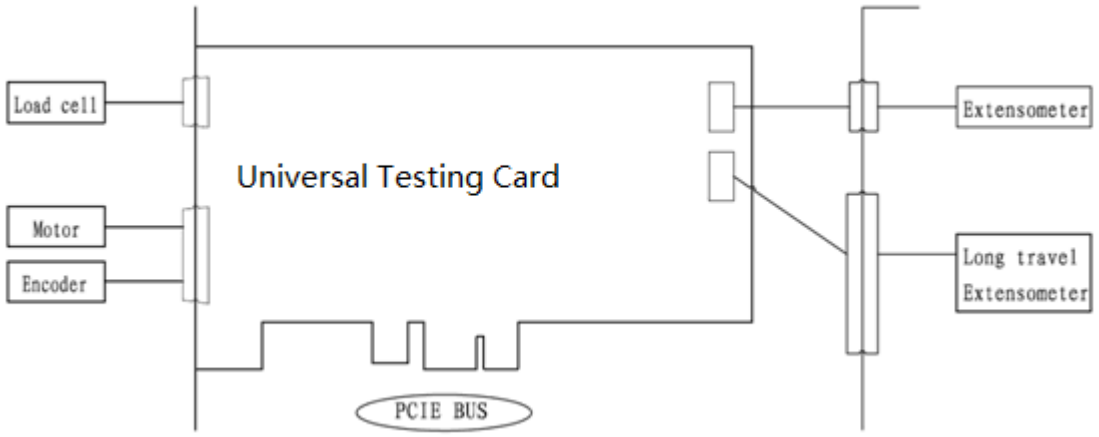
4. Measuring and control system

Remarks

During the testing process, if there being abnormal situation, which can not be terminated by normal shut down, please immediately press the emergency stop button, to protect the testing machine from being further damage.

4.1 System principle

The control system of the testing machine contains four parts, servo motor, drive system, control panel, display unit, as shown below.



System Principle

4.2 PCIE Card

Introduction

Vir802 is the flagship model of Vir8 controller family, primarily designed for 3-closed-loop control system of universal testing machine. As an add-on card, Vir800 adopts one single FPGA chip to accomplish PCI-E protocol and process digital signals simultaneously. 24-bit A/D converter is applied for competitive precision of acquisition. Hot-switched data rate make it possible to provide highest precision at 50Hz with noise-rejecting technique and most dynamic response at 1000Hz. Enhanced outputs including PWM, PNM and DA vibration improve system performance of respective testing systems.

Vir802 is easy to install and maintain with MaxKit toolbox software, which helps user to configure, calibrate, optimize, evaluate. Moreover, an engineer can finish his own testing program in seconds with latest compact version of UTK

Features

- 500,000 steps resolution for strain measurement
- Hot-switched data rate 50/1000Hz
- Soft IP Core implements Pci-E protocol.

- Multi-function pulse modulator.
- Built-in DA vibration signal.
- Input SSI signal of magnetostrictive displacement transducer.
- Support UTK v1.0 and v1.6.
- Support ISD development platform.
- Up to 6 cards works as a whole in the ISD development platform.
- Compatible interface with AD800
- Shipped with MaxKit toolbox software.

4.3 Displacement measurement

Brief Introduction

Displacement measurement unit, combined by the optical encoder and the drive system, can timely display the displacement of the medium crosshead. For bar type of specimen, the displacement of the movable crosshead can be taken as the deformation, which is widely adopted in the material testing area, such as wire, geotextile, net rope, paper, tape, adhesives, ceramics, plastics, building materials etc.

Technical specification

Max. displacement	Resolution	Accuracy
1000mm	0.025um	±0.5%

Working principle

The displacement is converted to the electrical signal by the optical encoder. When the motor is driven, the angular displacement is converted to linear displacement. Angular displacement is proportional to the pulse output of the encoder. Therefore, as long as the pulse output of the encoder is identified, the displacement can be known. The pulse output of the encoder will be processed by the shaping circuit, and then will be sent to the computer. Then the software will carry out the count, direction, identification and process, and then display the testing results. As mentioned above, the displacement measurement error, depending on the transmission error of the testing machine, is a fixed value; it does not require user calibration, eliminating the trouble of adjustment.

4.4 Load measurement

Brief Introduction

The load measuring amplifier unit is a major component of the testing machine, its main function is to enlarge and process the weak signal generated by the load cell, then send the amplified signal to the computer, then display or record the load applied on the specimen.

After starting the machine, if the value of the testing machine is more than 2% of the nominal value, please contact our company.

ϟ Technical specification ϟ

Load measuring range	0.4% -100%
<Note> it is decided by the selected load cell capacity, for example load cell 10KN, then the measuring range is 40N-10KN	
Max. load	10KN
Accuracy	±0.5%

ϟ Working principle ϟ

The load measurement system adopts a highly integrated analog-to-digital converter, this chip with charge-balancing technology, its performance can achieve 24 bit. After being applied a force, the load cell will generate a small signal output proportional to the test load, the signal does not go through any intermediate process, which will be directly sent into the A / D conversion chip for amplification and conversion, and then it is transferred into the single-chip computer. The computer unit will display the value after the signal is processed. The display unit will be shown in unit "N" or "KN". The computer possesses the memory function of the max. Load value, can keep the maximum test load for loading purpose. When the test load exceed 2%~ 5% of the maximum range, the overload protection system will automatically stop the medium crosshead moving to terminate the loading, in order to protect the safety of the load cell and the load frame.

4.5 Deformation measurement (optional)

Model YYU-25/50 extensometer:

ϟ Brief Introduction ϟ

The deformation measuring amplifier unit is also a major component of the testing machine, its main function is to amplify and process the weak signal generated by the extensometer, then send the amplified signal to the computer, then display or record the deformation value applied on the specimen.

This deformation measurement system is used for measuring the axial or lateral deformation, suitable for metal and some harder non-metallic materials, the elastic modulus E, yield the point σS, Poisson ratio μ mechanical properties can be available with our testing system. The system has high sensitivity and precision, stable performance, high automation.

Technical specification

YYU-25/50

Gauge length	50mm
Travel	25mm,
Displayed value error	0.5% FS

Sensitivity	0.2%

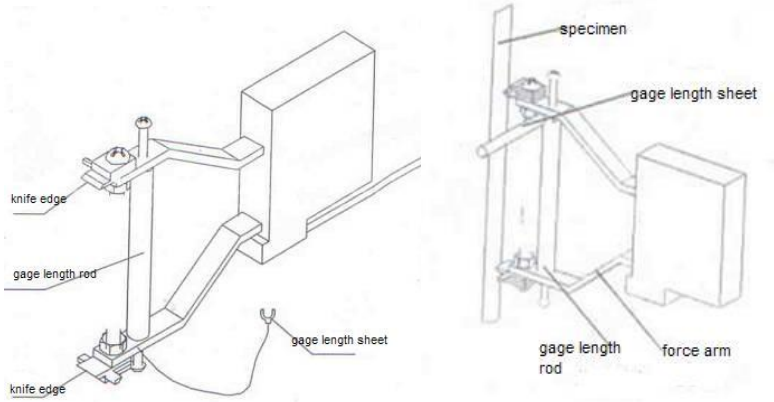
YYU-25/100

Gauge length	50mm
Travel	25mm,
Displayed value error	0.5% FS
Sensitivity	0.2%

Working principle

Extensometer includes an elastic element and a strain gauge. When the extensometer mobile arm moves together with the deformation of the specimen, causing elastic deformation so that the strain gauge resistance value changes, then the bridge lost balance, generating a voltage signal proportional to elastomer deformation; the work is done by amplification and conversion of A/D converter.

Extensometer installation diagram:



5. Accessory

5.1 Wedge Tensile Grip

Applications:

Wedge type grip holder is suitable for tension test for metal materials and some harder non-metal material. It is equipped with flat grip & V-shaped grip and it is suitable tensile testing for bars & plate specimen.

Carrying Capacity:

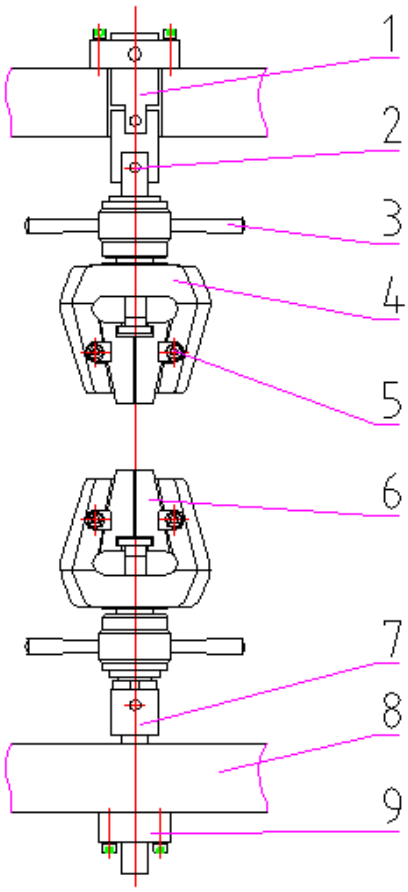
Maximum load: 10kN

Main Specification

Max. Clamping width mm	Clamping Thickness mm	Clamping diameter mm
40	0-14	Φ4-Φ14

Table 4.1

Structure & working principle



1. Upper crosshead 2. Universal Joint 3. Close/open knob
4. Grip body 5. Grip pressure plate 6. Insert
7. Lower flange 8. Moving crosshead 9. Load cell

Operation method:

The tensile fixture is composed by the connector, threaded sleeve, grips and inserts etc., Take the upper clamps for example, when the rotary handle is rotated clockwisely, the threaded sleeve will push the grips downwards, which will open the grips; Rotate counter-clockwisely, the grips will close. The grips movement is only in transverse direction, no axial movement will occur, so there will not be any axial load when clamping the specimen.

Attention:
Before usage, please check if the upper insert and lower insert are in the same plane, if not, loose grip pressure plate to adjust.
Choose proper insert by the marks on it according to different specimen thickness and gripping parts.
When adjust inserts, loose to the limit, remove spring and guide plate.

5.2 Compression Device

Application
The device is suitable for compression test for metal & non-metal materials. It conforms to ISO 6892, ASTM-E8. It can be equipped with deformation measuring meter to measure

the elastic module, assigned disproportionate compression stress, compression strength, compression bias yielding stress and so on.

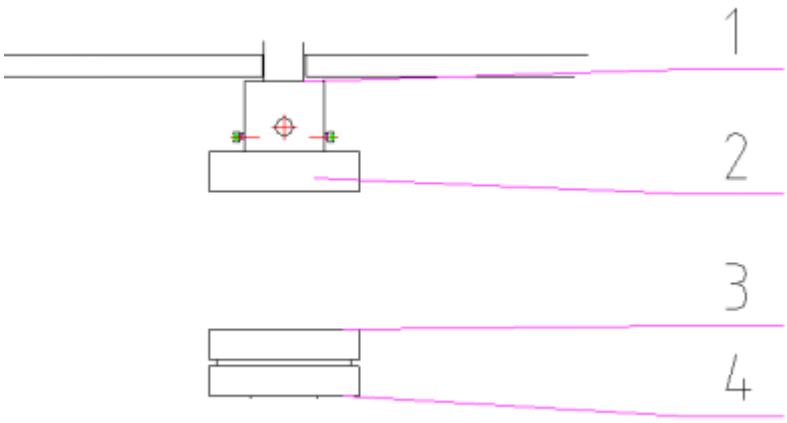
Specification

Max. Load	10KN
Diameter	Φ100

Table 4.2

Structure and principle

This device consists of upper & lower compression plate, spherical base, upper junction, locating shaft and so on. There is movable universal point between the convex sphere of lower compression plate and concave sphere of spherical seating. The compression plate can adjust the depth of parallelism between upper and lower compression plate automatically when applying the load. Thus it can avoid the bias load. See Fig. 4.3.



1. Upper flange；
2. Upper base seat；
3，Lower platen；
4，Lower spherical seat（installed on working bench）

Installation and Using

Install spherical seating in the center hole of table top with locating shaft, upper junction in the end of transducer link rod. Specimen should be on the center of the circle of platen ring-type channel.

Note: Lay oil on the platen and spherical body frequently in order to avoid getting rusty.

5.3 Screw action grip for polymer, composite and elastomer

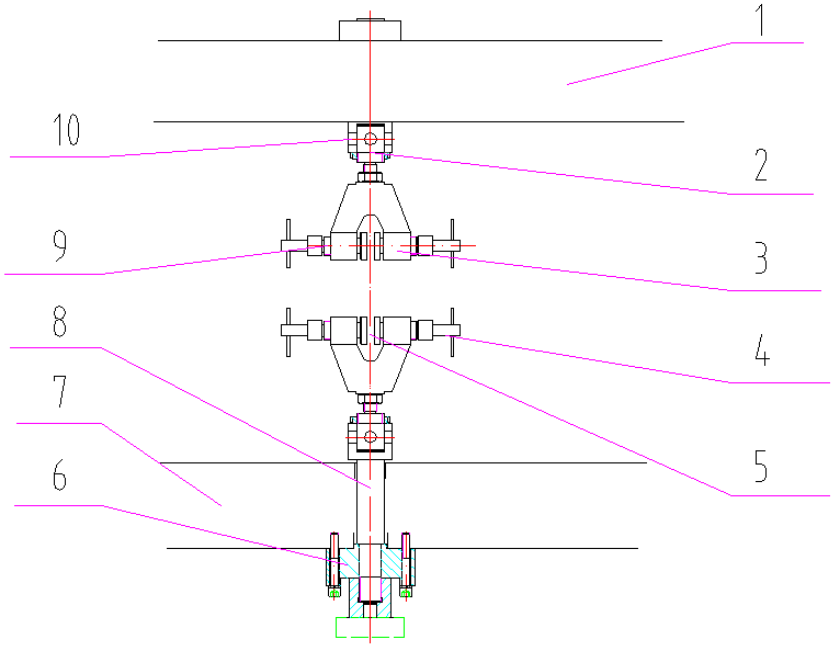
Applications:

This fixture is specially used for tensile tests of metal or non-metal.

Main Specification

Max. Clamping width mm	Clamping Thickness mm
60	0-15

Structure



1. Upper crosshead	2. Joint	3. Grip body	4. Adjusting handle
5. Insert	6. Load cell	7. Moving crosshead	8. Flange
9. Screw rod	10. Universal joint		

This fixture consists of grip body, adjusting handle and inserts. Put the adjusting handle outside of the screw rod to move the inserts horizontally.

Installation and usage:
Install the upper and lower grip bodies to the universal joint and upper flange to use. Please pay attention that the inserts are centered by adjusting the same screwing depths.

5.4 Three point bending fixture

Application
This device is used for the bending test of metallic and plastic materials etc., and it confirms with. Equipped with flexibility measurement meter, it can measure the bending mechanical performance such as bending elastic module, bending strength, assigned disproportionate bending stress (or assigned flexibility bending stress) etc.

Specification

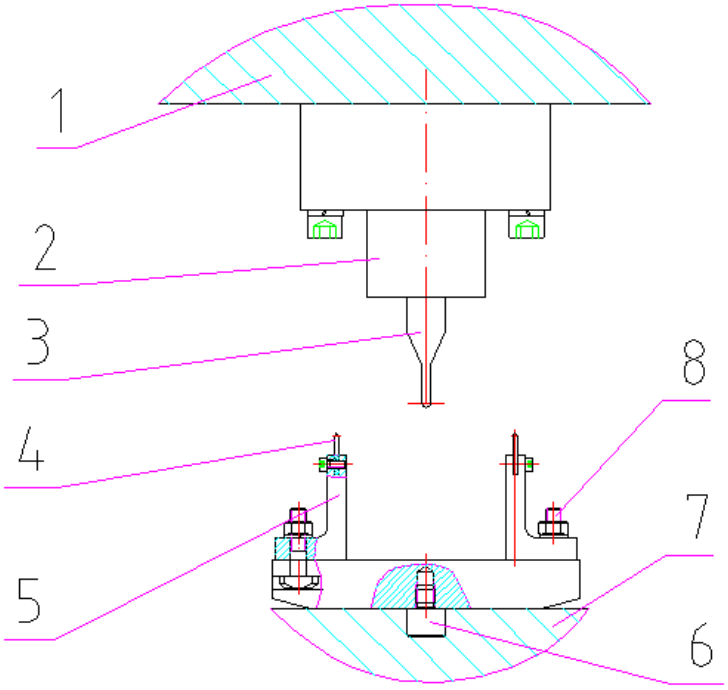
Max. Load	10kN
Dimension of upper punching roller and lower support roller	Dia.10
Span adjustment range	10-240mm

<Note> The Upper punching roller and lower support roller is equipped according to the users

Structure and Principle
This device mainly consists of supporting part and punching part, where guide rail, support and roller forms supporting part; while punching head, head seat and joint forms punching part. Roller is mounted on supporter that rotates with the pin in test, and a scale is sticked on the guide rail to adjust the span of two bending rollers.

Installation and Using

Guiding rail is fixed on the working table by positioning axial and punching head is connected on the bottom of connecting nut under the crosshead.



1. Middle crosshead 2. Connecting flange 3. Upper punching head 4. Lower roller 5. Supporter 6. Positioning pin 7. Working bench 8. T type screw

6. Import information

6.1 Safety function

- Limit switch for crosshead movement
- Full load alarm
- Over load stop function
- Emergency stop button

6.2 Maintenance

1. The testing machine belongs to the precise testing equipment. It is necessary to pay attention to the maintenance. It is especially needed to avoid the water and humidity. Prevent the machine, the transmission mechanism, the cover and the accessories form rusting.

2. If the testing machine has been not used for a long time, it is necessary to electrify the machine to drive the moving crosshead up and down every a certain time (not more than one week). Make the crosshead and bolt & nut regularly move to avoid rusting.

3. If overloaded during the test, (For details, please see the SOFTWARE MANUAL)

If the test load and deformation display are not instable, or the testing machine cannot be driven, please contact the manufacturer for maintenance.

6.3 Lubrication

As shown in the Drivetrain system, there are bearings installed on the upper end and lower

end of the drive ball screw, also on both ends of the axle of the middle driving belt;

Before leaving the factory, lithium grease will be painted on all the bearings; The grease is characterized by high temperature, long life oil; New grease shall be injected every 2 years.

The injection method is to open the cover of the upper crosshead, inject the grease into the bearing hole; and then open the dust cover from the bench table, and inject the oil into the bearing sleeve

For the lubricants, the best choice is the grease with the drop point above 170 ℃, such as lithium-based grease or synthetic compound calcium-based grease.

Driving ball screw lubrication can also use lithium grease, or # 30 oil, oil injection shall be performed once a week.

6.4 Driving Belt Adjustment

The Synchronic belt will affect the transmission efficiency and transmission accuracy, too loose and too tight are both not good; Please make sure that the synchronic belt is in appropriate tightness status, that is, there will be slight deflection with little figure touch;

Adjusting method:

Please loosen the four screws of the synchronic wheel seat or the motor seat, knock the seat slightly to move it back and forth; after the adjustment, please re-tighten the screws;

6.5 Normal trouble and way of removing

Serial No.	The Trouble	Cause of the trouble	Way of removing the trouble
1	The machine cannot ascend or descend.	1. The limit switch is working. 2. The limit switch is damaged or wire broken. 3. The URGENT switch is damaged or wire broken. 4. The power supply lacks one phase. 5. Overload of the speed-regulating system.	1. Remove the limit switch 2. Exchange the limit switch or repair the broken wire 3. Exchange the Urgent switch or repair the broken wire 4. Check and repair the power supply 5. Check the cause of overload and remove the trouble. Then electrify the machine again.
2	The test load is overload	1） The load cell is damaged 2） The wire of the load cell is broken or the socket is not reliable	1) Exchange the load cell Repair the broken wire or check the socket
3	The software does not work normally	The computer is infracted by the virus	1) Remove the virus with the virus-kill disk 2) Copy over again with the backup disk

7. Diagram

Attached figures

1. Attached figure 1: View of WDW-10

2. Attached figure 2: Foundation picture of WDW-10
3. Attached figure 3: Load frame
4. Attached figure 4: Vertical lifting picture of load frame
5. Attached figure 5: Electrical Principle diagram

Fig 1 View of WDW-10

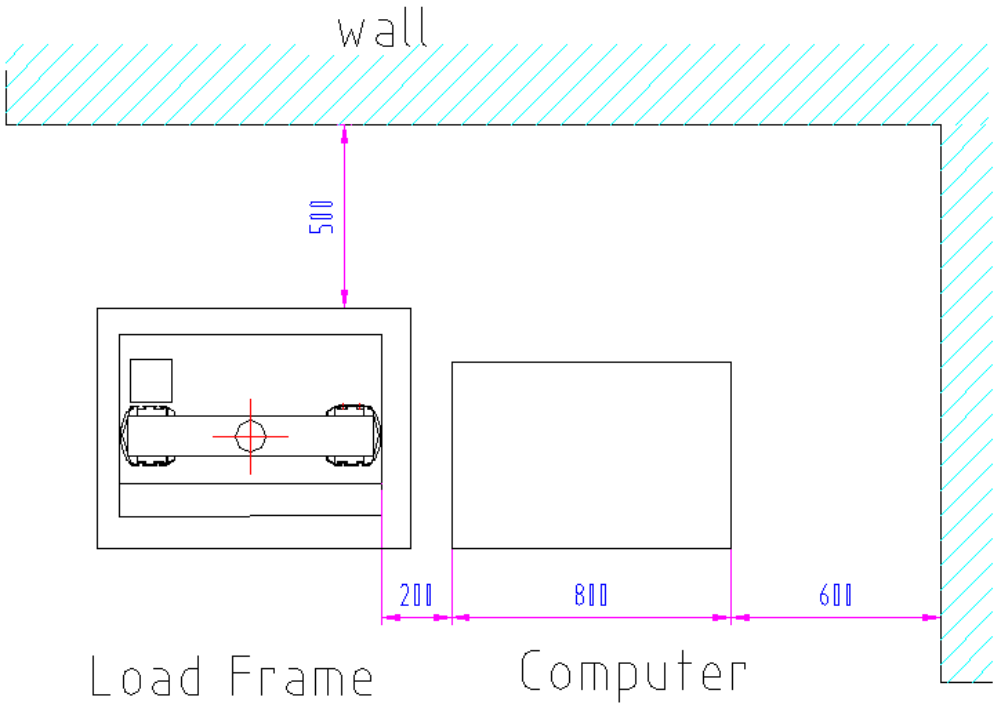
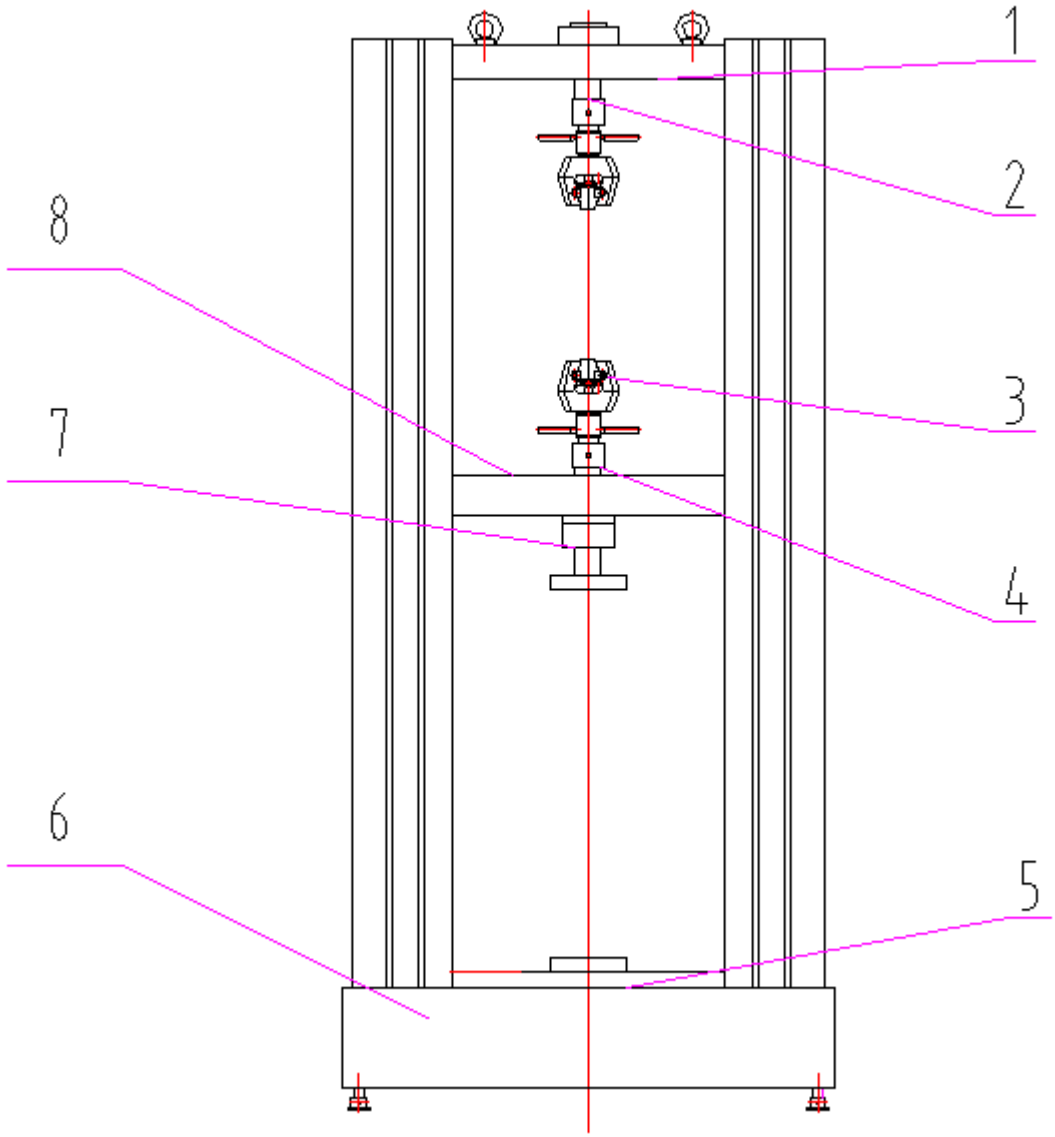


Fig.2 Foundation picture of WDW-10



1.Upper crosshead 2.Upper flange 3.Tension grips 4.Lower flange 5.Working bench
6.Drive system 7.Load cell 8.Moving crosshead

Fig.3 Load Frame

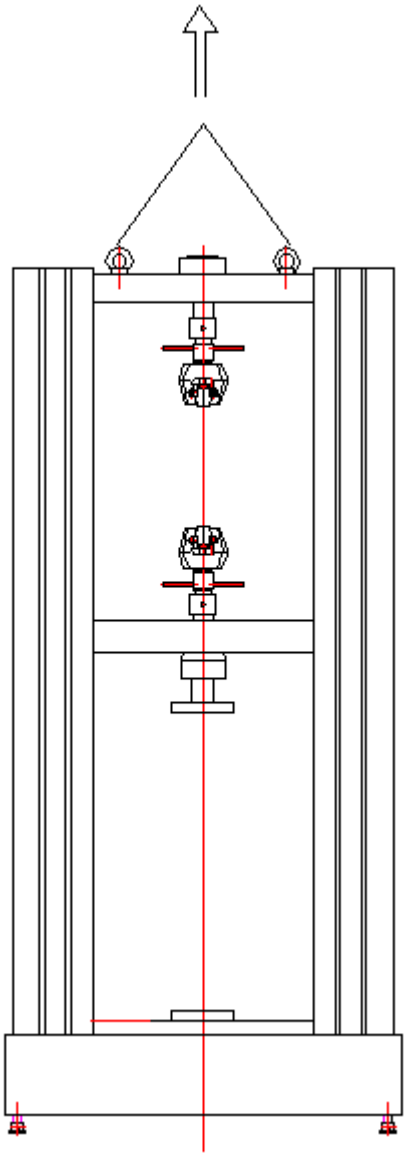


Fig.4 Vertical lifting picture of load frame

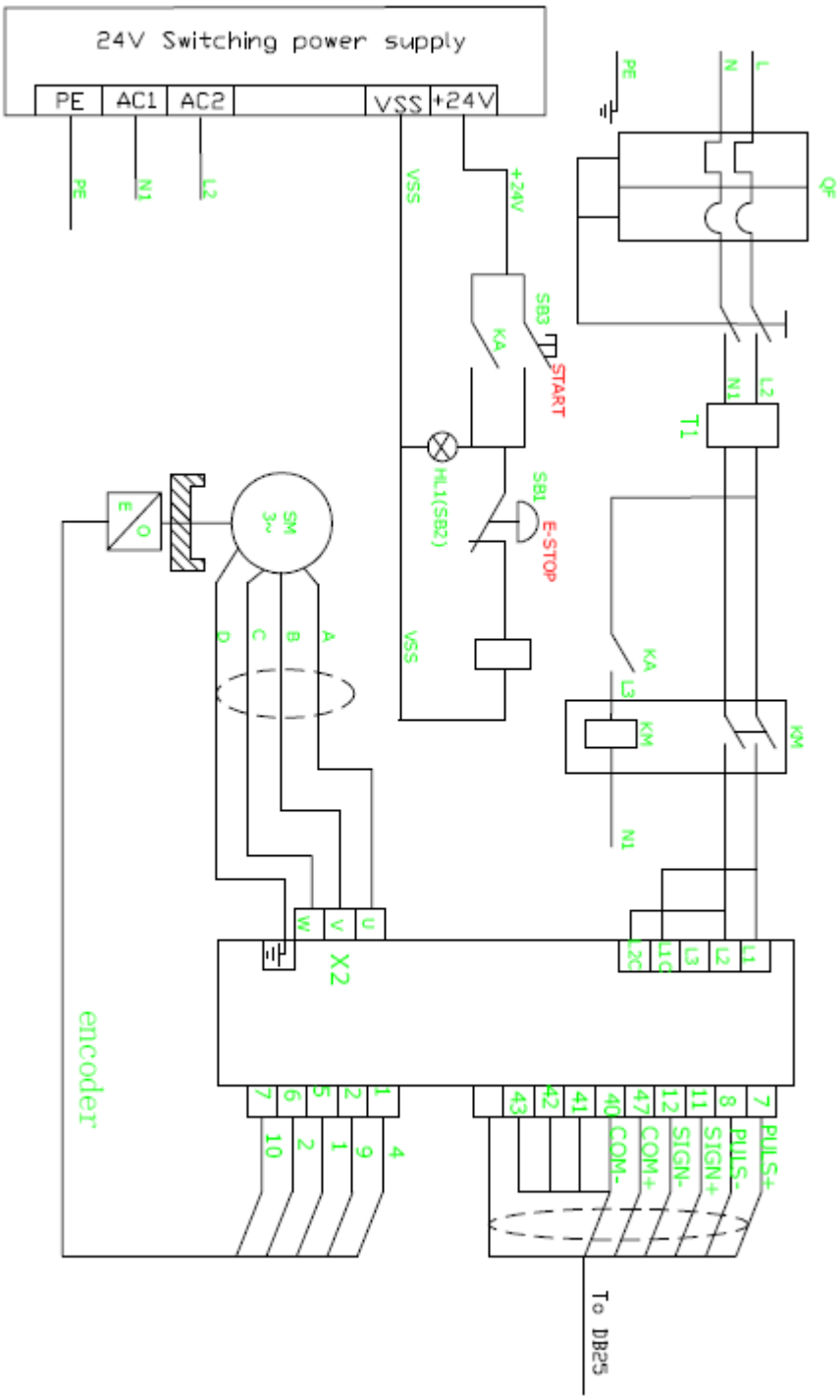


Fig. 5 Electrical Principle Diagram

8. Instruction of MaxPad LCD Handheld Control Box (ModMan-S)

Introduction:

9.1 LED

It is used to display displacement & load force

9.2 control state marking

9.3 Control speed

There are three control speeds for different speed application

9.4 Control key

Test start key, to control the test start.

Test stop key, to control the test stop.

Up-move control key, to control beam move up. It works in beam move-control mode.

Down-move control key, to control beam move down. It works in beam move-control mode.

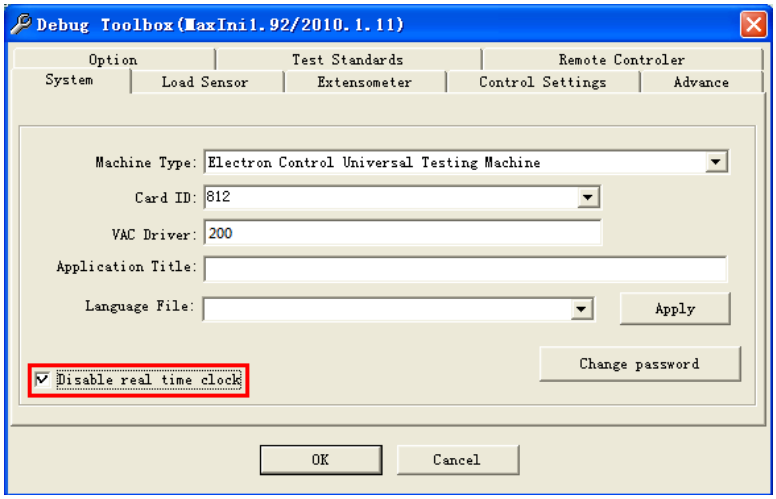
Reset control key, to reset beam position. It works in beam move-control mode.

9.5 Installation

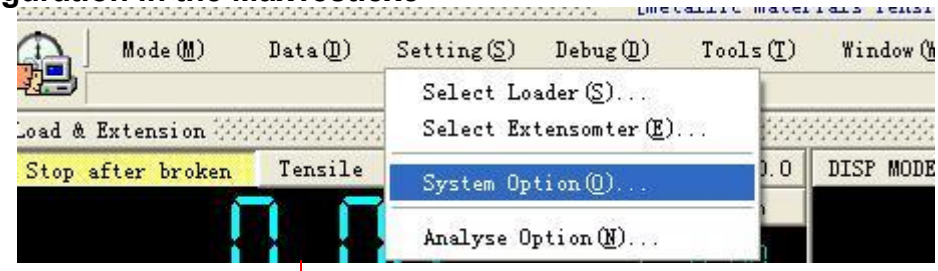
9.5.1 Install the driver

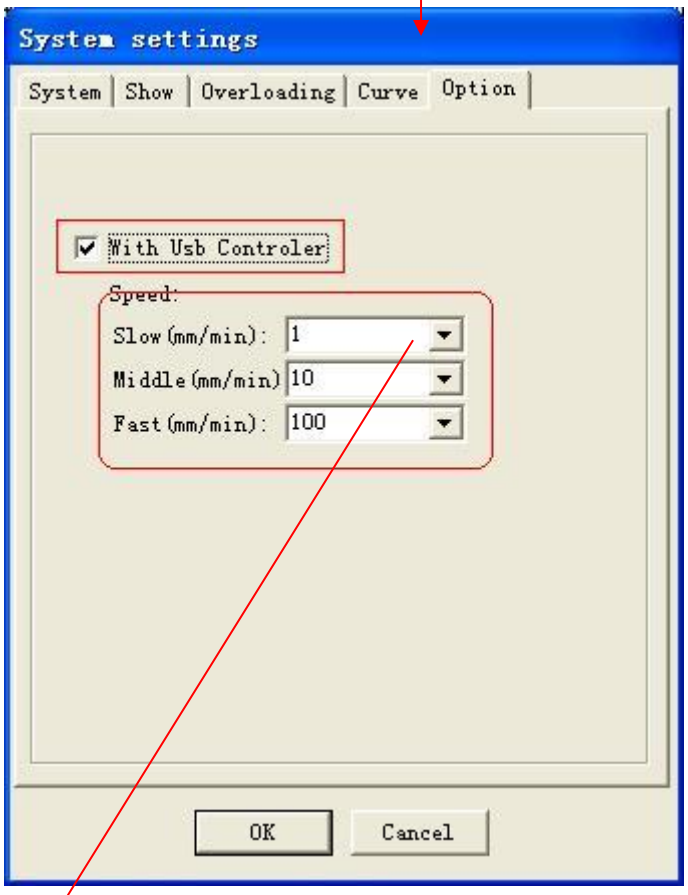
Connect the Mandan -USB to the computer:
Plug the USB cable to the connector of the computer. For the first time, that needs to install a driver. The driver program names “ModMan-USB ”, it is in the folder of the MaxTest.

9.5.2 Configuration in the MaxIni.exe



9.5.3 Configuration in the MaxTest.exe





To set the control speed value: The value of "Slow", "Middle" and "Fast" correspond to the

value on the ModMan

.

9.5.4 Successful connection marking

If the ModMan successfully connects to the compute, there would be a successful connection marking like a hand on the MaxTest's display board.