TMA - CMT-100 Computer Control Electronic Universal Testing Machine

Ⅰ Name and type of equipment

TMA - CMT-100 Computer control electronic universal testing machine

Ⅱ Application of equipment

This machine is applied in analysis and research of statics property testing of tensile, compression, bending, shearing, peeling, tearing, loading, relaxation, reciprocating and other items of metal and nonmetal material (including composite material). It can calculate ReH, ReL, Rp0.2, Fm, Rt0.5, Rt0.6, Rt0.65, Rt0.7, Rm, E and other testing parameters automatically and can do test and provide data according to GB, ISO, DIN, ASTM, JIS domestic and other international standards.

Ⅲ Main technical parameters

(1) Measurement parameters

1. Maximum test force: 100kN (can add sensors to extend the force range)

2. Accuracy class: 0.5

3. Measuring range of test force: 0.4%～100%FS （full scale）

4. Indicating error of test force: within ±0.5% of indicating value

5. Resolution of test force: ±1/300000 of maximum test force, grade unchanged and resolution unchanged in whole process

6. Deformation measuring range: 0.2%～100%FS

7. Deformation indicating error: within ±0.5% of indicating value

8. Resolution of deformation: 1/200000 of maximum deformation, up to 1/300000

9. Displacement indicating error: within ±0.5% of indicating value

10. Resolution of displacement: 0.025μm

（2）Control Parameters

1. Adjustable range of force control speed rate: 0.005～5%FS/s

2. Control accuracy of force control speed rate:

  When rate is less than 0.05%FS/s, within ±2% of setting value

  When rate is no less than 0.05%FS/s, within ±0.5% of setting value

3. Adjustable range of deformation rate: 0.005～5%FS/s

4. Control accuracy of deformation rate:

When rate is less than 0.05%FS/s, within ±2% of setting value

When rate is no less than 0.05%FS/s, within ±0.5% of setting value

5. Adjustable range of replacement rate: 0.001～500mm/min

6. Control accuracy of replacement rate:

When rate is less than 0.5mm/min, within ±1% of setting value

When rate is no less than 0.5mm/min, within ±0.2% of setting value

(3) Other parameters

1. Effective testing width: 550mm

1. Effective distance of tension: 800mm (can be custom-made according to user requirements)

2. Effective distance of compression: 800mm

3. Size of host (length x width x height): 1050×750×2100mm

4. Weight of host: about 1000Kg

5. Power supply: 415V, 50Hz, 2kW,

Ⅳ Performance and Characteristics

(1) Technical structure of mechanism:

The main frame is mainly made of foundation, two fixed beams, one moving beam, four columns and two screws constitute a portal frame structure. Transmission loading system adopts AC servo motor and synchronous cog belt speed reducer which drive high-precision ball screw and drive moving beam to realize loading. It has the characteristics of beautiful appearance, good stability, high rigidity, high control accuracy, high efficiency, low noise and energy saving and environmental protection.

(2) Control and measure system

This machine adopts the advanced DSC-10 full digital closed loop control system to control and measure and adopts computer to process testing course and dynamic display of testing curve and data processing. After testing, you can enlarge the curve to process reanalysis and editing of data through figure processing module. The performance of product reaches to international advanced level.

1. Realize special displacement, deformation and speed closed loop control. During the testing process, you can change the testing speed and testing method flexibly to make testing project more flexible and richer.

2. Multi-layer protection: including software and hardware protections and realizing overloading, over-current, overpressure, under-voltage, over speed, limiting and other safety protection ways for testing machine.

3. Three high-speed 24-bits A/D switching channel, the effective code value resolution can reach up to plus or minus 1/300000 and realize inside or outside invariable grade and invariable resolution in whole course.

4. Adopting USB or serial communication, data transmission is steady and reliable and the ability of anti-jamming is strong.

5. Adopting three pulse signal catch channel (three pulse signals are respectively one displacement and two big deformation signal) and the most advanced quadruple frequency technology at present to enlarge effective pulse quantity four times and improve resolution of signal, maximum catching frequency is 50MHz.

6. One servo motor digital-driven signal and maximum frequency of PWM output is 50MHz, minimum ones is 0.01MHz.

※ Technical advantage of control and measure system

1. DSC-10 full digital closed loop control system

DSC-10 full digital closed loop control system is our company newest research and develop new generation special control system for testing machine. It adopts international most advanced servo motor special control chips at present and multi-channel data collecting and processing module and ensures consistency of systematic sampling and high-speed, effective control function and advancement of system. Mostly use hardware module in system design to ensure product's steadiness and reliability.

2. High-efficiency and professional control platform

DSC is the combination of DSP+MCU inside and is specialized in automatic controlled IC. It integrates the advantage of DSP high speed of calculation and strong control ability of MCU to I/O and its whole performance is obviously better than single DSP or 32-bits single chip. Its inside integrate motor control needed module of hardware, for example, PWM, QEI and so on. This makes key performance of system to be guaranteed by hardware completely and ensure that system runs safely and steadily.

3. Parallel sampling mode on the basis of hardware

Another highlight of this system is that it adopts special ASIC chip. It can realize synchronous sampling to each senor signal of testing machine through ASIC chip to make us first realize parallel sampling mode on the basis of hardware at home and avoid asynchronous problem of loading and deformation caused by each senor channel sampling anciently.

4. Hardware filtration function of position pulse signal

Optical encoder position capture module adopts special hardware module and build-in 24 grade filter to process shaping filtering for sampling pulse signal. It can avoid wrong counting caused by the position pulse catching system because of interfering appearance of pulse. It can effectively make sure position accuracy and make position pulse catching system work stably and reliably.

5. Bottom realization of control function

Because the special ASIC chips share a series of peripheral work like sampling, condition monitoring and so on, the communication and others relative work are realized by inner hardware module. So our DSC specializes in controlling the main work of PID calculation and make our system not only more reliable but also let responding speed of control faster. So that allow us to complete adjustment of PID and control output from the rock-bottom calculation of control panel and make closed loop control complete at the bottom of system.

Ⅴ **Performance characteristics of DSC-10LG**

User interface supports Windows98, Windows-Me, Windows-XP, real-time curve displaying and processing, graphical visualization, software structure modularization, data storing and processing are based on MS-ACCESS database which is convenient for connecting with OFFICE software.

1. Grading management mode of user authority

After user login, the system open corresponding operation function module according to his authority. Super administrator has the supreme authority and can manage user authority, distributing different operation modules to different operators;

2. Possessing strong testing management function, testing units can be set freely according to own demand

You can edit corresponding testing program according to different standards. This system can complete test in accordance with standard request and output testing report which meets standard request after choosing corresponding testing program. It can display testing process and state of equipment, like

running state of equipment, running steps of program control, whether extensometer switching or not;

3. Strong function for curve analysis

You can choose diversified curves of load-deformation, load-time and so on, real time displaying one or some curves. You can compare the same group sample of curves using different color. Traverse curves, can enlarge any parts of testing curve to analyze. It supports to show and label each feature point as well as to choose point automatically or manually to compare on testing curve. The curves labeled feature points can be printed in test report.

4. Storing test data automatically can avoid losing data caused by accidents

With function of fuzzy query of test data, can inquire quickly test data and results according to different conditions, realizing testing result redisplay. It also can combine and open data of same test program processed at different time and lots to compare and analyze. Backup of data function can save the data stored before and check.

5. MS-ACCESS database saving format and expandability of software

DSC-10LG software core is based on MS-ACCESS database, can connect with OFFICE software, storing report as WORD format or EXCEL format; and open origin data. Users can look into origin data through database to facilitate material study, giving full play to the efficiency of measurement data.

6. Added extensometer can automatically obtain ReH, ReL, Rp0.2, Fm, Rt0.5, Rt0.6, Rt0.65, Rt0.7, Rm, E and other test parameters, parameters can be set freely, and can print graphics.

7. **Can set after yield, removing extensometer function**

DSC -10LG software automatic judgment, will switch deformation to displacement collect after finishing sample submission, and in the information bar to alert users "deformation switch is over, can remove extensometer".

8. Automatic return

Moving beam can automatically return to testing initial position.

9. Automatic calibration

Calibrate load and elongation automatically according to added standard.

10. Mode of measuring range: full range and no classification.

① Module unit: exchange a variety of accessories flexible, modular electrical hardware is convenient for function extension and maintenance.

② Automatic switch: display curve according to the test force and deformation automatic change range at the process of test.

Ⅵ **Configuration (take real product as standard)**

(1) The host: 100KN portal frame structure

1. Frame of whole machine: CMT series frame - one set

2. Ball screws: High-precision and zero clearance - (Imported Korea) – two

(2) Control system and measuring system

1. Servo motor, servo speed regulation and control system (Japan Panasonic) one set

2. Synchronous belt (Imported American) - one set

3. Load sensor: 100KN load sensor (Imported American) - one

4. Electronic extensometer: gauge length: 50mm; deformation: 10mm - one

5. DSC-10LG full digital closed loop measuring and control system (LIANGONG independent development) - one set

① Load measuring system

② Displacement measuring system

③ Deformation measuring system

6. DSC-10LG English software

7. Hand control box (with LCD screen, real-time display equipment running status, testing force and displacement, magnetic, can adsorption on the at any position of frame) - one

8. Commercial computer (Lenovo) - one

9. Printer (HP color ink-jet A4) - one

(3) Clamps (can be customized according to customer's requirements)

1. A set of wedge tensile clamps

① flat: 0-10mm   10-20mm   - one each

② V :Φ8-Φ16mm   Φ16-Φ26mm   - one each

2. A set of compression clamps (Φ160mm)

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