



MARS SERIES SERVO-HYDRAULIC SOLUTION 600 – 33,000 kN

MA

510*

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Research & Development

Early Stage 2006 - 2007

Generation I 2007 - 2012



Generation II 2013 - 2018









HTF Series MA servo control technology was born Servo energy-saving technology mature and extension

Servo technology upgrading



More precise

Smart Dynamic Interactive

Intelligent Flexible Sustainable





Page 1

Machine Range & Combinations



| | 130 | 280 | 400 | 570 | 750 | 1000 | 1350 | 1700 | 2250 | 3200 | 4500 | 5000 | 6800 | 8400 | 10600 | 15800 | 19300 | 41000 | 52800 | 62000 |
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Combination range

Features

01 Powerful

- High Injection Performance
- Resistant Plasticization Unit
- Rigid Clamping Unit Structure

03 Hardware

- Electrical parts
- Hydraulic parts

02 Efficient

- Electrical Charging as Standard
- Energy Saving
- Flexible Cooling/Thermal Control

04 Smart Technology

- Smart Algorithms
- HT- XTEND



Introducing HT·XTEND

The new **Standard** in Injection Molding through Smart Machine Technology

Al Algorithms

Sensor Technology Communication Technology

Hardware Design

MA1600

Control Technology



Introducing HT·XTEND

Real-time Monitoring Greater flexibility in production Increased Output with reduced costs optimization Al-driver Cost Reduction and ROI

> Minimizing downtime & maintenance expenses Energy Savings and Sustainability

Adaptability to New Materials

Enhanced Safety and Monitoring

Improved Precision and Quality Control

> control systems Adaptive







Overview Haitain Mars Series

High Rigid Platen

Structure reduces platen deformation and improves product quality

Intelligent Mold Open/Close

Self-learning and -correcting algorithms adjusts positioning quickly and precisely

Consumption

Smart energy consumption monitoring and auxiliary management via HMI

Intelligent Lubrication

Precise lubrication control, self-optimizing lubrication parameters

HMI

Large-screen control panel and UI design make for fast and intuitive interaction with machine

Supervised Energy

Resistant Plasticizing Unit

Strong performance with high wear resistance of plasticized parts (doubled compared G3)

Electrical Charging

Improves plasticizing speed and quality, while reducing energy consumption of the entire process (standard for models with IU of < 10600)

Dust-free distribution box

Extension of service life of technical components

High-response servo system

Tailor-made servo power system, high-speed response, dynamic sensitivity, and surging power





Injection Unit

- IU Structures
- Plasticizing Components
- Double-layer Linear Guides
- Energy-saving Heating Device
- Material Leakage Detection
- Full Closed-loop Injection Control
- Injection Performance
- Electrical Charging
- Charging Performance

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Injection Unit Structures

The injection oil cylinder below 250T, changing from a dual-cylinder to a single-cylinder, reduces injection resistance by 44% to 78% at various flow rates under no-load conditions. Injection unit 130-8400 equipment with electrical change motor, above is option.

Plasticizing Components

Highly resistant and efficient

- > 2500 kN: A screw and models below 2500 kN are standard with all hard screws
- 250T B/C screw and 250T and above models are standard with bi-metal screw
- Alloy barrel is used for models 2100T and below
- Wear resistance is greatly improved to further generations

Double-layer Linear Guides

Max. support for carriage and IU

- Low friction coefficient
- Low injection inertia
- High injection precision
- Better acceleration and deceleration response
- Precise back pressure control
- Wear resistance greatly improved to further generations

Energy-saving Heating Device

- Overall better energy saving results
- Optimal insulation
- Easy and quick to dismantle

| Туре | New | Old |
|---------------------|---|------|
| Heating Energy (kW) | 3.14 | 3.55 |
| Saving | 12 % | - |
| Description | Housing on top, left and right sides to save energy | _ |

Material Leakage Detection

When the nozzle contact surface leakage to the detection switch, and the computer read the temperature and time to a certain range, the machine will alarm, customers can choose use or not.

Full Closed-loop Injection Control

Repetitive accuracy testing of product weight

- High precision and repeatability
- Fast response
- Stability also at low injection-speeds

- Process adaptability

Repetitive injection positioning accuracy testing of high & low speed

| China National Standard | MA1600V | MA1600III |
|---|----------|-----------|
| Repetitive injection positioning accuracy | 0.080 mm | 0.160 mm |
| Repetitive injection positioning accuracy of high speed | 0.431 mm | 0.452 mm |

Shots

Consistent product quality

Full Closed-loop Injection Control

Standard Mode

Application: Acrylic cosmetic box on MA3200

Set Injection Speed

Full closed-loop mode

Actual Injection Speed

Injection Performance Improvements

Charging Performance Improvements

··· 6000/4500 ··· 12000/8400 ··· 33000/62000

- Screw speed increase
 25-35 %
- Plasticizing ability improved 18-24 %

- Overall improvement of plasticizing efficiency
- Shorten dry cycle times

Electrical Charging

- Reduced Energy Consumption
- Improving production cycle times
- Higher Charging Precision

Electrical Charging

| Condition | Item | MA1600V | MA160 |
|----------------|---------------------------------------|--|-------|
| | Energy Consumption (KW·h) | 0.879 | 1.028 |
| China National | Material (kg) | 3.095 | 3.190 |
| (without mold) | Energy Consumption Ratio (kW·h/kg) | 0.284 | 0.322 |
| | Charging Proportion | 40% | 40% |
| | Energy Consumption (KW·h) | MA1600V M tion 0.879 3.095 3.095 n Ratio 0.284 tion 40% tion 1.0139 3.870 3.870 n Ratio 0.262 tion 58% | 1.378 |
| China National | Material (kg) | 3.870 | 3.88 |
| mold) | Energy Consumption Ratio (kW·h/kg) | 0.262 | 0.355 |
| | Charging Proportion | 58% | 58% |

MAV1600 equipped with electrical charging

- Under no-load testing with PP material (MFR 30), the energy consumption decreased by 12%.
- Under loaded conditions with the mold (basin mold) using PP material (MFR 10), the energy consumption decreased by 26%.

* according to national standard with unit KW·h/kg.

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Machine energy consumption reduction

Clamping Unit

- High-rigid platen structure HT·XTEND
- High precision in positioning
- Dry cycle
- Precise mold positioning
- Lubrication Optimization

High-rigid Platen Structure

- Centralized Pressure Platen
- High rigidity against deformation
- Even pressure distribution across the surface
- Excellent moving platen support to protect the mold

High Precision in Positioning

MA III MA V

Set value

HT·CLAMP

- Program self-learning function
- Program self-correction function
- Excellent Clamping Positioning accuracy

High Precision in Positioning

By further optimizing the overall structure, oil circuit and program, the repeatability of clamping position optimized

| kN | | | |
|----|--------------|---|------------------------------|
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| | | | |
| | 6000 | ٦ | |
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| | 2800 2500 | J | oriess |
| | | Ļ | From 3.0 to 1.0 mm or |
| | 600 | J | less |

Dry Cycles in 5th Generation

| Specification | Dry Cycle time (s) |
|---------------|--------------------|
| MA600V/130 | 1.4 |
| MA900V/280 | 1.5 |
| MA1200V/400 | 1.7 |
| MA1600V/570 | 1.9 |
| MA2000V/750 | 2.0 |
| MA2500V/1000 | 2.1 |
| MA2800V/1350 | 2.25 |
| MA3200V/1700 | 2.35 |
| MA3800V/2250 | 2.6 |
| MA4700V/3200 | 2.8 |
| MA5300V/4500 | 3.05 |
| MA6000V/4500 | 3.3 |
| MA7000V/5000 | 3.6 |
| MA8000V/6800 | 3.9 |
| MA9000V/6800 | 4.3 |
| MA10000V/8400 | 4.6 |
| MA12000V/8400 | 4.8 |

- Self-learning and –correcting algorithm
- Correction of the position deviation
- Precise mold positioning
- Stable and fast performance

Non-Welding Technology

- Power pipeline non-welding process
- Cleaner and reduces the risk of oil spills

Efficient Oil Temperature Control

- Precise oil temperature control
- Stable machine performance due to oil cleaning
- Special: 2800 and above machines with a separate filtration system
- Water control valve for oil cooling

Water Control Valve for Oil Cooling

- PWM water control valve opens the cooling water circuit when oil temperature > set temperature
- Stabilization of Oil temperature

Test Design:

15% is a normal range, 20% is considered an extreme condition. At 15% heating power, the cooling water PWM can save 17.5 L/min of water supply that occupying 67.3% of the total volume. The water temperature fluctuation is calculated to be between 0.8~1.3 °C after PWM control.

| Condition | Heating Power | Oil Temp. | Water Flow Rate | Cooling Temp. | Chiller Flow Rate |
|---------------|---------------|-----------|--------------------|---------------|----------------------|
| | 10% | 36.6 | 4.16L/min | 25 | 26L/min |
| | 15% | 38.3 | 8.58L/min | 25 | 26L/min |
| | 20% | 38.8 | 9.88L/min | 25 | 26L/min |
| | 26% | 40.5 | 14.3L/min | 25 | 26L/min |
| Normally Open | 15% | 32.8 | 26.00L/min | 25 | 26L/min |

Drive Technology

- Mars Servo Drive System
- Haitian Servo Technology

Mars Servo Drive System

Dedicated servo power system for injection molding machines

185 bar System pressure

High performance servo drive system

Efficient, energy saving, quiet and stable operation

SUMITOMO high speed gear pumps

Ultra-high dynamic response of 100 ms

Haitian Servo Technology

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Software and Control

- Control Panel
- UI Design
- HT ·INJECTION
- HT ·CHARGE
- HT·LUBRICATE
- HT·DIAGNOSE
- HT·ENERGY

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MAV 12 inches panel

MAV 15 inches panel

UI Design

New UI design

HT·INJECT

- Real time monitoring of injection process
- Improves weight stability of injected products
- Acitve compensation of external disruptive factors

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HT·CHARGE

Intelligent Charging

- Energy consumption reduction
- Screw barrel wear is reduce

HT·LUBRICATE

- Algorithms and a precise lubrication model dynamically match the optimal lubrication quantity and parameters
- Intelligently optimized through multi-data algorithms such as lubrication control, cycle times, mold opening stroke and mold clamping pressure
- Automatically calculates lubricating oil consumption and displays the percentage of lubricating parts remaining in real time

HT·LUBRICATE

HT·DIAGNOSE

- The topology of the injection molding machine can be displayed on the controller to help the operator quickly determine the cause of the fault and locate the corresponding module.
- The monitoring points include: controller/J6 card/drive/transducer

Smart self-detection

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| | 9 | | <u>₩</u> & • | ⇔ ⊆ | \$ |
| 5 SLAVE IN | MASTER | Norma Disconnec Lost O | l ●Stat ted ●Stat P | te OK te Err | Dr Sta Re Ac |
| | | | | | Dr Ma Dr |
| | | | | 🕫 Back | F1 Ho |

| | | | 8 | 2022-0 | 1-10 1 |
|--|------------------|---|---|--------|--------|
| S | Topo-Information | G | | 🕒 🏭 | × • |
| Driver1:HISta.Word00000000RealSpd.0 RPMAct.Torq.0 %DC Volt.0 VDri.Temp0.0 °CMot.Temp0.0 °CDri.Bypa.NoUse | | | | | |
| Press [.] to select | | | | | |
| 🗉 Home 😰 Topo 📴 Inf | | | | | |

V1.0

HT·DIAGNOSE

- The online help
 function provides
 troubleshooting
 measures
- Maintenance tips
- QR code alarm help

| | | | | | | | 💄 8 | 202 | 2-0 |
|----|------|---|----|------------|--------|-------|------|---------|-----|
| ſ | | | | Maintain | | G | | | 115 |
| | * | Maint. Project I Every 7 Days | м | aint. Cour | tdown | 7 | Day | Fatigue | 0 |
| | * | Maint Project II Every 500 Hours | м | aint. Cour | tdown | 483 | Hour | Fatigue | 3 |
| | * | Maint ProjectIII Every 3000 Hours | м | aint. Cour | itdown | 2983 | Hour | Fatigue | 1 |
| | * | Maint ProjectIV Every 6000 Hours | м | aint. Cour | itdown | 5983 | Hour | Fatigue | 0 |
| | * | Maint ProjectV Every 12000 Hours | м | aint. Cour | itdown | 11983 | Hour | Fatigue | 0 |
| | * | Maint ProjectVI Every 36000 Hours | М | aint. Cour | itdown | 35983 | Hour | Fatigue | 0 |
| 6 | Pr | ess [OK] key to sele | ct | | | | | | |
| F1 | Home | E MT1 E MT2 | | | | | | | |

| • | | | Alarm- History | | | - |
|-----|----------|---------|--------------------------------|------------|----------|----|
| Dis | olay Sta | rt No. | 1 | Total Erro | or Count | |
| No. | Code S | ShotCnt | Alarm Description | Start | t Time | Re |
| 1 | 1D | 4 | Lubrication Fail | 01/02/21 | 10:12:42 | 1 |
| 2 | 2C | 4 | Hydraulic Safe Error | 01/02/21 | 10:11:52 | 1 |
| 3 | 1 | 1 | Please Close Door | 01/02/21 | 10:10:48 | 1 |
| 4 | С | 1 | Mold Open End Error | 01/02/21 | 10:10:15 | 1 |
| 5 | 144 | 1 | Emg Stop Feedback Error | 01/02/21 | 10:10:10 | 1 |
| 6 | 3 | 1 | Off Man./Emerg. Key | 01/02/21 | 10:09:10 | 1 |
| 7 | вв | 1 | Purge Guard Safe Circuit Error | 01/02/21 | 10:08:38 | 1 |
| 8 | 1 | 1 | Please Close Door | 01/02/21 | 10:08:21 | 1 |
| 9 | 3E | 1 | Door 2 Not Close | 01/02/21 | 10:08:17 | 1 |
| 10 | С | 1 | Mold Open End Error | 01/02/21 | 10:08:04 | 1 |

HT·DIAGNOSE

HT·ENERGY

- Real-time display of refined energy consumption information
- Enables customers to optimize energy efficiency
- Reduce energy consumption and waste
- Full range standard

| Sector 100 − 1 | Home | | 2021-01-01 16:20:1 |
|---|---|---|---|
| iiii iiii 0.0 0.0 | iiii iii iii 0.0 0.0 0. | \$ \$\$\$ 0 0.0 | 111 111 0.0 0.0 °C |
| Mold Name | IMCS (学) 0.000 kWh/kg | OilTemp ShotCount Cyc.Time Scr.Speed ClampForce | 0.0 °C 0 cnt 0.00 s 0 rpm 0 ton |
| Image: Big the second secon | 0.0 mm • 0.0 mm | Inj.Pos. Noz.Pos. | 0.0 mm 0.0 mm |

| | | _ |
|------------------|--------------------------------------|-------------------|
| | | |
| <u>.</u> | | |
| § | | |
| Heat/D Energy | rive Ratio | |
| Auto/M Energy | anual Ratio | |
| Energy | Calendar | (kW |
| 0_0 12.25 1 | 0_0_0_0 2.26_12.27 a In This F | 0 12.3 Page |
| | Enol | |
| Home | | |
| F1 | F2 | F |
| | | |
| 7 ABC | 8 DEF | |
| 4 jkL | 5 MNO | |
| 1 stu | 2 vwx | |
| 1 | 0 | |
| + 45 | ***** | • |
| | | 11.2 |

No need to match an electric meter, and easily enables refined energy consumption monitoring and analysis

| | | DIAITIAN PLASTICS MACHINERY | 5 |
|--|-------------------------------|-----------------------------|---|
| | | 2021-01-01 16:53:19 | |
| Energy-Energy | | | |
| Heate 0% | Total Power | 3600.000 kW | |
| Drive 0% | EnergyTotal | 16040.000 kWh | |
| Auto 1% | HeatEnergy | 0.000 kWh | |
| Manua 99 % | DriveEnergy | 0.000 kWh | |
| | | | |
| Vh) 💻 Auto 💻 Manua | Mass Per Mold | 0.0 g | |
| | ProdCount | 0 | |
| | EnergyPerMass | 0.000 kWh/kg | |
| <u>0</u> 0 <u>0</u> 0 <u>0</u> 0 <u>0</u> .28 12.29 12.30 12.31 | ResetTime 0000-00-00 00:00 | Reset | |
| e Not Measured, For Re | ference Only, Min: 0.0 | Max: 1000000.0 | |
| Ene2 | | 🔟 Back | |
| | | | |
| -3 F4 F5 | E6 E7 | F8 F9 F10 | |
| | | | |
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| 9 GHI | | ^ | |
| 6 | | | |
| POR | Ľ | | |
| 3 | | ~ | |
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| | 0 | | |
| 全自动 具模使用 | | | |
| | | 2 0 0 | |
| | | | |

| | | | | 2 | 1 | 2021-01-0 | 01 16:53:2 |
|---|---|----------------|--------|-----------|---------------|-----------|--------------------|
| § | | Energy-Energy2 | . | U | | <u> </u> | 3 + 4 G |
| Last Action Ene | rgy(kWh) | | Last 1 | 0 Cycle E | nergy(k\ | Wh) | |
| Mold Cls. | | 0.0000 | 1 | | | | 0.0000 |
| Mold Opn | | 0.0000 | 2 | | | | 0.0000 |
| Inject | | 0.0000 | 3 | | | | 0.0000 |
| inject | | 0.0000 | 4 | | | | 0.0000 |
| Hold | | 0.0000 | 6 | | | | 0.0000 |
| Charge | | 0.0000 | 7 | | | | 0.0000 |
| SuckBack | | 0.0000 | 8 | | | | 0.0000 |
| E's store | | | 9 | | | | 0.0000 |
| | | | | | | | |
| 🖻 Home 😰 Enel | B Ene2 | | | |] | | 💷 Bad |
| 12 Home 12 Enel | Ene2 | F4 F5 | F6 | F7 | F8 | F9 | F10 |
| F1 F2 | F3 | F4 F5 | F6 | F7 | F8 | F9 | Bad |
| F1 F2 | F3 | F4 F5 | F6 | F7 | F8 | F9 | F10 |
| F1 F2 | F3 | F4 F5 | F6 | F7 | F8 | F9 | Bad |
| Home Enel F1 F2 7 ABC 8 DEF 4 5 | F3 | F4 F5 | F6 | F7 | F8 | F9 | F10 |
| Home E Enel F1 F2 7 8 4 5 | Ene2 F3 | F4 F5 | F6 | F7 | F8 | F9 | F10 |
| P Home P Enel F1 F2 7 8 4 5 MNO 1 2 2 1 2 YWX 2 | Ene2 F3 9 GHI 6 POR 3 YZ | F4 F5 | F6 | F7 | F8 | F9 | F10 |
| Home E Enel F1 F2 7 8 4 5 4 5 1 2 | Ene2 F3 9 GH 6 POR 3 YZ | F4 F5 | F6 | F7 | F8 | F9 | F10 |
| P Home P Enel F1 F2 7 8 4 5 1 2 1 2 1 0 | Ene2 F3 9 GHI 6 PQR 3 YZ ¢ | F4 F5 | F6 | F7 | F8 | F9 | F10 |
| E Home 2 Enel F1 F2 7 ABC 8 Use 5 4 5 MNO 1 STU 2 WXX 0 + BIR | Ene2 F3 F3 9 </td <td>F4 F5</td> <td>F6</td> <td>F7</td> <td>F8 K OK</td> <td>F9</td> <td>F10</td> | F4 F5 | F6 | F7 | F8 K OK | F9 | F10 |

Integration & Control of Auxiliary

- High flexibility for integrated products
- Injection molding machine control system as the center
- Control each production unit via network system
- Mold information is associated with peripheral equipment to achieve highly automated production
- Make production data more transparent and production management more efficient
- Shortcut Buton

Integration & Control of Auxiliary

Drying hopper integrated control (optional)

- After determining the type of raw materials, the corresponding drying temperature and drying time are intelligently recommended
- After setting drying time, countdown reminder
- Timing switch function
- Fan and electric heating working status display

Integration & Control of MES

Industry Application

Automotive

Plastic parts products in the automotive manufacturing industry are suitable for various process technologies and application needs, providing efficient and highquality solutions.

Consumer Electronics

In the consumer electronics industry, plastic spare parts products in consumer electronics are designed to provide efficient and highquality solutions for molding multiple cavities.

Appliances

Plastic products in household appliances provide flexible, efficient and stable solutions based on product characteristics

Daily Necessities

Plastic products used in daily life respond to the surge in customer costs, focus on customers' return on investment, and provide various economical solutions

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MARS SERIES Thank You!

