



MK6 vs XX-A5 (Internal Confidential)











Measured Performance

Specifications vs
Actual Measured

INTERNAL ONLY

Summary Scoring

Model	General	Electricals	Hydraulics	Mechanics	Total Score
JM168-MK6					16
XX160-A5					5

Highest Actual Measured Speed for All Specifications at 99% Settings

	単位	XX160-A5	JM168-MK6
Max. Clamp Closing Speed	mm/s	768	817 (+6%)
Max. Clamp Opening Speed	mm/s	1,242	1,313 (+6%)
Max. Injection Speed	mm/s	98	108 (+10%)
Max. Plasticizing Speed	rpm	233	224 (-4%)
Max. Mould Adj. Speed	mm/s	1.7	2.5 (+50%)

- MK6 has a all-rounded speed advantage
- **XX-A5** is slightly faster in plasticizing rpm (but at the expense of very low torque due to much smaller hydraulic motor)

What Makes The Difference

Precision Hydraulics®
for the MK6



Precision Hydraulics®

- Next-Gen computer control algorithms and hydraulics circuit design
- Developed by senior Japanese engineers with decades of technical expertise, using advanced hydraulics simulation software
- Enhancement of 3rd Gen Servo-Pump technology: from 3G to 4G
- Eliminates unnecessary pressure drops for ultimate precision

Precision at HIGH SPEED

(JM168-MK6 has *sustainable* dry cycle of only 1.9s)

Rock-Solid Stability

(little vibrations and shocks even running at max. speed)

High Repeatability

(tolerances < 0.05%)

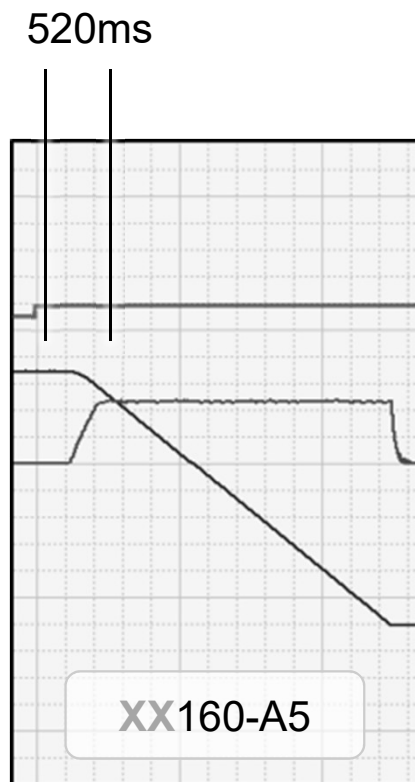


Injection Performance

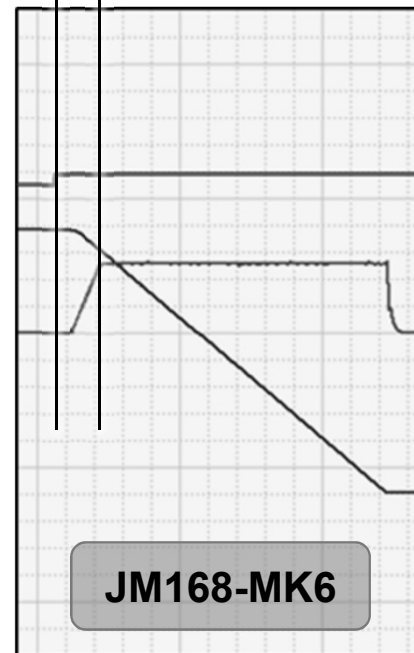
Comparisons of Injection Specs &
Actual Measurements

INTERNAL ONLY

Injection Speed Response (0 → 99%)



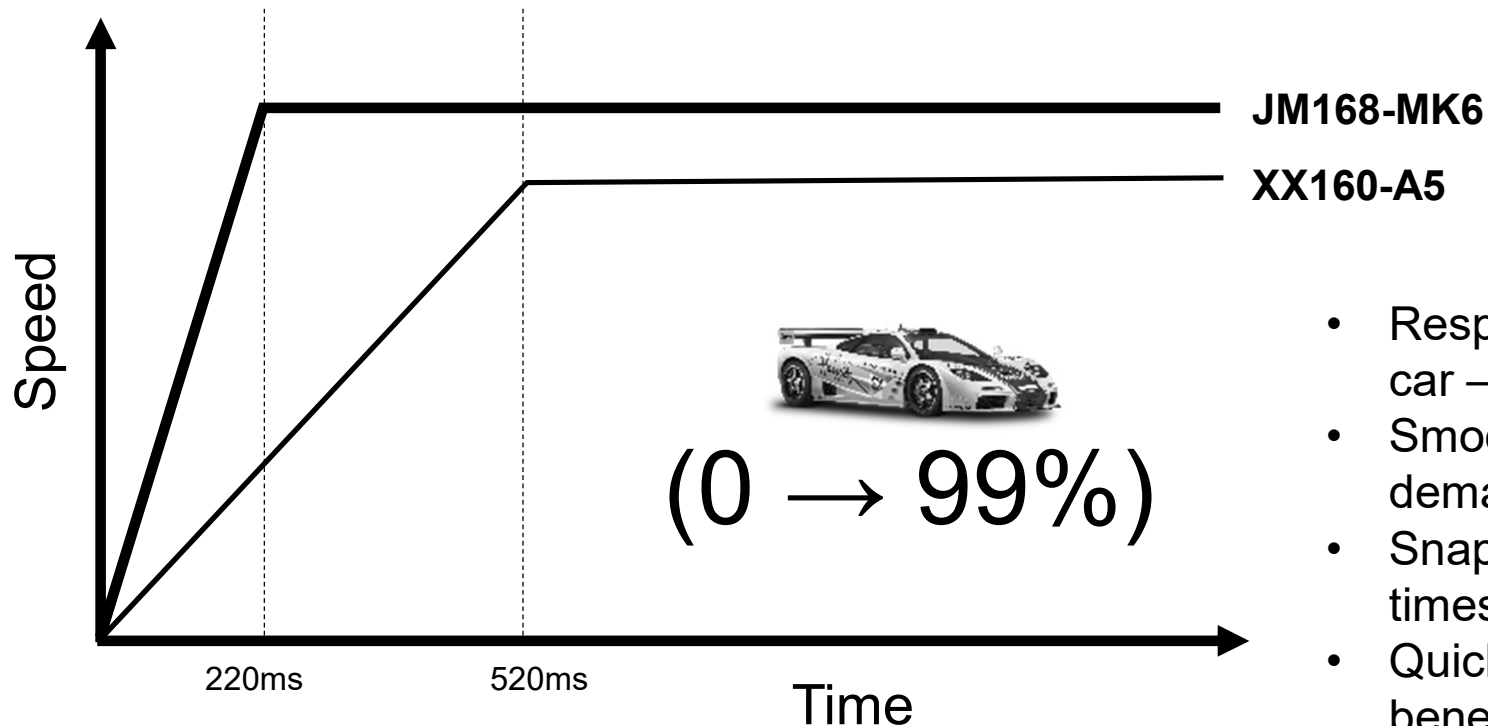
220ms



- Injection speed response curves from 0-99%
- Smaller numbers are better
- Look for: smoothness, no fluctuations, no overshoots

— Command
— Speed
— Position

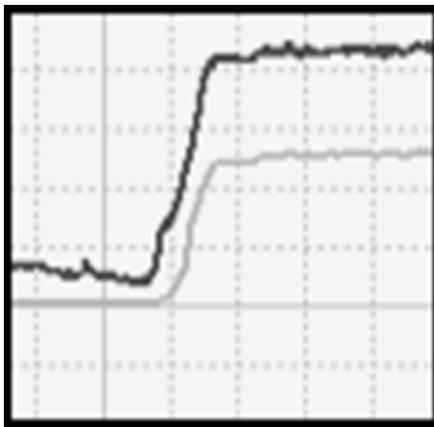
The Importance of Speedy Response



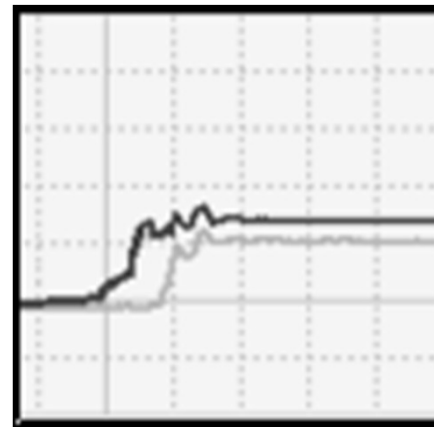
Notes

- Response is similar to a sports car – 0-100kph acceleration time
- Smooth rides at high speed demands quick responses
- Snappy responses reduce cycle times, increase productivity
- Quick responses are particularly beneficial to difficult or thin-walled moulding processes

Injection Pressure Control



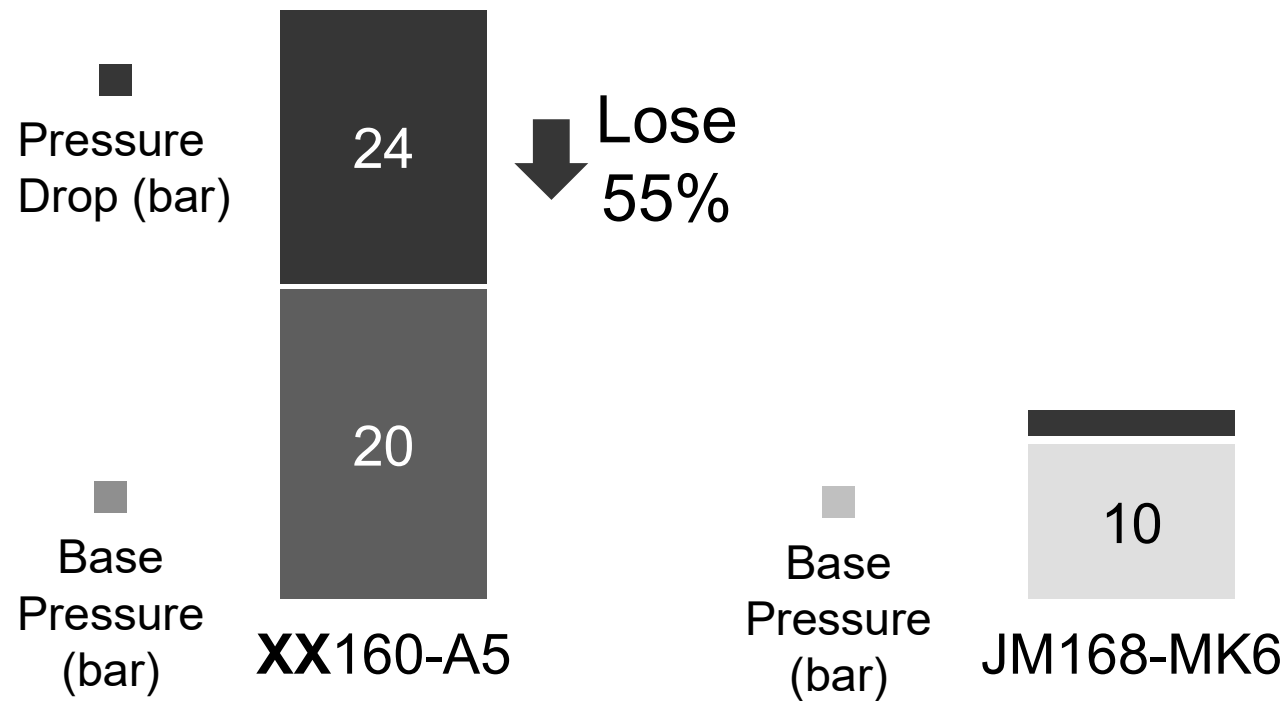
XX160-A5



JM168-MK6

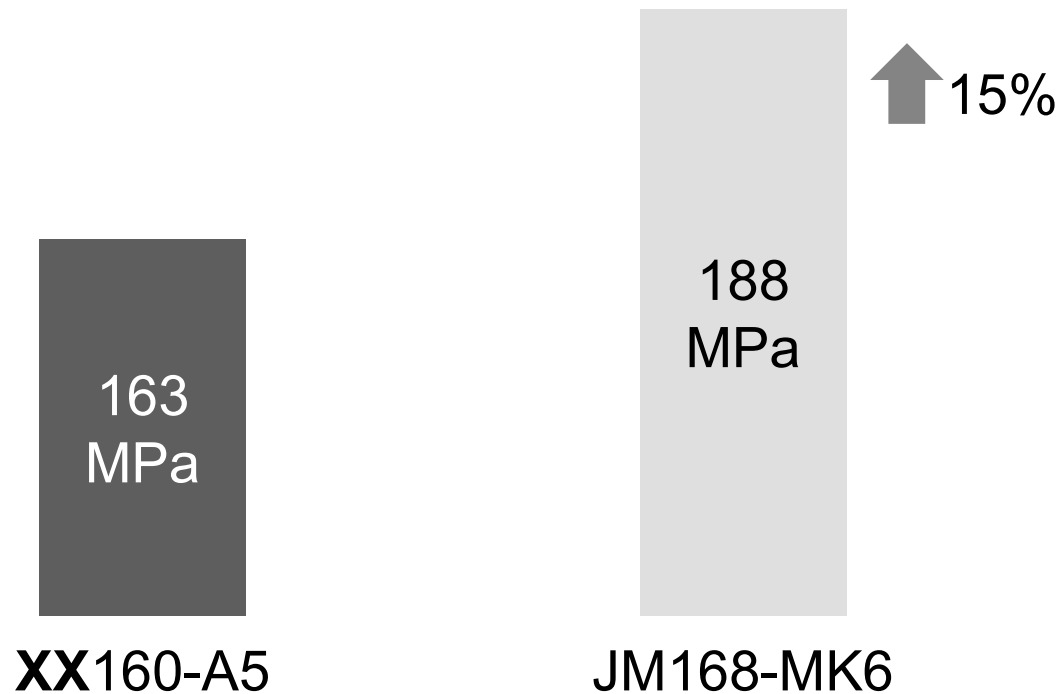
- Look for: smoothness, no fluctuations, no overshoots
- Injection pressure control is vital to ultimate part quality
- Special materials (e.g. engineering resins) are particularly sensitive to pressure fluctuations
- Stable injection pressure has a definitive impact on yield rates
- MK6 has superior pressure control

Injection Base Pressure and Pressure Drop



- Smaller numbers are better
- Base pressure and pressure drops are non-work wasted energy dispersed as heat, requiring even more energy to cool
- High base pressure or pressure drops leads to significantly lower power efficiency and energy saving
- MK6's *Precision Hydraulics*® all but eliminates pressure drops and has very low base pressure

Injection Pressure



- Bigger numbers are better
- Higher injection pressure means better and more consistent part quality

Nozzle Protection Guard

no window



XX160-A5

not convenient

Window



JM168-MK6

Easy to operate

Injection Carriage Cylinders

horizontal dual
balanced



XX160-A5

not convenient
when working on nozzle

Diagonal
Dual Balanced



JM168-MK6

Easy to operate on nozzle

Injection Base

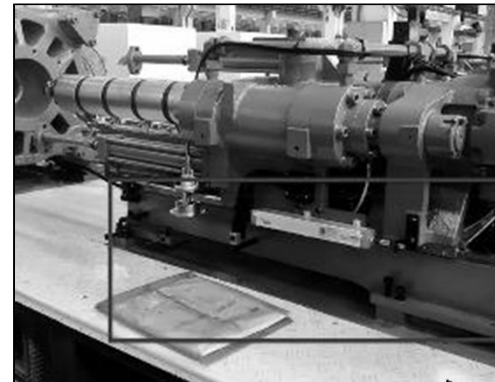
traditional guide rods



XX160-A5

not designed for
high-speed injection

Linear Rails



JM168-MK6

Smoothness for
high-speed injection



Holding Performance

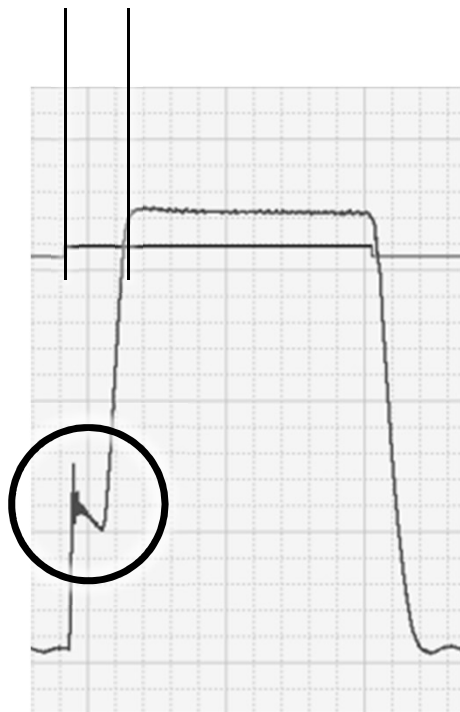
Comparisons of Holding Specs &
Actual Measurements



INTERNAL ONLY

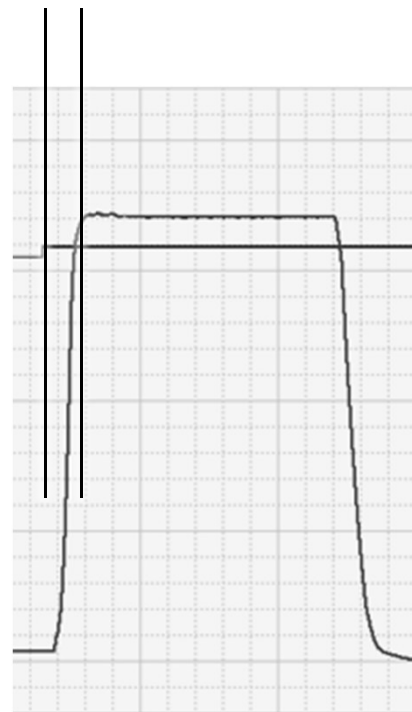
Holding Pressure Response (0 → 99%)

490ms



XX160-A5

270ms

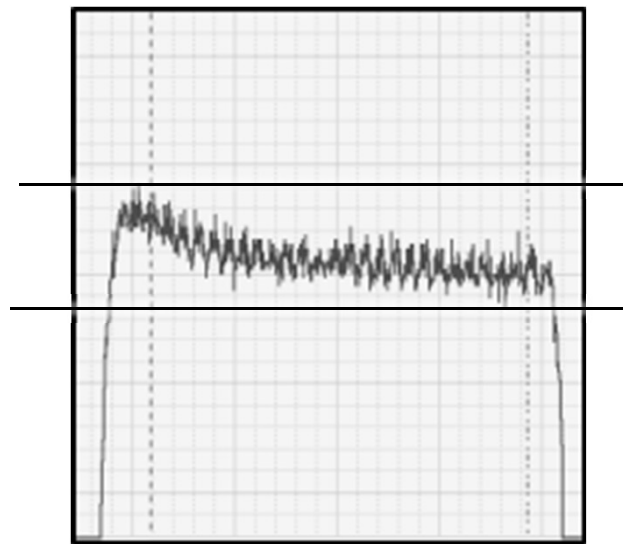


JM168-MK6

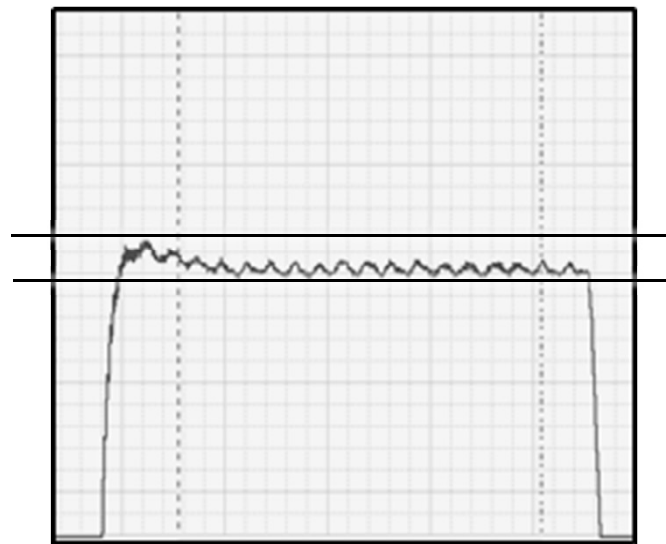
- Holding pressure response curves from 0-99%
- Smaller numbers are better
- Look for: smoothness, no fluctuations, no overshoots
- Stable holding pressure is vital to part quality and high yield
- **XX-A5** experiences significant overshoots and instabilities

— Pres. — Cmd.

Pressure Control



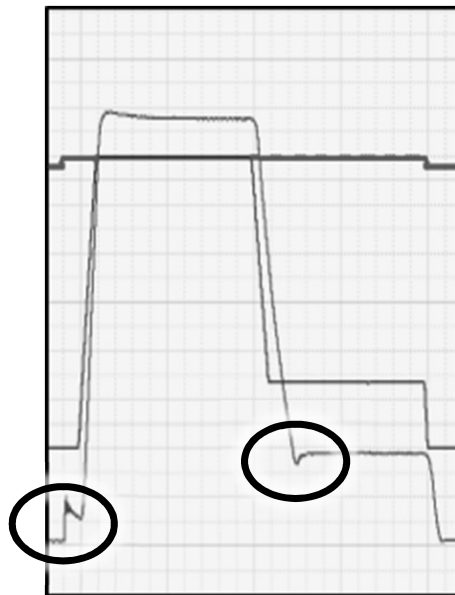
XX160-A5



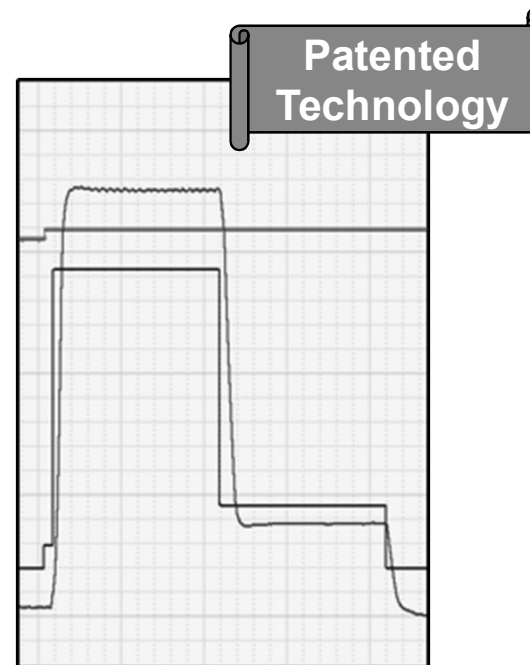
JM168-MK6

- Look for: smoothness, no fluctuations, no overshoots
- **XX-II/IIS** have lower quality pressure control – i.e. high fluctuations and overshoots
- MK6's innovative *Precision Hydraulics*[®] technology yields precise pressure control
- Precise pressure control is vital for demanding, pressure-sensitive applications such as optical parts

V/P Switch-Over Response



XX160-A5



JM168-MK6

- Look for: smoothness, no fluctuations, no overshoots
- Precise and stable V/P switch-over is vital for demanding applications requiring precise dosing

— Injection Command
— Actual Pressure
— Pressure Command

Back Pressure Control

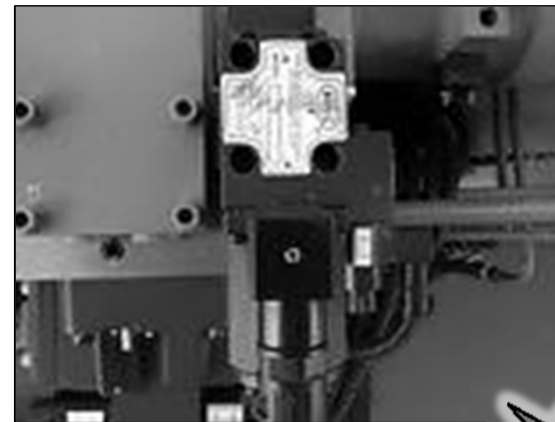
manual



XX160-A5

not convenient
slow and inaccurate

Digital



JM168-MK6

Easy, fast, accurate



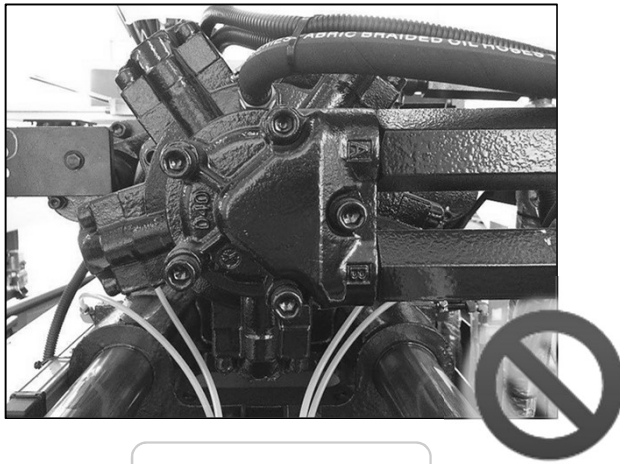
Plasticizing Performance

Comparisons of Specs &
Actual Measurements

INTERNAL ONLY

Plasticizing Motor Size and Torque

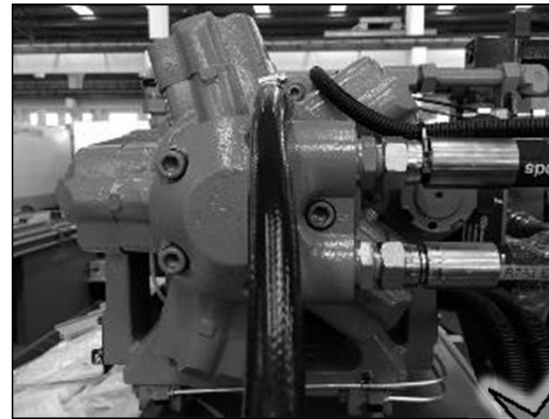
weak!



XX160-A5

Size: 400cc
Unit torque: 56 Nm

Fast and Strong



JM168-MK6

Size: 500cc
Unit torque: 80 Nm

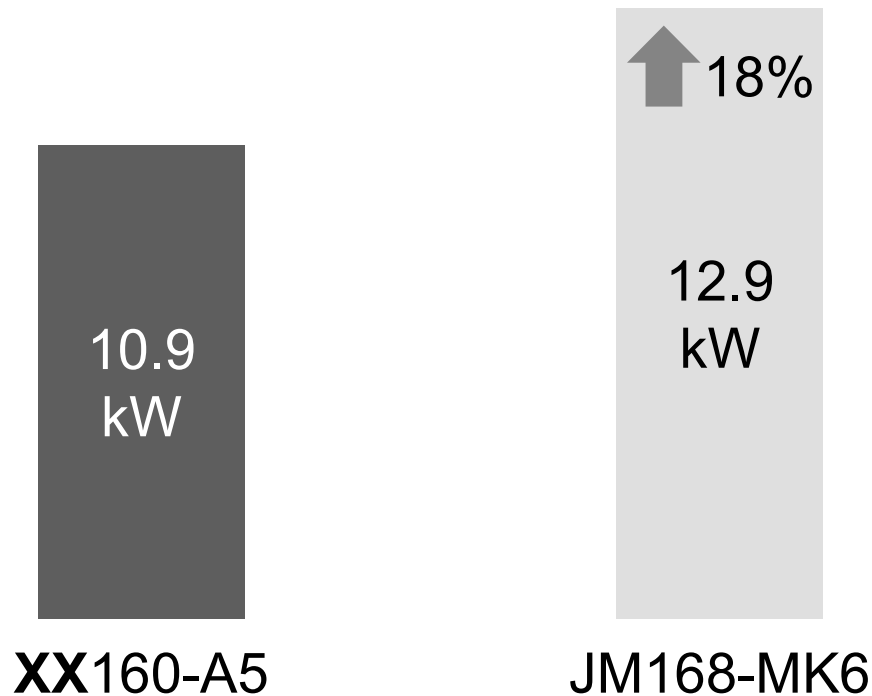
Plasticizing Torque

Model	Screw Diam.	Flow Rate	Unit Torque	Max. Pressure	Max. Torque
JM168-MK6	46mm	500cc	8	175 bar	1,400
XX160-A5	48mm	400cc	5.6	175 bar	980

↓ 30%

Due to reduced power-pack of the **XX-A5**, the hydraulic motor is artificially made smaller to maintain plasticizing speed, at the expense of very low torque (bad for engineering resins)

Max. Heater Power



- Bigger numbers are better
- Inadequate heating power reduces plasticizing quality and efficiency, lengthens cycle time

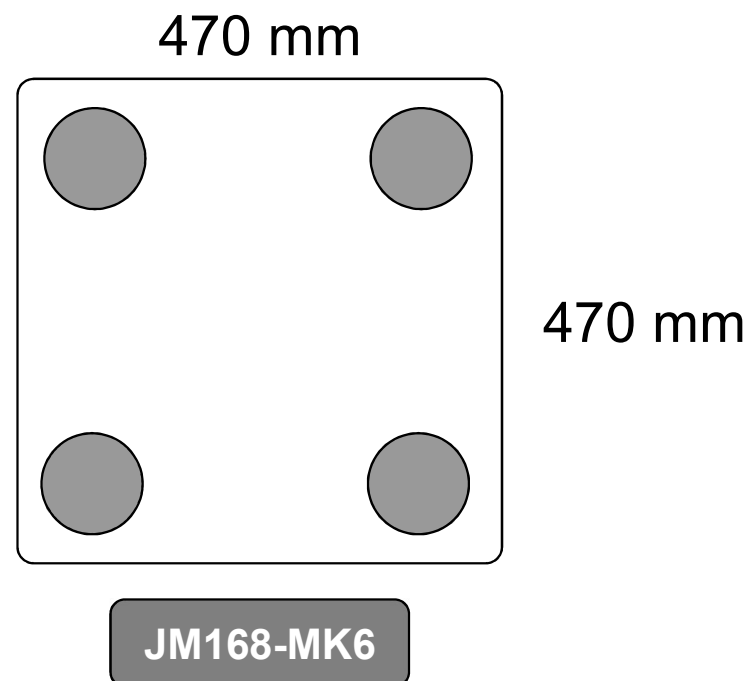
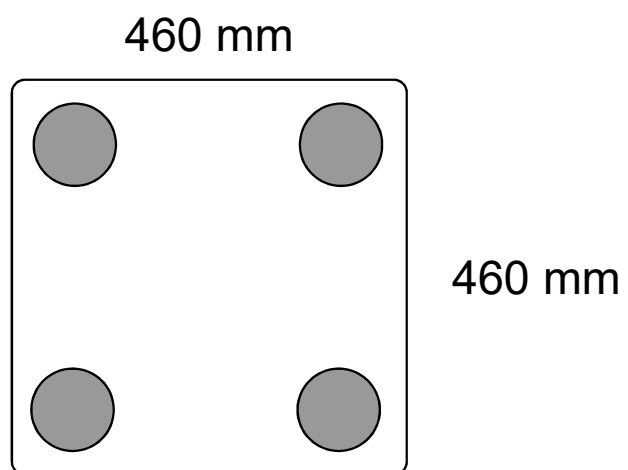


Clamp Performance

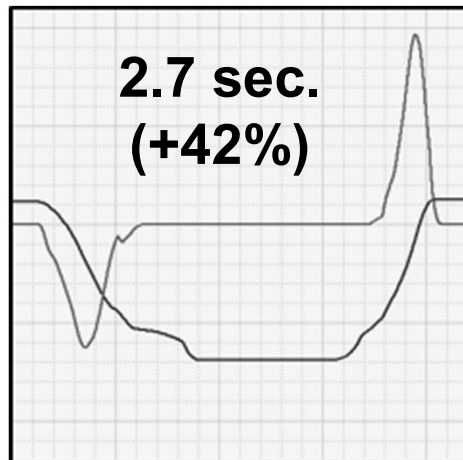
Comparisons of Platen and
Toggle Designs, Specs &
Actual Measurements

INTERNAL ONLY

Space Between Tie-bars

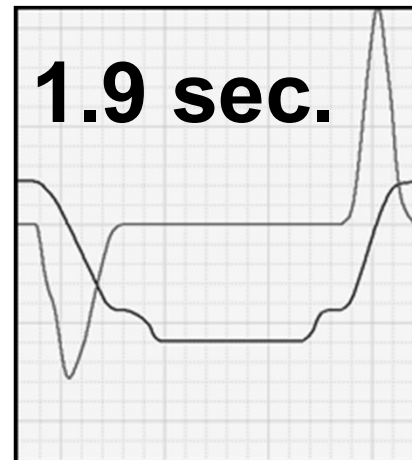


Dry Cycle Time



XX160-A5

Japanese Hydraulic
& Mechanical Tech.



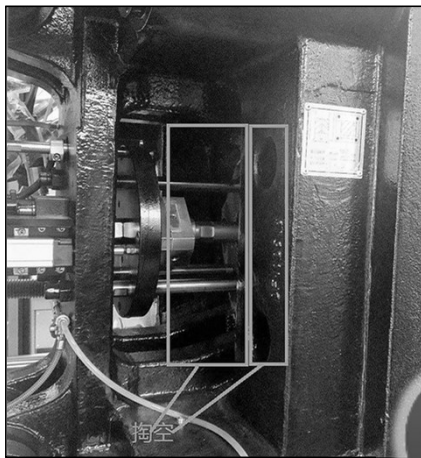
JM168-MK6

- Smaller numbers are better
- Look for: smooth motion, no fluctuations, no overshoots
- MK6's toggle mechanism and hydraulic circuit is based on advanced Japanese designs, enabling ultra-high speed operations

— Clamp Speed
— Clamp Position

Platen Construction

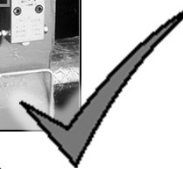
large deformation



XX160-A5

Hollow inside
Actual thickness: 70mm

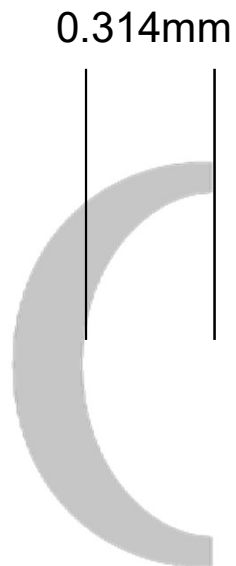
No Deformation



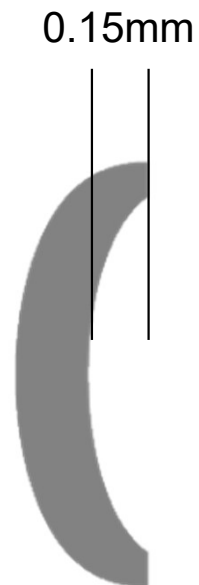
JM168-MK6

Solid inside
Actual thickness: 142 mm

Platen Deformation

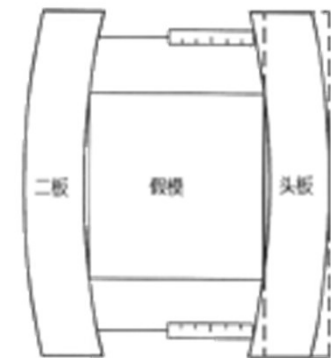


XX160-A5

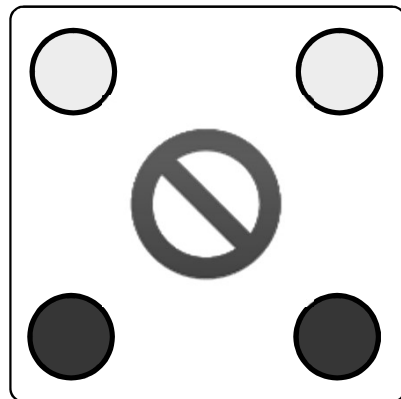


JM168-MK6

- Smaller numbers are better
- Large deformations can cause flashes
- MK6 v.next will target <math><0.1\text{mm}</math> deformation



Uniformness of Tie-Bar Deformations



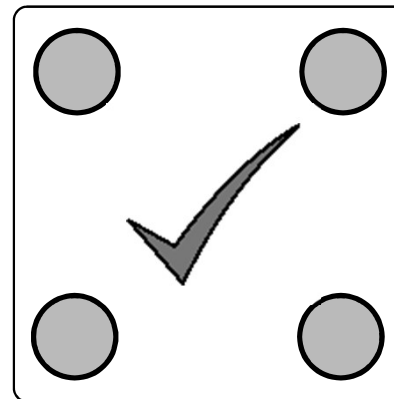
XX160-A5

● > 10%

○ 1-10%

● < 1%

Japanese
Toggle Design

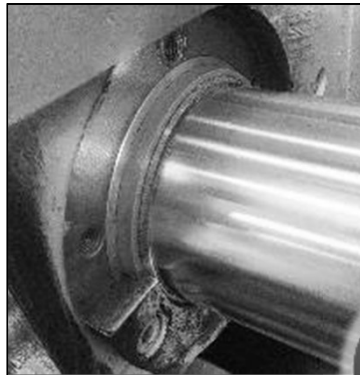


JM168-MK6

- All four tie-bars must deform equally, or uniformly, for the best part quality without flashes and internal stresses
- Only MK6's special toggle design based on advanced Japanese technology guarantees absolute uniformity

Bushings for the Moving Platen

copper

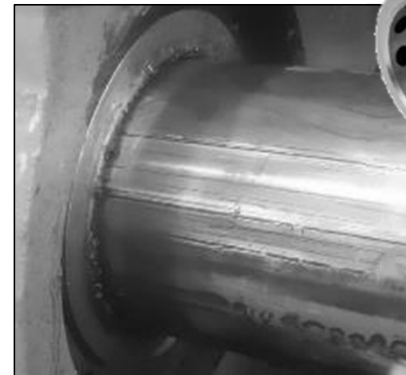


XX160-A5

high friction



Oil-less Bushings



JM168-MK6

Smooth motion
Low friction



Lubrication Oil Sensor

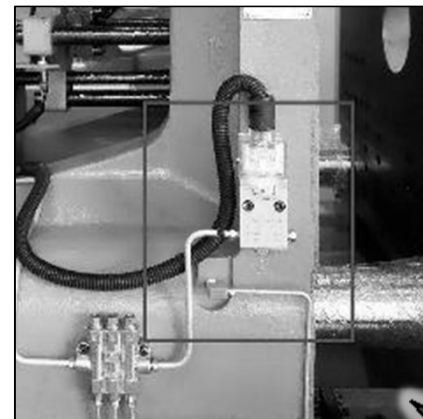
poor detection



XX160-A5

sensor installed at pump
limited detection

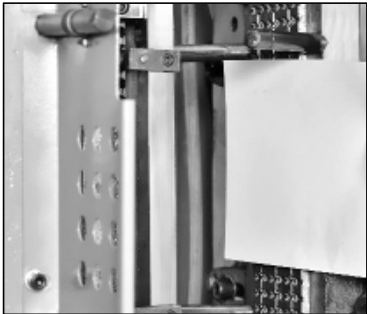
Perfect Detection



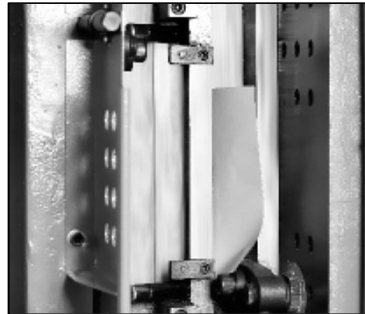
JM168-MK6

Sensor installed
at application end

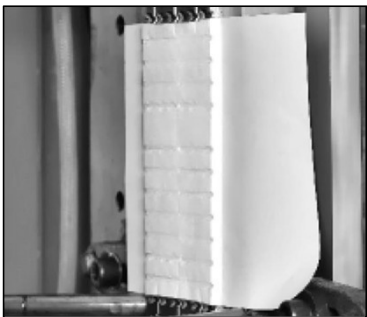
MK6 – “A4” Mould Protection Feature



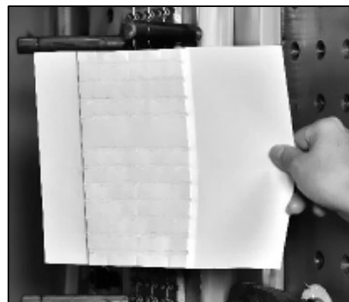
Place sheet of A4 paper inside clamp



Close clamp at 99% speed & pressure!



Clamp bounces open and alarm sounds



Inspect paper: it is not even punctured through!

- MK6 delivers the ultimate in mould protection – a single sheet of A4 paper, at 99% clamp speed and pressure settings
- *Precision Hydraulics*[®] at works here
- **XX-II/IIS** has no equivalent mould protection feature

Reopening a Locked Clamp

Locked Period	Model	XX160-A5	JM168-MK6
1 hour	Pressure	>150 bar	< 100 bar
	Status	Large noise Hard vibration	Silky Smooth
60 hours	Pressure	>160 bar	< 100 bar
	Status	Large noise Hard vibration	Silky Smooth

Hydraulic Safety Valve



XX160-A5

no safety valve
not compliant to
safety regulations

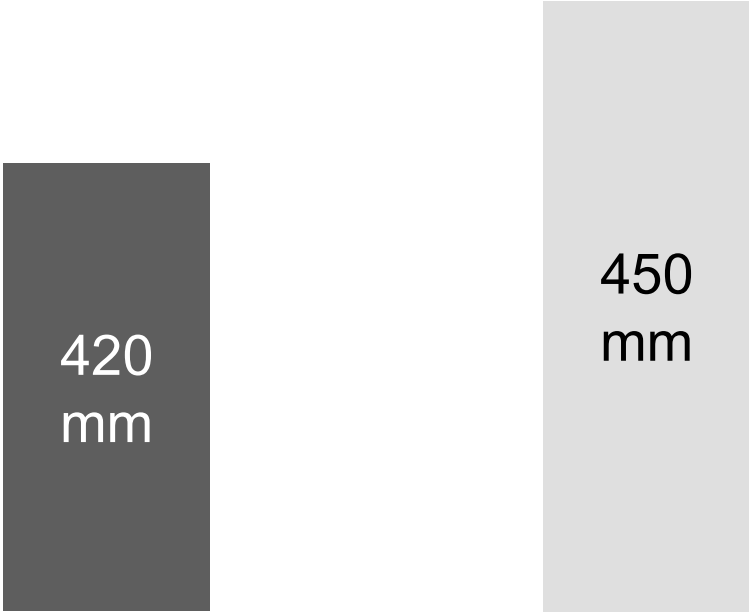


JM168-MK6



Compliant to all
safety standards

Opening Stroke



420
mm

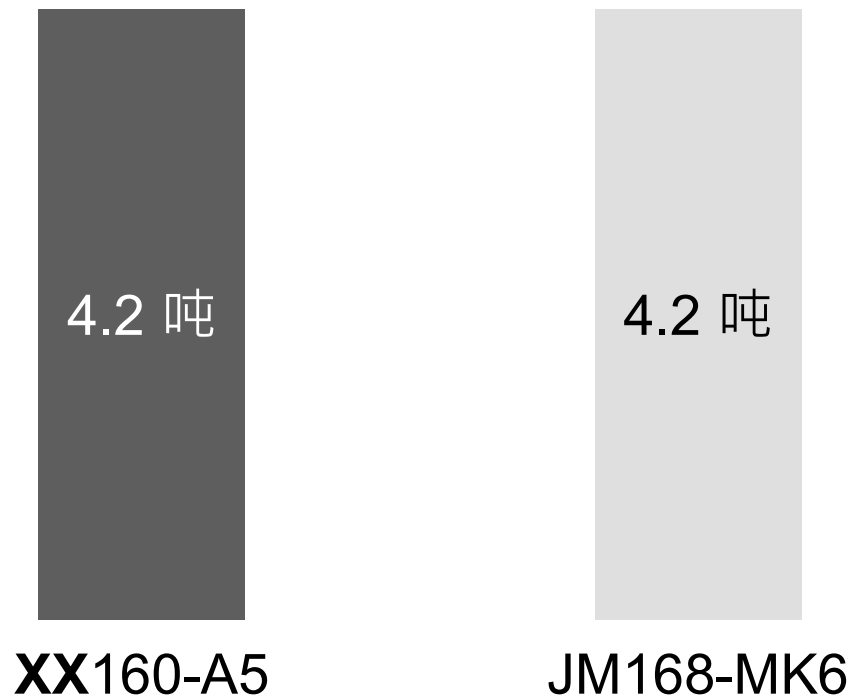
XX160-A5

450
mm

JM168-MK6

- Bigger numbers are better
- Larger opening strokes enable production of deep-cavity parts

Ejector Force



- Bigger numbers are better
- Larger ejector force enables production of deep-cavity/extra-long parts

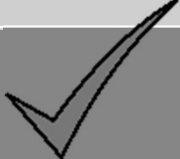



Mould Adj. Performance

Comparisons of Specs &
Actual Measurements

INTERNAL ONLY

Automatic Clamping Force Adjustment

Model	Time Needed	Set Clamp Force	Measure Mould Thickness
JM168-MK6	29 sec.		not needed
XX160-A5	77 sec.		Must

- Due to complex non-linear relationship between clamping pressure and clamping force, achieving accurate clamping force usually requires experience and certain “black arts”
- Both allow intelligent automatic adjustment of clamping force
- **XX-A5** also requires measuring the mould’s actual thickness which is time-consuming



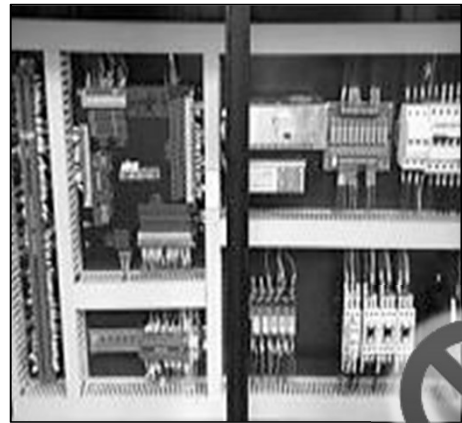
Electricals

Comparisons of Specs &
Standards

INTERNAL ONLY

Electrical Cabinet

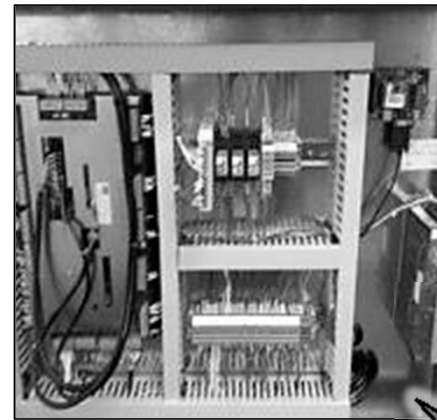
prone to interference



XX160-A5

traditional resin board

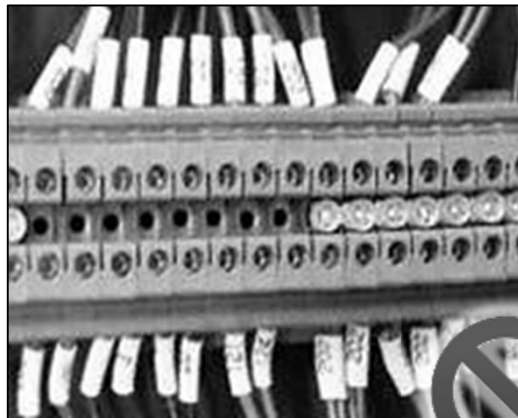
Resistant to
Interference



JM168-MK6

Galvanized sheet

Low-Voltage Terminals



XX160-A5

traditional
terminals



JM168-MK6

CE-standard
spring-type terminals

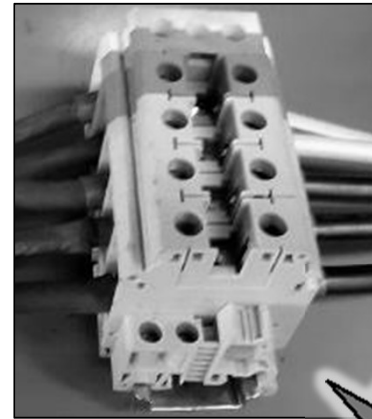
Power Connection Terminals



XX160-A5



normal terminals
not compliant
to safety regs



JM168-MK6

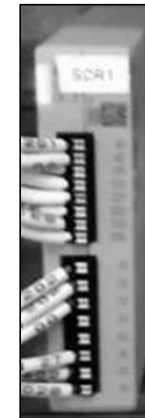
CE-compliant terminals

Safety Modules



XX160-A5

no safety module
not compliant to
safety regulations



JM168-MK6

Pilz (Germany)
Fully compliant to
safety standards

Nozzle Guard Safety Switch



XX160-A5

no safety switch
not compliant to
safety regulations



JM168-MK6

Full Compliant to
Safety Standards



Guard Door Safety Switches



XX160-A5



non-safe switch
not compliant to
safety regulations



JM168-MK6



Safety Switch
Full Compliant to
Safety Standards



Power Pack

Comparisons of Specs

INTERNAL ONLY

Maximum Sustainable Power Output

slow, low power (15kW)



XX160-A5

Pump: 50cc
Max. power: 17.5kW

Fast, High Power (22kW)



JM168-MK6

Pump: 64cc
Max. power: 22kW

Impact of Maximum Power Output on Application Processes

Power Demand by Process	5kW	10kW	15kW	20kW
JM168-MK6	✓	✓	✓	✓
XX160-A5	✓	✓	✓	trips alarm!

- Different applications require different power outputs (e.g. engineering resins and thin-walled parts require more power)
- If process power demand exceeds servosystem limit, alarm is tripped and machine stops
- Energy efficiency drops significantly when power output is close to limit
- Notes: As a servo-pump system can achieve 0 rpm, *ACTUAL* energy consumption is *NOT* related to max. power limit