



STEC-NC3 操作盒
CONTROLLER

7英寸 宽屏液晶触摸屏

Wide Liquid Crystal Touch Panel

NEW 采用触摸灵敏度高的7英寸宽屏液晶显示屏。

NEW 菜单栏始终显示在操作画面。

NEW 更改文字内容时可输入词组。

+ USB通信端口 USB CONNECTION

通过连接USB,可实现数据(动作程序·警报履历·操作履历等)管理。
USB memory connection allows handing of data such as operation program / alarm history / operation history.

+ 搭载高性能CPU,反应灵敏。

IMPROVEMENT IN OPERATION RESPONSE WITH HIGH-SPEED CPU
提高程控处理能力。
Improvement in processing capacity of sequencer.

+ 护角及防断线设计

TO PREVENT BROKEN WIRE IN CORNER GUARD AND CABLE

操作盒掉落时护角起保护操作盒本体的作用。通过改变操作盒连接接口的位置,避免操作盒线触碰操作人员身体。
Protection in the case of drop of controller. Change of cable position to avoid interference with operators.

+ 控制·动力电源分离

SEPARATION OF CONTROL AND POWER SUPPLY

出现紧急情况时保持供电,缩短安全重启、复归的时间。
Safe reboot and reduction of recovery time with emergent power source.

+ 制振控制 VIBRATION CONTROL

流畅的停止动作实现周期缩短。
Cycle improvement by smooth stop operation.

+ 标配绝对编码器 STANDARD USE OF ABSOLUTE ENCODER

接入电源时无需原点复归。
去掉感应块,减少机器保养负担。
Home return with power on not required.
Easy maintenance by abolition of sensor dock.

+ 3国语言切换(选项) THREE-LANGUAGE SWITCHING

可从日语·英语·简体中文·韩语·泰语·葡萄牙语中选择3种语言,切换显示。
Three languages can be selected from Japanese, English, Simplified Chinese, Korean, Thai, and Portuguese.

650~4000 ton 大型注塑机用 LARGE-SIZED IMM FOR 650~3000 ton

高刚性、短周期、高性能的伺服马达驱动型机械手

HIGH RIGIDITY, SHORT CYCLE AND ROBOTIC FUNCTION SERVO MOTOR DRIVEN ROBOT

ESW-III SERIES

技术革新·采用全新升级版控制器

TECHNICAL INNOVATION, NEW UPGRADE CONTROLLER.

加载了更加智能的机器人控制功能,功能多样、操作简便。
MORE INTELLIGENT ROBOTS WITH CONTROL FUNCTION, MULTIFUNCTION, EASY OPERATION.



》》操作简单 EASY OPERATION

保持菜单栏显示 CUSTOM MENU SETTINGS

常用按键始终显示在画面左侧。
Menu display buttons can be rearranged, in frequency order.

调整取出周期 EXTRACT CYCLE ADJUSTMENT

输入制品取出时间后,即可自动调节上下前后轴的速度和加速度。
Speed and acceleration of vertical crosswise axes are automatically adjusted by entering the product extract time.

自动调整顶针计时器 EJECTOR TIMER AUTO ADJUSTMENT

可自动调整顶针前进计时器。
The ejector advance timer can be automatically adjusted.

PASS动作后的直线距离显示功能

DIRECT DISTANCE DISPLAY FUNCTION AFTER PASS OPERATION
在原来的PASS设定上,显示PASS动作后的直线距离。
Direct distance after pass operation is display in the conventional pass setting.

操作盒显示吸着压力数值

VACUUM PRESSURE INDICATION ON PENDANT
操作盒画面中可显示吸着压力数值,可变更吸着确认的检测压力值设定。(标准1回路)
Displays of the amount of suction as well as the suction pressure for confirming takeup can be adjusted from the control pendant (Standard: 1 circuit).

》》节能 ENERGY SAVING FEATURE

伺服休眠功能 SERVO SLEEP FEATURE

超过设定的时间后进入待机状态,自动OFF马达电源。
Motor power is turned off after the set time.

成型周期自动联动 MOLD CYCLE AUTO LINK

机械手的动作配合成型周期,与注塑机同步动作。
Operation of the unloader is synchronized to the mold cycle.

节能监测功能 ENERGY-SAVING MONITOR

通过画面确认耗电量,及时发现电量浪费现象,节约用电。
Display of consumed electric power for power savings.

》》提高生产效率 IMPROVED PRODUCTION EFFICIENCY

生产管理功能 PRODUCTION CONTROL FEATURE

输入预定生产数量即可显示出生产完成时间。另有显示生产实际数量统计表和抽样检查功能,更有利于成型品的品质管理。
Inputs the number of pieces to be produced, and the estimated time of production is displayed. Other features such us graphing of production results and sampling also contribute to better product quality control.

初期不良品排出 INITIAL RELEASE

抽样检查功能 SAMPLE RELEASE

》》安全性 SAFETY

干涉检测功能 COLLISION DETECT FUNCTION

因操作失误、设定失误等原因引起机器干涉时,伺服马达紧急停止,有效减轻损伤程度。
Current monitor of a servo motor reduces damage by hard braking of the servo motor when interference caused by operation and setting errors occurs.

保养功能 MAINTENANCE FEATURE

画面上显示给油、定期点检时间。可通过查阅历史记录(日期)信息进行保养确认。
Lubrication and scheduled inspection schedules (oiling and regular inspection) are displayed on the screen. The maintenance history (with dates) is also displayed for confirmation.

周期确认运转 ONE CYCLE CHECK OPERATION

可通过一键启动连续步进动作,确认1个周期的运转情况。
Pressing a key allows one cycle check operation in continuous step operation.

》》环保设计 LOW STRESS ON ENVIRONMENT

环保设计 ENVIRONMENTALLY FRIENDLY DESIGN

减少铅、六价铬等环境有害物质的使用,专为环保而设计。
Environmental loading materials such as lead and hexavalent chromium are reduced.

符合RoHS CONFORMS TO RoHS

》》选项功能 OPTIONAL

CNC全编程 FULL CNC

客户可以自己编写程序。
Customers can create programs.

标准功能 STANDARD FUNCTIONS

功能名 Function Name	说明 Description
取出侧 Product Extract Side	
取出下降待机 Delayed arm descent	开模完毕前, 夹具下降至模具附近待机, 有效缩短取出周期。可任意变更设定位置。 Shorten the cycle time by making the product-side/runner-side vertical arm stand by just above the mold. Setting position is adjustable.
前进取出侧姿势控制 Crosswise product extract side posture control	在姿势动作的状态下通过安全门上方。为避免在姿势动作状态下夹具与走行体或者模具上方障碍物干涉, 姿势动作的前后位置可以任意设定。 Used to first carry out posture action on the extracting side and then start traverse action after extracting vertically extended products. Avoid interference with an obstacle on mold or the traverse rail, used to carry out the posture action after the completion of advance action. Crosswise position is adjustable.
吸着确认单元 (1回路) Vacuum confirmation unit (1circuit)	使用真空发生单元1回路取出产品。 Products are extracted with vacuum generator (tacovam) 1 circuit.
自由滑移取出 Free extract for under-cut mold	取出有扣位的产品时, 在抓取到产品后根据轴设定值移动, 解除扣位后取出产品。 Extracting the products with snap joints, moving it according to axis setting after taking the products. The products can be extracted after unlocking the joints.
顶针联动 Ejector link	抓取到产品后, 通过与注塑机的顶针联动取出产品。 Product extraction is performed connecting with the ejector of IMM.
顶针后退联动 Ejector return link	抓取住产品后, 通过注塑机的顶针联动, 取出产品。 The ejector of IMM is interlocked after holding a product.
水口横内开放 Runner release within mold	产品或水口从模具上剥离后, 需要直接在横内开放时选择此功能。 Used to release products or runners within mold after pulling them out of the mold.
固定可动切换 Extraction from fixed mold	可自由选择从模具的固定侧或可动侧取出产品。 It can be selected to take the products from fixed or moving side of mold.
前后自由伺服点 Crosswise Free Servo point	在产品夹取位置限制前后轴的伺服马达扭矩, 防止对手臂增加负荷时造成损伤。 The torque of the servo motor of an anteroposterior axis is restricted in a product chuck position. The damage to when load is added to an arm is prevented.
走行 Traverse	
走行途中姿势 Posture control during traverse	在走行途中与姿势动作。走行复归开始同时进行姿势复位, 可缩短全周期。 All the cycles can also be shorten by carrying out traverse return and posture return together after products were released during traverse action.
浇口途中开放 (走行·复归) Midway runner release (Move·Revert)	浇口往返走行途中进行开放动作。 Runner is released during traverse or return motion.
不良品排出 Defective product reject	与注塑机发出的不良品信号联动, 进行不良品排出动作。 Defective products are separated from other products interlocked with the defect signal of IMM.
初期不良品排出 Initial defective product reject	自动开始后, 根据初期不良品排出计数器的设定, 将设定数值内的产品开放到不良品位置。 Ejects only the number of extracted products and sprues preset with the counter to the ejection position after the start of automatic operations when faulty products exist after the continuation of molding following the replacement of the metal mold or material. Normal operations are then performed after this.
横走行待机 Delayed traverse	如果模具上方有障碍物, 机械手或者夹具在模具没有完全打开的情况下有干涉时, 机械手可以在模具外等待模具完全打开后走行复归。 Make the unloader stand by out of the molding machine's door if there are obstacles in the mold moving section.
落下侧 Product Release Side	
落下侧下降途中姿势 Posture midway descent at release side	在产品开放下降途中进行姿势反转动作。在上升途中进行姿势反转复位动作。 Operation of posture reversal is carried out in the middle of downward of product opening. Return operation of posture reversal is performed in the middle of a rise.
装箱点 Point packaging	与输送带或排列机等装箱设备联动, 进行产品的装箱动作。(各轴256点) Packaging operation carried out by linking with packaging device of conveyor or of pallet changer. (Max 256 points)
自由装箱点 (200点×2级) Point free packaging (200 points × 2 stage)	设定从注塑机中取出的产品的随机开放顺序。 Set the order to randomly release the products extracted form the molder.
输送带启动信号 Start signal of conveyor	产品开放完毕后, 启动输送带动作信号。 After opening a product wide, the signal of a conveyor start is taken out.
其它 Other	
3国语言切换 (简体中文、日文、英文) Three language exchange (Chinese(new), Japanese, English)	操作盒的显示画面可切换3国语言。日语·英语·汉语(简体字)为基本的切换语言。 Language switching between three languages can be used for display. Basically used languages are Japanese, English, and Chinese (new character format).
插入式用户编程 Easy NC steps (USER PROGRAM EDITING)	NC步程序的简易设定功能。在步进操作中可指定插入位置。 Features the simple NC step program settings. This makes it possible to designate positions for interruptions in mold changing operations.
外部存储记忆 External storage memory	换模信息(最大999套)保存在 Micro SD卡。 Recordable step changes (Max 999 molds). A memory is carried out to Micro SD card.
设定值隐藏功能 Default blind feature	通过隐藏功能只显示需要的轴点、时间等, 能够缩短设定时间, 提高作业效率。 The teaching time is reduced by the default blind feature that enables only axis point, timer, etc, required for actions to display. The operation efficiency is improved.
伺服休眠 Servo sleep feature	在超过设定时间后的待机中, 关闭马达电源。 Motor power is turned off after the set time.
背景灯自动OFF Backlight Auto OFF	超过[显示OFF时间]设定的时间如果不操作操作盒, 背景灯则关闭。 The backlight goes out if no pendant operation is performed for the period set with the [DISPLAY OFF TIME] function.
(部分)集中给油 (分流器) (*仅ESW-2000III机种) Centralized Lubrication system (Manifold) (Only For ESW-2000III)	定期对导轨的滑块部位做给油保养时, 可以在取出侧对各轴臂的滑块补充黄油, 缩短给油作业的时间和移动距离。 Greasing for parts of slider of the guide regularly, it can be added butter to the slider of each axis on the extraction side. Shorten the time and distance of greasing.
伺服监视 (波形监视) Servo monitor (Wave shape monitor)	可以通过操作盒监视各轴的速度, 电流等数据及波形信息。 Monitor the speed of each axis, current and wave shape informations by pendant.

选项功能 OPTION FUNCTIONS

姿势·旋转轴NC

Posture & rotation NC

装备伺服马达驱动的姿势轴和旋转轴, 在执行夹取、剪切、装箱、嵌件等动作时, 可以自由设定位置。

AC servo motor which are equipped in posture and rotation axes. It can set the position freely as extraction, gate cutting, packaging or insert motion.



姿势轴NC

Posture NC

姿势轴使用伺服马达替换传统的气缸驱动, 可以自由设定姿势轴的动作位置, 提高调试夹具的效率。

Servo motor are used on the posture axes instead of traditional cylinder driving. It can set the motion position of posture freely and improve the chuck testing.



CNC编程功能

CNC program editing function

可以简单自由的编写自动运转程序。

Can be created easily the NC program freely.



选项清单 | OPTION LIST

选项名 Option Name	选项说明 Option Name
取出侧 Product Extract Side	
吸着确认单元 (2回路) Vacuum confirmation unit (2circuits)	使用真空发生单元2回路取出产品。 Products are extracted with vacuum generator (tacovam) 2 circuits.
吸着确认单元 (4回路) Vacuum confirmation unit (4circuits)	使用真空发生单元4回路取出产品。 Products are extracted with vacuum generator (tacovam) 4 circuits.
夹具减压阀 Chuck pressure regulator	调整夹具的抓取力。 Adjust the gripping force of the chuck.
旋转功能 Rotation Unit	进行夹具板旋转动作。可以选择在模内、模外、落下侧进行旋转动作。 Used to prevent product from hitting the robot in the mold, within the mold or on the release side by rotating the chuck plate.
上升途中闭模 Mold close during arm ascent	模内上升途中, 使注塑机开始闭模 缩短开模时间, 提高周期的仕样。 Used to shorten the molding time by starting the mold closing on the way to ascent.
制品确认 (LS-4) Product confirmation LS-4	上升途中安装限位开关, 检知产品。 Detects the product mounting the limit switch in the middle rise.
落下侧 Product Release Side	
剪切回路(夹具内) Air nipper in chuck circuit	使用夹具内气剪 (1回路) 剪切水口的时候, 需要此仕样。自动运转时在落下侧的产品开放位置, 产品开放前进行此动作。 Used to take the cutting of direct gates or side gates with the air nipper in the chuck plate. When in automatic operation, cutting is made at product release position before the product release.
制品2点开放 Release product at two different points	在两处进行制品开放动作。产品夹取变为2回路。 Two different products are extracted and released to different positions on the release side. Two circuits are required for the chucking.
制品4点开放 Release product at four different points	在四处进行制品开放动作。产品夹取变为4回路。 Four different products are extracted and released to different positions on the release side. Four circuits are required for the chucking.
NT剪切·可动侧(有单元) NT gate cutting on crossmember of moving mold side (w/unit)	以处理产品水口为目的, 在落下侧的走行导轨端安装NT单元气剪, 切断水口。 For purposes of product gate processing, the air nipper in the NT unit mounted at the end of the release-side traverse rail is used to cut gates at 2 points.
其它 Other	
警报灯 (红色·无蜂鸣器) Alarm Lamp (Red color, w/o buzzer)	机械手发生警报 (异常) 时, 警报灯亮。 因机种不同, 警报灯的安装位置也有所不同。需确认。 The alarm lamp is switched on a light when there is a alarm (error) in the robot. Mounting positions are different with robots.
自动快速交换用夹具 (气压式) Quick chuck change automatic (air sw)	可快速装卸夹具。 One-touch simple mating/demating of chuck plate.
操作盒支架 Pendant stand	操作盒专用支架。 Stand of operation pendant only.
欧规 12 EUROMAP 12	欧规 12 EUROMAP 12 Specification
欧规 67 EUROMAP 67	欧规 67 EUROMAP 67 Specification

机器参数 SPECIFICATIONS

ESW-III SERIES

ESW-1700III



适用射出注塑机 Injection Press Range
650-1600 ton

基本参数 | COMMON SPECIFICATIONS

电源 Power Source	常用气压 Air Pressure	驱动方式 Drive System	姿势(气缸) Posture (Air Cylinder)	气缸推力(气压:0.49Mpa时) Air Cylinder Driving Force (Air Pressure at 0.49Mpa)		控制箱 Control Box
				最大可搬重量 Max. Load	姿势力矩 Posture Torque	
AC200~220V ±10% 50/60Hz(三相) 3 Phase	0.49Mpa	AC伺服马达 AC Servo Motor	90° 固定 90° Fixed	25kg(35Kg) (含夹具重量) Incl Chuck Weight	55N·m (110N·m)	STEC-NC3

综合参数 | GENERAL SPECIFICATIONS

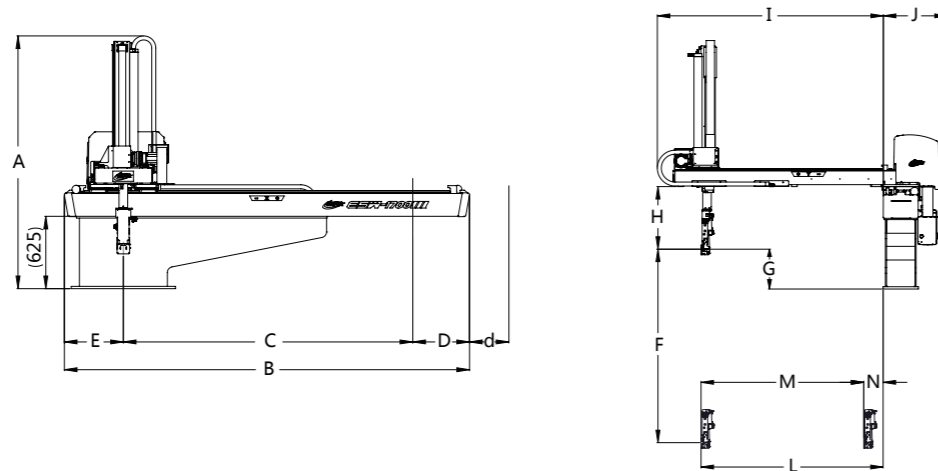
机种 Model	行程(移动量) (mm) Stroke			电源设备容量 (KVA) Electric Consumption	最大消费电力 (KW) Max Power Consumption	机器重量 (kg) Net Weight		空气消耗量 (N L/周期) Air Consumption (N L/Cycle)
	制品侧上下 Product side Vertical	制品侧前后 Product side Crosswise	走行 Traverse			本体 Main Body	操作盒 Pendant	
ESW-1700III	1700 [2000] [2300]	170~1600 [170~1900]	3000 [2500] [3500] [4000]	4.00	2.75	932.5	2.0	35.39

Ⓞ [] 尺寸表示选项行程。
Ⓞ 本体重量包括控制箱及电线的重量。
Ⓞ () 内的数值表示姿势强化型。

Ⓞ Figure in [] shows option stroke.
Ⓞ Net weight includes the weight of interlock box and driver box.
Ⓞ () is for posture reinforcement type.

ESW-1700III 外形尺寸 OUTER DIMENSIONS

- Ⓞ [] 内的尺寸表示选项行程。
- Ⓞ 姿势部厚度为115mm, 但根据配管方式不同, 此尺寸多少会有些不同。
- Ⓞ *1表示F尺寸为2000mm,
- Ⓞ *2表示F尺寸为2300mm,
- Ⓞ *3表示C尺寸为2500mm,
- Ⓞ *4表示C尺寸为3500mm,
- Ⓞ *5表示C尺寸为4000mm,
- Ⓞ *6表示L尺寸为1900mm,
- Ⓞ Figure in [] shows option stroke.
- Ⓞ Thickness of posture area is basically about 115 mm (depends on tubing)
- Ⓞ *1 When dimension F is 2000 mm.
- Ⓞ *2 When dimension F is 2300 mm.
- Ⓞ *3 When dimension C is 2500 mm.
- Ⓞ *4 When dimension C is 3500 mm.
- Ⓞ *5 When dimension C is 4000 mm.
- Ⓞ *6 When dimension L is 1900 mm.



机种 Model	ESW-1700III	
A 全高	Overall height	2180[2330]~[2480] ^{*2}
B 全宽	Overall width	4000[3500] ^{*3} [4540] ^{*4} [5020] ^{*5}
C 走行行程	Traverse stroke	3000[2500] ^{*3} [3500] ^{*4} [4000] ^{*5}
D 落下侧突出位置	Overhang, release side	490[490] ^{*3} [530] ^{*4} [510] ^{*5}
E 取出侧突出位置	Overhang, product side	510
F ①:制品侧上下行程	①Vertical stroke	1700[2000] ^{*1} [2300] ^{*2}
G ①:制品侧上下待机位置	①Vertical standby	350
H 夹具安装位置上方有效尺寸	Bottom of crosswise to chuck mount position	550
I 前后单元	Crosswise arm	1990[2290] ^{*6}
J 本体厚度	Thickness	560
K ②:水口侧上下待机位置	② Vertical standby	—
L ①:制品前进MAX	①Crosswise reach max	1600[1900] ^{*6}
M ①:制品前后行程MAX	①Crosswise stroke max	1430[1730] ^{*6}
N ①:制品前后待机MIN	①Crosswise standby min	170
O ①② 接近MIN	①② Proximity min	—
P ②:水口侧前后行程MAX	② Crosswise stroke max	—
Q ②:水口侧前后待机MIN	② Crosswise standby min	—

Ⓞ [] 尺寸表示选项行程尺寸。
Ⓞ ①: 表示制品侧手臂, ②: 表示水口侧手臂。
※ 反操作时E、D值与正操作时相同
※ d值正操作时为0、[0]^{*3}、[0]^{*4}、[0]^{*5}, 反操作时为0、[0]^{*3}、[0]^{*4}、[0]^{*5}。

Ⓞ Figure in [] shows option stroke.
Ⓞ In the column of stroke, ① stands for product side arm and ② stands for runner side arm.
※ Date E & D of anti-operator the same as operator.
※ d is 0、[0]^{*3}、[0]^{*4}、[0]^{*5} as operate, d is 0、[0]^{*3}、[0]^{*4}、[0]^{*5} as anti-operate.

ESW-2000III



适用射出注塑机 Injection Press Range
1600-4000 ton

基本参数 | COMMON SPECIFICATIONS

电源 Power Source	常用气压 Air Pressure	驱动方式 Drive System	姿势(气缸) Posture (Air Cylinder)	气缸推力(气压:0.49Mpa时) Air Cylinder Driving Force (Air Pressure at 0.49Mpa)		控制箱 Control Box
				最大可搬重量 Max. Load	姿势力矩 Posture Torque	
AC200~220V ±10% 50/60Hz(三相) 3 Phase	0.49Mpa	AC伺服马达 AC Servo Motor	90° 固定 90° Fixed	40kg (含夹具重量) Incl Chuck Weight	110N·m	STEC-NC3

综合参数 | GENERAL SPECIFICATIONS

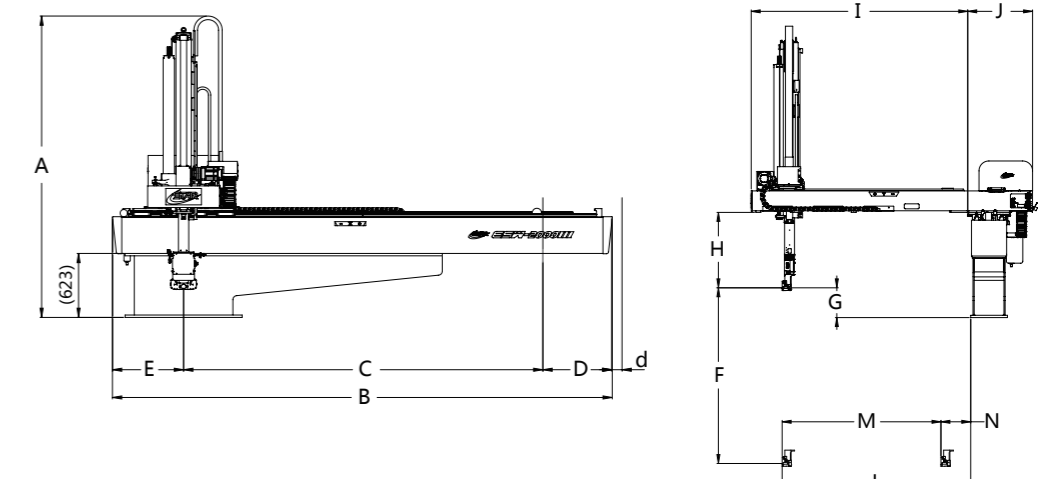
机种 Model	行程(移动量) (mm) Stroke			电源设备容量 (KVA) Electric Consumption	最大消费电力 (KW) Max Power Consumption	机器重量 (kg) Net Weight		空气消耗量 (N L/周期) Air Consumption (N L/Cycle)
	制品侧上下 Product side Vertical	制品侧前后 Product side Crosswise	走行 Traverse			本体 Main Body	操作盒 Pendant	
ESW-2000III	2500 [3000]	300~1900 [300~2100]	4000 [3500] [4500]	4.7	3.85	2021	2	129.77

Ⓞ [] 尺寸表示选项行程。
Ⓞ 本体重量包括控制箱及电线的重量。

Ⓞ Figure in [] shows option stroke.
Ⓞ Net weight includes the weight of interlock box and driver box.

ESW-2000III 外形尺寸 OUTER DIMENSIONS

- Ⓞ [] 内的尺寸表示选项行程。
- Ⓞ 姿势部厚度为125mm, 但根据配管方式不同, 此尺寸多少会有些不同。
- Ⓞ *1表示F尺寸为3000mm,
- Ⓞ *2表示F尺寸为3500mm,
- Ⓞ *3表示C尺寸为4500mm,
- Ⓞ *4表示L尺寸为2100mm,
- Ⓞ Figure in [] shows option stroke.
- Ⓞ Thickness of posture area is basically about 125mm (depends on tubing)
- Ⓞ *1 When dimension F is 3000 mm.
- Ⓞ *2 When dimension C is 3500 mm.
- Ⓞ *3 When dimension C is 4500 mm.
- Ⓞ *4 When dimension L is 2100 mm.



机种 Model	ESW-2000III	
A 全高	Overall height	2970[3220] ^{*1}
B 全宽	Overall width	5394[4869] ^{*2} [5919] ^{*3}
C 走行行程	Traverse stroke	4000[3500] ^{*2} [4500] ^{*3}
D 落下侧突出位置	Overhang, release side	701[676] ^{*2} [726] ^{*3}
E 取出侧突出位置	Overhang, product side	693
F ①:制品侧上下行程	①Vertical stroke	2500[3000] ^{*1}
G ①:制品侧上下待机位置	①Vertical standby	305
H 夹具安装位置上方有效尺寸	Bottom of crosswise to chuck mount position	760
I 前后单元	Crosswise arm	2182[2382] ^{*4}
J 本体厚度	Thickness	654
K ②:水口侧上下待机位置	② Vertical standby	—
L ①:制品前进MAX	①Crosswise reach max	1900[2100] ^{*4}
M ①:制品前后行程MAX	①Crosswise stroke max	1600[1800] ^{*4}
N ①:制品前后待机MIN	①Crosswise standby min	300
O ①② 接近MIN	①② Proximity min	—
P ②:水口侧前后行程MAX	② Crosswise stroke max	—
Q ②:水口侧前后待机MIN	② Crosswise standby min	—

Ⓞ [] 尺寸表示选项行程尺寸。
Ⓞ ①: 表示制品侧手臂, ②: 表示水口侧手臂。
※ 反操作时E、D值与正操作时相同
※ d值正操作时为0、[0]^{*2}、[0]^{*3}, 反操作时为0、[0]^{*2}、[0]^{*3}。

Ⓞ Figure in [] shows option stroke.
Ⓞ In the column of stroke, ① stands for product side arm and ② stands for runner side arm.
※ Date E & D of anti-operator the same as operator.
※ d is 0、[0]^{*2}、[0]^{*3} as operate, d is 0、[0]^{*2}、[0]^{*3} as anti-operate.