April 2016
NEW

MAUS
ITALIA

Matex

Hi-tech low-voltage electrical portable equipment and mobile stations *for* semi-automatic controlled tube expansion

CE
MADE IN ITALY

ENG

Matex

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MX-2

Matex

Hi-tech portable equipment and electric mobile stations for **semi-automatic** controlled expansion of tubes **1/4”** to **3”** (6,35 to 76,20 mm).

The ***process of tube expansion*** in tube sheet bundles using the traditional tube expander must meet ***quality, productivity and repeatability requirements*** which are essential to successfully pass the strict ***pressure, tightness tests at which the tube bundles*** are subjected in the final testing stage to meet the strict construction standards.

To ***start and control the operation of the tube expander***, Maus Italia offers a ***range of motorised control systems and accessories***, divided in three main families: portable, semi-automatic and automatic.

Our experience has selected the **control of the torque measured on the expander axis** as the most appropriate reference technology.

Unlike pure dimensional control, torque control **is able to compensate parameter variability** *(e.g. tolerances on sheet hole diameter and tube thickness)*, ensuring **reliability, repeatability and productivity** for heat exchanger manufacturers.

Thanks to its fifty-year experience in the industry, Maus Italia, a company always focused on research, has designed and manufactured the ***Matex***, the new ***hi-tech*** electric mobile stations for semi-automatic expansion of tubes, ***top of range in the ”semi-automatic” product***, whose innovative solutions allow tube expansion on an industrial scale.

These extraordinary results are achieved thanks to the latest generation electronic components selected by the engineers of Maus Italia thanks to experience gained in the manufacturing of the ***MA-2501*** working centres.

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Overview of the features of the Matex series stations

Flex Matex

Workstation with **flexible shaft**.
Matex flex is the **most practical solution** proposed by Maus Italia for the expansion of **tube bundle heat-exchangers tubes (use of 5X torque multiplier) with OD 6.35 ÷ 19.05 mm (*1/4"÷ 3/4"*)**.

It consists of:

1. ***Matextsx-blu***
   Continuous cycle digital **control unit** with microprocessor and touch screen interface
2. ***Matex R F6000***
   Low voltage brushless **electric rolling motor** featuring a high number of revolutions with arrangement for the use with flexible shaft
3. ***FSD 12/2000***
   Flexible shaft for motor-tube expander mechanic drive with optional torque multiplier (5X)
4. ***PE/901***
   Digital input remote control **pedal set**
5. ***TPB-2***
   Balancer to support the flexible shaft
6. ***Porter flag***
   Support/handling **trolley** for the controller with rolling motor support

Packaging dim.	mm *(inches)*	1400 x 820 x 1210 *(4.6 x 2.7 x 4.0)*
Net weight	Kg *(Lb)*	190 *(419)*
Gross weight	Kg *(Lb)*	300 *(662)*

Port Matex

Workstation with **portable electric tube expander**.
Port Matex is the **"portable" solution** proposed by Maus Italia for the expansion of tubes of **tube bundle heat-exchangers tubes with OD 6.35 ÷ 31.75 mm (*1/4"÷ 1.1/4"*)**.

It consists of:

1. ***Matextsx-blu***
   Continuous cycle digital **control unit** with microprocessor and touch screen interface
2. ***Matex R P####***
   Low voltage brushless **electric rolling motor** featuring a high number of revolutions in 4 versions
3. ***PE/901***
   Digital input remote control **pedal set**
4. ***TPB-2***
   Balancer to support the portable rolling motor
5. ***Porter flag***
   Support/handling **trolley** for the controller with rolling motor support

Packaging dim.	mm *(inches)*	1400 x 820 x 1210 *(4.6 x 2.7 x 4.0)*
Net weight	Kg *(Lb)*	180 *(397)*
Gross weight	Kg *(Lb)*	290 *(640)*

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Quadrol Matex

Workstation with **telescopic shaft**.
Quadrol Matex is the **most complete solution** proposed by Maus Italia for the expansion of **tube bundle heat-exchangers tubes** with **OD 9,52 ÷ 76,20 mm (*3/8"÷ 3"*)**.

It consists of:

1. ***Matex tsx-blu***
   Continuous cycle digital **control unit** with microprocessor and touch screen interface
2. ***Matex R V4*** o ***Matex R L4***
   Low voltage brushless **electric rolling motors** with 4-speed gear
3. ***F/308 HS***
   Telescopic shaft for motor-tube expander mechanic drive
4. ***F/314 HS*** o ***F/317 HS***
   Adapters with female-female double quick couplings specific for high speeds
5. ***PE/901***
   Digital input remote control **pedal set**
6. ***Porter plus*** o ***Porter executive***
   Trolleys for controller support/handling and rolling motor support with manual or **continuous servo assisted handling on axis Y**

Packaging dim.	mm *(inches)*	1570 x 820 x 1210	*(5.2 x 2.7 x 4.0)*
Net weight	Kg *(Lb)*	250	*(552)*
Gross weight	Kg *(Lb)*	360	*(794)*

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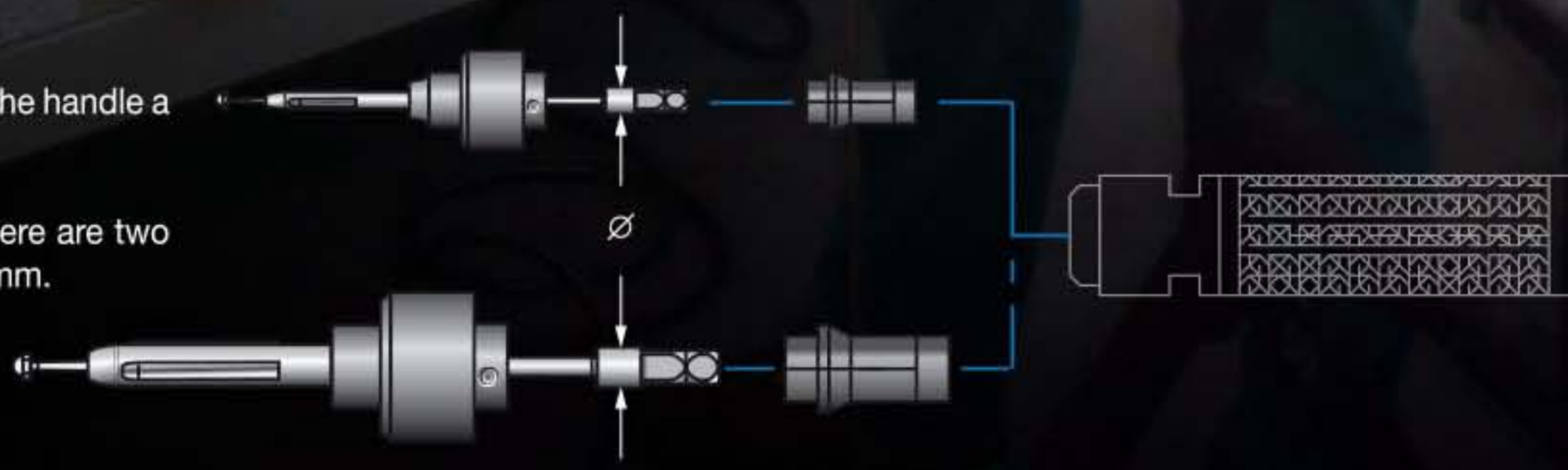
Built-in joint

The flexible shaft ***FSD 12/2000*** includes in the handle a cylindrical clamp adapter that fits perfectly the standard Maus Italia mandrel.
In the standard supply of the ***flex Matex*** there are two cylindrical clamp adapters for ø8 and ø12 mm.



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Matex

Flex Matex

Hi-tech tube rolling system **with flexible shaft** for **tubes** with outside diameter of 6,35 to 19,05 mm (**1/4”** up to **3/4”**).

In the ***Flex Matex*** system, to the digital control unit with microprocessor ***Matex tsx-blu*** *(torque-based speed continuous variation)* as been added an extraordinary innovation of **flexible shaft** ***FSD 12/2000*** mounted on ***Porter flag*** trolley for quick handling in the workshop.

The ***Flex Matex*** system, dedicated to demanding users, is recommended for **serial production of small heat-exchangers** where tool lightness and manoeuvrability sensibly reduces the production times.

Compared with the traditional rolling equipment with fixed speed motor, ***Flex Matex*** excels in terms of high productivity, high quality of the expanded product and significant reduction of tool wear.

Direct WITHOUT 5X multiplier

Max. speed
6000 rev/min (RpM)

De outside dia. tubes
6,35 ÷ 9,52 mm (1/4”÷ 3/8”)

Max. torque
3,5 Nm (2.6 Ft Lb)

WITH 5X multiplier

Max. speed
1200 rev/min (RpM)

De outside dia. tubes.
6,35 ÷ 19,05 mm (1/4”÷ 3/4”)

Max. torque
17,5 Nm (12.9 Ft Lb)

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Port Matex

Portable hi-tech tube rolling system for **tubes** with outside diameter of 6,35 to 31,75 mm (**1/4”** up to **1.1/4”**).

WITH Matex R P6000

Max. speed
6000 rev/min (RpM)

De outside dia. tubes
6,35 ÷ 9,52 mm (1/4”÷ 3/8”)

Max. torque
3,5 Nm (2.6 Ft Lb)

WITH Matex R P1500

Max. speed
1500 rev/min (RpM)

De outside dia. tubes
6,35 ÷ 19,05 mm (1/4”÷ 3/4”)

Max. torque
13,5 Nm (9.9 Ft Lb)

WITH Matex R P1000

Max. speed
1000 rev/min (RpM)

De outside dia. tubes
6,35 ÷ 25,40 mm (1/4”÷ 1”)

Max. torque
20,5 Nm (15.1 Ft Lb)

WITH Matex R P600

Max. speed
600 rev/min (RpM)

De outside dia. tubes
6,35 ÷ 31,75 mm (1/4”÷ 1.1/4”)

Max. torque
35 Nm (25.8 Ft Lb)

In the ***Port Matex*** system, the digital control unit with microprocessor ***Matex tsx-blu*** *(torque-based speed continuous variation)* is associated with a small powerful portable brushless motor available in 4 versions:

- ***Matex R P6000***
- ***Matex R P1500***
- ***Matex R P1000***
- ***Matex R P600***

The ***Port Matex*** system, dedicated to demanding users, is recommended for the production of small exchangers where tool lightness and manoeuvrability sensibly reduces production times.

The ***Porter flag*** trolley and the balancer ***TPB-2*** are options available to ease the use of the portable equipment.

Compared with the traditional expansion system with fixed speed motor, ***Port Matex*** excels in terms of high productivity, high quality of the expanded product and significant reduction of tool wear.

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Quadrol Matex

Hi-tech expansion system **with telescopic shaft** for tubes with **outside diameter** from 9,52 to 76,20 mm (**3/8”** up to **3”**).

Maus Italia introduces the ***Quadrol Matex*** system with the digital control unit with microprocessor ***Matex tsx-blu*** *(torque-based speed continuous variation)* in conjunction with suspended electric rolling motor (***Matex R V4*** or ***Matex R L4***).
The telescopic shaft ***F/308 HS*** is used for the mechanical driving of the tube expander.

The dedicated ***Porter*** trolley is proposed in two versions: ***plus*** *with manual continuous handling on axis Y or* ***executive*** *with* ***continuous servo-assisted handling on axis Y.***

The ***Quadrol Matex*** system, dedicated to demanding users, is recommended for the **production of medium-big heat-exchangers** where **tool power and manoeuvrability** sensibly reduces production times.

Compared with the traditional expansion system with fixed speed motor, ***Quadrol Matex*** excels in terms of high productivity, high quality of the expanded product and significant reduction of tool wear.

WITH Matex R L4

Max. speed
450 rev/min (RpM)

De outside dia. tubes
9,52 ÷ 76,20 mm (3/8”÷ 3”)

Max. torque
180 Nm (132.8 Ft Lb)

WITH Matex R V4

Max. speed
800 rev/min (RpM)

De outside dia. tubes
9,52 ÷ 44,45 mm (1/4”÷ 1.3/4”)

Max. torque
125 Nm (92.2 Ft Lb)

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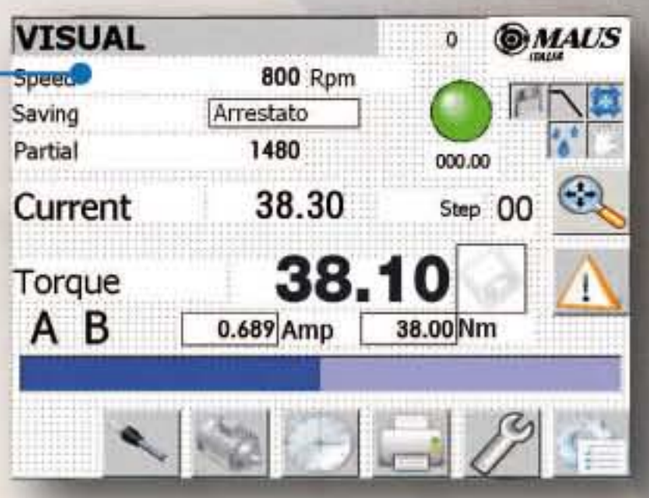
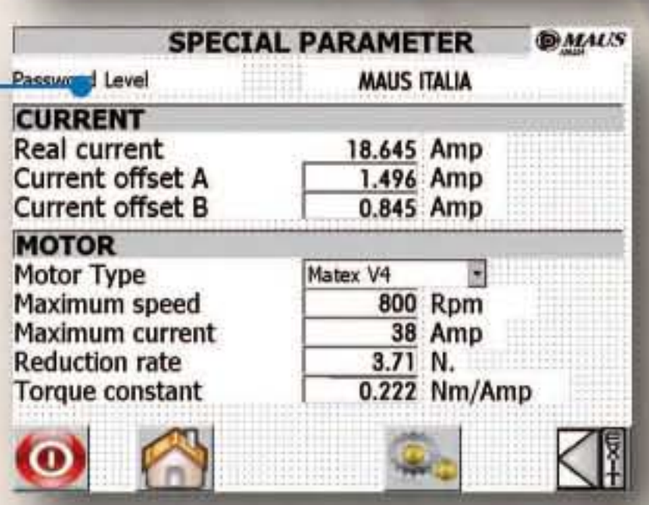
Viewing

During the tube rolling process, this screen is the home page for the operator who needs to control all the parameters involved. Access to all "Setup" screens is controlled by the icon menu on the bottom.



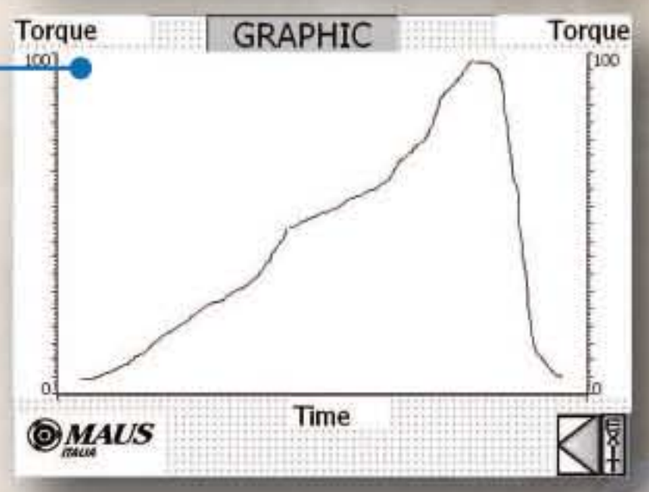
Special parameters

Setup/Verification screen (with password protection) of the configuration of the rolling motors connected to the control unit. Command centre for the automatic setting of the rolling motor offset and for general configuration.



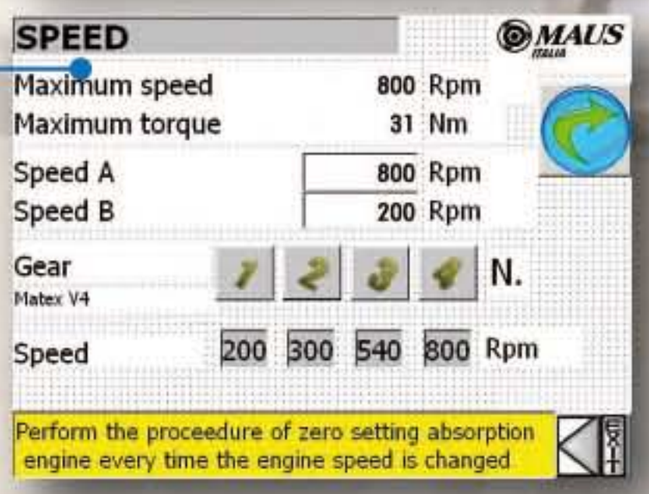
Graph

Displays in real time the graph of the torque delivered by the expander in Nm of the last 30". The displayed "range" is from zero Nm to the value reached by the machine.



Speed

Adapts to the rolling motors of the ***R*** series connected to the rolling unit and selected in the "Setup". The speed of the two main stages of the tube rolling can be defined; the **approach** (Phase A) and the **crushing** (step B) and if provided the rev/min for each stage.



Main Menu

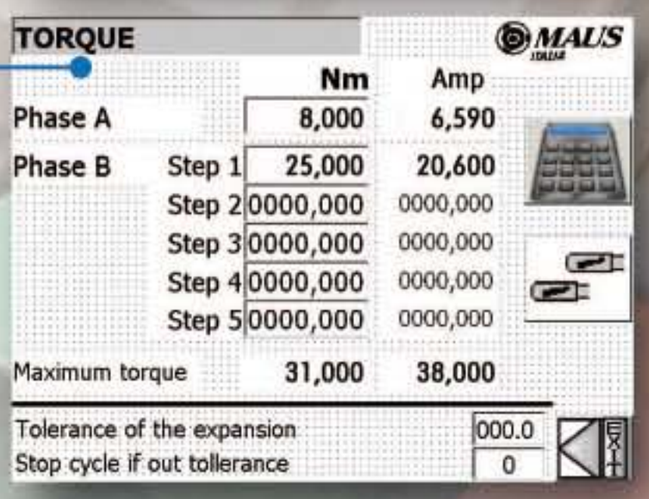
Screen for quick access to:

- Motor offset
- Tube rolling report activation
- Activation of lubrication during cycle
- Operation in automatic cycle
- Operation in manual cycle
- Activation of "decreasing speed"

Torques

It is possible to set the torque values of the rolling motors for the two main stages of the tube rolling; **approach** (step A) and **crushing** (step B).

Setting the torque value in Nm, the motor draw value in Ampere is displayed next to the above value.



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Matextsx-blu

Continuous cycle electronic digital control unit with touch screen interface

Independent of the voltage variations ± 10%

The digital **control unit** ***Matextsx-blu*** is the brain of the system. Easy to use and equipped with 8" LCD **touch screen**, it has user friendly interface with dedicated software and it is protected by a sturdy metal case with a high degree of protection IP 55.

The ***Matextsx-blu*** allows the compensation of the tolerances for both the diameter of the holes in the tube sheets and of the thickness of the tubes with consequent **reaching of uniform sealing** of all the tubes at the operating pressure of the heat-exchange equipment, also estimating **tube rolling times.**

Designed to match the rolling motors of the ***R***-series,

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Matex R F

Flexible shaft

		Matex R F6000	
		F6000 *Direct WITHOUT **5X** multiplier*	**F6000** *WITH **5X** multiplier*
Max. speed	rev/min *(R.P.M)*	6000	1200
Max. torque	Nm *(Ft Lb)*	3,50 *(2.6)*	17,50 *(12.9)*
O.D. tubes Max.	mm *(inches)*	9,52 *(3/8")*	19,05 *(3/4")* *

Matex R P

Portable

		Matex R P####			
		P6000	**P1500**	**P1000**	**P600**
Max. speed	rev/min *(R.P.M)*	6000	1500	1000	600
Max. torque	Nm *(Ft Lb)*	3,50 *(2.6)*	13,50 *(9.9)*	20,50 *(15.1)*	35,00 *(25.8)*
O.D. tubes Max.	mm *(inches)*	9,52 *(3/8")*	19,05 *(3/4")*	25,40 *(1")*	31,75 *(1.1/4")*

* Non ferrous

Matex R L4

Telescopic shaft

		Matex R L4			
	Mechanical gearbox	I[a]	II[a]	III[a]	IV[a]
Max. speed	rev/min *(R.P.M)*	110	170	300	450
Max. torque	Nm *(Ft Lb)*	180 *(132.8)*	150 *(110.6)*	84 *(61.9)*	57 *(42.0)*
O.D. tubes Max.	mm *(inches)*	76,20 *(3")*	63,50 *(2.1/2")*	50,80 *(2")*	38,10 *(1.1/2")*

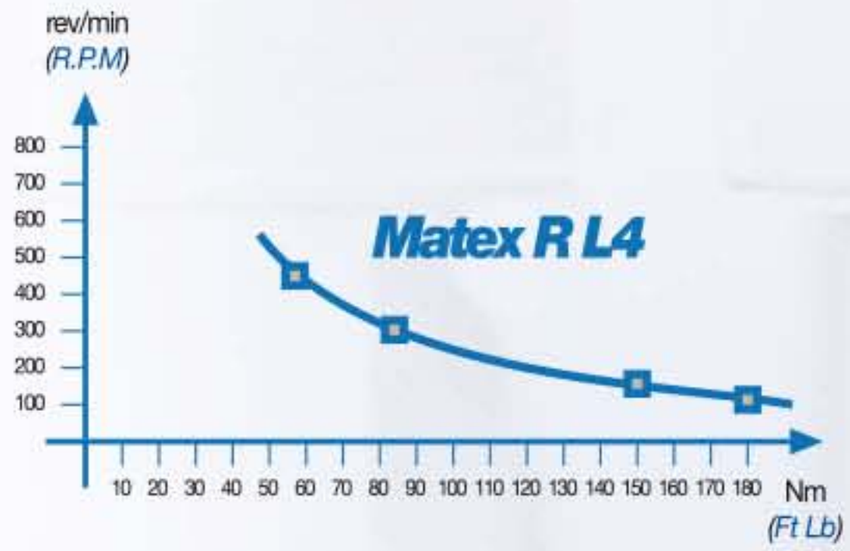
Matex R V4

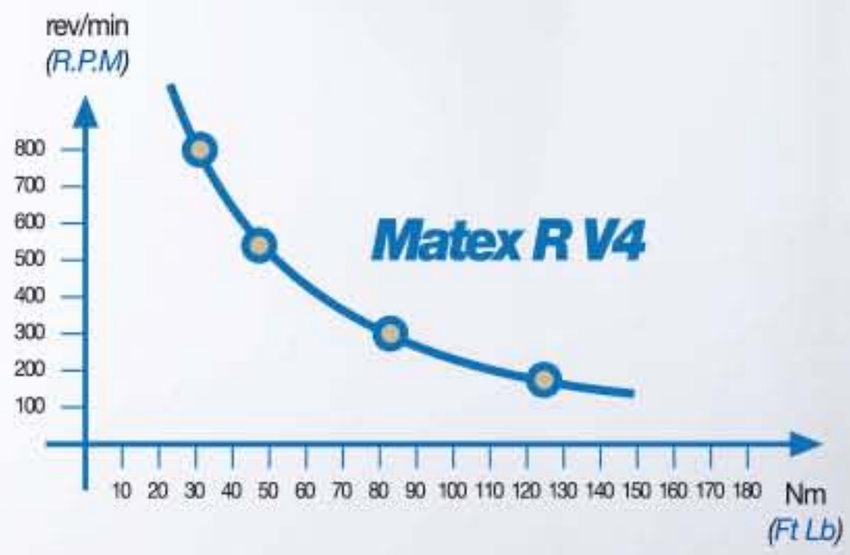
Telescopic shaft

		Matex R V4			
	Mechanical gearbox	I[a]	II[a]	III[a]	IV[a]
Max. speed	rev/min *(R.P.M)*	200	300	540	800
Max. torque	Nm *(Ft Lb)*	125 *(92.2)*	83 *(61.2)*	47 *(34.7)*	31 *(22.9)*
O.D. tubes Max.	mm *(inches)*	44,45 *(1.3/4")*	38,10 *(1.1/2")*	31,75 *(1.1/4")*	25,40 *(1")*

Flexibility of use

Due to the **4 speed gearbox**, the **rolling motors *Matex R L4*** and ***Matex R V4*** are able to **optimize the "range" of speed on yhe base of the operating parameters, as described in the below tables and graphs.**





Matex R

Low-voltage electric rolling motors with **brushless motor**

Several models of **electric rolling motors** are available to meet the main technical requirements from the market, according to the tube size and to the required expansion characteristics.
Strong and **low-noise**, the ***R*** series rolling motors feature a **low-voltage variable speed brushless motor** (48 V) and integrated suspension and are **specially designed to provide**:

- Great increase in sensitiveness;
- Continuous speed variations;
- Flexibility of use.

With the **low-voltage** rolling motors, the strict **safety** requirements set out for portable equipment in **work sites characterised by the presence of great metal masses are satisfied**.

Designed for exclusive use with the control unit ***Matextsx-blu***, they are paired as follows:

Matex R	F	P	V4	L4
Flex Matex	●			
Port Matex		●		
Quadrol Matex			●	●

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F/308 HS

Articulated telescopic shaft for mechanical drive from R L4 and R V4 motors to the tube expanders manufactured by Maus Italia

It is the technological evolution of the previous F/308, with innovative design solutions making it reliable, particularly easy to handle as well as accurate and stable at high speeds.

It increases the operating range along the X and Y axis and it completes motion along the Z axis;
It allows to quickly connect the tube expander by means of the ***F/317 HS*** joint.

Special executions available upon request

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Working cycle

It is hereinafter analysed the evolution of the rotation speed of the **rolling motors *Matex R*** in the phases of tube rolling, as indicated in the diagram alongside:

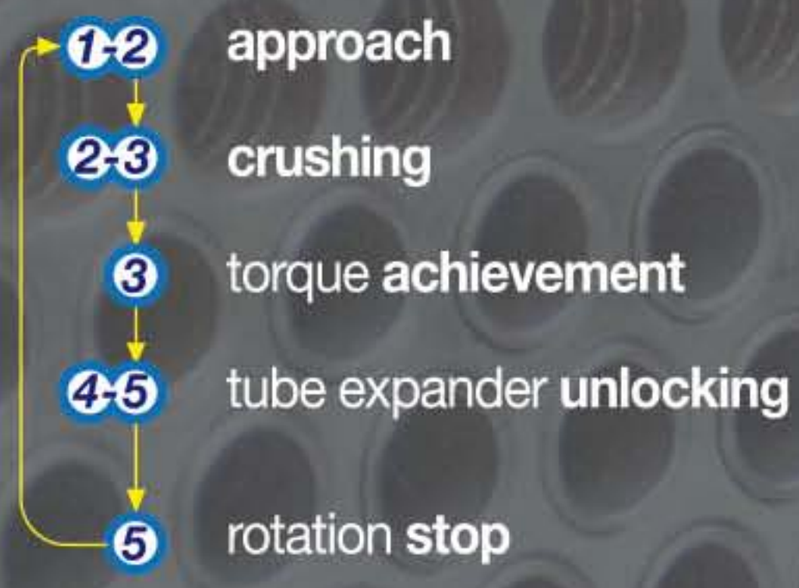
approach of the tube to the wall of the tube sheet hole with **high speed rotation** of the tube expander;

crushing of the tube thickness with torque-based speed decreasing **continuous variation**

reaching the set torque value, with **stop** of the rotation of the tube expander;

unlocking of the tube expander with initial slow rotation speed and fast rotation up to the complete extraction of the tube expander;

instantaneous **stop** of the rotation to permit the reinsertion of the tube expander in the next tube during the **scheduled pause** before the **automatic restart** of the **continuous cycle** from the point 1



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patented

F/314 HS
F/317 HS

Joints with **double female-female quick** coupling specific for **high speeds**

The joints with double quick coupling ***F/314 HS*** and ***F/317 HS***, besides allowing to **replace the tube expander in very short time**, with an **accurate and patented design**, ensure that the shaft ***F/308 HS*** is **perfectly coaxial** with the tube expander mandrel, reducing any vibration and allowing the operator to more easily insert of the tube expander, even if rotating, into the tube.

PE/901

Digital input remote control pedal set

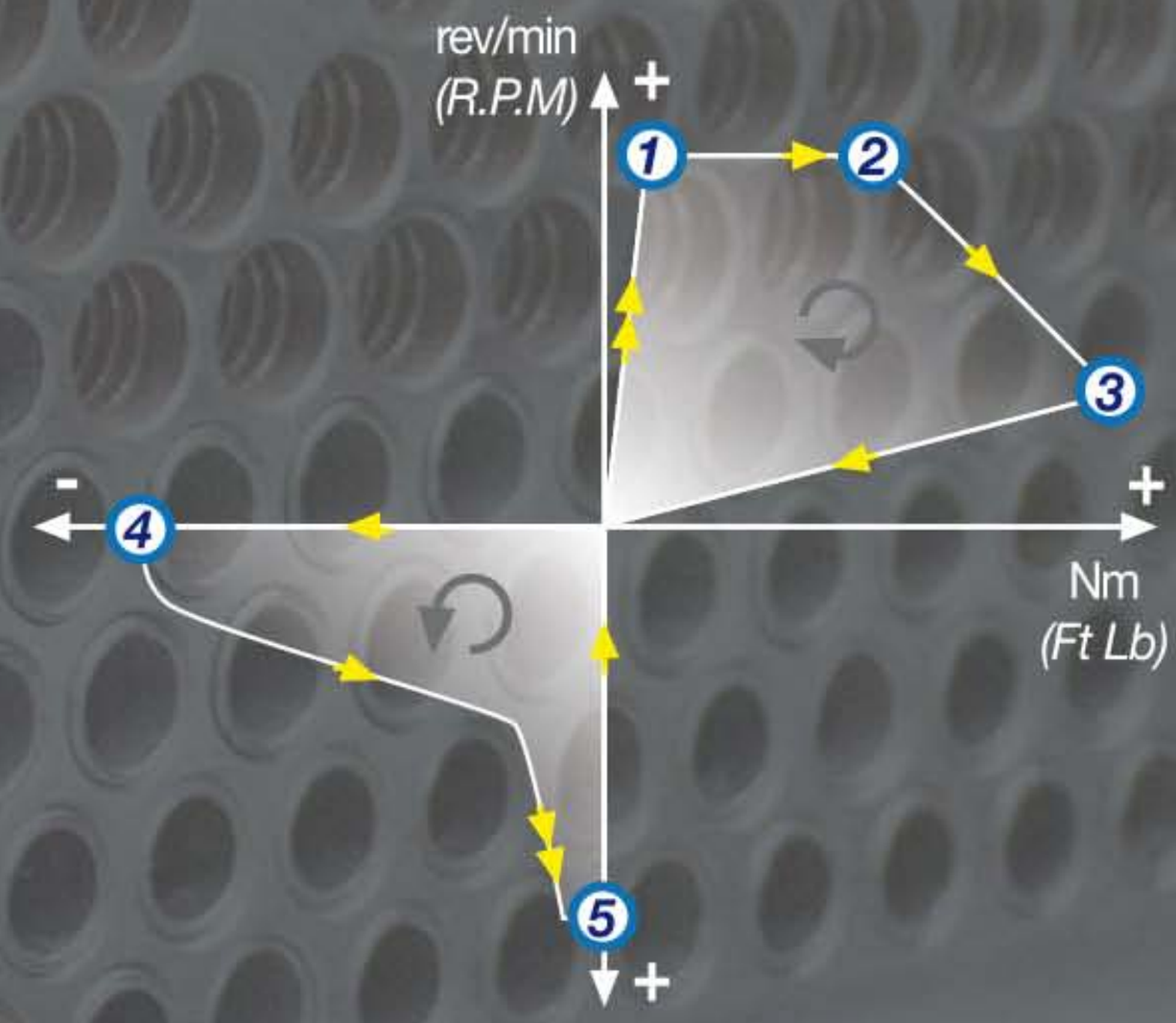
High speed

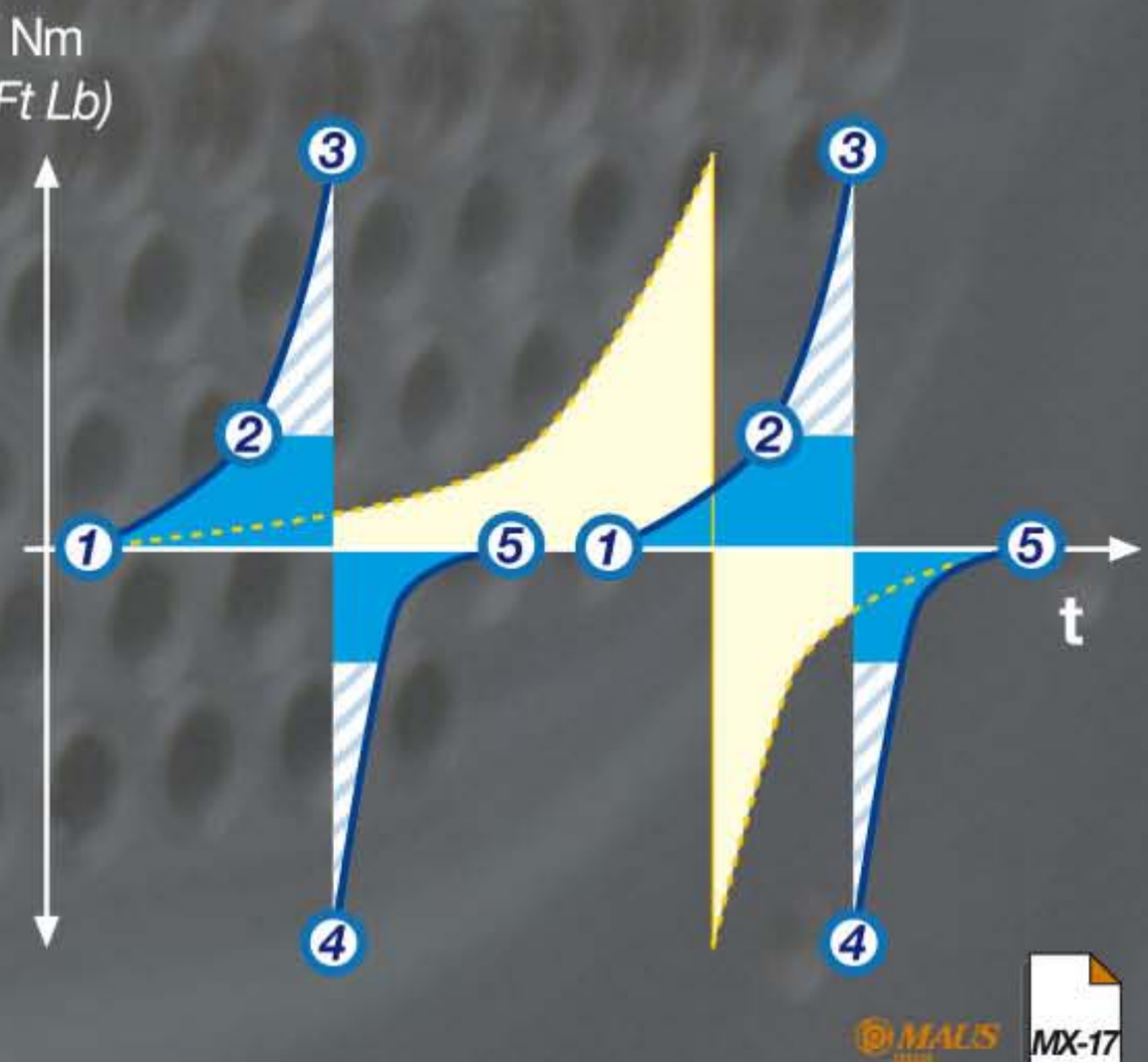
Variable speed

Constant speed

Matex tube rolling

Traditional tube rolling





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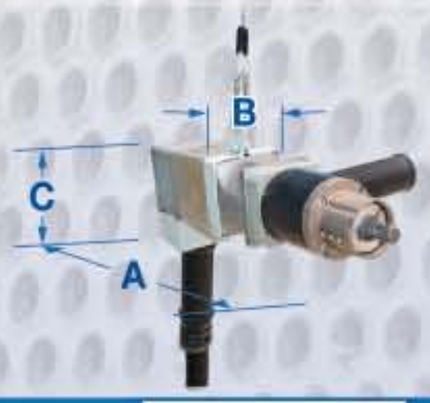
Matextsx-blu

Supply			
Voltage		Volt - Ph	400 - 3
Frequency		Hz	50/60
Installed power		Kw	2,5
Motor voltage		V	48
Pedal set voltage		V	24
Dimensions			
Length (depth)	A	mm *(Ft)*	475 *(1.56)*
Width	B	mm *(Ft)*	600 *(1.97)*
Height	C	mm *(Ft)*	475 *(1.56)*
Weight		Kg *(Lb)*	75 *(166)*
Degree of protection		IP	55
Colours		RAL	7030 - 7035

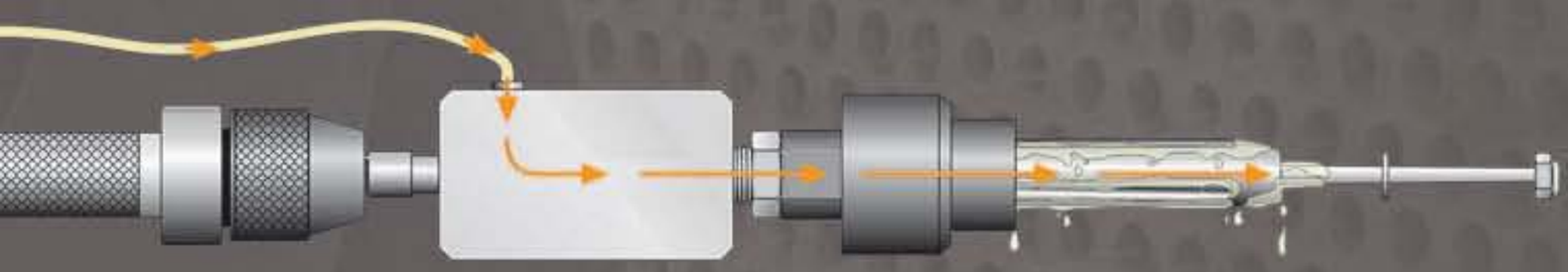
*On request, the **Matextsx-blu** control unit is available as well in the 220 Vac single phase version.*



Matex R

Supply			Matex R P####				Matex R F6000*	Matex R V4	Matex R L4
Motor voltage		V	48				48	48	48
Motor power		Kw / A	0,80 / 38				0,80 / 38	2,24 / 38	2,24 / 38
Working capacity			**P6000**	**P1500**	**P1000**	**P600**		Mechanical gearbox I II III IV	Mechanical gearbox I II III IV
Max. speed		rev/min *(R.P.M)*	6000	1500	1000	600	6000	200-300-540-800	110-170-300-450
Max. torque		Nm *(Ft Lb)*	3,50 *(2.6)*	13,50 *(9.9)*	20,50 *(15.1)*	35,00 *(25.8)*	3,5 *(2.6)*	125 *(92.2)*	180 *(132.8)*
Max tube Ø		mm *(inches)*	9,52 *(3/8)*	19,05 *(3/4)*	25,40 *(1)*	31,75 *(1.1/4)*	9,52 *(3/8)*	44,45 *(1.3/4)*	76,20 *(3)*
Telescopic shaft		*Cod.*	/				FSD 12/2000	F-308 HS /3	F-308 HS /3
Joints		*Cod.*	F/314 HS				/	F/317 HS	F/317 HS
Advised shank			⍁M				Cylindrical jaw	3	3
Dimensions									
Length	A	mm *(inches)*	340 *(13.4)*				270 *(13.4)*	609 *(10.7)*	609 *(24)*
Width	B	mm *(inches)*	75 *(3.0)* Without handle				70 *(2.8)*	180 *(7)*	180 *(7)*
Height	C	mm *(inches)*	250 *(9.8)*				250 *(9.8)*	280 *(11)*	280 *(11)*
Weight		Kg *(Lb)*	6 *(13.3)*				6 *(13.3)*	24 *(53)*	24 *(53)*
Degree of protection		IP	55				55	55	55
Colours		RAL	9005 - 7035				9005 - 7035	9005 - 7030 - 7035	9005 - 7030 - 7035

* Direct WITHOUT 5X multiplier

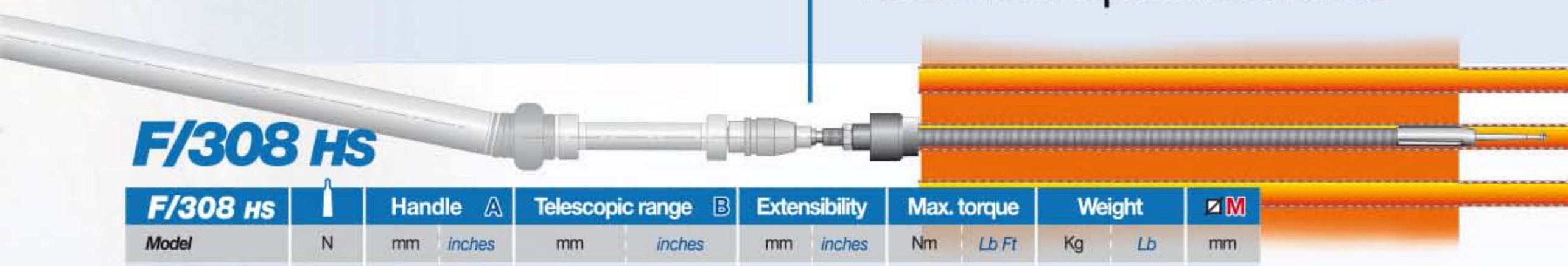


Lubricator *LCQ1*

To increase the life of the tools, it's possible to add the **lubricator *LCQ1*** and the related **tank with minimum adjustment** of the lubricant.
This lubricator can be used with specific tube expanders.

• For any further items please refer to the "*Accessories*" catalogue

Technical specifications



F/308 HS

F/308 HS		Handle A		Telescopic range B		Extensibility		Max. torque		Weight		⌀M
Model	N	mm	inches	mm	inches	mm	inches	Nm	Lb Ft	Kg	Lb	mm
F-308 HS-3	3	225	8.9	650÷1060	25.6÷41.7	410	16.1	180	132	7,9	17.41	18
* F-308 HS-3L	3	225	8.9	850÷1460	33.5÷57.5	**610**	**24.0**	180	132	8,9	19.62	18

* *Version with extra extensibility for use with tube expanders whose length exceeds 500mm (19,7")*

F/314 HS

patented

F/314 HS	⌀F	Weight	
Model	inches	Kg	Lb
F-314 HS - 1/4"	1/4	0,18	0.40
F-314 HS - 3/8"	3/8	0,21	0.46

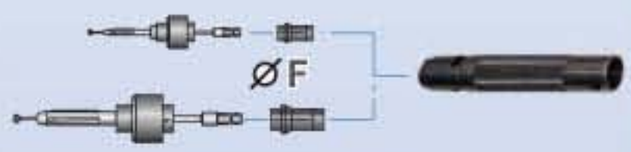
FSD 12/2000

FSD 12/2000	Length		Max. torque		Weight		⌀F
Model	mm	inches	Nm	Lb Ft	Kg	Lb	mm
FSD-12-2000	2000	78,.7	3,5	2.6	5,8	12.8	8 -12

F/317 HS

patented

F/317 HS	⌀F	Weight	
Model	inches	Kg	Lb
F-317 HS - 3/8"	3/8	0,29	0.64
F-317 HS - 1/2"	1/2	0,31	0.68
F-317 HS - 3/4"	3/4	0,38	0.84



N.2 Cylindrical jaws

5X multiplier opzional

Porter

Work axes			Porter Flag	Porter plus	Porter executive
X axis		Motion	/	manual sliding	manual sliding
Y axis		Motion	manual sliding	servo manual	motor-driven
Working capacity					
Supported torque		Nm (Ft Lb)	100 (73)	250 (184)	250 (184)
Supported weight		Kg (Lb)	150 (330)	150 (330)	150 (330)
Horizontal stroke	X	mm (inches)	/	1000 (39)	1000 (39)
Vertical stroke	Y	mm (inches)	/	650 (25)	650 (25)
Dimensions					
Length (depth)	A	mm (Ft)	1200 (4.0)	1400 (4.6)	1400 (4.6)
Width	B	mm (Ft)	700 (2,3)	700 (2.3)	700 (2.3)
Height	C	mm (Ft)	2070 (6.8)	2030 (6.7)	2030 (6.7)
Weight		Kg (Lb)	70 (155)	81 (179)	113 (250)
Colours			Anodised aluminium	Anodised aluminium	Anodised aluminium

www.mausitalia.it

MAUS ITALIA F. AGOSTINO & C. s.a.s.
SS PAULLESE KM 30
26010 BAGNOLO CREMASCO (CR)

Tel. 0373 2370
FAX 0373 237039
e-mail: expo@mausitalia.it
www.mausitalia.it

gloveadv.com design studio

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