



Quadrol 90x

*Low-voltage
electrical mobile stations
for semi-automatic controlled
tube rolling expansion*



MADE IN ITALY

What's new in **x** version



Electromagnetic compatibility

Thanks to **galvanically isolated external commands** (rolling motor and pedal switch), the **x version** meets the common regulatory standards for electromagnetic compatibility and ensuring the **proper use of the equipment in confined spaces and inside or in the presence of large metal.**



Self zero setting

Reset the amps drawn from the idle rolling motor showing the operator on the display the "real zero." **Free so the operator from controlling the offset** to the beginning of each job ensuring **repeatability from the first flaring.**



Anti-friction tube expander controlled release

Program the reverse rotation time to rolling during the tube expnder release. **It reduces abrasion of the mandrel and rolls** ensuring a longer life to the tube expander.



High security

Designed to comply with strict European regulations governing the equipment at the workplace.



Quadrol 90x

Low-voltage electrical mobile stations for semi-automatic controlled expansion of tubes whose diameter ranges between **3/8"** and **2 1/2"** (between 9,5 and 63,5 mm).

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

To start and control the operation of the tube expander Maus Italia offers a **range of fully motorised control systems and accessories**, including three main families:

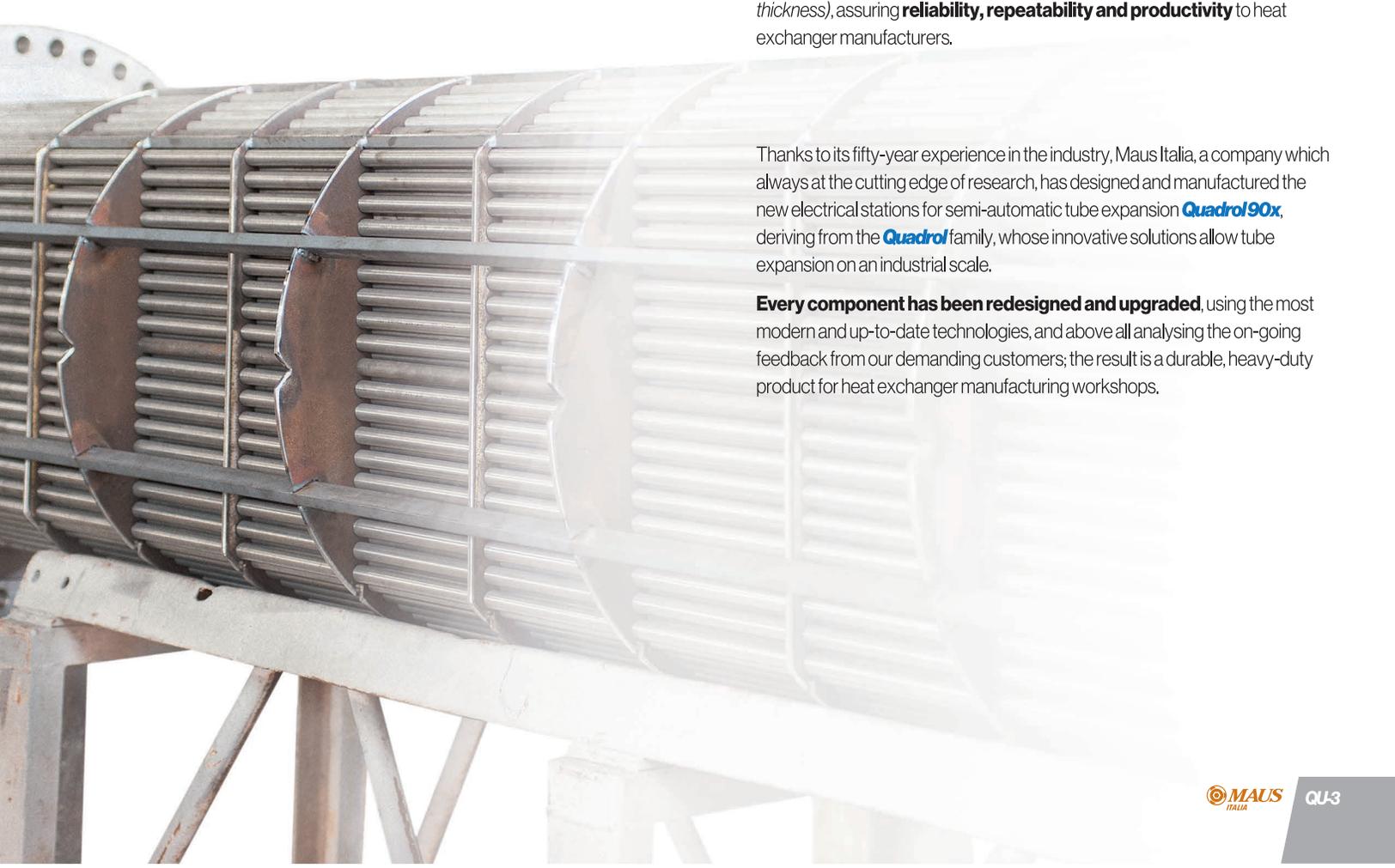
- **Portrol** (portable)
- **Quadrol** (semi-automatic)
- **Automation** (automatic)

Based on our experience we have selected the **control of the torque measured on the expander axis** as the most appropriate reference technology.

Unlike pure dimensional control, in fact, the torque control **can make up for parameter variability** (e.g. tolerances on sheet hole diameter and tube thickness), assuring **reliability, repeatability and productivity** to heat exchanger manufacturers.

Thanks to its fifty-year experience in the industry, Maus Italia, a company which always at the cutting edge of research, has designed and manufactured the new electrical stations for semi-automatic tube expansion **Quadrol 90x**, deriving from the **Quadrol** family, whose innovative solutions allow tube expansion on an industrial scale.

Every component has been redesigned and upgraded, using the most modern and up-to-date technologies, and above all analysing the on-going feedback from our demanding customers; the result is a durable, heavy-duty product for heat exchanger manufacturing workshops.





Fixed positions on the vertical axis

Manual vertical displacement of the rolling motor

Y+

Y-

Y+ Y-

Quadrol 90x *standard*

- Cheap
- Lightweight
- Easy to disassemble

Quadrol 90x *plus*

- Increased operating range on the X axis
- Continuous manual motion along the Y axis
- Reduction of the positioning time

Quadrol 90x

Mobile **semi-automatic** expansion stations accommodating and supporting the **MK low-voltage** 3-phase electrical rolling motors.

The **Quadrol 90x** stations include the following components:

- **F90V5x** electronic expansion **controller**, the latest version of the successful F90 series, boasting thousands of pieces sold all over the world;
- **MK** series electrical **rolling motor**, strong and low-noise, featuring a self-ventilated, low-voltage three-phase motor, with automatic speed variation according to the torque, complete with a four-speed oil-bath gearbox featuring a suspension device mounted on a ball bushing;
- **F308HS** articulated **telescopic shaft**, deriving from the previous **F308** series, with innovative design solutions making it reliable, particularly easy to handle as well as accurate and stable at high speeds; it **expands the operating range along the X and Y axes and allows motion along the Z axis**;
- **F314HS** and **F317HS** patented **quick couplings**, specifically designed to be used with the tube expander manufactured by Maus Italia to reduce the vibrations experienced by the operator, particularly when the rotation speed exceeds 400 rpm.
- **PE900** pedal set
- The **Porter** series **trolleys**, four-wheeled and designed to **support and displace the F90V5x electronic controller and the MK series rolling motor, dampen the reaction to the torque generated by the rolling motor, relieving the operator of this tiring function.**

Their distinctive feature is the extruded aluminium modular structure, combining strength and low weight.

The **Quadrol 90x** station comes in 3 different versions, according to the **Porter** series trolley model:

- **Quadrol 90x standard** with **Porter standard**
- **Quadrol 90x plus** with **Porter plus**
- **Quadrol 90x executive** with **Porter executive**



Motor-driven rolling motor vertical displacement

Remote control
Y+
Y-

Quadrol 90x executive

- Servo driven motion along the Y axis with increased productivity
- High reduction of the positioning time
- Cabinets for safe tools and accessories storage



The control board **F90V5x**

The new display interface has been redesigned to integrate all the commands in a display panel 7" optimizing the programming times by the operator.

M

Cycle mode

MAN manual cycle for individual rolling expansion

AUTO automatic cycle for rolling expansion in series

T

Rolling motor voltage

26U reduce considerably the minimum controllable torque value, increasing the sensitivity in low torque rolling expansion.

42U allows the rolling motor to achieve maximum torque for which has been designed

D

Phase Reversal

Rolling motor rotation reverse without changing the power supply wiring.

CM

Tube rolling values

Rolling value sets by the operator to reach the calculated tube expansion diameter.

RZ

Self zero setting



Reset to zero the power consumption of the idle rolling motor showing to the operator on the display the "actual zero."

Can be automatic **A0** or manual **M0**.

CB

Power consumption of rolling motor

Actual power consumption of the idle rolling motor.

TL

Tube expander release time



Low reverse rotation time to release the tube expander once torque is achieved, allowing the friction reduction among mandrel, rolls and expanded tube.

TV

Tube expander extraction time from the expanded tube

For a fast unlocking off the tube expander **TL** phase and, after for speeding up its extraction out of the tube.

TC

Pause time (tube change)

Pause time between a rolling expansion and the other, necessary for the operator to reposition the tube expander in the next tube.

N

Counter

Counting the rolling expansion completed with success.

NT

Total counter

It counts the quantity of tube expansion during the entire life of the control unit. It is not resettable.



Photograph

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High repeatability

F90V5x

Electronic microprocessor
tube expansion controller

The **F90V5x** electronic expansion controller is the eight version of the F90 series, **which has sold in its thousands all over the world since 1972.**

F90V5x is easy to learn, is equipped with a **dedicated interface**; it is protected by a strong metal casing offering a high degree of protection IP 54 (closed cabinet).

Designed to be used with the **MK** series electrical **rolling motor**, it can also be used to control previous versions.

The **F90V5x** is a microprocessor controller allowing the management all commands from a **specially designed panel.**

The opposite page shows the **main display screen on the 7" monitor** and an explanation of the user-friendly digital controls.

Technical
specifications **QU-13**



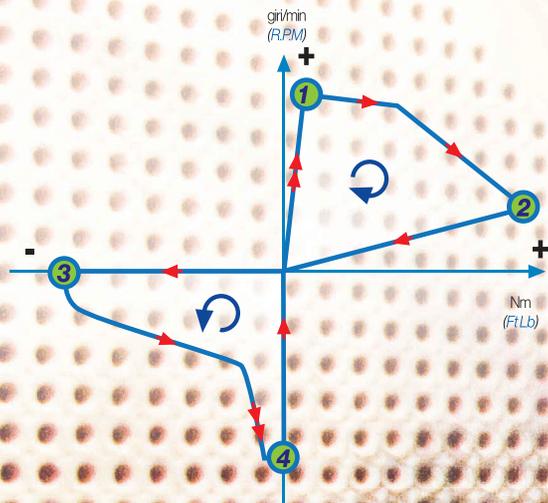
What's new in the **MK** rolling motors



Continuous speed variation

The increase of the working torque the rolling motor decreases the number of revolutions.

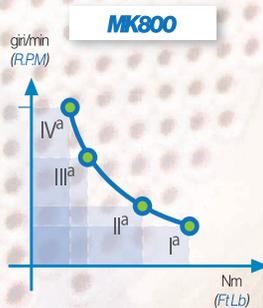
The variation of the number of revolutions according to the working torque of the tube expander, allows the motor to decrease the speed up to 60% avoiding overheating and the consequent deterioration of parts of the tools.



- 1 approach/squeezing
- 2 Max. torque achievement
- 2-3 rotation reversing
- 3-4 tube expander release
- 4 rotation stopping

The operator can select the speed of rotation of the motor, thanks to the the **MK** series electrical **rolling motor 4-speed mechanical gearbox** which optimises the machining cycle (as shown in the table below), according to **work parameters**, such as:

- tube material
- tube diameter and thickness
- roller length
- mandrel model



		MK800				MK400			
Mechanical gearbox		I ^a	II ^a	III ^a	IV ^a	I ^a	II ^a	III ^a	IV ^a
Speed	giri/min (R.P.M)	200	300	540	800	110	170	300	450
Min. torque	Nm (Ft.Lb)	0,30 (0,22)	0,25 (0,18)	0,20 (0,15)	0,15 (0,11)	0,50 (0,37)	0,40 (0,30)	0,30 (0,22)	0,20 (0,15)
Max. torque	Nm (Ft.Lb)	55,00 (40,57)	36,00 (26,55)	20,00 (14,75)	14,00 (10,33)	165,00 (121,70)	114,00 (84,08)	64,00 (47,20)	44,00 (32,45)
Min tube Ø	mm (inches)	25,40 (1")	19,05 (3/4")	12,70 (1/2")	9,52 (3/8")	38,10 (1 1/2")	25,40 (1")	19,05 (3/4")	15,87 (5/8")
Max tube Ø	mm (inches)	38,10 (1 1/2")	31,75 (1 1/4")	22,22 (7/8")	19,05 (3/4")	63,50 (2 1/2")	38,10 (1 1/2")	31,75 (1 1/4")	25,40 (1")

*Speed variation
according
to torque*

MK

Electric rolling motors
with three-phase motor
at low voltage and
4-speed gearbox in oil bath

The **MK800** and **MK400** are our **two models** of **electrical rolling motors** that meet the main technical requirements of the market, according to tube size and required expansion characteristics.

With a self-ventilating low-voltage (26/42 V) three-phase motor and integrated suspension, the **MK series** electrical **rolling motor** have been **specially designed to guarantee:**

- Robustness;
- Continuous performance;
- Speed variation according to torque;
- Flexible use.

The **low-voltage rolling motor** meet the strict **safety** requirements for portable equipment in work sites where there are large metal masses or confined spaces.

*Technical
specifications* **QU-14**

Photograph
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F308 HS

Articulated telescopic shaft for mechanical motion transmission from **MK** series rolling motors to Maus Italia tube expanders

It derives from the previous F308 series, with innovative design solutions making it reliable, particularly easy to handle as well as accurate and stable at high speeds

It expands the operating range along the X and Y axis and it complements motion along the Z axis; It allows to quickly connect the mandrel through the **F314HS** and **F317HS** couplings.

Special executions available upon request

Technical specifications **QU-14**

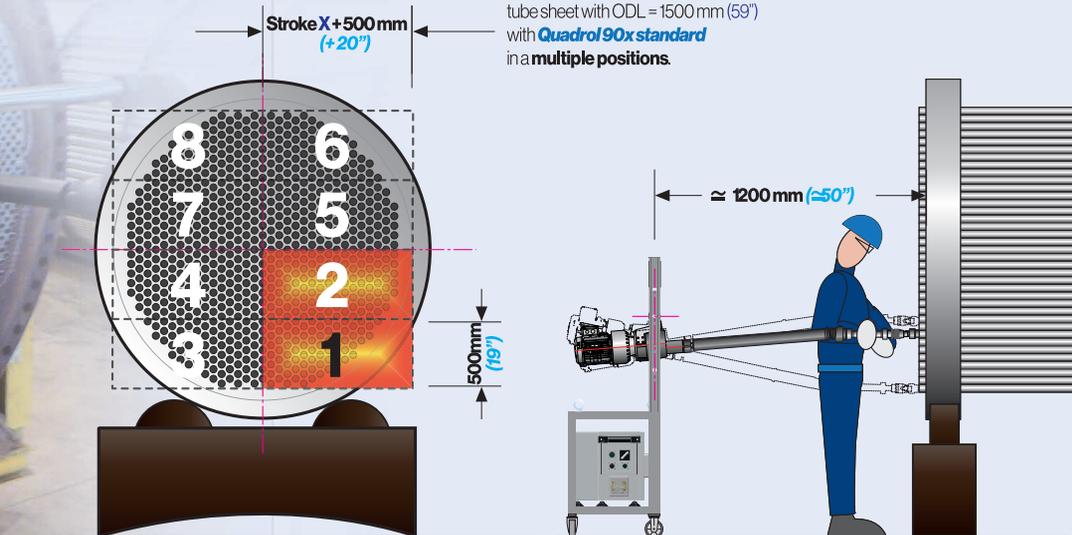


Fields and work distance of the **Quadrol 90x** series stations.

After placing the **Quadrol 90x standard** mobile station about 1.2 metre away (as shown in the figure below), the operator will be able to easily insert the tube expander mandrel into all the holes arranged inside the coloured area, representing the field which can be reached from each individual position.

To complete the tube sheet the operator will have to move the station to new positions.

Example:
tube sheet with ODL = 1500 mm (59")
with **Quadrol 90x standard**
in a **multiple positions**.



with **Quadrol 90x standard**
8 positions

F314HS F317HS

Patent

Joints with female female double quick couplings specific for high speeds

The latest joints with double quick coupling **F314HS** and **F317HS**, besides allowing to **replace the tube expander extremely quickly**, thanks to an **accurate, patented design** ensure that the input shaft **F308HS** is **perfectly coaxial** with the tube expander mandrel, on the output, **reducing any vibration and allowing the operator to more easily insert the running mandrel into the tube**.



NO VIBRATION

Technical specifications **QU-15**

PE900

Digital input remote control pedal set

After placing the **Quadrol 90x plus** or **Quadrol 90x executive** mobile station about 1.2 metre away (as shown in the figure below), the operator will be able to easily insert the tube expander into all the holes arranged inside the coloured area, representing the field which can be reached from an individual position.

Area assuring maximum torque control accuracy and repeatability

Area subject to minimal torque variations, proportional to the inclination of the Cardan joint.



with **Quadrol 90x plus**
1 single position with continuous manual motion

with **Quadrol 90x executive**
1 single position with servo driven remotely controlled motion

Components included
in the order

Quadrol 90x standard



Trolley **Porter standard**
Controller **F90V5x**
Motor **MK800** or **M400**
Telescopic shaft **F308HS**
Couplings **F314HS** and **F317HS**
Pedal set **PE900**

Quadrol 90x plus



Trolley **Porter plus**
Controller **F90V5x**
Motor **MK800** or **MK400**
Telescopic shaft **F308HS**
Couplings **F314HS** and **F317HS**
Pedal set **PE900**

Quadrol 90x executive



Trolley **Porter executive**
Controller **F90V5x**
Motor **MK800** or **MK400**
Telescopic shaft **F308HS**
Couplings **F314HS** and **F317HS**
Pedal set **PE900**

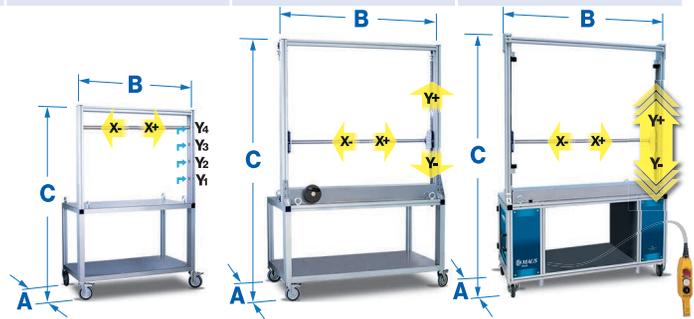
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Technical specifications
of the **Porter** trolleys
and of the **F90V5x** controller

Porter

Work axes		<i>Porter standard</i>	<i>Porter plus</i>	<i>Porter executive</i>
X axis	Motion	manual sliding	manual sliding	manual sliding
Y axis	Motion	fixed positions	servo manual	motor-driven
Working capacity				
Supported torque	Nm (FLb)	250 (184)	250 (184)	250 (184)
Supported weight	Kg (Lb)	150 (330)	150 (330)	150 (330)
Horizontal stroke	X mm (inches)	600 (23)	1000 (39)	1000 (39)
Vertical stroke	Y mm (inches)	4 step 480 (19)	650 (25)	650 (25)
Dimensions				
Length (depth)	A mm (Ft)	500 (1.7)	700 (2.3)	700 (2.3)
Width	B mm (Ft)	900 (3.0)	1400 (4.6)	1400 (4.6)
Height	C mm (Ft)	1510 (5.0)	2030 (6.7)	2030 (6.70)
Weight	Kg (Lb)	40 (89)	81 (179)	113 (250)
Colours		Anodised aluminium	Anodised aluminium	Anodised aluminium



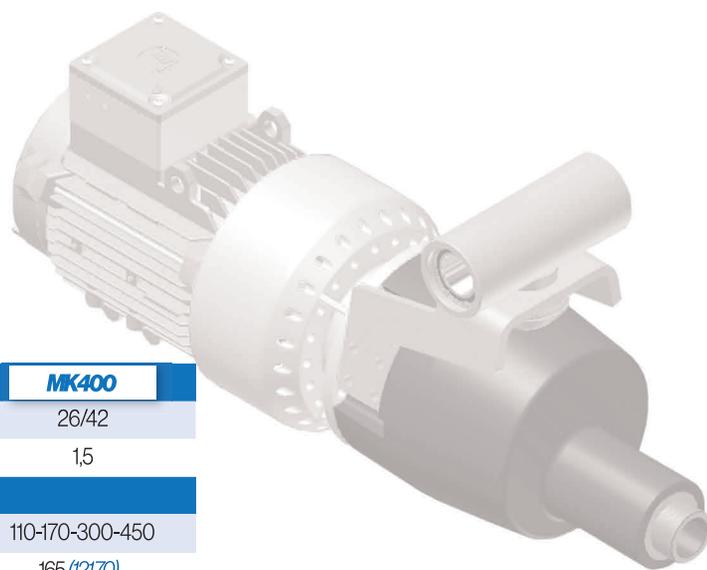
F90V5x

Supply		<i>F90V5x</i>
* Voltage	V-Ph	230/400-3
Frequency	Hz	50/60
Installed power	KW	1,6
Motor voltage	V	26 / 42
Pedal set voltage	V	24
Dimensions		
Length (depth)	A mm (Ft)	410 (1.35)
Width	B mm (Ft)	760 (2.49)
Height	C mm (Ft)	405 (1.33)
Weight	Kg (Lb)	65 (144)
Degree of protection	IP	54
Colours	RAL	7030-7035



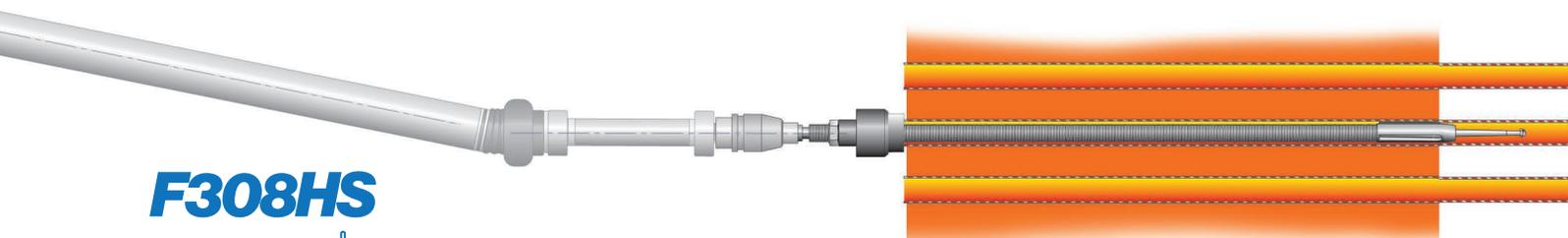
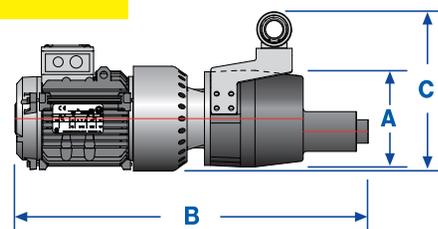
* On request for different power supply

Technical specifications of the **MK** motors and of the **F308HS** telescopic shaft



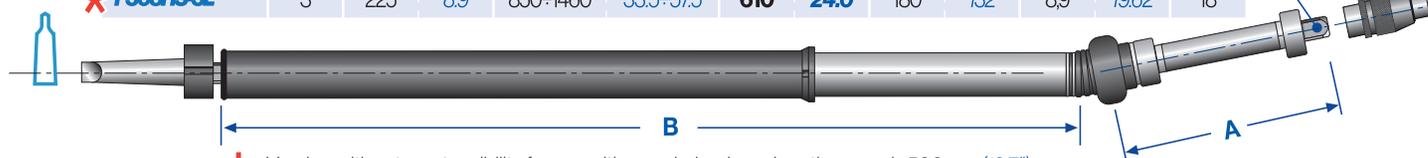
MK

Supply		MK800	MK400
Motor voltage	V	26/42	26/42
Motor power	KW	0,8	1,5
Working capacity			
Speed	giri/min (R.P.M)	200-300-540-800	110-170-300-450
Max torque	Nm (F.Lb)	55 (40,57)	165 (121,70)
Min tube Ø	mm (inches)	952 (3/8)	15,87 (5/8)
Max tube Ø	mm (inches)	3810 (11/2)	6350 (21/2)
Recommended telescopic shaft	Cod.	F308HS-2	F308HS-3
Recommended couplings	Cod.	F314HS	F317HS
Adapter	 C.M.	3	3
Dimensions			
Gearbox Ø	A mm (Ft)	180,0 (0.59)	180,0 (0.59)
Width	B mm (Ft)	608,5 (1.99)	608,5 (1.99)
Height	C mm (Ft)	272,0 (0.89)	272,0 (0.89)
Weight	Kg (Lb)	30,0 (67)	31,0 (69)
Degree of protection	IP	55	55
Colours	RAL	9005-7030	9005-7030



F308HS

F308HS		Handle A		Telescopic range B		Extensibility		Max. torque		Weight		
Model	N	mm	inches	mm	inches	mm	inches	Nm	LbFt	Kg	Lb	mm
F308HS-2B	3	205	8.1	650÷1060	25.6÷41.7	410	16.1	70	51	54	11.90	12
F308HS-3	3	225	8.9	650÷1060	25.6÷41.7	410	16.1	180	132	7,9	17.41	18
* F308HS-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 mandrels whose length exceeds 500mm (19,7")

patent

Technical specifications
of the **F314HS** and
F317HS couplings



F314HS		Weight	
Model	∅ F inches	Kg	Lb
F314HS-1/4"	1/4	0,18	0,40
F314HS-3/8"	3/8	0,21	0,46



F317HS		Weight	
Model	∅ F inches	Kg	Lb
F317HS-3/8"	3/8	0,29	0,64
F317HS-1/2"	1/2	0,31	0,68
F317HS-3/4"	3/4	0,38	0,84

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



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