

NEW



Quadrol 90

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



MADE IN ITALY

Quadrol 90

MAUS
ITALIA



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Quadrol 90

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 90**, 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-

Quadrol 90 standard

- Cheap
- Lightweight
- Easy to disassemble

Quadrol 90 plus

- Increased operating range on the X axis
- Continuous manual motion along the Y axis
- Motor displacement without gantry crane
- Safe
- Downtime reduction

plus ...

plus ...

High repeatability

Quadrol 90

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

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

- **F90 V4** 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;
 - **F/308 HS** articulated **telescopic shaft**, deriving from the previous F/308 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**;
 - **F/314 HS** and **F/317 HS** 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.
 - **PE/900** pedal set
- The **Quadrol 90** station comes in 3 different versions, according to the **Porter** series trolley model:

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

The **Porter** series **trolleys**, four-wheeled and designed to support and displace the **F90 V4** 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..



Quadrol 90 executive

- Servo driven motion along the Y axis
- Practical
- Motor axis / tube axis alignment
- Cabinets for safe tool and accessory storage.





Enter

Button set allowing to enter all setting values.



Zero setting

It resets the Amperes absorbed by the motor under no-load conditions, displaying an "actual zero" to the operator



Phase reversal

It allows to immediately reverse rotation without having to operate on the supply cables.



Usage range amplification

26 V greatly reduces the minimum torque value which can be controlled.

42 V it allows high-torque processing for large diameter tubes.



Operability

The automatic mode allows the operator to greatly increase productivity



Return time

Time required for the pin to move back and the rollers to return. It allows the operator to withdraw the mandrel from the sheet hole.



Pausing time

Time elapsing between expansion cycles, allowing the operator to insert the mandrel into the next tube.



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F90 V4

Electronic microprocessor tube expansion controller

The **F90 V4** electronic expansion controller is the seventh version of the **F90 series**, *boasting thousands of pieces sold all over the world since 1972*.

F90 V4 is easy to learn, is equipped with a dedicated interface and is protected by a strong metal casing offering a high degree of protection.

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

F90 V4 is a microprocessor controller allowing to manage all the commands from a **specially designed panel**.

The opposite page shows the **high-luminosity display screens** and the relevant **digital commands** the operator can easily access.

Technical specifications



QU-12



MK

Low-voltage electrical rolling motors with three-phase motor.

Great increase in sensitiveness

Even compared with the previous M4 series, the **MK** series rolling motors are characterised by the **wide torque adjustment range**, expanding the range of tubes which can be treated.

Automatic speed variations

The special manufacturing feature progressively and automatically varying speed according to torque allows to select a higher speed value then on the previous version; this results in the following benefits:

A noticeable reduction of cycle time

As the work strain increases the motor rpm decrease.

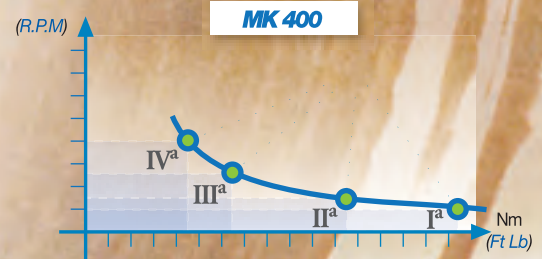
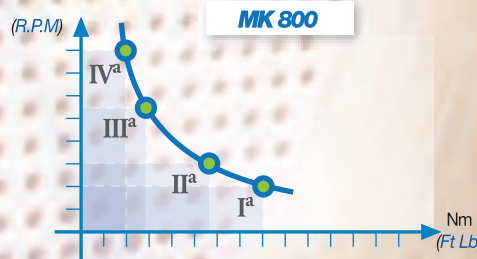
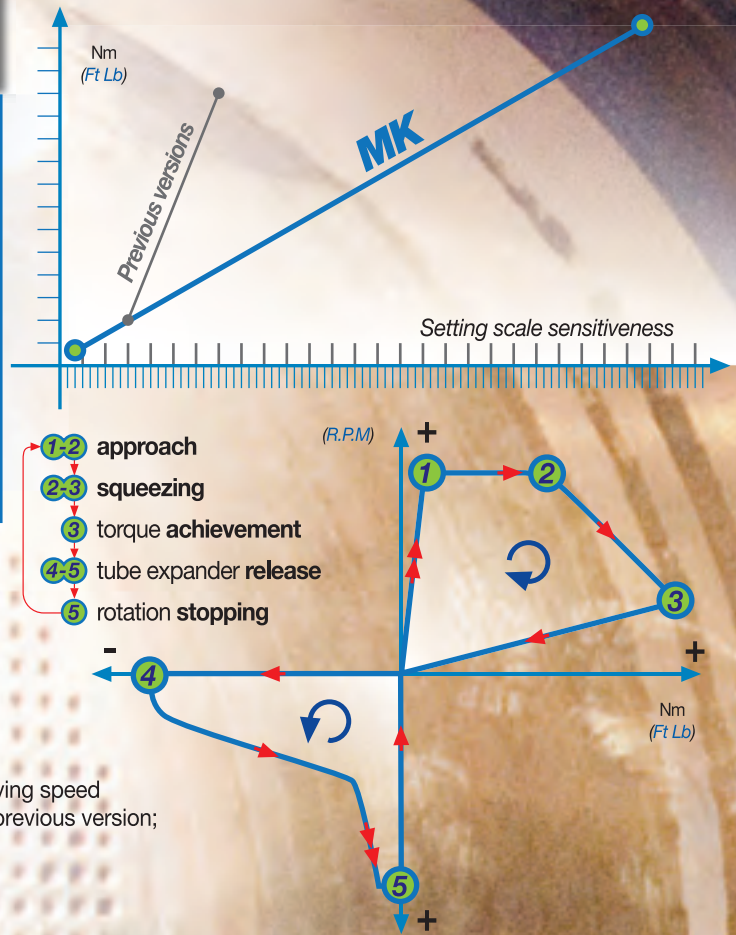
Reduced tool wearing

The variation of the rpm according to the strain experienced by the tube expansion mandrel allows to decrease the motor speed by up to 60%, preventing overheating and the subsequent deterioration of the tools wearing parts.

Flexibility of use

Thanks to the 4 speed range gearboxes, the **MK** series rolling motors can optimise the speed range according to work parameters like the ones listed in the table below:

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



		MK 800				MK 400			
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")

All listed values are indicative and refer to the 50 Hz supply frequency.

The 60 Hz supply frequency (available as optional) increases by 20% the specified rpm and decreases by 20% the specified torque values.

The Maus Italia sales service is available to help our customers to identify the most appropriate solution.

MK

Low-voltage electrical rolling motors with three-phase motor.

Speed variation according to couple

MK 800 and **MK 400** are the **two models** of **electrical rolling motors** we offer 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 **MK series rolling motors** feature a **self-ventilated low-voltage (42 V) three-phase motor** and are **specially designed to provide:**

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

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

Technical specifications



Extremely low noise level



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F/308 HS

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

It derives from the previous F/308 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 **F/314 HS** and **F/317 HS** couplings.

Technical specifications

QU-12

Special executions available upon request

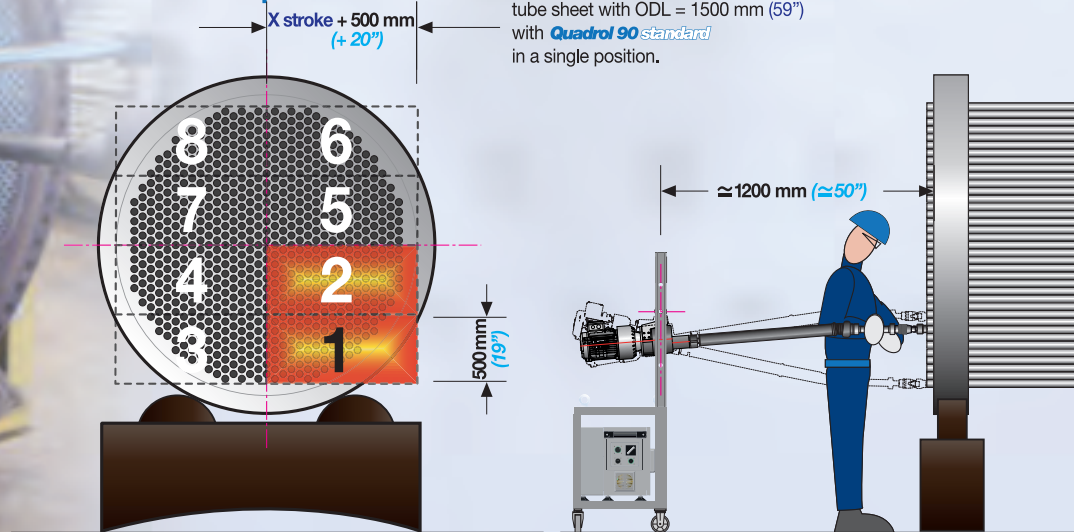
∅ M

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

After placing the **Quadrol 90 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 90 standard**
in a single position.



with **Quadrol 90 standard**
8 positions

F/314 HS F/317 HS

**Patent
Pending**

Joints with female female
double quick couplings
specific for high speeds

The latest joints with double quick coupling **F/314 HS** and **F/317 HS**, besides allowing to **replace the tube expander extremely quickly**, thanks to an **accurate, patented design** ensure that the input shaft **F/308 HS** 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-12

PE/900

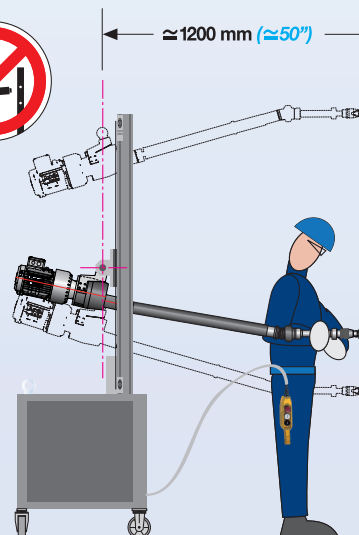
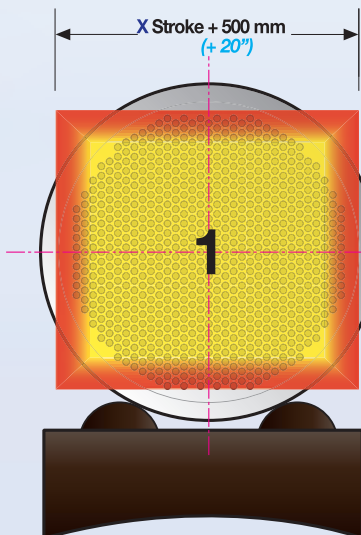
**Digital input remote control
pedal set**

After placing the **Quadrol 90 plus** or **Quadrol 90 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.

Example:
tube sheet with ODL = 1500 mm (59")
with **Quadrol 90 plus** and **Quadrol 90 executive**
in a single position.



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

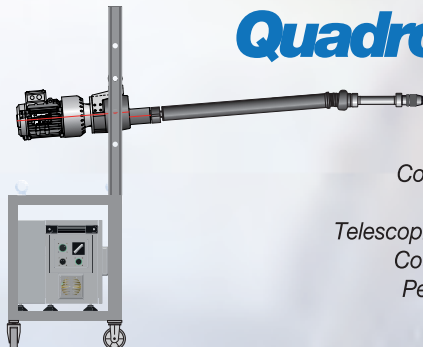
with **Quadrol 90 executive**
1 single position with servo driven remotely controlled motion

QU-9

Quadrol 90

Components included
in the order

Quadrol 90 standard



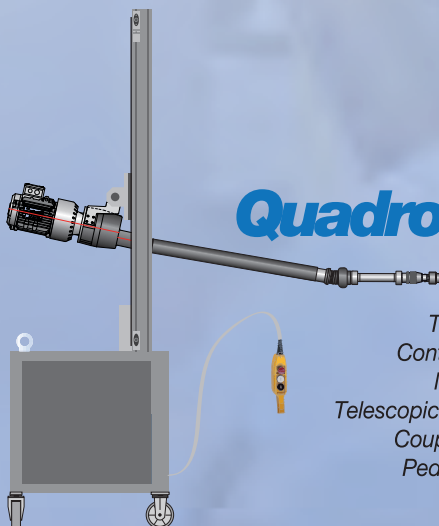
- Trolley **Porter standard**
- Controller **F90 V4**
- Motor **MK 800 or MK 400**
- Telescopic shaft **F/308 HS**
- Couplings **F/314 HS and F/317 HS**
- Pedal set **PE/900**

Quadrol 90 plus




- Trolley **Porter plus**
- Controller **F90 V4**
- Motor **MK 800 or MK 400**
- Telescopic shaft **F/308 HS**
- Couplings **F/314 HS and F/317 HS**
- Pedal set **PE/900**

Quadrol 90 executive



- Trolley **Porter executive**
- Controller **F90 V4**
- Motor **MK 800 or MK 400**
- Telescopic shaft **F/308 HS**
- Couplings **F/314 HS and F/317 HS**
- Pedal set **PE/900**

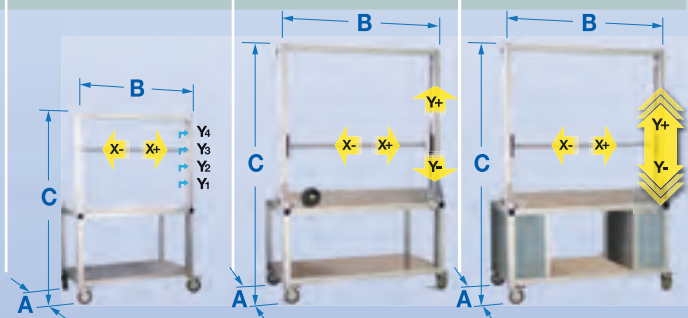
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Technical specifications of the **Porter** trolleys and of the **F90V4** controller

Porter

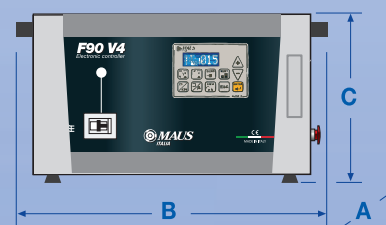


Work axes		Porter standard	Porter plus	Porter executive
X axis	Motion	manual sliding	manual sliding	manual sliding
Y axis	Motion	fixed positions	servo manual	motor-driven
Working capacity				
Supported torque	Nm (Ft Lb)	250 (184)	250 (184)	250 (184)
Supported weight	Kg (Lb)	150 (330)	150 (330)	150 (330)
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



F90 V4

Supply		F90 V4
Voltage	Volt - Ph	220/400 - 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	55
Colours	RAL	7030 - 7035

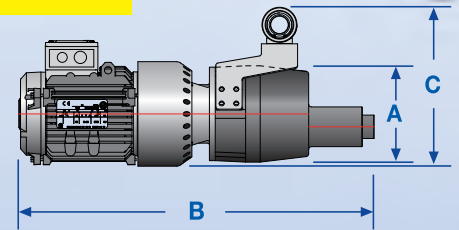


Technical specifications of the **MK** motors and of the **F/308 HS** telescopic shaft



MK

Supply		MK 800	MK 400
Motor voltage	V	42	42
Motor power	Kw / A	1,5 / 29	1,5 / 37
Working capacity			
Speed	(R.P.M)	200-300-540-800	110-170-300-450
Max torque	Nm (Ft.Lb)	55 (40.57)	165 (121.70)
Min tube Ø	mm (inches)	9,52 (3/8)	15,87 (5/8)
Max tube Ø	mm (inches)	38,10 (1.1/2)	63,50 (2.1/2)
Recommended telescopic shaft	Cod.	F-308 HS /2	F-308 HS /3
Recommended couplings	Cod.	F/314 HS	F/317 HS
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)	32,0 (71)	32,0 (71)
Degree of protection	IP	55	55
Certified noise test	Db	35	35
Colours	RAL	9005 - 7030 - 7035	9005 - 7030 - 7035



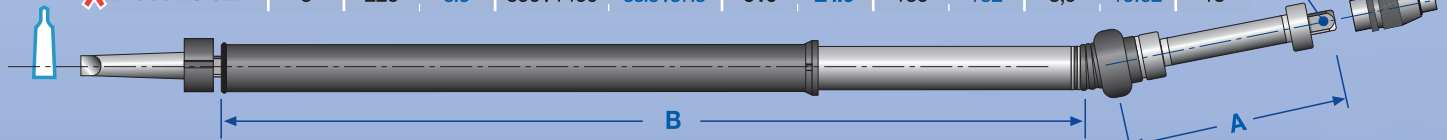
All listed values are indicative and refer to the 50 Hz supply frequency.

The 60 Hz supply frequency (available as optional) increases by 20% the specified rpm and decreases by 20% the specified torque values.

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F/308 HS

F/308 HS	Handle A	Telescopic range B		Extensibility	Max. torque	Weight	∅ M					
Model	N	mm	inches	mm	inches	Nm	Lb Ft	Kg	Lb	mm		
F-308 HS-2/b	3	205	8.1	650÷1060	25.6÷41.7	410	16.1	70	51	5,4	11.90	12
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 mandrels whose length exceeds 500mm (19,7")



NO VIBRATION

Technical specifications of the **F/314 HS** and **F/317 HS** couplings

Patent pending

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

Patent pending

F/317 HS	∇F	Weight	
<i>Model</i>	<i>inches</i>	<i>Kg</i>	<i>Lb</i>
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

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





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