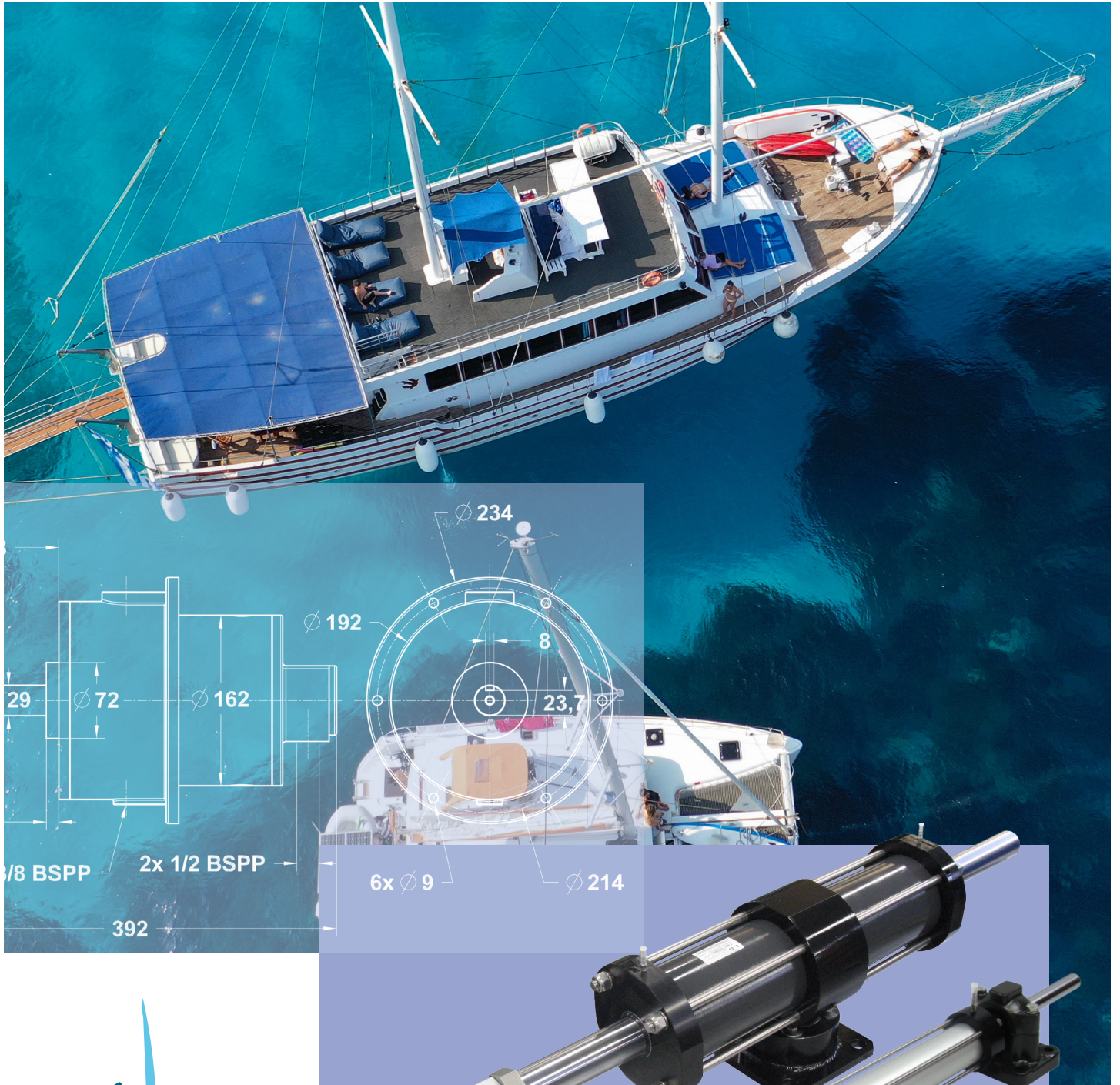


# Work and Pleasure Boats with Inboard Engines



## **Lecomble & Schmitt s.A.s.**

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# HYDRAULIC STEERING SYSTEMS

## INTRODUCTION

### LS Hydraulic Steering Systems

Our hydraulic steering systems **are perfectly adapted** to outboard and inboard motor boats and pleasure, sporting, fishing and commercial applications and to monohull and multihull sailing-boats.

They **are easy to install**, state of the art machine finished and **made to resist a marine environment**.

You can easily select **the best suited system for your boat** within a range of more than **20 pumps and 30 cylinders** which will provide **efficiency, reliability and smoothness**.

Our systems carry a **2 year warranty** and our range of cylinders for fishing and work boats **is approvable** by Classification Societies such as **BV, ABS, LRS, GL** and others.

**All our cylinders and pumps** are **CE** approved.

## DESCRIPTION OF LS HYDRAULIC STEERING SYSTEMS

As a general rule, the basic set up of a steering system includes:

- 1 cylinder,
- 1 manual pump,
- tubing to connect the cylinder to the manual pump.

Other elements will be added to this basic set up in function of the number of steering stations or rudders to be operated, and of the installation of a power unit for automatic or non automatic pilot.

### Cylinder

The cylinder is the dictating element towards the selection of a system as it gives the power to the steering system. To select a cylinder, follow the instructions on page 4.

### Manual pump

The manual pump is an axial piston pump which makes it possible to suck and force back the oil contained in the circuit when the wheel is turned. Its cubic capacity determines the number of turns required for a lock to lock manoeuvre. The pump is fitted with a lock valve which prevents rudder or motor movement when the helm is not operated. Some models are fitted with pressure relief valves which protect the circuit against abnormal pressure increase.

### Tubing

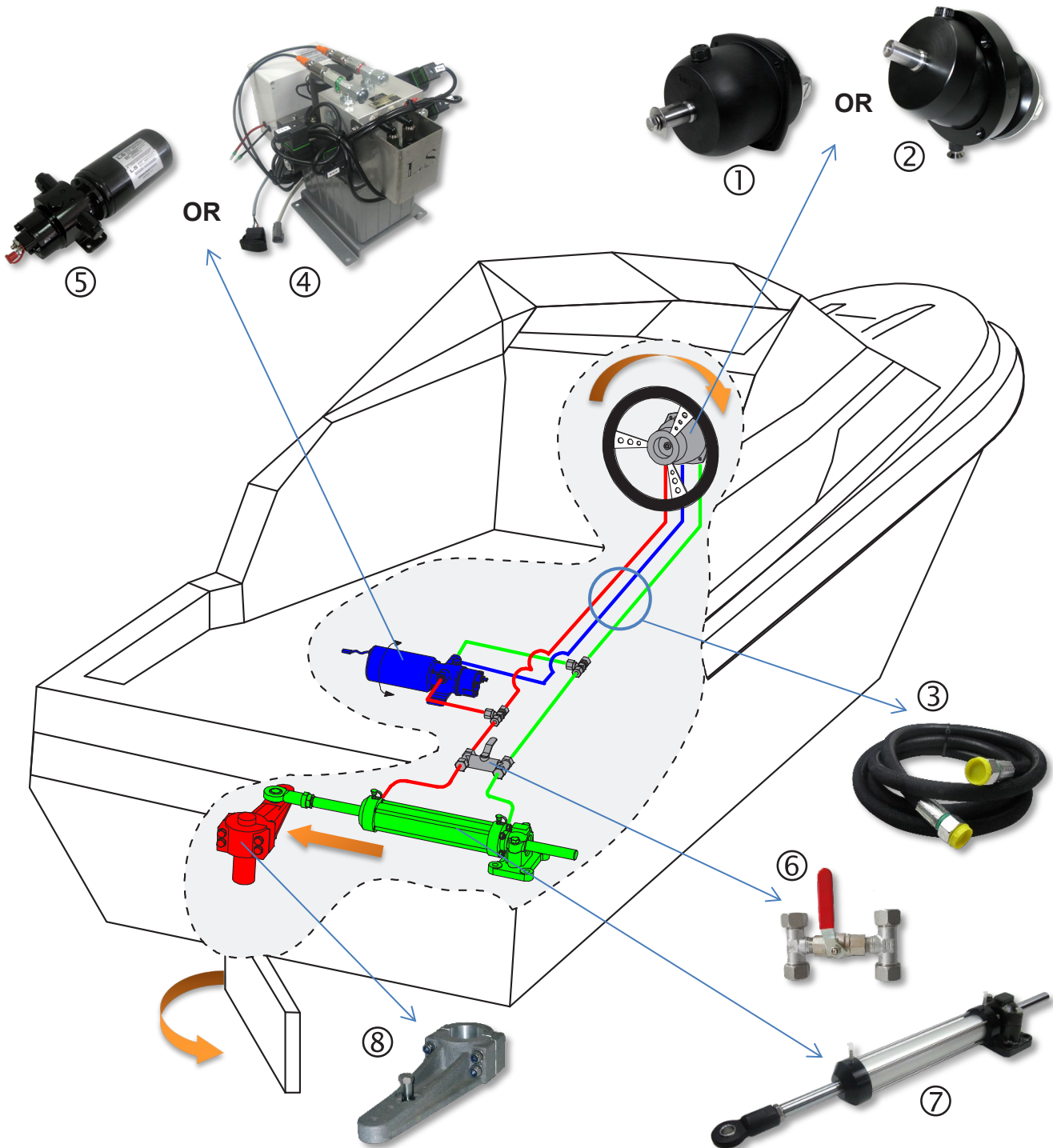
Only tubing designed for hydraulic transfer is to be used. The tube diameter is calculated in function of the pump cubic capacity (see charts pages 7,8 and 12). Maximum efficiency is achieved with inflexible tubing, however flexible tubing may be used for torque levels not exceeding 100 kpm.



# HYDRAULIC STEERING SYSTEMS

## WORKING PRINCIPLE

When the helm is turned to starboard, the pump ① or ② sucks the oil from the port circuit (red) and pushes it back into the starboard circuit (green), thus driving the cylinder rod ⑦ which in turn displaces the rudder or motor. The cylinder body ⑦ is fixed to the boat.



① Hydraulic helm pump	⑤ Autopilot power pack
② Hydraulic helm pump – Tilt pump (multi-position)	⑥ By-pass valve
③ Tubing (port / starboard)	⑦ Hydraulic cylinder
④ Autopilot and power assist power pack	⑧ Tiller arm

# HYDRAULIC STEERING SYSTEMS

## SELECTION OF A HYDRAULIC STEERING SYSTEM

Determine your boat's steering torque on our website : [www.ls-france.com](http://www.ls-france.com)



- **For boats fitted with a rudder** with speed not exceeding 25 knots, the torque of the rudder or rudders is calculated according to following formula and corrections.

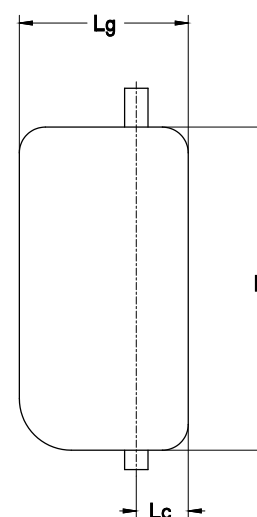
It must be known that the torque necessary to manoeuvre a boat depends on:

- the speed of the water flowing on the surface of the rudder at a certain angle,
- the rudder size,
- the total sweep of the rudder (and part of the boat), if the rudder stock is not perpendicular,
- the compensating surface of the rudder.

### Torque Calculation Formula for Speed below 25 Knots

$$C = S \times [ (0.4 Lg) - Lc ] \times V^2 \times K$$

- C** = Torque in kpm
- S** = Total surface of rudder (H x Lg) in sq. m
- H** = Height of rudder in m
- Lg** = Width of rudder in m
- Lc** = Compensation width in m
- V** = Maximum speed of the boat in knots
- K** = Coefficient according to total angle of rudder
  - Port to starboard 70° **K = 15.89**
  - Port to starboard 80° **K = 17.80**
  - Port to starboard 90° **K = 19.52**



### Corrections in function of the type of boat:

- For sailing-boats **C x 0.5**
- For a boat with a steering nozzle **C x 2.0**
- For twin engine power boats with 1 rudder **C x 0.5**
- For boats fitted with several rudders (catamarans, trimarans, monohulls), multiply the calculated torque result by the number of rudders fitted on the boat.

Once the torque is known, the appropriate cylinder is selected (pages 6 or 12) and one or two manual pumps will be added accordingly (pages 6 or 12).

**Note: If the selected pump has a higher flow rate in order to reduce the number of turns lock to lock, it will be necessary to use a steering wheel with the maximum recommended diameter.**

- **For pleasure boats with planing or semi-planing hulls** and speed exceeding 25 knots, the cylinder may be selected by using the chart below:

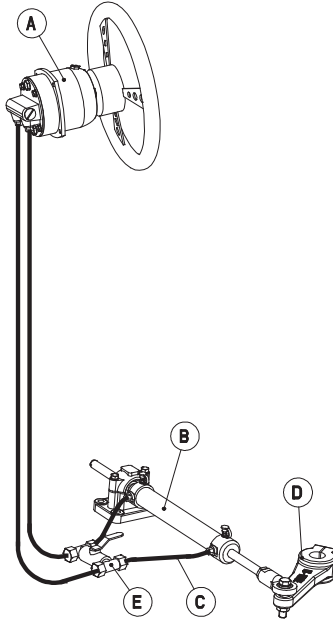
Length of Hull	Cylinder Type – 1 Rudder	Cylinder Type – 2 Rudders
8 metres	VHM 40 DTP – code 2200075 page 11	VHM 32 DTP – code 2200059 page 10
10 metres	VHM 40-254 – code 2200496 page 11	VHM 40 DTP – code 2200075 page 11
12 metres	VHM 40-254 – code 2200496 page 11	VHM 40 DTP – code 2200075 page 11
14 metres	VHM 50 DTP – code 2200497 page 11	VHM 40-254 – code 2200496 page 11

*This chart is given as an indication only*

# HYDRAULIC STEERING SYSTEMS

## ASSEMBLING DIAGRAMS OF HYDRAULIC STEERING SYSTEMS

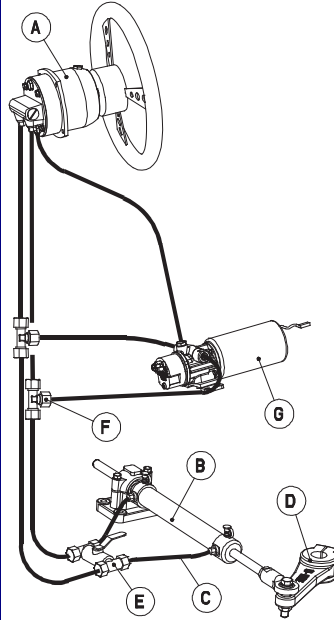
Single station + lock valve



A - 1 pump + LV + fittings  
B - 1 cylinder  
C - 2 hoses + fittings

Option D - tiller arm  
E - by-pass valve

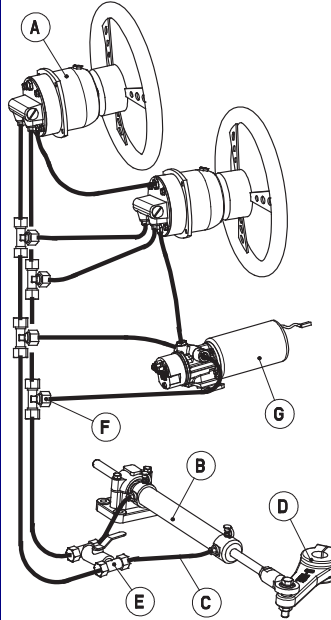
Single station + lock valve + power pack



A - 1 pump + LV + fittings  
B - 1 cylinder  
C - 2 hoses + fittings  
F - tees + connection fittings  
G - 1 power pack

Option D - tiller arm  
E - by-pass valve

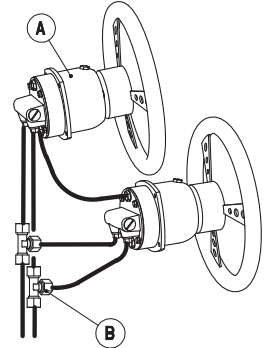
Double station + lock valve + power pack



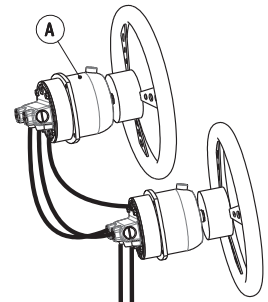
A - 2 pumps + LV + fittings  
B - 1 cylinder  
C - 2 hoses + fittings  
F - tees + connection fittings  
G - 1 power pack

Option D - tiller arm  
E - by-pass valve

Double station + lock valve

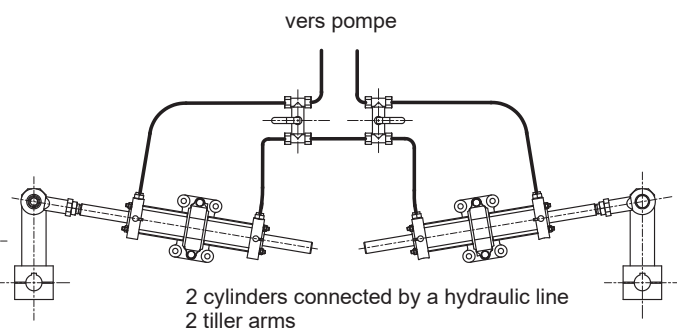
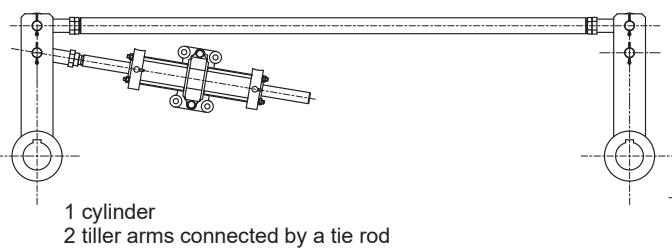
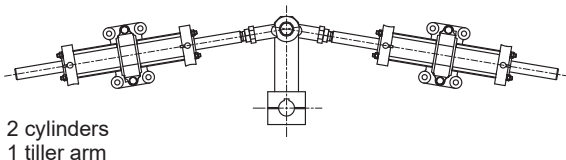
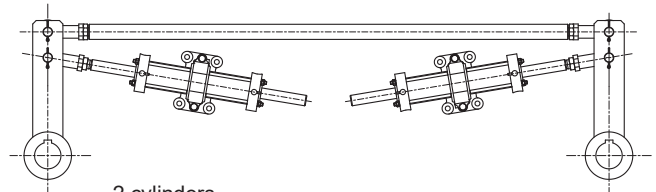
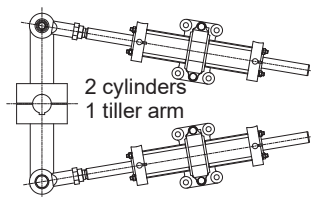
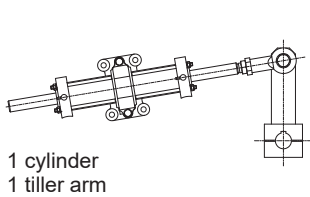


A - 2 pumps + LV + fittings  
B - tees + connection fittings



A - 2 pumps with dual outlet flange + LV + fittings

## POSSIBLE ASSEMBLIES



# HYDRAULIC STEERING SYSTEMS FOR INBOARD MOTOR BOATS

Number of turns lock to lock in function of the <b>PUMP / CYLINDER</b> selection		<b>T Y P E O F P U M P</b>						
		Page 7 <b>2200804</b> 20 HB with lock valve (*)	Page 7 <b>2200948</b> 26 HB with lock valve (*)	Page 7 <b>2200949</b> 30 HB without lock valve  <b>2200950</b> 30 HB with lock valve (*)	Page 7 <b>2201104</b> 35 HB without lock valve  <b>2201105</b> 35 HB with lock valve (*)	Page 8 <b>2201106</b> 40 HB without lock valve  <b>2201107</b> 40 HB with lock valve (*)	Page 8 <b>2201732</b> 50 HB without lock valve  <b>2201728</b> 50 HB with lock valve (*)	Page 8 <b>2200194</b> 70 CT without lock valve  <b>2200088</b> 70 CT with lock valve
<b>T Y P E O F C Y L I N D E R</b>	Page 10 <b>2200831</b> <b>VHM 26 DTP</b> 27 kpm 200 ft.lbs 265 N.m.	<b>3</b>						
	Page 10 <b>2200051</b> <b>VHM 28 DTP</b> 30 kpm 217 ft.lbs 295 N.m.	<b>3.5</b>	<b>2.7</b>	<b>2.3</b>				
	Page 10 <b>2200059</b> <b>VHM 32 DTP</b> 50 kpm 361 ft.lbs 490 N.m.		<b>4.6</b>	<b>4</b>	<b>3.4</b>			
	Page 11 <b>2200075</b> <b>VHM 40 DTP</b> 84 kpm 620 ft.lbs 823 N.m.			<b>6.4</b>	<b>5.5</b>	<b>4.8</b>		
	Page 11 <b>2200496</b> <b>VHM 40 DTP C254</b> 105 kpm 759 ft.lbs 1030 N.m.				<b>6.8</b>	<b>6</b>	<b>4.8</b>	<b>3.4</b>
	Page 11 <b>2200497</b> <b>VHM 50 DTP</b> 185 kpm 1350 ft.lbs 1813 N.m.					<b>8.8</b>	<b>7.1</b>	<b>5</b>
	Page 11 <b>2200498</b> <b>VHM 50 DTP C300</b> 240 kpm 1750 ft.lbs 2350 N.m.					<b>11.6</b>	<b>9.3</b>	<b>6.6</b>





# PUMPS



	<p><b>2200804</b> Pump 20 HB with lock valve(*)</p> <p><b>2200807</b> Set of straight fittings for Ø 6 mm flexible tube</p> <p><b>2201989</b> Set of elbow fittings for Ø 6 mm flexible tube</p> <p><b>2200809</b> Set of tees for Ø 6 mm flexible tube</p> <p><b>2200986</b> S/Steel wheel Ø 400 mm</p>	<p><b>Flow rate</b> 20 cc/t 1.2 cu.in</p> <p><b>Minimum size of tubing</b> Ø 6 mm .25 "</p> <p><b>Weight</b> 3.5 kg 7.7 lbs</p> <p><b>Volume</b> 400 cc 24.4 cu.in</p> <p><b>Max. Wheel diametre</b> Ø 520 mm 20 ½ "</p>
	<p><b>2200948</b> Pump 26 HB with lock valve(*)</p> <p><b>2200021</b> Set of elbow fittings for Ø 8 mm flexible tube</p> <p><b>2200048</b> Set of straight fittings for Ø 10mm inflexible tube</p> <p><b>2200047</b> Set of tees for Ø 8 mm flexible tube</p> <p><b>2200046</b> Set of tees for Ø 10 mm inflexible tube</p> <p><b>2200986</b> S/Steel wheel Ø 400 mm</p> <p>(**) Contact us</p>	<p><b>Flow rate</b> 26 cc/t 1.6 cu.in</p> <p><b>Minimum size of tubing</b> 8x10 mm .31"x.39"</p> <p><b>Weight</b> 3.5 kg 7.7 lbs</p> <p><b>Volume</b> 400 cc 24.4 cu.in</p> <p><b>Max. Wheel diametre</b> Ø 520 mm 20 ½ "</p>
	<p><b>2200949</b> Pump 30 HB without lock valve</p> <p><b>2200950</b> Pump 30 HB with lock valve(*)</p> <p><b>2200021</b> Set of elbow fittings for Ø 8mm flexible tube</p> <p><b>2200048</b> Set of straight fittings for Ø 10mm inflexible tube</p> <p><b>2200047</b> Set of tees for Ø 8 mm flexible tube</p> <p><b>2200046</b> Set of tees for Ø 10 mm inflexible tube</p> <p><b>2200029</b> Adaptable cone + locking pin</p> <p><b>2200986</b> S/Steel wheel Ø 400 mm</p> <p>(**) Contact us</p>	<p><b>Flow rate</b> 29 cc/t 1.7 cu.in</p> <p><b>Minimum size of tubing</b> 8x10 mm .31"x.39"</p> <p><b>Weight</b> 3.4 kg 7.5 lbs</p> <p><b>Volume</b> 400 cc 24.4 cu.in</p> <p><b>Max. Wheel diametre</b> Ø 520 mm 20 ½ "</p>
<p>Dual Outlet Pump (**)</p>	<p><b>2201104</b> Pump 35 HB without lock valve</p> <p><b>2201105</b> Pump 35 HB with lock valve(*)</p> <p><b>2200021</b> Set of elbow fittings for Ø 8mm flexible tube</p> <p><b>2200048</b> Set of straight fittings for Ø 10mm inflexible tube</p> <p><b>2200047</b> Set of tees for Ø 8 mm flexible tube</p> <p><b>2200046</b> Set of tees for Ø 10 mm inflexible tube</p> <p><b>2200029</b> Adaptable cone + locking pin</p> <p><b>2200986</b> S/Steel wheel Ø 400 mm</p> <p>(**) Contact us</p>	<p><b>Flow rate</b> 35 cc/t 2.14 cu.in</p> <p><b>Minimum size of tubing</b> 8x10 mm .31"x.39"</p> <p><b>Weight</b> 3.4 kg 7.5 lbs</p> <p><b>Volume</b> 400 cc 24.4 cu.in</p> <p><b>Max. Wheel diametre</b> Ø 520 mm 20 ½ "</p>

# PUMPS



	<p><b>2201106</b> Pump type 40 HB without lock valve  <b>2201107</b> Pump type 40 HB with lock valve (*)  <b>2200068</b> Set of straight fittings for Ø 10mm flexible tube  <b>2200048</b> Set of straight fittings for Ø 10mm inflexible tube  <b>2200072</b> Set of tees for Ø 10mm flex. tube  <b>2200046</b> Set of tees for Ø 10mm inflex. tube  <b>2200029</b> Adaptable cone + locking pin  <b>2200180</b> S/Steel wheel Ø 500 mm</p> <p>(**) <i>Contact us</i></p>	<table border="0"> <tr> <td>Flow rate</td> <td>40 cc/t</td> <td>2.44 cu.in</td> </tr> <tr> <td>Minimum size of tubing</td> <td>8x10mm</td> <td>.31"x.39"</td> </tr> <tr> <td>Weight</td> <td>3.4 kg</td> <td>7.5 lbs</td> </tr> <tr> <td>Volume</td> <td>400 cc</td> <td>24.4 cu.in</td> </tr> <tr> <td>Max. Wheel diametre</td> <td>Ø 520 mm</td> <td>20 ½ "</td> </tr> </table>	Flow rate	40 cc/t	2.44 cu.in	Minimum size of tubing	8x10mm	.31"x.39"	Weight	3.4 kg	7.5 lbs	Volume	400 cc	24.4 cu.in	Max. Wheel diametre	Ø 520 mm	20 ½ "
Flow rate	40 cc/t	2.44 cu.in															
Minimum size of tubing	8x10mm	.31"x.39"															
Weight	3.4 kg	7.5 lbs															
Volume	400 cc	24.4 cu.in															
Max. Wheel diametre	Ø 520 mm	20 ½ "															
<p>Dual Outlet Pump (**)</p>	<p><b>2201732</b> Pump type 50 HB without lock valve  <b>2201728</b> Pump type 50 HB with lock valve (*)  <b>2200068</b> Set of straight fittings for Ø 10mm flexible tube  <b>2200048</b> Set of straight fittings for Ø 10mm inflexible tube  <b>2200072</b> Set of tees for Ø 10mm flex. tube  <b>2200046</b> Set of tees for Ø 10mm inflex. tube  <b>2200029</b> Adaptable cone + locking pin  <b>2200180</b> S/Steel wheel Ø 500 mm</p> <p>(**) <i>Contact us</i></p>	<table border="0"> <tr> <td>Flow rate</td> <td>50 cc/t</td> <td>3.05 cu.in</td> </tr> <tr> <td>Minimum size of tubing</td> <td>8x10 mm</td> <td>.31"x.39"</td> </tr> <tr> <td>Weight</td> <td>3.4 kg</td> <td>7.5 lbs</td> </tr> <tr> <td>Volume</td> <td>400 cc</td> <td>24.4 cu.in</td> </tr> <tr> <td>Max. Wheel diametre</td> <td>Ø 520 mm</td> <td>20 ½ "</td> </tr> </table>	Flow rate	50 cc/t	3.05 cu.in	Minimum size of tubing	8x10 mm	.31"x.39"	Weight	3.4 kg	7.5 lbs	Volume	400 cc	24.4 cu.in	Max. Wheel diametre	Ø 520 mm	20 ½ "
Flow rate	50 cc/t	3.05 cu.in															
Minimum size of tubing	8x10 mm	.31"x.39"															
Weight	3.4 kg	7.5 lbs															
Volume	400 cc	24.4 cu.in															
Max. Wheel diametre	Ø 520 mm	20 ½ "															
	<p><b>2200194</b> Pump 70 CT without lock valve  <b>2200088</b> Pump 70 CT with lock valve  <b>2200089</b> Set of straight fittings 3/8 BSPP Ø12 mm  <b>2200102</b> Set of tees for Ø 12 mm inflex. tube  <b>2200175</b> Wooden wheel Ø 600 mm</p>	<table border="0"> <tr> <td>Flow rate</td> <td>70 cc/t</td> <td>4.27 cu.in</td> </tr> <tr> <td>Minimum size of tubing</td> <td>10x12 mm</td> <td>.39"x.47"</td> </tr> <tr> <td>Weight</td> <td>5.5 kg</td> <td>12.1 lbs</td> </tr> <tr> <td>Volume</td> <td>660 cc</td> <td>40 cu.in</td> </tr> <tr> <td>Max. Wheel diametre</td> <td>Ø 1000 mm</td> <td>39 ¾ "</td> </tr> </table>	Flow rate	70 cc/t	4.27 cu.in	Minimum size of tubing	10x12 mm	.39"x.47"	Weight	5.5 kg	12.1 lbs	Volume	660 cc	40 cu.in	Max. Wheel diametre	Ø 1000 mm	39 ¾ "
Flow rate	70 cc/t	4.27 cu.in															
Minimum size of tubing	10x12 mm	.39"x.47"															
Weight	5.5 kg	12.1 lbs															
Volume	660 cc	40 cu.in															
Max. Wheel diametre	Ø 1000 mm	39 ¾ "															

# HB 5 TILT PUMPS

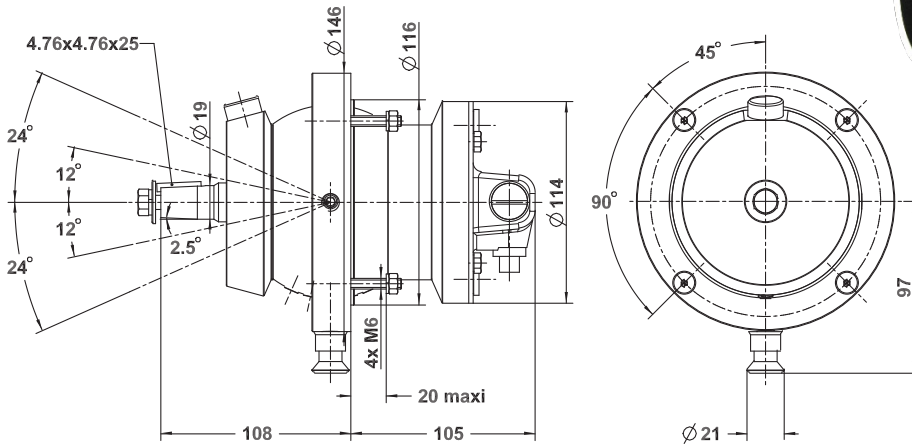


This product – the only one of its kind – is the most compact system on the market.

The hydraulic pump has been integrated directly into the tilt mechanism and is fitted with a lock valve.

## ORIENTATION RANGE

Possible orientation angle:  
-24° to +24° (5 positions).



Ref.	Designation	Flow rate
2203658	HB 5 TILT PUMP – 20 CT	20 cc/t
2203559	HB 5 TILT PUMP – 26 CT	26 cc/t
2203659	HB 5 TILT PUMP – 30 CT	30 cc/t
2203669	HB 5 TILT PUMP – 35 CT	35 cc/t
2203670	HB 5 TILT PUMP – 40 CT	40 cc/t
2203695	HB 5 TILT PUMP – 50 CT	50 cc/t

# CYLINDERS



	<p><b>2200831</b> VHM 26 DTP + fittings  <b>2201994</b> Set of fittings for VHM 224  <b>2200810</b> Ø 6 mm flexible tube (per metre)  <b>2200803</b> By-pass for Ø 6 mm flexible tube  <b>2200003</b> Tiller arm LS 30 P + screws &amp; bolts  <b>2200017</b> Oil (2 litre can)</p>	<p>Maximum torque 27 kpm 200 ft.lbs  Stroke 150 mm 5 29/32"  Maximum pressure 50 bars 725 PSI  Volume 62.6 cc 3.8 cu.in  Radius of tiller arm 129 mm 5 5/64"  Total rudder angle 70°  Weight 1 kg 2.2 lbs</p>
	<p><b>2200051</b> VHM 28 DTP  <b>2200123</b> Set of straight fittings 1/4 BSPP for Ø 8 mm flexible tube  <b>2200049</b> Set of flexible tube and fittings 1/4 BSPP Ø 10 mm  <b>2200024</b> Ø 8 mm flexible tube (per metre)  <b>2200027</b> By-pass for Ø 8 mm flexible tube  <b>2200045</b> By-pass for Ø 10 mm inflexible tube  <b>2200003</b> Tiller arm LS 30 P + screws &amp; bolts  <b>2200017</b> Oil (2 litre can)</p>	<p>Maximum torque 30 kpm 217 ft.lbs  Stroke 150 mm 5 29/32"  Maximum pressure 50 bars 725 PSI  Volume 69.2 cc 34.22 cu.in  Radius of tiller arm 129 mm 5 5/64"  Total rudder angle 70°  Weight 1.1 kg 2.4 lbs</p>
	<p><b>2200059</b> VHM 32 DTP  <b>2200123</b> Set of straight fittings 1/4 BSPP for Ø 8 mm flexible tube  <b>2200049</b> Set of flexible tube and fittings 1/4 BSPP Ø 10 mm  <b>2200024</b> Ø 8 mm flexible tube (per metre)  <b>2200027</b> By-pass for Ø 8 mm flexible tube  <b>2200045</b> By-pass for Ø 10 mm inflexible tube  <b>2200060</b> Tiller arm LS 50 P + screws &amp; bolts  <b>2200017</b> Oil (2 litre can)</p>	<p>Maximum torque 50 kpm 361 ft.lbs  Stroke 200 mm 7 7/8"  Maximum pressure 50 bars 725 PSI  Volume 120.5 cc 7.35 cu.in  Radius of tiller arm 180 mm 7 3/32"  Total rudder angle 70°  Weight 2.3 kg 5.1 lbs</p>




# CYLINDERS



Possible orientation of the outlets (bleeders and fittings)

	<p><b>2200075</b> VHM 40 DTP</p> <p><b>2200068</b> Set of straight fittings 1/4 BSPP for flexible tube Ø 10 mm</p> <p><b>2200049</b> Set of flex. tubes &amp; fitt. 1/4 BSPP Ø10 mm</p> <p><b>2200070</b> Flexible tube Ø 10 mm per metre</p> <p><b>2200067</b> By-pass for flex. tube Ø 10 mm</p> <p><b>2200045</b> By-pass for inflex. tube Ø 10 mm</p> <p><b>2200499</b> Tiller arm LS 75 P + screws &amp; bolts</p> <p><b>2200017</b> Oil (2 litre can)</p>	<p>Maximum torque 84 kpm 620 ft.lbs</p> <p>Stroke 204 mm 8"</p> <p>Maximum pressure 50 bars 725 PSI</p> <p>Volume 191 cc 11.6 cu.in</p> <p>Radius of tiller arm 180 mm 7 3/32"</p> <p>Total rudder angle 70°</p> <p>Weight 3.4 kg 7.5 lbs</p>
	<p><b>2200496</b> VHM 40 DTP C254</p> <p><b>2200049</b> Set of flex. tubes &amp; fitt. 1/4 BSPP Ø10 mm</p> <p><b>2200045</b> By-pass for inflex. tube Ø 10 mm</p> <p><b>2200533</b> Tiller arm LS 105P + screws &amp; bolts</p> <p><b>2200017</b> Oil (2 litre can)</p>	<p>Maximum torque 105 kpm 759 ft.lbs</p> <p>Stroke 254 mm 10"</p> <p>Maximum pressure 50 bars 725 PSI</p> <p>Volume 239 cc 14.5 cu.in</p> <p>Radius of tiller arm 220 mm 8 21/32"</p> <p>Total rudder angle 70°</p> <p>Weight 3.8 kg 8.4 lbs</p>
	<p><b>2200497</b> VHM 50 DTP</p> <p><b>2200096</b> Set of flexible tubes &amp; fittings 3/8 BSPP Ø 12 mm</p> <p><b>2200097</b> By-pass for inflex. tube Ø 12 mm</p> <p><b>2200534</b> Tiller arm LS 185 P + screws &amp; bolts</p> <p><b>2200017</b> Oil (2 litre can)</p>	<p>Maximum torque 185 kpm 1350 ft.lbs</p> <p>Stroke 228 mm 9"</p> <p>Maximum pressure 60 bars 870 PSI</p> <p>Volume 352 cc 21.5 cu.in</p> <p>Radius of tiller arm 200 mm 7 7/8"</p> <p>Total rudder angle 70°</p> <p>Weight 5 kg 11 lbs</p>
	<p><b>2200498</b> VHM 50 DTP C300</p> <p><b>2200096</b> Set of flexible tubes &amp; fittings 3/8 BSPP Ø 12 mm</p> <p><b>2200097</b> By-pass for inflex. tube Ø 12 mm</p> <p><b>2200535</b> Tiller arm LS 240 P + screws &amp; bolts</p> <p><b>2200017</b> Oil (2 litre can)</p>	<p>Maximum torque 240 kpm 1750 ft.lbs</p> <p>Stroke 300 mm 11 13/16"</p> <p>Maximum pressure 60 bars 870 PSI</p> <p>Volume 464 cc 28.5 cu.in</p> <p>Radius of tiller arm 260 mm 10 1/4"</p> <p>Total rudder angle 70°</p> <p>Weight 5.8 kg 12.8 lbs</p>

# HYDRAULIC STEERING SYSTEMS FOR INBOARD MOTOR BOATS

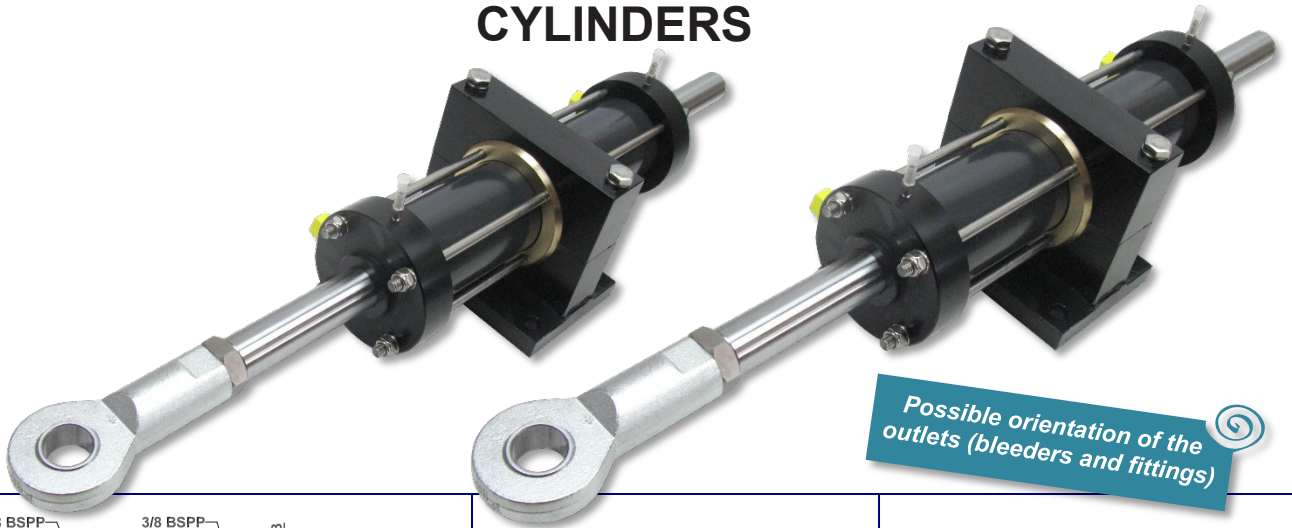
Number of turns lock to lock in function of the <b>PUMP / CYLINDER</b> selection 		<b>T Y P E O F P U M P</b>				
		<i>Page 13</i> <b>2200194</b> 70 CT without lock valve <b>2200088</b> 70 CT with lock valve	<i>Page 13</i> <b>2200494</b> 90 CT without lock valve <b>2200489</b> 90 CT with lock valve	<i>Page 13</i> <b>2200106</b> 105 CT without lock valve	<i>Page 13</i> <b>2200130</b> 150 CT without lock valve	<i>Page 13</i> <b>2200135</b> 200 CT without lock valve
<b>T Y P E O F C Y L I N D E R</b>	<i>Page 14</i> <b>2200093</b> <b>VHM 45 DT C228</b> 140 kpm 1033 ft.lbs 1372 N.m.	<b>3.8</b>				
	<i>Page 14</i> <b>2200094</b> <b>VHM 60 DT</b> 265 kpm 1957 ft.lbs 2597 N.m.	<b>7.2</b>	<b>5.6</b>			
	<i>Page 14</i> <b>2200095</b> <b>VHM 60 DT C300</b> 344 kpm 2540 ft.lbs 3510 N.m.	<b>9.5</b>	<b>7.4</b>	<b>6.3</b>		
	<i>Page 14</i> <b>2202932</b> <b>VHM 63 DT C345</b> 450 kpm 3250 ft.lbs 4591 N.m.	<b>12.3</b>	<b>9.6</b>	<b>8.2</b>	<b>5.75</b>	
	<i>Page 15</i> <b>2202700</b> <b>VHM 80 DT</b> 600 kpm 4430 ft.lbs 5880 N.m.		<b>13</b>	<b>11</b>	<b>7.8</b>	
	<i>Page 15</i> <b>2202699</b> <b>VHM 90 DT</b> 840 kpm 6076 ft.lbs 8230 N.m.			<b>15</b>	<b>10.4</b>	<b>7.8</b>
	<i>Page 15</i> <b>2202840</b> <b>VHM 90 DT C400</b> 1000 kpm 7233 ft.lbs 9806 N.m.			<b>19</b>	<b>14</b>	<b>10.5</b>
	<i>Page 16</i> <b>2202815</b> <b>VHM 110 DT C300</b> 1200 kpm 8660 ft.lbs 11765 N.m.			<b>22</b>	<b>15.5</b>	<b>11.5</b>
	<i>Page 16</i> <b>2202698</b> <b>VHM 110 DT</b> 1600 kpm 11800 ft.lbs 15680 N.m.				<b>20.5</b>	<b>15.4</b>
	<i>Page 16</i> <b>2202685</b> <b>VHM 120 DT</b> 2000 kpm 14770 ft.lbs 19600 N.m.					<b>20</b>

# PUMPS



	<p><b>2200194</b> Pump 70 CT without lock valve  <b>2200088</b> Pump 70 CT with lock valve  <b>2200089</b> Set of straight fittings for pump 3/8 BSPP Ø 12 mm  <b>2200102</b> Set of tees for Ø 12 mm inflex. tube  <b>2200175</b> Wooden wheel Ø 600 mm</p> <p><b>Ø 12-17 fittings available on request</b></p>	<p><b>Flow rate</b> 70 cc/t 4.27 cu.in  <b>Minimum size of tubing</b> 10x12 mm .39"x.47"  <b>Weight</b> 5.5 kg 12.1 lbs  <b>Volume</b> 660 cc 40 cu.in  <b>Max. Wheel diametre</b> Ø 1000 mm 39 3/8 "</p>
	<p><b>2200494</b> Pump 90 CT without lock valve  <b>2200489</b> Pump 90 CT with lock valve  <b>2200089</b> Set of straight fittings for pump 3/8 BSPP Ø 12 mm  <b>2200102</b> Set of tees for Ø 12 mm inflex. tube  <b>2200998</b> Wooden wheel Ø 700 mm</p> <p><b>Ø 12-17 fittings available on request</b></p>	<p><b>Flow rate</b> 90 cc/t 5.5 cu.in  <b>Minimum size of tubing</b> 10x12 mm .39"x.47"  <b>Weight</b> 5.5 kg 12.1 lbs  <b>Volume</b> 660 cc 40 cu.in  <b>Max. Wheel diametre</b> Ø 1000 mm 39 3/8 "</p>
	<p><b>2200106</b> Pump 105 CT without lock valve  <b>2200107</b> Set of straight fittings for pump 1/2 BSPP Ø 18 mm  <b>2200110</b> Lock valve LS 170  <b>2200111</b> Set of straight fittings for lock valve 1/2 BSPP Ø 18 mm  <b>2200115</b> Set of tees for Ø 18 mm inflex. tube  <b>2200177</b> Wooden wheel Ø 700 mm</p> <p><b>Ø 15-21 fittings available on request</b></p>	<p><b>Flow rate</b> 105 cc/t 6.41 cu.in  <b>Minimum size of tubing</b> 15x18 mm .59"x.70"  <b>Weight</b> 16.4 kg 36.2 lbs  <b>Volume</b> 2000 cc 122 cu.in  <b>Max. Wheel diametre</b> Ø 1000 mm 39 3/8 "</p>
	<p><b>2200130</b> Pump 150 CT without lock valve  <b>2200107</b> Set of straight fittings for pump 1/2 BSPP Ø 18 mm  <b>2200110</b> Lock valve LS 170  <b>2200111</b> Set of straight fittings for lock valve 1/2 BSPP Ø 18 mm  <b>2200115</b> Set of tees for Ø 18 mm inflex. tube  <b>2200178</b> Wooden wheel Ø 800 mm</p> <p><b>Ø 15-21 fittings available on request</b></p>	<p><b>Flow rate</b> 150 cc/t 9.15 cu.in  <b>Minimum size of tubing</b> 15x18 mm .59"x.70"  <b>Weight</b> 16.4 kg 36.2 lbs  <b>Volume</b> 2000 cc 122 cu.in  <b>Max. Wheel diametre</b> Ø 1000 mm 39 3/8 "</p>
	<p><b>2200135</b> Pump 200 CT without lock valve  <b>2200107</b> Set of straight fittings for pump 1/2 BSPP Ø 18 mm  <b>2200110</b> Lock valve LS 170  <b>2200111</b> Set of straight fittings for lock valve 1/2 BSPP Ø 18 mm  <b>2200115</b> Set of tees for Ø 18 mm inflex. tube  <b>2200179</b> Wooden wheel Ø 1000 mm</p> <p><b>Ø 15-21 fittings available on request</b></p>	<p><b>Flow rate</b> 200 cc/t 12.2 cu.in  <b>Minimum size of tubing</b> 15x18 mm .59"x.70"  <b>Weight</b> 17 kg 37.5 lbs  <b>Volume</b> 2000 cc 122 cu.in  <b>Max. Wheel diametre</b> Ø 1000 mm 39 3/8 "</p>

# CYLINDERS



	<p><b>2200093</b> VHM 45 DT C228 APD</p> <p><b>2200096</b> Set of flex. tube and fitt. 3/8 BSPP Ø 12 mm</p> <p><b>2200097</b> By-pass for Ø 12 mm inflexible tube</p> <p><b>2200098</b> Tiller arm LS 105 + screws &amp; bolts</p> <p><b>2200017</b> Oil (2 litre can)</p> <p><i>On request: Ø 12-17 fittings, flexible tube and by-pass</i></p>	<table border="0"> <tr> <td>Maximum torque</td> <td>140 kpm</td> <td>1033 ft.lbs</td> </tr> <tr> <td>Stroke</td> <td>228 mm</td> <td>9"</td> </tr> <tr> <td>Maximum pressure</td> <td>60 bars</td> <td>870 PSI</td> </tr> <tr> <td>Volume</td> <td>268 cc</td> <td>16.3 cu.in</td> </tr> <tr> <td>Radius of tiller arm</td> <td>200 mm</td> <td>7 7/8"</td> </tr> <tr> <td>Total rudder angle</td> <td colspan="2">70°</td> </tr> <tr> <td>Weight</td> <td>10.9 kg</td> <td>24 lbs</td> </tr> </table>	Maximum torque	140 kpm	1033 ft.lbs	Stroke	228 mm	9"	Maximum pressure	60 bars	870 PSI	Volume	268 cc	16.3 cu.in	Radius of tiller arm	200 mm	7 7/8"	Total rudder angle	70°		Weight	10.9 kg	24 lbs
Maximum torque	140 kpm	1033 ft.lbs																					
Stroke	228 mm	9"																					
Maximum pressure	60 bars	870 PSI																					
Volume	268 cc	16.3 cu.in																					
Radius of tiller arm	200 mm	7 7/8"																					
Total rudder angle	70°																						
Weight	10.9 kg	24 lbs																					
	<p><b>2200094</b> VHM 60 DT APD</p> <p><b>2200096</b> Set of flex. tube and fitt. 3/8 BSPP Ø 12 mm</p> <p><b>2200097</b> By-pass for Ø 12 mm inflexible tube</p> <p><b>2200099</b> Tiller arm LS 155 + screws &amp; bolts</p> <p><b>2200017</b> Oil (2 litre can)</p> <p><i>On request: Ø 12-17 fittings, flexible tube and by-pass</i></p>	<table border="0"> <tr> <td>Maximum torque</td> <td>265 kpm</td> <td>1957 ft.lbs</td> </tr> <tr> <td>Stroke</td> <td>228 mm</td> <td>9"</td> </tr> <tr> <td>Maximum pressure</td> <td>60 bars</td> <td>870 PSI</td> </tr> <tr> <td>Volume</td> <td>505 cc</td> <td>30.8 cu.in</td> </tr> <tr> <td>Radius of tiller arm</td> <td>200 mm</td> <td>7 7/8"</td> </tr> <tr> <td>Total rudder angle</td> <td colspan="2">70°</td> </tr> <tr> <td>Weight</td> <td>14.2 kg</td> <td>31.3 lbs</td> </tr> </table>	Maximum torque	265 kpm	1957 ft.lbs	Stroke	228 mm	9"	Maximum pressure	60 bars	870 PSI	Volume	505 cc	30.8 cu.in	Radius of tiller arm	200 mm	7 7/8"	Total rudder angle	70°		Weight	14.2 kg	31.3 lbs
Maximum torque	265 kpm	1957 ft.lbs																					
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Maximum pressure	60 bars	870 PSI																					
Volume	505 cc	30.8 cu.in																					
Radius of tiller arm	200 mm	7 7/8"																					
Total rudder angle	70°																						
Weight	14.2 kg	31.3 lbs																					
	<p><b>2200095</b> VHM 60 DT C300 APD</p> <p><b>2200096</b> Set of flex. tube and fitt. 3/8 BSPP Ø 12 mm</p> <p><b>2200097</b> By-pass for Ø 12 mm inflexible tube</p> <p><b>2200100</b> Tiller arm LS 330 + screws &amp; bolts</p> <p><b>2200017</b> Oil (2 litre can)</p> <p><i>On request : Ø 12-17 fittings, flexible tube and by-pass</i></p>	<table border="0"> <tr> <td>Maximum torque</td> <td>344 kpm</td> <td>2540 ft.lbs</td> </tr> <tr> <td>Stroke</td> <td>300 mm</td> <td>11 13/16"</td> </tr> <tr> <td>Maximum pressure</td> <td>60 bars</td> <td>870 PSI</td> </tr> <tr> <td>Volume</td> <td>664 cc</td> <td>40.5 cu.in</td> </tr> <tr> <td>Radius of tiller arm</td> <td>260 mm</td> <td>10 1/4"</td> </tr> <tr> <td>Total rudder angle</td> <td colspan="2">70°</td> </tr> <tr> <td>Weight</td> <td>15.5 kg</td> <td>34.2 lbs</td> </tr> </table>	Maximum torque	344 kpm	2540 ft.lbs	Stroke	300 mm	11 13/16"	Maximum pressure	60 bars	870 PSI	Volume	664 cc	40.5 cu.in	Radius of tiller arm	260 mm	10 1/4"	Total rudder angle	70°		Weight	15.5 kg	34.2 lbs
Maximum torque	344 kpm	2540 ft.lbs																					
Stroke	300 mm	11 13/16"																					
Maximum pressure	60 bars	870 PSI																					
Volume	664 cc	40.5 cu.in																					
Radius of tiller arm	260 mm	10 1/4"																					
Total rudder angle	70°																						
Weight	15.5 kg	34.2 lbs																					
	<p><b>2202932</b> VHM 63 DT C345 APD</p> <p><b>2200109</b> Set of flex. tube and fitt. 1/2 BSPP Ø 18 mm</p> <p><b>2200015</b> By-pass for Ø 18 mm inflexible tube</p> <p><b>2201540</b> Tiller arm LS 450 + screws &amp; bolts</p> <p><b>2200017</b> Oil (2 litre can)</p> <p><i>On request : Ø 15-21 fittings, flexible tube and by-pass</i></p>	<table border="0"> <tr> <td>Maximum torque</td> <td>450 kpm</td> <td>3250 ft.lbs</td> </tr> <tr> <td>Stroke</td> <td>345 mm</td> <td>13 19/32"</td> </tr> <tr> <td>Maximum pressure</td> <td>60 bars</td> <td>870 PSI</td> </tr> <tr> <td>Volume</td> <td>862 cc</td> <td>52.6 cu.in</td> </tr> <tr> <td>Radius of tiller arm</td> <td>300 mm</td> <td>11 13/16"</td> </tr> <tr> <td>Total rudder angle</td> <td colspan="2">70°</td> </tr> <tr> <td>Weight</td> <td>15.7 kg</td> <td>34.6 lbs</td> </tr> </table>	Maximum torque	450 kpm	3250 ft.lbs	Stroke	345 mm	13 19/32"	Maximum pressure	60 bars	870 PSI	Volume	862 cc	52.6 cu.in	Radius of tiller arm	300 mm	11 13/16"	Total rudder angle	70°		Weight	15.7 kg	34.6 lbs
Maximum torque	450 kpm	3250 ft.lbs																					
Stroke	345 mm	13 19/32"																					
Maximum pressure	60 bars	870 PSI																					
Volume	862 cc	52.6 cu.in																					
Radius of tiller arm	300 mm	11 13/16"																					
Total rudder angle	70°																						
Weight	15.7 kg	34.6 lbs																					



# CYLINDERS



Possible orientation of the outlets (bleeders and fittings)

	<p><b>2202700</b> VHM 80 DT APD</p> <p><b>2200109</b> Set of flexible tubes and fittings 1/2 BSPP Ø 18 mm</p> <p><b>2200015</b> By-pass for Ø 18 mm inflex. tube</p> <p><b>2200113</b> Tiller arm LS 550 - 840 + screws &amp; bolts</p> <p><b>2200017</b> Oil (2 litre can)</p> <p><i>On request: Ø 15-21 fittings, flexible pipe and by-pass</i></p>	<p>Maximum torque 600 kpm 4430 ft.lbs</p> <p>Stroke 300 mm 11 13/16"</p> <p>Maximum pressure 60 bars 870 PSI</p> <p>Volume 1167 cc 71.2 cu.in</p> <p>Radius of tiller arm 260 mm 10 1/4"</p> <p>Total rudder angle 70°</p> <p>Weight 30 kg 66.2 lbs</p>
	<p><b>2202699</b> VHM 90 DT APD</p> <p><b>2200109</b> Set of flexible tubes and fittings 1/2 BSPP Ø 18 mm</p> <p><b>2200015</b> By-pass for Ø 18 mm inflex. tube</p> <p><b>2200113</b> Tiller arm LS 550 - 840 + screws &amp; bolts</p> <p><b>2200017</b> Oil (2 litre can)</p> <p><i>On request: Ø 15-21 fittings, flexible pipe and by-pass</i></p>	<p>Maximum torque 840 kpm 6076 ft.lbs</p> <p>Stroke 300 mm 11 13/16"</p> <p>Maximum pressure 60 bars 870 PSI</p> <p>Volume 1567 cc 95.6 cu.in</p> <p>Radius of tiller arm 260 mm 10 1/4"</p> <p>Total rudder angle 70°</p> <p>Weight 32.5 kg 71.7 lbs</p>
	<p><b>2202840</b> VHM 90 DT C400 APD</p> <p><b>2200109</b> Set of flexible tubes and fittings 1/2 BSPP Ø 18 mm</p> <p><b>2200015</b> By-pass for Ø 18 mm inflex. tube</p> <p><b>2202626</b> Tiller arm LS 1000 + screws &amp; bolts</p> <p><b>2200017</b> Oil (2 litre can)</p> <p><i>On request: Ø 15-21 fittings, flexible pipe and by-pass</i></p>	<p>Maximum torque 1000 kpm 7233 ft.lbs</p> <p>Stroke 400 mm 15 3/4"</p> <p>Maximum pressure 60 bars 870 PSI</p> <p>Volume 2090 cc 128 cu.in</p> <p>Radius of tiller arm 350 mm 13 3/4"</p> <p>Total rudder angle 70°</p> <p>Weight 45 kg 100 lbs</p>

# CYLINDERS



	<p><b>2202815</b> VHM 110 DT C300 APD</p> <p><b>2200109</b> Set of flexible tubes and fittings 1/2 BSPP Ø 18 mm</p> <p><b>2200015</b> By-pass for Ø 18 mm inflex. tube</p> <p><b>2201935</b> Tiller arm LS 1200 + screws &amp; bolts</p> <p><b>2200017</b> Oil (2 litre can)</p> <p><i>On request:</i> <b>Ø 15-21 fittings, flexible pipe and by-pass</b></p>	<p>Maximum torque 1200 kpm 8660 ft.lbs</p> <p>Stroke 300 mm 11 13/16"</p> <p>Maximum pressure 60 bars 870 PSI</p> <p>Volume 2307 cc 141 cu.in</p> <p>Radius of tiller arm 260 mm 10 1/4"</p> <p>Total rudder angle 70°</p> <p>Weight 50 kg 110 lbs</p>
	<p><b>2202698</b> VHM 110 DT APD</p> <p><b>2200109</b> Set of flexible tubes and fittings 1/2 BSPP Ø 18 mm</p> <p><b>2200015</b> By-pass for Ø 18 mm inflex. tube</p> <p><b>2200134</b> Tiller arm LS 1350 - 1660 + screws &amp; bolts</p> <p><b>2200017</b> Oil (2 litre can)</p> <p><i>On request:</i> <b>Ø 15-21 fittings, flexible pipe and by-pass</b></p>	<p>Maximum torque 1600 kpm 11800 ft.lbs</p> <p>Stroke 400 mm 15 3/4"</p> <p>Maximum pressure 60 bars 870 PSI</p> <p>Volume 3076 cc 187.7 cu.in</p> <p>Radius of tiller arm 350 mm 13 3/4"</p> <p>Total rudder angle 70°</p> <p>Weight 53 kg 116 lbs</p>
	<p><b>2202685</b> VHM 120 DT APD</p> <p><b>2200109</b> Set of flexible tubes and fittings 1/2 BSPP Ø 18 mm</p> <p><b>2200015</b> By-pass for Ø 18 mm inflex. tube</p> <p><b>2200134</b> Tiller arm LS 1350 - 1660 + screws &amp; bolts</p> <p><b>2200017</b> Oil (2 litre can)</p> <p><i>On request:</i> <b>Ø 15-21 fittings, flexible pipe and by-pass</b></p>	<p>Maximum torque 2000 kpm 14770 ft.lbs</p> <p>Stroke 400 mm 15 3/4"</p> <p>Maximum pressure 60 bars 870 PSI</p> <p>Volume 3798 cc 231.8 cu.in</p> <p>Radius of tiller arm 350 mm 13 3/4"</p> <p>Total rudder angle 70°</p> <p>Weight 60 kg 132 lbs</p>

# MANUAL HELM PUMPS

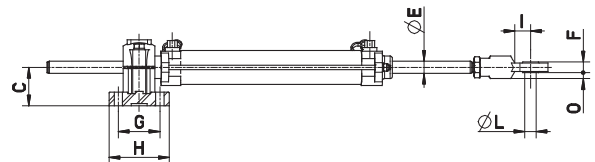
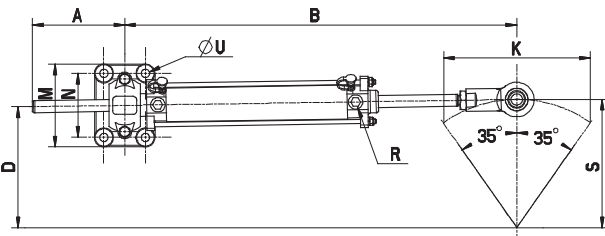


	<b>2200842</b> Pump 70 CT without lock valve double bearing	<b>Flow rate</b> 70 cc/t <b>Minimum tubing size</b> 16 x 18 mm <b>Weight</b> 6.5 kg <b>Volume</b> 660 cc <b>Max. wheel diameter</b> Ø 1000 mm
	<b>2200711</b> Pump 70 CT with lock valve double bearing	
	<b>2202189</b> Pump 70 CT with lock valve double bearing BR	
	<b>2200814</b> Pump 90 CT without lock valve double bearing	<b>Flow rate</b> 90 cc/t <b>Minimum tubing size</b> 16 x 18 mm <b>Weight</b> 6.5 kg <b>Volume</b> 660 cc <b>Max. wheel diameter</b> Ø 1000 mm
	<b>2200832</b> Pump 90 CT with lock valve double bearing	
	<b>2201455</b> Pump 90 CT with lock valve double bearing BR	
	<b>2201941</b> Pump 60 CT with lock valve - 8° - sailing-boat	<b>Flow rate</b> 60 cc/t <b>Minimum tubing size</b> 16 x 18 mm <b>Weight</b> 7.7 kg <b>Volume</b> 660 cc <b>Max. wheel diameter</b> Ø 1000 mm
	<b>2201942</b> Pump 70 CT with lock valve - 8° - sailing-boat	<b>Flow rate</b> 70 cc/t <b>Minimum tubing size</b> 16 x 18 mm <b>Weight</b> 7.7 kg <b>Volume</b> 660 cc <b>Max. wheel diameter</b> Ø 1000 mm
	<b>2201857</b> Pump 90 CT with lock valve - 8° - sailing-boat	<b>Flow rate</b> 90 cc/t <b>Minimum tubing size</b> 16 x 18 mm <b>Weight</b> 7.7 kg <b>Volume</b> 660 cc <b>Max. wheel diameter</b> Ø 1000 mm
	<b>2200605</b> Pump 115 CT without lock valve - 8°	<b>Flow rate</b> 115 cc/t <b>Minimum tubing size</b> 16 x 18 mm <b>Weight</b> 8.4 kg <b>Volume</b> 1000 cc <b>Max. wheel diameter</b> Ø 1200 mm
	<b>2201420</b> Pump 115 CT with lock valve - 8°	
	<b>2201421</b> Pump 170 CT without lock valve - 8°	<b>Flow rate</b> 170 cc/t <b>Minimum tubing size</b> 16 x 18 mm <b>Weight</b> 8.5 kg <b>Volume</b> 1000 cc <b>Max. wheel diameter</b> Ø 1200 mm

# OTHER PUMP AND CYLINDER MODELS



	<p><b>2201762</b> Pump 23 HB – LV Flow rate 23 cc/rev 1.4 cu.in / rev</p> <p><b>2200037</b> Pump 29 CT HB – LV Flow rate 29 cc/rev 1.7 cu.in / rev</p> <p><b>2200019</b> Pump 35 CT HB – LV Flow rate 35 cc/rev 2.14 cu.in/ rev</p>	<p>Minimum size of tubing 8x10mm .31"x.39"</p> <p>Weight 3,3 kg 7.3 lbs</p> <p>Volume 400 cc 24.4 cu.in</p> <p>Max. wheel diametre Ø 520 mm 20 ½ "</p>
	<p><b>2200282</b> Pump 29 CT 30 – LV Flow rate 29 cc/rev 1.7 cu.in / rev</p> <p><b>2200073</b> Pump 40 CT – LV Flow rate 40 cc/rev 2.44 cu.in / rev</p>	<p>Minimum size of tubing 8x10 mm .31"x.39"</p> <p>Weight 3,9 kg 8.6 lbs</p> <p>Volume 400 cc 24.4 cu.in</p> <p>Max. wheel diametre Ø 800 mm 31 ½ "</p>
<p>BOUT ARBRE POMPE 36/60/70/90 CT - CAR - PC / SHAFT END PUMP 36/60/70/90 CT - LV - SC</p>	<p><b>2200248</b> Pump 36 CT - LV Flow rate 36 cc/rev 2.2 cu.in / rev</p> <p><b>2200353</b> Pump 60 CT - LV Flow rate 60 cc/rev 3.66 cu.in / rev</p> <p><b>2201896</b> Pump 36 CT – LV - SC Flow rate 36 cc/rev 2.2 cu.in / rev</p> <p><b>2200413</b> Pump 60 CT – LV - SC Flow rate 60 cc/rev 3.66 cu.in / rev</p> <p><b>2200262</b> Pump 70 CT – LV - SC Flow rate 70 cc/rev 4.27 cu.in / rev</p> <p><b>2200567</b> Pump 90 CT – LV - SC Flow rate 90 cc/rev 5.5 cu.in / rev</p>	<p>Minimum size of tubing 10x12 mm .39"x.47"</p> <p>Weight 5,5 kg 12.1 lbs</p> <p>Volume 660 cc 40 cu.in</p> <p>Max. wheel diametre Ø 1000 mm 39 ¾ "</p> <p>Minimum size of tubing 15x18 mm .59"x.70"</p> <p>Weight 5,5 kg 12.1 lbs</p> <p>Volume 660 cc 40 cu.in</p> <p>Max. wheel diametre Ø 1000 mm 39 ¾ "</p>



TYPE		A	B	C	D	E	F	G	H	I	K	L	M	N	O	U	R	S
Vérins	<b>2200249 VHM 32 DT</b>	97	444	42	117	16	14	40	56	20	150	15	91	75	9	8,5	¼ BSPP	129
	<b>2200222 VHM 35 DTP</b>	122	520	51	163	16	14	55	80	20	200	15	110	85	9	11	¼ BSPP	180
Cylinders	<b>2200249 VHM 32 DT</b>	3 <sup>13/16</sup>	17 <sup>31/64</sup>	1 <sup>21/32</sup>	4 <sup>39/64</sup>	5/8	5/8	1 <sup>37/64</sup>	2 <sup>3/16</sup>	25/32	5 <sup>29/32</sup>	19/32	3 <sup>37/64</sup>	2 <sup>61/64</sup>	23/64	21/64	¼ BSPP	5 <sup>5/64</sup>
	<b>2200222 VHM 35 DTP</b>	4 <sup>1/32</sup>	20 <sup>9/16</sup>	2	6 <sup>27/64</sup>	5/8	5/8	2 <sup>5/32</sup>	3 <sup>5/32</sup>	25/32	7 <sup>7/8</sup>	19/32	4 <sup>21/64</sup>	3 <sup>11/32</sup>	23/64	7/16	¼ BSPP	7 <sup>5/64</sup>



# OPTIONAL ADDITIONS TO OUR STEERING SYSTEMS

## Speedy Purge

LS Speedy Purge makes it possible for one single operator to **fill in and bleed** a hydraulic steering system perfectly well and neatly within 10 minutes.



**2203593** LS Speedy Purge – 12V

**2203836** LS Speedy Purge – 12V with 4 m extension hoses

**1206948** Set of 2 x 4 m extension hoses

**2200376** Elect. by-pass NO 06 12 VDC 3/8 BSPP

**2201479** Elect. by-pass NO 06 24 VDC 3/8 BSPP

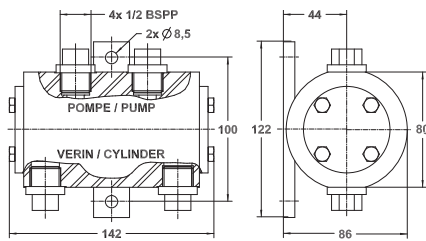
**2200566** Elect. by-pass NO 12 12 VDC 1/2 BSPP

**2201438** Elect. by-pass NO 12 24 VDC 1/2 BSPP



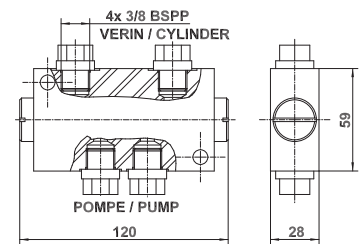
## 2200110 Lock valve on line LS 170

For pumps : 105 CT - 150 CT - 170 CT - 200 CT / without Lock Valve



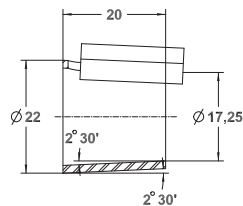
## 2200078 Lock valve on line LS 115

For pumps : 30 HB, 35 HB, 40 HB, 50 HB, 70 CT, 90 CT / without LV



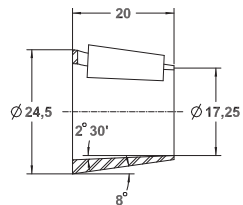
## 2201138 Adaptable cone with pin Ø 22 - 2.30° angle

For pumps : 30 HB, 35 HB, 40 HB

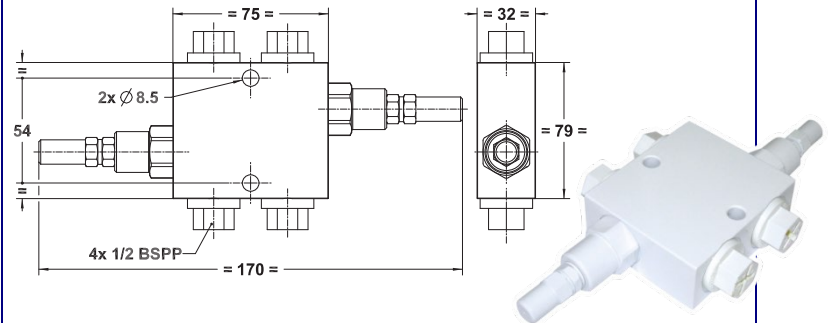


## 2200029 Adaptable cone with pin Ø 24.5 - 8° angle

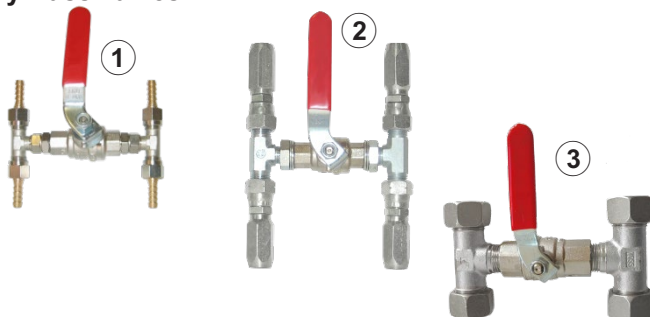
For pumps : 30 HB, 35 HB, 40 HB



## 2203369 Dual pressure relief valve



## By-Pass valves



**1** **2200803** By-pass valve—flexible tube TS 6  
**2202496** By-pass valve—flexible tube TS 8

**2** **2200027** By-pass valve—flexible tube Ø 8 mm  
**2200067** By-pass valve—flexible tube Ø 10 mm

**2200683** By-pass valve—inflexible tube 6 x 8  
**2200045** By-pass valve—inflexible tube 8 x 10  
**3** **2200097** By-pass valve—inflexible tube 10 x 12  
**2202022** By-pass valve—inflexible tube 13 x 15  
**2200015** By-pass valve—inflexible tube 15 x 18

## 2201058 Pump Bezel



## Steering Oil

**2200017** 2 Litre oil can  
Dexron II

**2203045** 20 Litre oil can  
white oil ISO 22

**2203201** 20 Litre oil can  
Dexron II

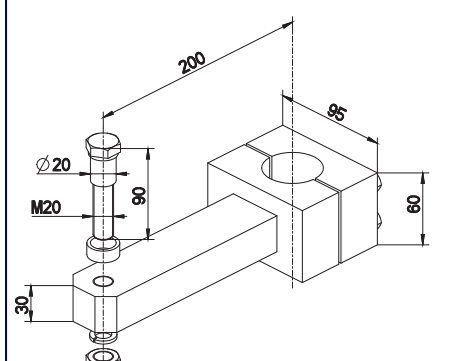
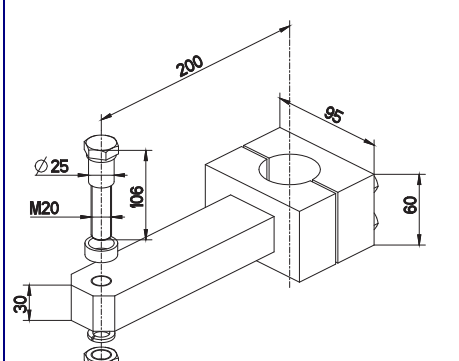
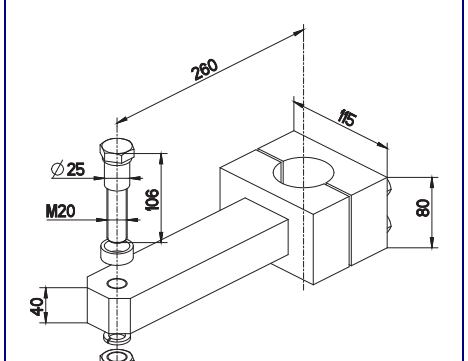
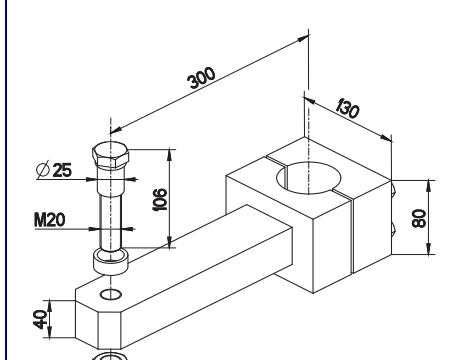
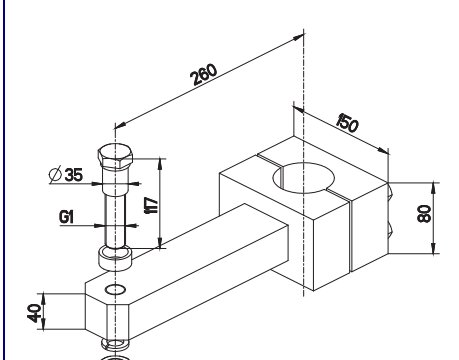
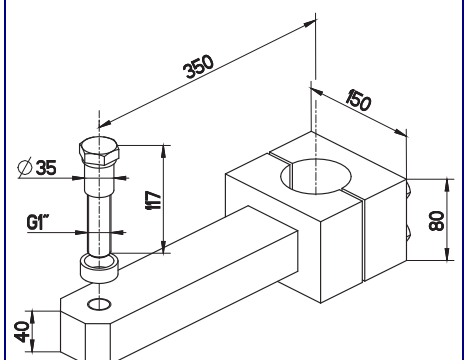
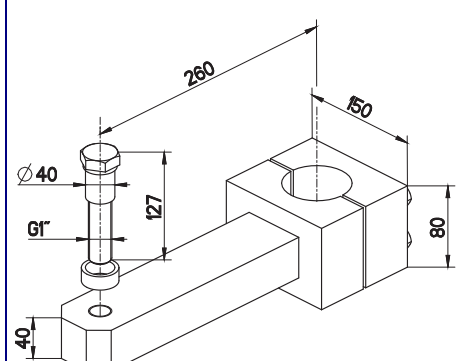
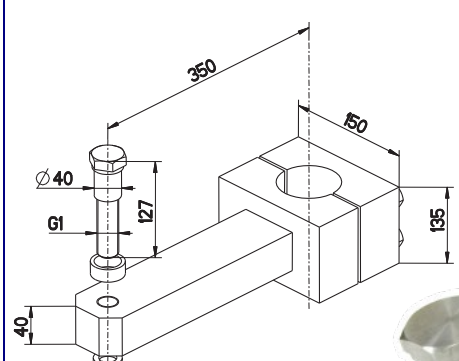



# TILLER ARMS



<p><b>2200003</b> Pilot bored equipped tiller arm LS 30 P Ø 22 pilot bored – maxi Ø 40</p>	<p><b>2200060</b> Pilot bored equipped tiller arm LS 50 P Ø 22 pilot bored – maxi Ø 40</p>	<p><b>2200499</b> Pilot bored equipped tiller arm LS 75 P Ø 22 pilot bored – maxi Ø 40</p>
<p><b>2200533</b> Pilot bored equipped tiller arm LS 105 P Ø 28 pilot bored – maxi Ø 50</p>	<p><b>2200534</b> Pilot bored equipped tiller arm LS 185 P Ø 28 pilot bored – maxi Ø 50</p>	<p><b>2200535</b> Pilot bored equipped tiller arm LS 240 P Ø 28 pilot bored – maxi Ø 50</p>

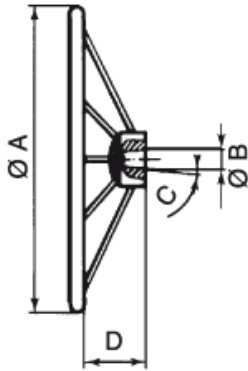
# TILLER ARMS

<p><b>2200098</b> Pilot bored equipped tiller arm LS 105 ∅ 20 pilot bored – maxi ∅ 50</p> 	<p><b>2200099</b> Pilot bored equipped tiller arm LS 155 ∅ 20 pilot bored – maxi ∅ 50</p> 	<p><b>2200100</b> Pilot bored equipped tiller arm LS 330 ∅ 20 pilot bored – maxi ∅ 64</p> 
<p><b>2201540</b> Pilot bored equipped tiller arm LS 450 ∅ 20 pilot bored – maxi ∅ 64</p> 	<p><b>2200113</b> Pilot bored equipped tiller arm LS 550-840 ∅ 20 pilot bored – maxi ∅ 88</p> 	<p><b>2202626</b> Pilot bored equipped tiller arm LS 1000 ∅ 20 pilot bored – maxi ∅ 88</p> 
<p><b>2201935</b> Pilot bored equipped tiller arm LS 1200 ∅ 20 pilot bored – maxi ∅ 88</p> 	<p><b>2200134</b> Pilot bored equipped tiller arm LS 1350-1660 ∅ 20 pilot bored – maxi ∅ 100</p> 	

# S/STEEL AND WOODEN STEERING WHEELS

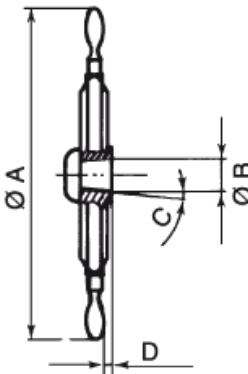


## S/STEEL WHEELS



CODE	DESIGNATION	Ø A	Ø B	C	D
2200985	S/steel wheel 350 – 19	350 13 <sup>25</sup> / <sub>32</sub> "	19 <sup>3</sup> / <sub>4</sub> "	2°30'	75 2 <sup>61</sup> / <sub>64</sub> "
2200986	S/steel wheel 400 – 19	400 15 <sup>3</sup> / <sub>4</sub> "	19 <sup>3</sup> / <sub>4</sub> "	2°30'	75 2 <sup>61</sup> / <sub>64</sub> "
2200180	S/steel wheel 500 – 19	500 19 <sup>11</sup> / <sub>16</sub> "	19 <sup>3</sup> / <sub>4</sub> "	2°30'	75 2 <sup>61</sup> / <sub>64</sub> "
2200987	S/steel wheel 600 – 22	600 23 <sup>5</sup> / <sub>8</sub> "	22 <sup>7</sup> / <sub>8</sub> "	2°30'	26 1"
2200988	S/steel wheel 700 – 22	700 27 <sup>9</sup> / <sub>16</sub> "	22 <sup>7</sup> / <sub>8</sub> "	2°30'	26 1"

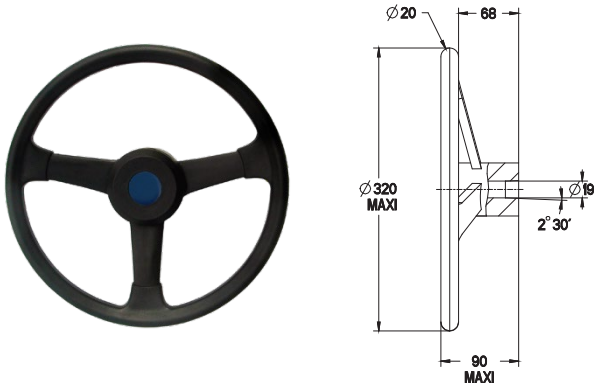
## WOODEN WHEELS



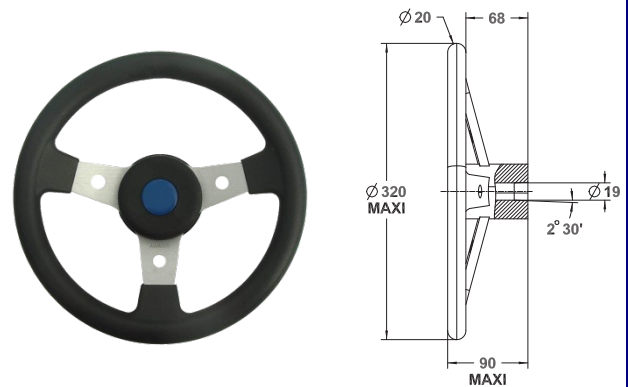
CODE	DESIGNATION	Ø A	Ø B	C	D
2200173	Wooden wheel 420 – 22	420 16 <sup>17</sup> / <sub>32</sub> "	22 <sup>7</sup> / <sub>8</sub> "	2°30'	15 <sup>19</sup> / <sub>32</sub> "
2200996	Wooden wheel 420 – 19	420 16 <sup>17</sup> / <sub>32</sub> "	19 <sup>3</sup> / <sub>4</sub> "	2°30'	15 <sup>19</sup> / <sub>32</sub> "
2200174	Wooden wheel 500 – 22	500 19 <sup>11</sup> / <sub>16</sub> "	22 <sup>7</sup> / <sub>8</sub> "	2°30'	15 <sup>19</sup> / <sub>32</sub> "
2200997	Wooden wheel 500 – 19	500 19 <sup>11</sup> / <sub>16</sub> "	19 <sup>3</sup> / <sub>4</sub> "	2°30'	15 <sup>19</sup> / <sub>32</sub> "
2200175	Wooden wheel 600 – 22	600 23 <sup>5</sup> / <sub>8</sub> "	22 <sup>7</sup> / <sub>8</sub> "	2°30'	15 <sup>19</sup> / <sub>32</sub> "
2200998	Wooden wheel 700 – 22	700 27 <sup>9</sup> / <sub>16</sub> "	22 <sup>7</sup> / <sub>8</sub> "	2°30'	15 <sup>19</sup> / <sub>32</sub> "
2200177	Wooden wheel 700 – 28	700 27 <sup>9</sup> / <sub>16</sub> "	28 1 <sup>3</sup> / <sub>32</sub> "	0°	15 <sup>19</sup> / <sub>32</sub> "
2200178	Wooden wheel 800 – 28	800 31 <sup>1</sup> / <sub>2</sub> "	28 1 <sup>3</sup> / <sub>32</sub> "	0°	15 <sup>19</sup> / <sub>32</sub> "
2200179	Wooden wheel 1000 – 28	1000 39 <sup>3</sup> / <sub>8</sub> "	28 1 <sup>3</sup> / <sub>32</sub> "	0°	15 <sup>19</sup> / <sub>32</sub> "

# RANGE OF STEERING WHEELS

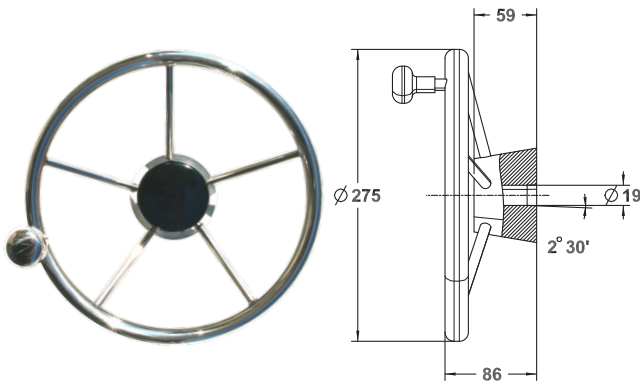
**2200181** Black “sport” steering wheel Ø 320-19



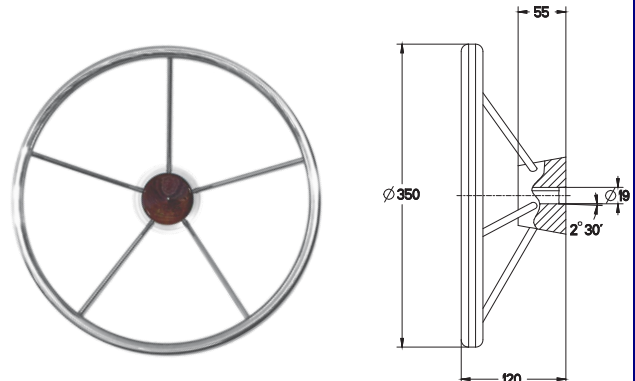
**2200182** Black “racing” steering wheel Ø 320-19



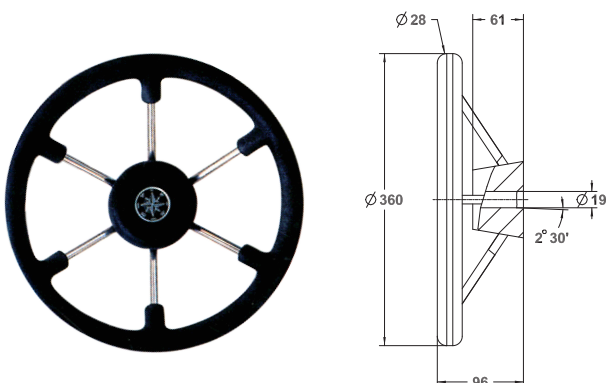
**2202462** S/Steel Wheel with knob Ø 275-19



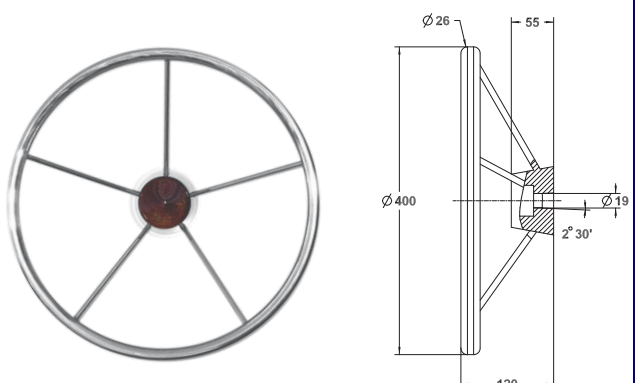
**2200985** S/Steel Wheel Ø 350-19



**2203377** Covered S/Steel Wheel Ø 360-19



**2200986** S/Steel Wheel Ø 400-19





# HYDRAULIC FLEXIBLE TUBES

## FLEXIBLE TUBES FOR CRIMP CONNECTIONS

Only the sole use of LS flexible tubes in Ø6, Ø8 or Ø10 mm will guarantee the global performances of LS steering systems.

	Ø6	Ø8	Ø10
Per metre	<b>2200810</b>	<b>2200024</b>	<b>2200070</b>
8 meters	<b>1204267</b>	<b>1204986</b>	
10 meters	<b>1204268</b>	<b>1204825</b>	
12 meters	<b>1204740</b>	<b>1204742</b>	
13 meters		<b>1204743</b>	
15 meters		<b>1202887</b>	
16 meters		<b>1204741</b>	
20 meters		<b>1205245</b>	
25 meters	<b>1204985</b>	<b>1207117</b>	
35 meters	<b>1205301</b>	<b>1205300</b>	
50 meters	<b>1207223</b>	<b>1207145</b>	
100 meters	<b>1207229</b>	<b>1207230</b>	<b>1207231</b>
400 meters	<b>1205359</b>	<b>1205360</b>	
400 meters (on reel)	<b>1207024</b>	<b>1207025</b>	



## FLEXIBLE TUBES WITH PRE-CRIMPED CONNECTIONS

High pressure flexible tubes of various lengths with pre-crimped connections of various kinds (several diameters, straight fittings, 90° elbow fittings). Stainless steel fittings available.

### A few references in 10 L :

- Flex. tube R1T8 lg 500 – 2 x EFT10L **1290013**
- Flex. tube R1T8 lg 1000 – 2 x EFT10L **1290023**
- Flex. tube R1T8 lg 1500 – 2 x EFT10L **1290025**
- Flex. tube R1T8 lg 2000 – 2 x EFT10L **1290027**
- Flex. tube R1T8 lg 3000 – 2 x EFT10L **1290117**

### A few references in 12 L :

- Flex. tube R1T10 lg 500 – 2 x EFT12L **1290042**
- Flex. tube R1T10 lg 1000 – 2 x EFT12L **1290052**
- Flex. tube R1T10 lg 1500 – 2 x EFT12L **1290054**
- Flex. tube R1T10 lg 2000 – 2 x EFT12L **1290056**
- Flexi. tube R1T10 lg 3000 – 2 x EFT12L **1290130**

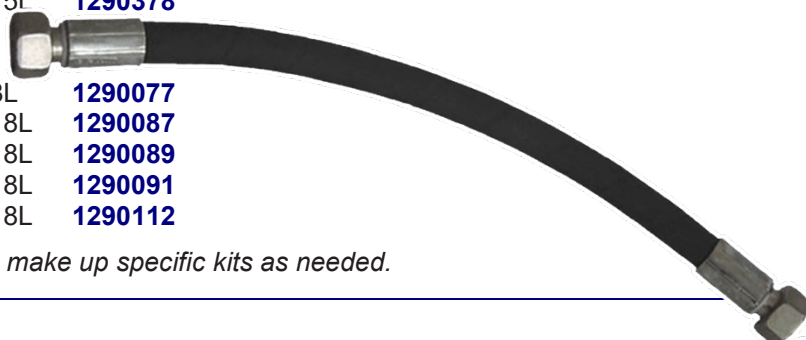
### A few references in 15 L :

- Flex. tube R1T13 lg 500 – 2 x EFT15L **1290385**
- Flex. tube R1T13 lg 1000 – 2 x EFT15L **1290376**
- Flex. tube R1T13 lg 2000 – 2 x EFT15L **1290387**
- Flex. tube R1T13 lg 2500 – 2 x EFT15L **1290378**

### A few references in 18 L :





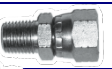


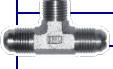




- Flex. tube R1T16 lg 500 – 2 x EFT18L **1290077**
- Flex. tube R1T16 lg 1000 – 2 x EFT18L **1290087**
- Flex. tube R1T16 lg 1500 – 2 x EFT18L **1290089**
- Flex. tube R1T16 lg 2000 – 2 x EFT18L **1290091**
- Flex. tube R1T16 lg 3000 – 2 x EFT18L **1290112**

Other lengths on request. Possibility to make up specific kits as needed.










# FITTINGS

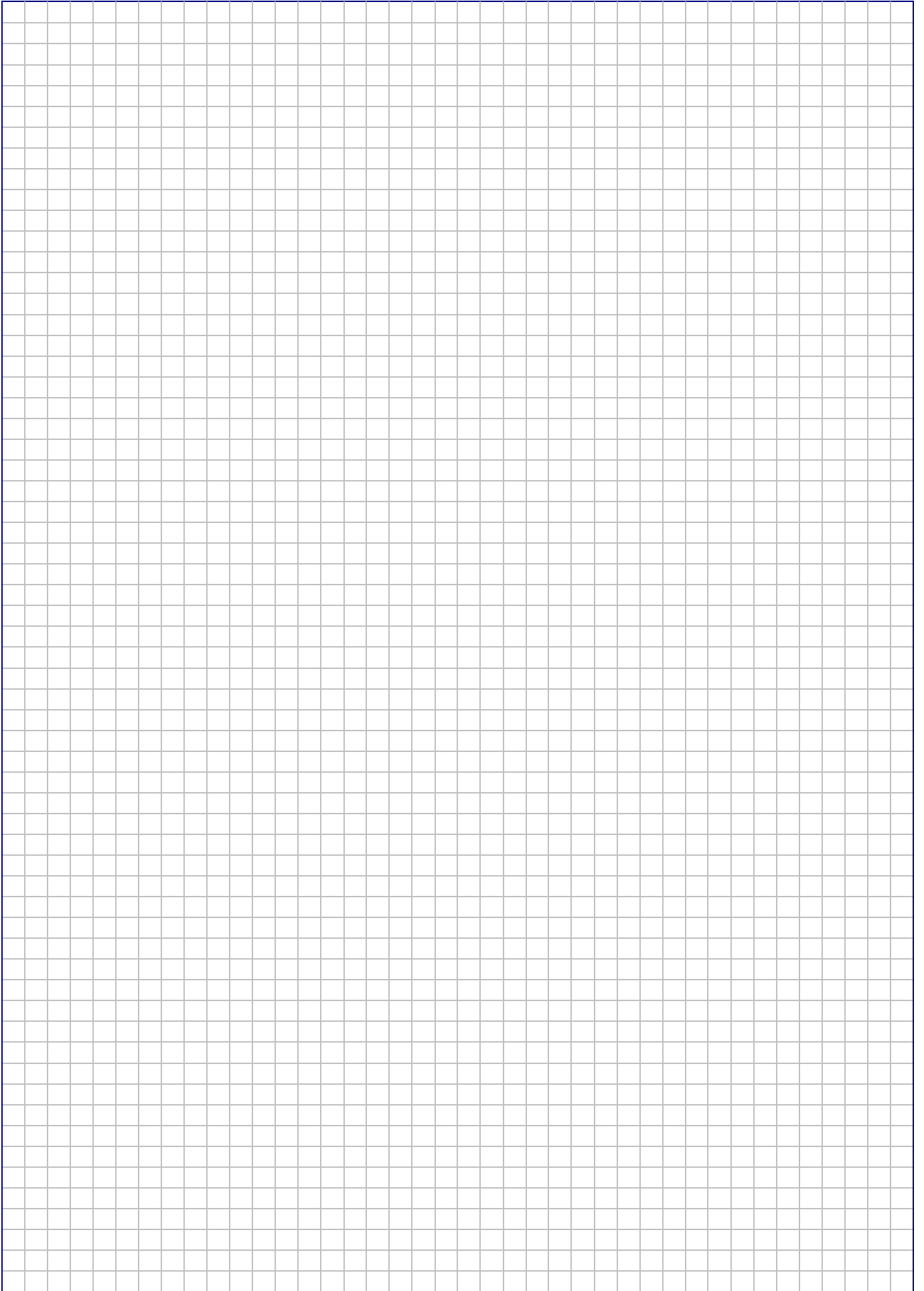
## FOR FLEXIBLE TUBE

Type	Designation	Code for steel	Code for s/steel	
	<b>Elbow fittings 90°</b>	1/4 BSPT JIC M. 9/16	<b>2200321</b>	<b>2200309</b>
		3/8 BSPT JIC M. 9/16	<b>2200426</b>	
	<b>Swivel elbow fitt.</b>	1/4 BSPP JIC M. 9/16	<b>1205997</b>	<b>1206365</b>
	<b>Swivel elbow fitt.</b>	JIC M. 9/16 – JIC F 9/16	<b>1205894</b>	<b>1205656</b>
	<b>Straight fittings</b>	1/4 BSPT JIC M. 9/16	<b>2200427</b>	<b>2200447</b>
		1/4 BSPP JIC M. 9/16	<b>2200199</b>	<b>2200448</b>
		3/8 BSPT JIC M. 9/16	<b>2200428</b>	
		3/8 BSPP JIC M. 9/16	<b>2200429</b>	<b>2202039</b>
	<b>Adapters</b>	1/4 BSPT JIC F.T. 9/16	<b>2200430</b>	
		3/8 BSPT JIC F.T. 9/16	<b>2200356</b>	
	<b>Connection fitt.</b>	JIC M. 9/16	<b>2200288</b>	<b>1206540</b>
	<b>Tee fittings</b>	Rotatable 1/4 BSPP 2 x JIC M. 9/16	<b>2200431</b>	
		3/8 BSPT 2 x JIC M. 9/16	<b>2200432</b>	
	<b>Equal tee fittings</b>	JIC M. 9/16	<b>2200433</b>	<b>2202009</b>
	<b>Swivel tee fittings</b>	Rotatable JIC M. 9/16	<b>2201566</b>	
	<b>Straight fittings</b>	JIC M. 9/16 inner diam. 8	<b>2200299</b>	<b>2200449</b>
		JIC M. 9/16 inner diam. 10	<b>2200301</b>	
	<b>Elbow fittings</b>	Inner diam. 8	<b>2200302</b>	
		Inner diam. 10	<b>2200303</b>	
	<b>Connection fitt.</b>	Inner diam. 8	<b>2200373</b>	
		Inner diam. 10	<b>2200434</b>	

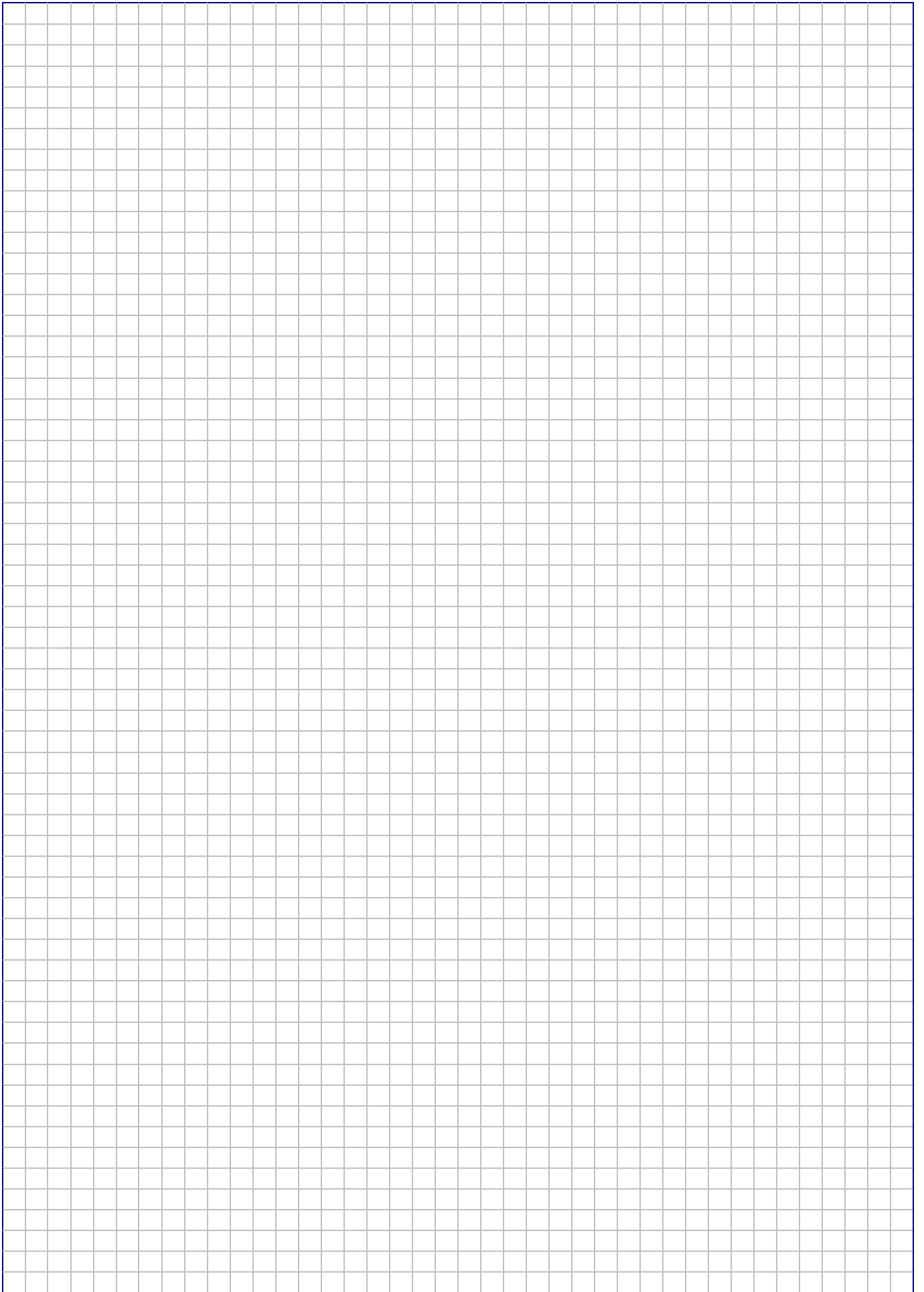
## FOR INFLEXIBLE TUBE

	<b>Straight fittings</b>	1/4 BSPP diam. 8	<b>2200435</b>	
		1/4 BSPP diam. 10	<b>2200436</b>	<b>1202695</b>
		3/8 BSPP diam. 10	<b>2200437</b>	
		3/8 BSPP diam. 12	<b>2200438</b>	
		3/8 BSPP diam. 15	<b>1203905</b>	<b>1205517</b>
		1/2 BSPP diam. 18	<b>2200439</b>	<b>2200866</b>
	<b>Elbow fittings</b>	1/4 BSPT diam. 10	<b>2200440</b>	
		3/8 BSPT diam. 12	<b>2200306</b>	
		3/8 BSPT diam. 15	<b>1204618</b>	
		1/2 BSPT diam. 18	<b>2200441</b>	
	<b>Tee fittings</b>	1/4 BSPT diam. 10	<b>2200442</b>	
		3/8 BSPT diam. 12	<b>2200443</b>	<b>1206034</b>
		1/2 BSPT diam. 18	<b>2200339</b>	<b>1205104</b>
	<b>Connection fitt.</b>	Diam. 10	<b>2200469</b>	
		Diam. 12	<b>2200585</b>	
		Diam. 15	<b>1206228</b>	<b>1205518</b>
		Diam. 18	<b>2200270</b>	<b>1204035</b>
	<b>Equal tee fittings</b>	Diam. 8	<b>2200444</b>	
		Diam. 10	<b>2200259</b>	
		Diam. 12	<b>2200445</b>	
		Diam. 15	<b>1204627</b>	<b>1206521</b>
		Diam. 18	<b>2200446</b>	<b>1205131</b>
	<b>Swivel tee fittings</b>	Diam. 10	<b>1204516</b>	
		Diam. 12	<b>1202634</b>	
		Diam. 18	<b>1202635</b>	
	<b>Reductions</b>	1/8 BSPP M – 1/4 BSPP F	<b>1202438</b>	
		1/4 BSPP M – 3/8 BSPP F	<b>2200390</b>	<b>1206522</b>
		1/4 BSPP M – 1/2 BSPP F	<b>2200389</b>	<b>2200859</b>
		3/8 BSPP M – 1/4 BSPP F	<b>2200374</b>	<b>1203268</b>
		3/8 BSPP M – 1/2 BSPP F	<b>2200396</b>	<b>2200858</b>
		1/2 BSPP M – 1/4 BSPP F	<b>2200221</b>	<b>1202696</b>
		1/2 BSPP M – 3/8 BSPP F	<b>2200332</b>	<b>1206528</b>

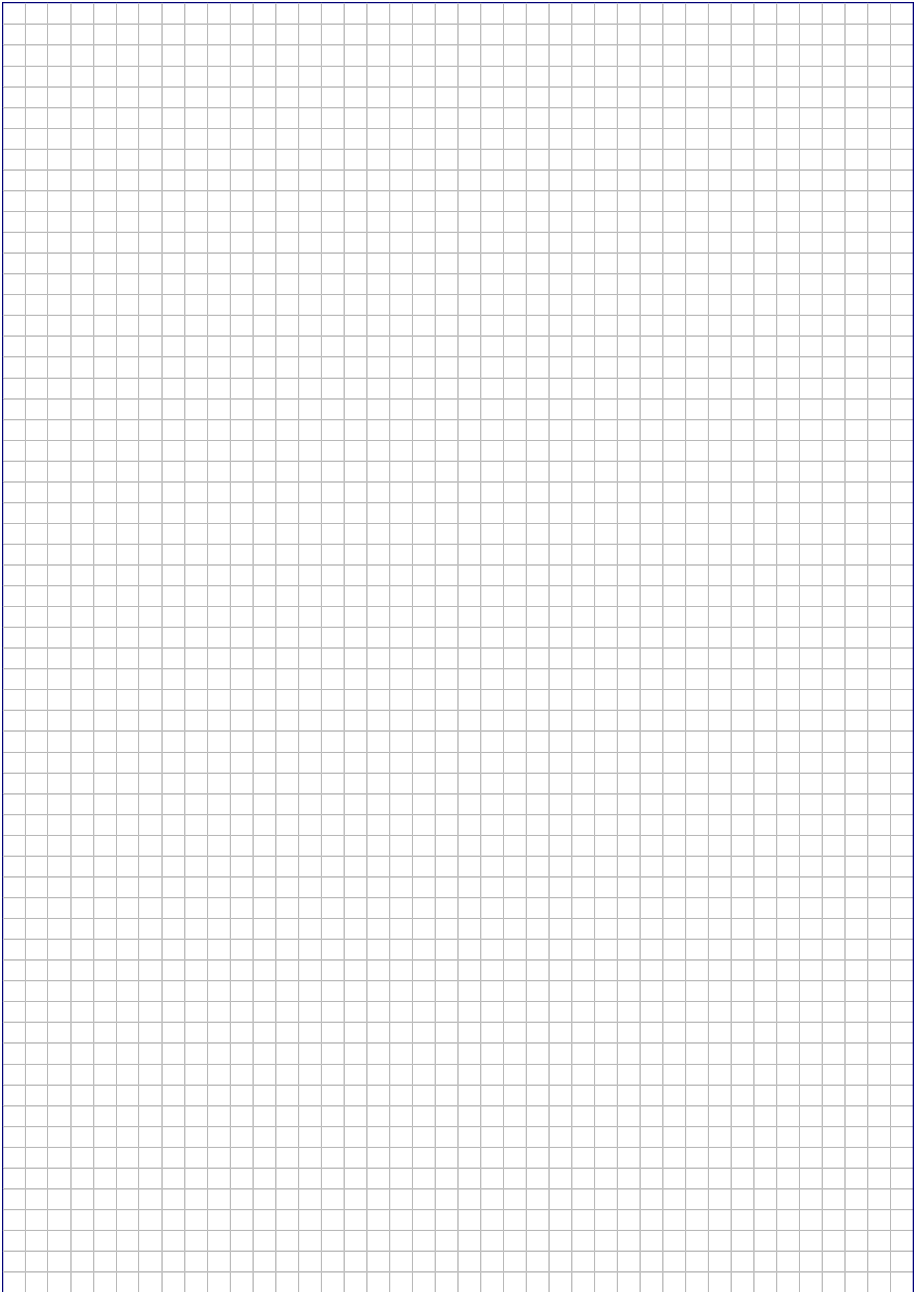
# NOTES



# NOTES



# NOTES





## GUARANTEE

- 1) The manufacturer guarantees the equipment sold and supplied against any faulty manufacturing or defects whether they are the result of the design, the raw material, the manufacturing or construction under the terms and restrictions indicated below :
  - 2) The guarantee is applicable only if the client has satisfied the general obligations of this contract, in particular, the terms of payment.
  - 3) The guarantee only includes equipment sold by the manufacturer. It does not extend to equipment in which the manufacturer's supply has been installed and, in particular, to the performances of this equipment.
  - 4) When the manufacturer's supplies are installed by the client or a third party into any other equipment, they remain solely responsible for this installation, the selection and suitability of the manufacturer's supplies as the manufacturer's diagrams, designs and proposals are given as an indication only, unless otherwise specified in the order. In particular, the manufacturer does not guarantee components or equipment not sold by him, nor the assembly, adaptation, design or operation of the assembly or parts of the assembly thus created. The manufacturer's supply, as well as the assembly created by the client or a third party, are assumed to be operated under the exclusive control of the client or the third party.
  - 5) The period of the guarantee is eighteen months starting from the date of first use by the original consumer or twenty four months from the date of delivery of the products to the transporter, distributor or wholesaler. The manufacturer has the right to require from the client proof of the commissioning date specified on the guarantee request. This period is neither extended nor interrupted through legal or amicable claims on the part of the client. At the end of this period, the guarantee is terminated without further consideration.
  - 6) The obligation of the guarantee only applies if the client establishes that the defect appeared under normal operating conditions stipulated for this type of supply, or indicated by the manufacturer in writing and during normal operation. It does not apply in case of negligence, faulty maintenance or supervision, operator's responsibility, imprudence, non observance of recommended or operating instructions, or the use of oil of insufficient quality for the equipment. The manufacturer is released from responsibility for any damage caused by loss of oil or leaks. The guarantee also does not apply for any incidents resulting from a case of force majeure or Acts of God, as well as any damage, replacement or repairs exceeding the normal material wear.
  - 7) The guarantee is limited to the repair in the manufacturer's shop at his own cost within the shortest possible time, of the equipment and parts supplied by him, identified as defective by the technical department. These parts must be sent pre-paid. No claim may be made for compensation for any damage such as personal injury, damage to goods other than those concerned in this contract, privation of possession, operating losses, commercial damage or loss of earnings. During the guarantee period, the cost of labor, dismantling and reassembly of the equipment outside the manufacturer's plant, the shipping costs for repaired, replaced or faulty equipment, travelling and accommodation expenses for technicians are the responsibility of the client.
- When the guarantees are given according to the industrial results for a given equipment, these results and the consequences of this undertaking will result in a special agreement between the parties.
- 8) In order to take advantage of this guarantee, the client must notify the manufacturer in writing as soon as possible of the defects attributed to the equipment and provide any proof concerning these defects. He must do his best for the manufacturer to be able to ascertain these defects and to perform corrective actions. The guarantee does not apply if the equipment is not returned to the manufacturer in the state in which it broke down or if it has previously been disassembled, repaired, modified either by a third party, the user or the client. After receiving proper notification of the equipment defect, the manufacturer shall correct this fault as soon as possible, reserving the right, if applicable, to modify all or part of equipment in order to fulfil the obligations.
  - 9) The client agrees that the manufacturer will not be responsible for damage due to the fact that the client has not satisfied any one of the obligations defined above.

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*Sailing is an art... Accompanying you is our business!*

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