HYDRAULIC STEERING SYSTEMS FOR INBOARD MOTOR BOATS

2021

LECOMBLE & SCHMITT

Lecomble & Schmitt S.A.S.

BP N° 2
64240 URT – France

Sales Department: 33 (0) 559 56 24 11 - commercial@ls-france.com
Technical Department: 33 (0) 559 56 26 46 - commercial2@ls-france.com
Fax : 33 (0) 559 56 95 71

http://www.ls-france.com

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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.

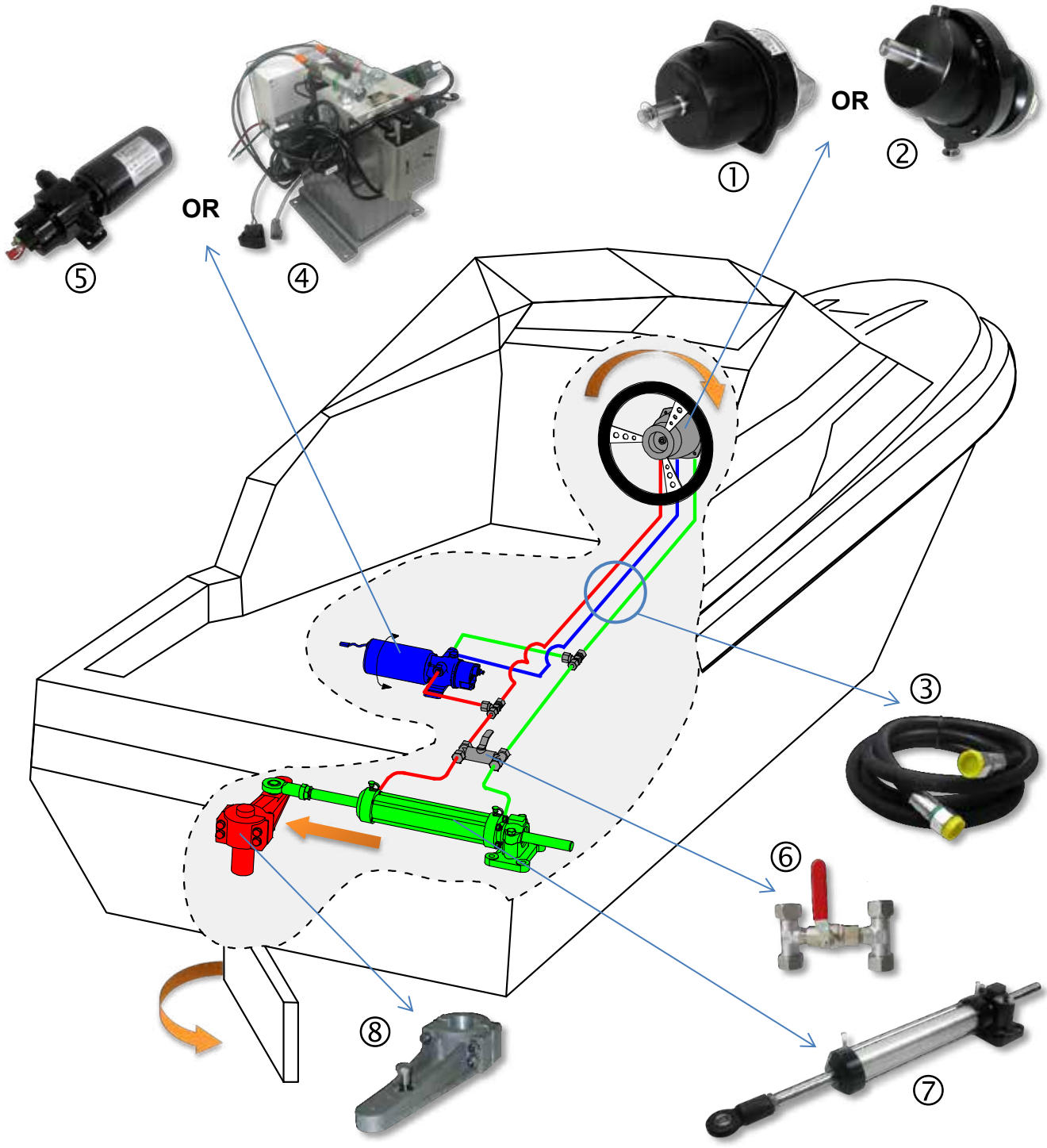
Tubing

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

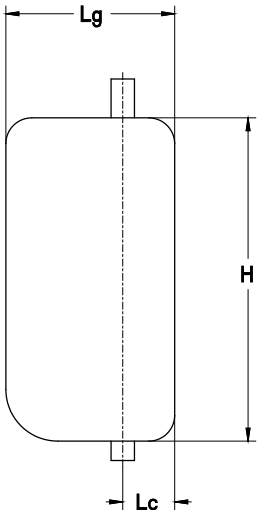
SELECTION OF A HYDRAULIC STEERING SYSTEM

- **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:

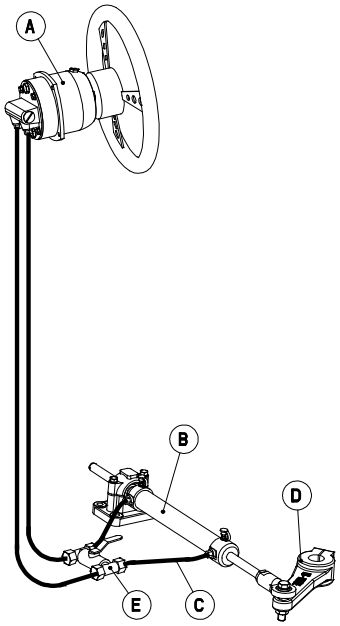
Length of Hull	Cylinder Type – 1 Rudder		Cylinder Type – 2 Rudders	
8 metres	VHM 40 DTP – code 2200075	page 11	VHM 32 DTP – code 2200059	page 10
10 metres	VHM 40-254 – code 2200496	page 11	VHM 40 DTP – code 2200075	page 11
12 metres	VHM 40-254 – code 2200496	page 11	VHM 40 DTP – code 2200075	page 11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

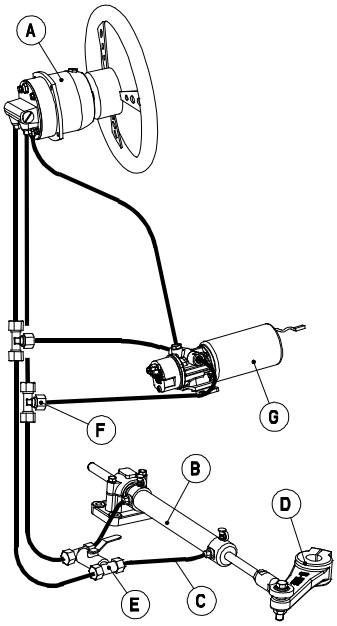
Single station + lock valve



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

Option D – tiller arm
E – by-pass valve

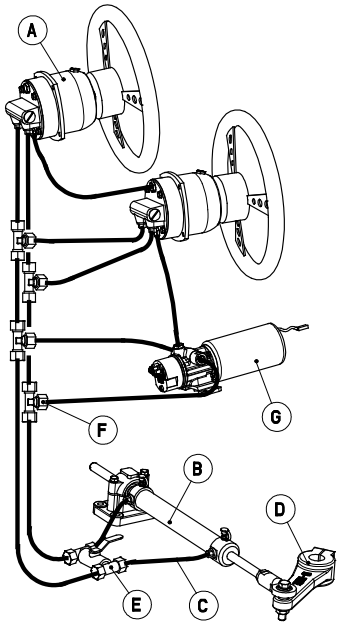
Single station + lock valve + power pack



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

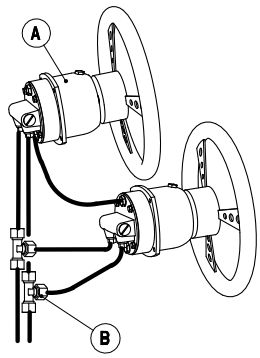
Double station + lock valve + power pack



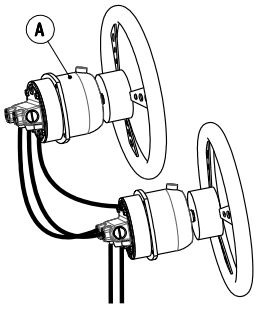
A – 2 pumps + LV + fittings
B – 1 cylinder
C – 2 hoses + fittings
F – tees + connection fittings
G – 1 power pack

Option D – tiller arm
E – by-pass valve

Double station + lock valve

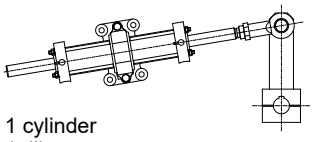


A – 2 pumps + LV + fittings
B – tees + connection fittings

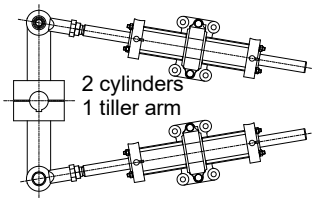


A – 2 pumps with dual outlet flange + LV + fittings

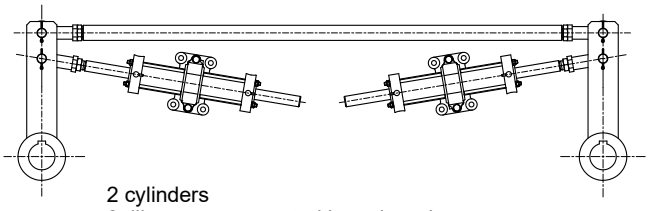
POSSIBLE ASSEMBLIES



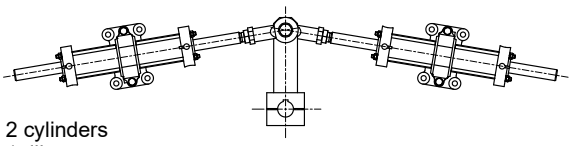
1 cylinder
1 tiller arm



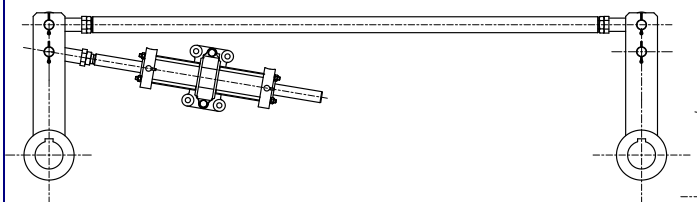
2 cylinders
1 tiller arm



2 cylinders
2 tiller arms connected by a tie rod

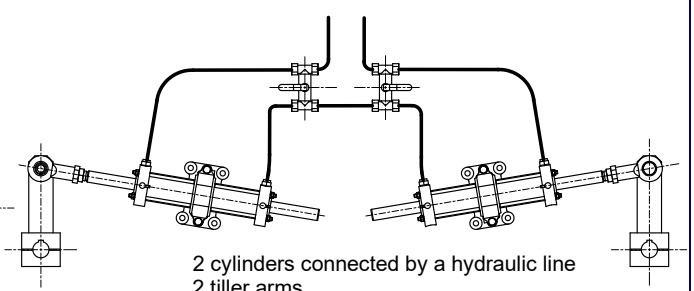


2 cylinders
1 tiller arm



1 cylinder
2 tiller arms connected by a tie rod

vers pompe



2 cylinders connected by a hydraulic line
2 tiller arms

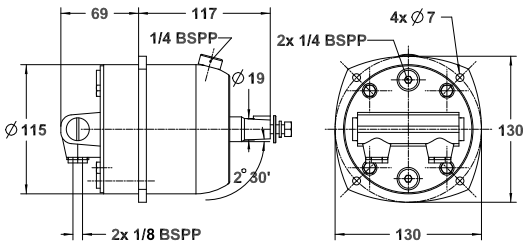
HYDRAULIC STEERING SYSTEMS FOR INBOARD MOTOR BOATS

Number of turns lock to lock in function of the ***PUMP / CYLINDER*** *selection*

TYPE OF CYLINDER	TYPE OF PUMP						
	Page 7 **2200804** 20 HB with lock valve (*)	*Page 7* **2200948** 26 HB with lock valve (*)	*Page 7* **2200949** 30 HB without lock valve **2200950** 30 HB with lock valve (*)	*Page 7* **2201104** 35 HB without lock valve **2201105** 35 HB with lock valve (*)	*Page 8* **2201106** 40 HB without lock valve **2201107** 40 HB with lock valve (*)	*Page 8* **2201732** 50 HB without lock valve **2201728** 50 HB with lock valve (*)	*Page 8* **2200194** 70 CT without lock valve **2200088** 70 CT with lock valve
Page 10 **2200831** **VHM 26 DTP** 27 kpm 200 ft.lbs 265 N.m.	**3**						
Page 10 **2200051** **VHM 28 DTP** 30 kpm 217 ft.lbs 295 N.m.	**3.5**	**2.7**	**2.3**				
Page 10 **2200059** **VHM 32 DTP** 50 kpm 361 ft.lbs 490 N.m.		**4.6**	**4**	**3.4**			
Page 11 **2200075** **VHM 40 DTP** 84 kpm 620 ft.lbs 823 N.m.			**6.4**	**5.5**	**4.8**		
Page 11 **2200496** **VHM 40 DTP C254** 105 kpm 759 ft.lbs 1030 N.m.				**6.8**	**6**	**4.8**	**3.4**
Page 11 **2200497** **VHM 50 DTP** 185 kpm 1350 ft.lbs 1813 N.m.					**8.8**	**7.1**	**5**
Page 11 **2200498** **VHM 50 DTP C300** 240 kpm 1750 ft.lbs 2350 N.m.					**11.6**	**9.3**	**6.6**

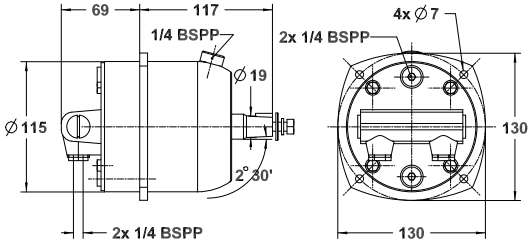
(*) Available in Tilt HB 5 version – Page 9

PUMPS



2200804 Pump 20 HB with lock valve(*)
2200807 Set of straight fittings for Ø 6 mm flexible tube
2201989 Set of elbow fittings for Ø 6 mm flexible tube
2200809 Set of tees for Ø 6 mm flexible tube
2200986 S/Steel wheel Ø 400 mm

Flow rate	20 cc/t	1.2 cu.in
Minimum size of tubing	Ø 6 mm	.25 "
Weight	2.8 kg	6.2 lbs
Volume	400 cc	24.4 cu.in
Max. Wheel diametre	Ø 520 mm	20 ½ ''

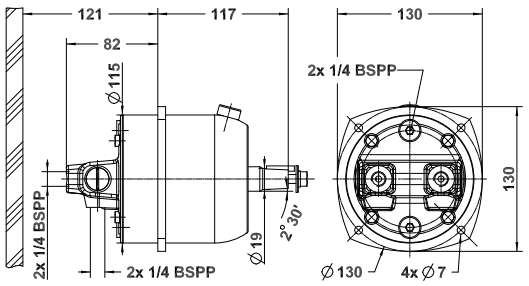


2200948 Pump 26 HB with lock valve(*)
2200021 Set of elbow fittings for Ø 8 mm flexible tube
2200048 Set of straight fittings for Ø 10mm inflexible tube
2200047 Set of tees for Ø 8 mm flexible tube
2200046 Set of tees for Ø 10 mm inflexible tube
2200986 S/Steel wheel Ø 400 mm
(**) *Contact us*

Flow rate	26 cc/t	1.6 cu.in
Minimum size of tubing	8x10 mm	.31''x.39''
Weight	2.8 kg	6.2 lbs
Volume	400 cc	24.4 cu.in
Max. Wheel diametre	Ø 520 mm	20 ½ ''

2200949 Pump 30 HB without lock valve
2200950 Pump 30 HB with lock valve(*)
2200021 Set of elbow fittings for Ø 8mm flexible tube
2200048 Set of straight fittings for Ø 10mm inflexible tube
2200047 Set of tees for Ø 8 mm flexible tube
2200046 Set of tees for Ø 10 mm inflexible tube
2200029 Adaptable cone + locking pin
2200986 S/Steel wheel Ø 400 mm
(**) *Contact us*

Flow rate	29 cc/t	1.7 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 ''



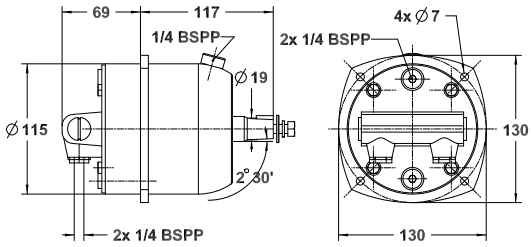
Dual Outlet Pump (**)

2201104 Pump 35 HB without lock valve
2201105 Pump 35 HB with lock valve(*)
2200021 Set of elbow fittings for Ø 8mm flexible tube
2200048 Set of straight fittings for Ø 10mm inflexible tube
2200047 Set of tees for Ø 8 mm flexible tube
2200046 Set of tees for Ø 10 mm inflexible tube
2200029 Adaptable cone + locking pin
2200986 S/Steel wheel Ø 400 mm
(**) *Contact us*

Flow rate	35 cc/t	2.14 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 "

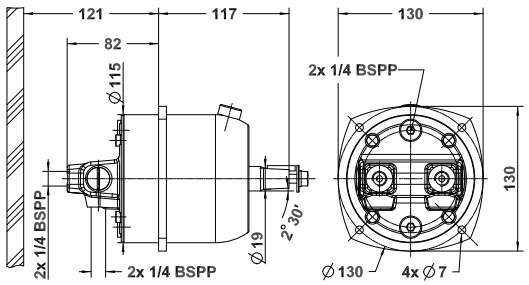
(*) Available in Tilt HB 5 version – Page 9

PUMPS



2201106	Pump type 40 HB without lock valve	Flow rate	40 cc/t 2.44 cu.in
2201107	Pump type 40 HB with lock valve (*)	Minimum size of tubing	8x10mm .31"x.39"
2200068	Set of straight fittings for Ø 10mm flexible tube	Weight	3.4 kg 7.5 lbs
2200048	Set of straight fittings for Ø 10mm inflexible tube	Volume	400 cc 24.4 cu.in
2200072	Set of tees for Ø 10mm flex. tube	Max. Wheel diametre	Ø 520 mm 20 ½ ''
2200046	Set of tees for Ø 10mm inflex. tube		
2200029	Adaptable cone + locking pin		
2200180	S/Steel wheel Ø 500 mm		

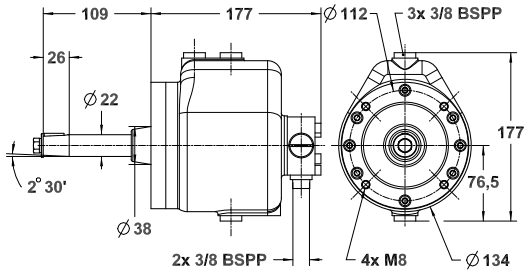
(**) *Contact us*



Dual Outlet Pump (**)

2201732	Pump type 50 HB without lock valve	Flow rate	50 cc/t 3.05 cu.in
2201728	Pump type 50 HB with lock valve (*)	Minimum size of tubing	8x10 mm .31''x.39''
2200068	Set of straight fittings for Ø 10mm flexible tube	Weight	3.4 kg 7.5 lbs
2200048	Set of straight fittings for Ø 10mm inflexible tube	Volume	400 cc 24.4 cu.in
2200072	Set of tees for Ø 10mm flex. tube	Max. Wheel diametre	Ø 520 mm 20 ½ ''
2200046	Set of tees for Ø 10mm inflex. tube		
2200029	Adaptable cone + locking pin		
2200180	S/Steel wheel Ø 500 mm		

(**) *Contact us*



2200194	Pump 70 CT without lock valve	Flow rate	70 cc/t 4.27 cu.in
2200088	Pump 70 CT with lock valve	Minimum size of tubing	10x12 mm .39''x.47''
2200089	Set of straight fittings 3/8 BSPP Ø12 mm	Weight	5.5 kg 12.1 lbs
2200102	Set of tees for Ø 12 mm inflex. tube	Volume	660 cc 40 cu.in
2200175	Wooden wheel Ø 600 mm	Max. Wheel diametre	Ø 1000 mm 39 ⅜ "

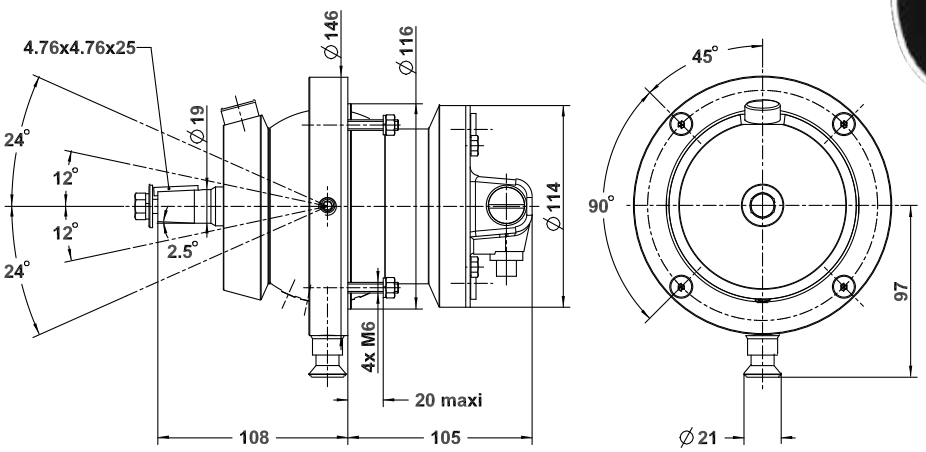
(*) Available in Tilt HB 5 version – Page 9

HB 5 TILT PUMPS

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

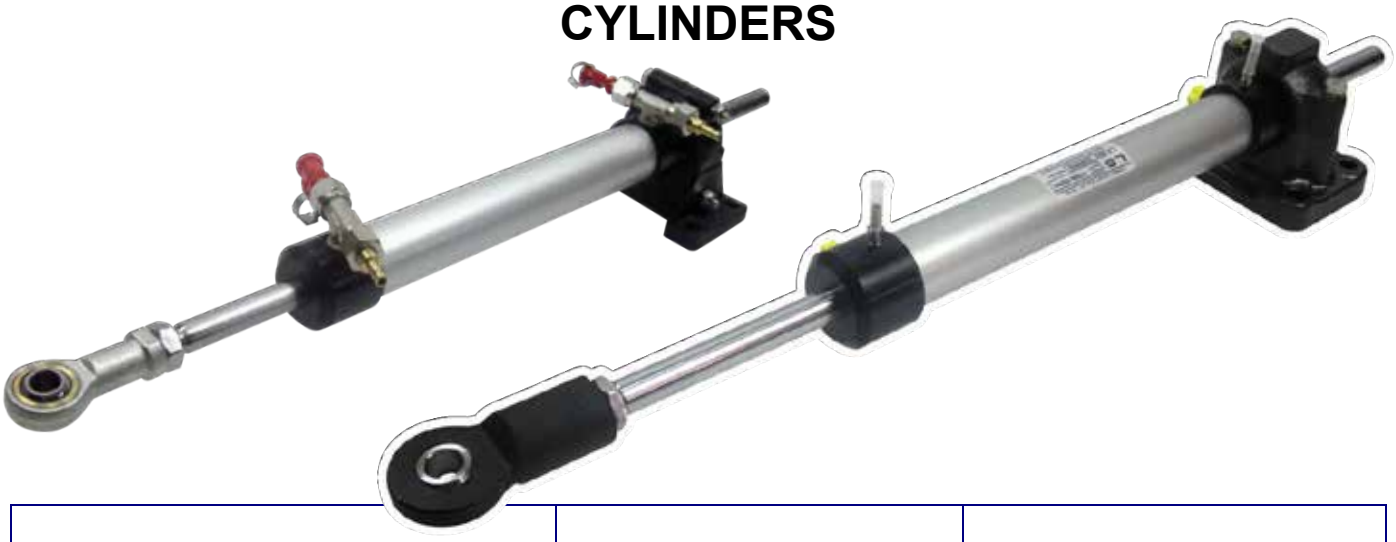
The hydraulic pump has been integrated directly into the tilt mechanism and is fitted with a lock valve.

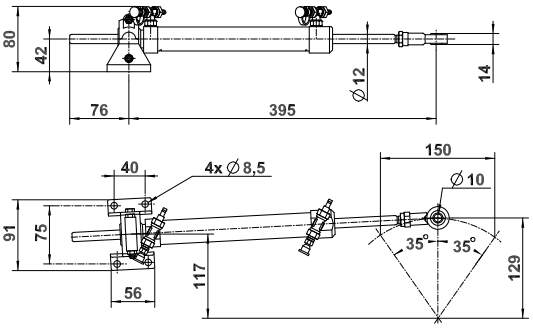
ORIENTATION RANGE
Possible orientation angle:
-24° to +24° (5 positions).



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**

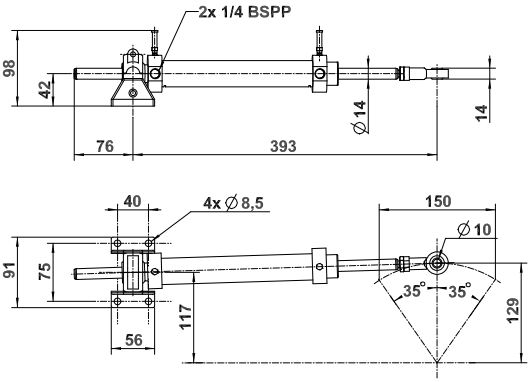
CYLINDERS





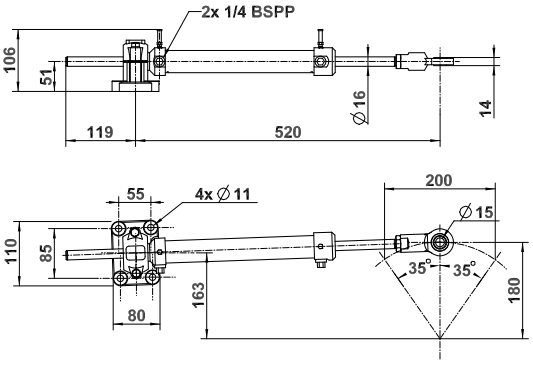
2200831	VHM 26 DTP + fittings
2201994	Set of fittings for VHM 224
2200810	Ø 6 mm flexible tube (per metre)
2200803	By-pass for Ø 6 mm flexible tube
2200003	Tiller arm LS 30 P + screws & bolts
2200017	Oil (2 litre can)

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



2200051	VHM 28 DTP
2200123	Set of straight fittings 1/4 BSPP for Ø 8 mm flexible tube
2200049	Set of flexible tube and fittings 1/4 BSPP Ø 10 mm
2200024	Ø 8 mm flexible tube (per metre)
2200027	By-pass for Ø 8 mm flexible tube
2200045	By-pass for Ø 10 mm inflexible tube
2200003	Tiller arm LS 30 P + screws & bolts
2200017	Oil (2 litre can)

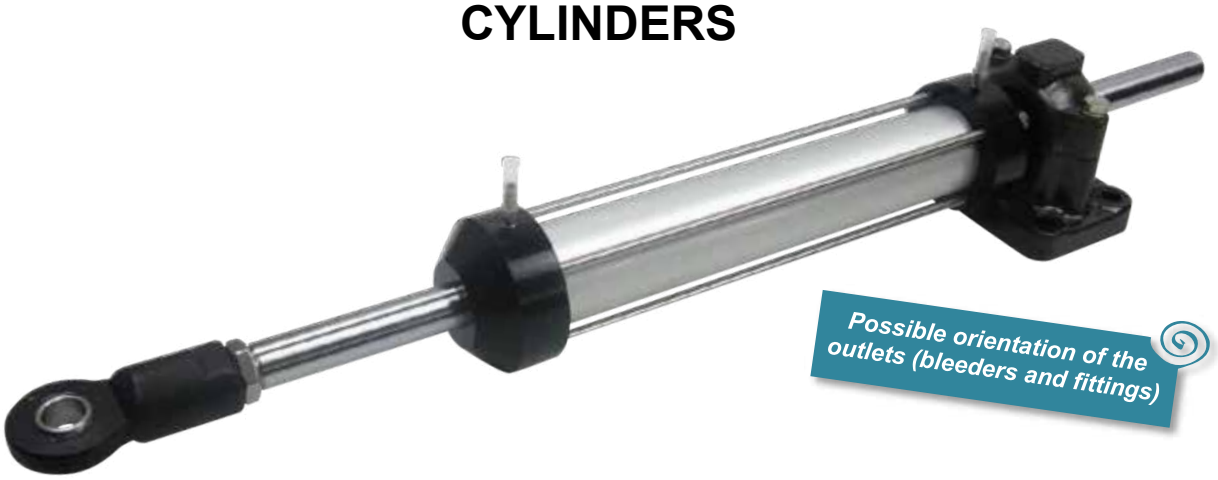
Maximum torque	30 kpm	217 ft.lbs
Stroke	150 mm	5 29/32"
Maximum pressure	50 bars	725 PSI
Volume	69.2 cc	34.22 cu.in
Radius of tiller arm	129 mm	5 5/64"
Total rudder angle	70°	
Weight	1.1 kg	2.4 lbs

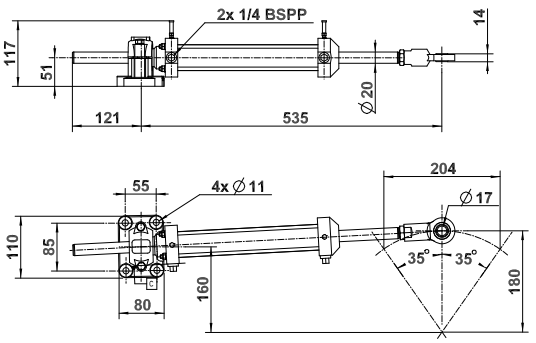


2200059	VHM 32 DTP
2200123	Set of straight fittings 1/4 BSPP for Ø 8 mm flexible tube
2200049	Set of flexible tube and fittings 1/4 BSPP Ø 10 mm
2200024	Ø 8 mm flexible tube (per metre)
2200027	By-pass for Ø 8 mm flexible tube
2200045	By-pass for Ø 10 mm inflexible tube
2200060	Tiller arm LS 50 P + screws & bolts
2200017	Oil (2 litre can)

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

CYLINDERS





2200075 VHM 40 DTP

2200068 Set of straight fittings 1/4 BSPP for flexible tube Ø 10 mm

2200049 Set of flex. tubes & fitt. 1/4 BSPP Ø10 mm

2200070 Flexible tube Ø 10 mm per metre

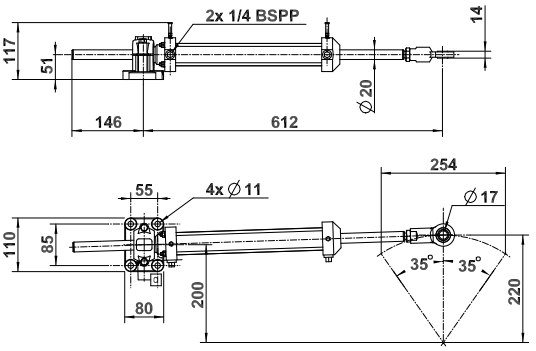
2200067 By-pass for flex. tube Ø 10 mm

2200045 By-pass for inflex. tube Ø 10 mm

2200499 Tiller arm LS 75 P + screws & bolts

2200017 Oil (2 litre can)

Maximum torque	84 kpm	620 ft.lbs
Stroke	204 mm	8"
Maximum pressure	50 bars	725 PSI
Volume	191 cc	11.6 cu.in
Radius of tiller arm	180 mm	7 3/32"
Total rudder angle	70°	
Weight	3.4 kg	7.5 lbs



2200496 VHM 40 DTP C254

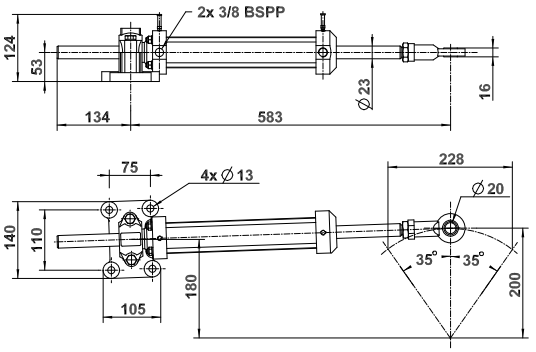
2200049 Set of flex. tubes & fitt. 1/4 BSPP Ø10 mm

2200045 By-pass for inflex. tube Ø 10 mm

2200533 Tiller arm LS 105P + screws & bolts

2200017 Oil (2 litre can)

Maximum torque	105 kpm	759 ft.lbs
Stroke	254 mm	10"
Maximum pressure	50 bars	725 PSI
Volume	239 cc	14.5 cu.in
Radius of tiller arm	220 mm	8 21/32"
Total rudder angle	70°	
Weight	3.8 kg	8.4 lbs



2200497 VHM 50 DTP

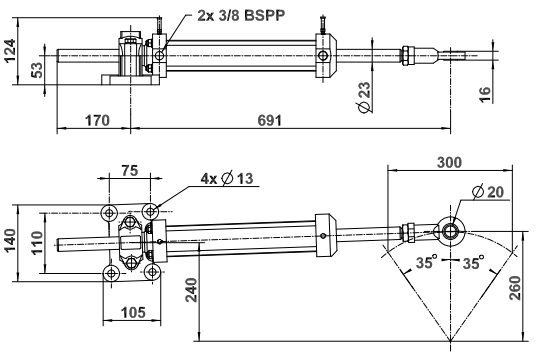
2200096 Set of flexible tubes & fittings 3/8 BSPP Ø 12 mm

2200097 By-pass for inflex. tube Ø 12 mm

2200534 Tiller arm LS 185 P + screws & bolts

2200017 Oil (2 litre can)

Maximum torque	185 kpm	1350 ft.lbs
Stroke	228 mm	9"
Maximum pressure	60 bars	870 PSI
Volume	352 cc	21.5 cu.in
Radius of tiller arm	200 mm	7 7/8"
Total rudder angle	70°	
Weight	5 kg	11 lbs



2200498 VHM 50 DTP C300

2200096 Set of flexible tubes & fittings 3/8 BSPP Ø 12 mm

2200097 By-pass for inflex. tube Ø 12 mm

2200535 Tiller arm LS 240 P + screws & bolts

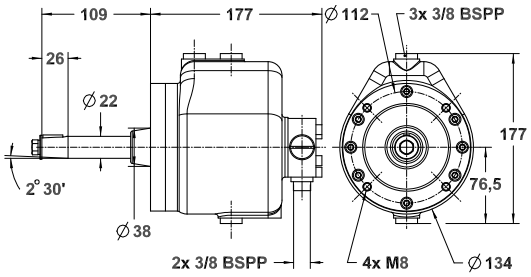
2200017 Oil (2 litre can)

Maximum torque	240 kpm	1750 ft.lbs
Stroke	300 mm	11 13/16"
Maximum pressure	60 bars	870 PSI
Volume	464 cc	28.5 cu.in
Radius of tiller arm	260 mm	10 ¼"
Total rudder angle	70°	
Weight	5.8 kg	12.8 lbs

HYDRAULIC STEERING SYSTEMS FOR INBOARD MOTOR BOATS

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

PUMPS



2200194 Pump 70 CT without lock valve
2200088 Pump 70 CT with lock valve
2200089 Set of straight fittings for pump 3/8 BSPP Ø 12 mm
2200102 Set of tees for Ø 12 mm inflex. tube
2200175 Wooden wheel Ø 600 mm

Ø 12-17 fittings available on request

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 ⅜ "

2200494 Pump 90 CT without lock valve
2200489 Pump 90 CT with lock valve
2200089 Set of straight fittings for pump 3/8 BSPP Ø 12 mm
2200102 Set of tees for Ø 12 mm inflex. tube
2200998 Wooden wheel Ø 700 mm

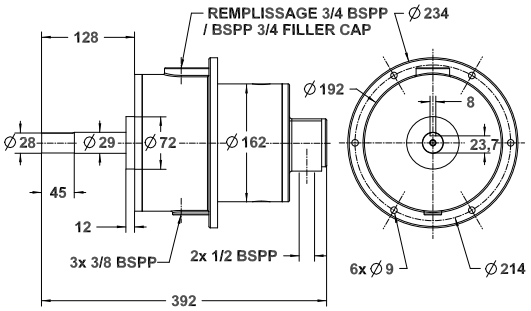
Ø 12-17 fittings available on request

Flow rate	90 cc//t	5.5 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 ⅜ "

2200106 Pump 105 CT without lock valve
2200107 Set of straight fittings for pump 1/2 BSPP Ø 18 mm
2200110 Lock valve LS 170
2200111 Set of straight fittings for lock valve 1/2 BSPP Ø 18 mm
2200115 Set of tees for Ø 18 mm inflex. tube
2200177 Wooden wheel Ø 700 mm

Ø 15-21 fittings available on request

Flow rate	105 cc/t	6.41 cu.in
Minimum size of tubing	15x18 mm	.59''x.70''
Weight	16.4 kg	36.2 lbs
Volume	2000 cc	122 cu.in
Max. Wheel diametre	Ø 1000 mm	39 ⅜ "



2200130 Pump 150 CT without lock valve
2200107 Set of straight fittings for pump 1/2 BSPP Ø 18 mm
2200110 Lock valve LS 170
2200111 Set of straight fittings for lock valve 1/2 BSPP Ø 18 mm
2200115 Set of tees for Ø 18 mm inflex. tube
2200178 Wooden wheel Ø 800 mm

Ø 15-21 fittings available on request

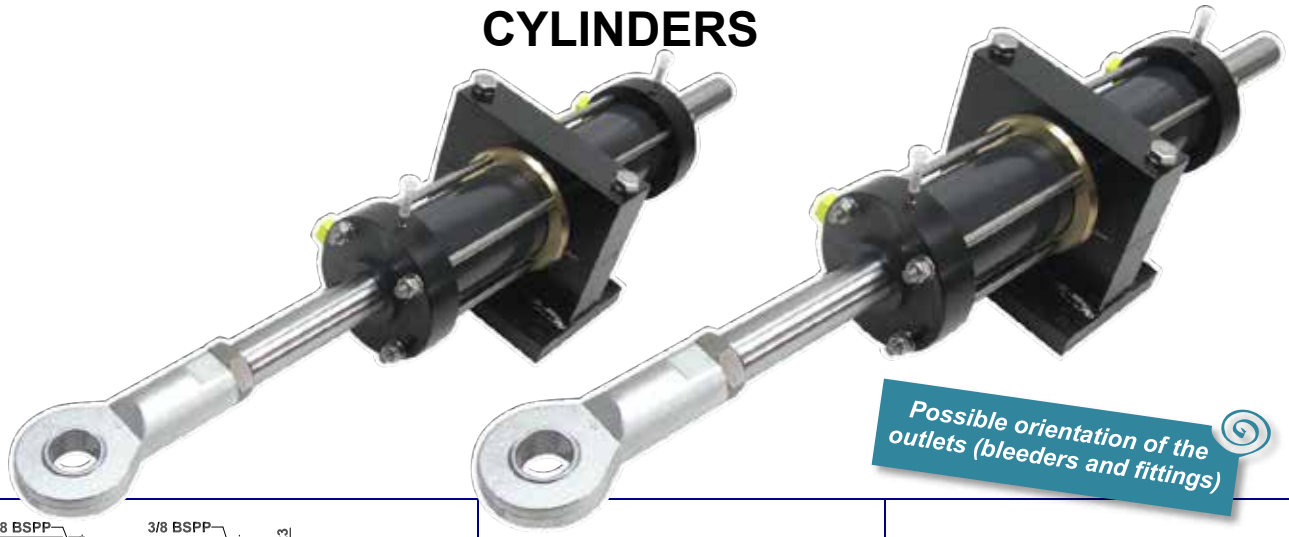
Flow rate	150 cc/t	9.15 cu.in
Minimum size of tubing	15x18 mm	.59''x.70''
Weight	16.4 kg	36.2 lbs
Volume	2000 cc	122 cu.in
Max. Wheel diametre	Ø 1000 mm	39 ⅜ "

2200135 Pump 200 CT without lock valve
2200107 Set of straight fittings for pump 1/2 BSPP Ø 18 mm
2200110 Lock valve LS 170
2200111 Set of straight fittings for lock valve 1/2 BSPP Ø 18 mm
2200115 Set of tees for Ø 18 mm inflex. tube
2200179 Wooden wheel Ø 1000 mm

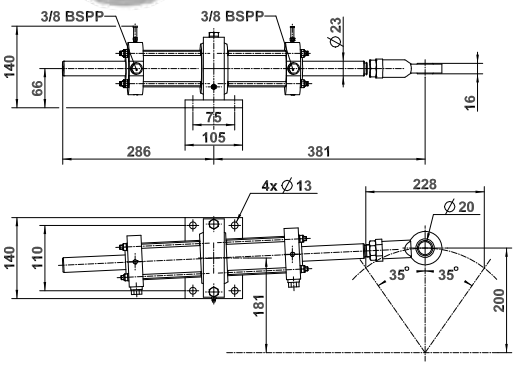
Ø 15-21 fittings available on request

Flow rate	200 cc/t	12.2 cu.in
Minimum size of tubing	15x18 mm	.59''x.70''
Weight	17 kg	37.5 lbs
Volume	2000 cc	122 cu.in
Max. Wheel diametre	Ø 1000 mm	39 ⅜ "

CYLINDERS



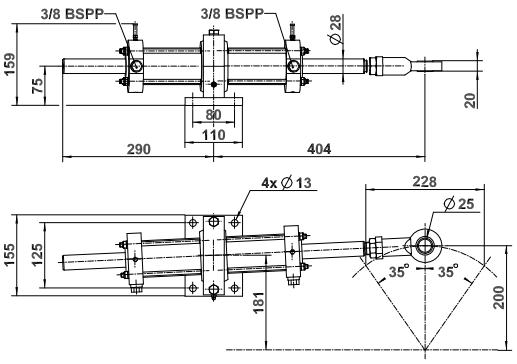
Possible orientation of the outlets (bleeders and fittings)



2200093 VHM 45 DT C228 APD
2200096 Set of flex. tube and fitt. 3/8 BSPP Ø 12 mm
2200097 By-pass for Ø 12 mm inflexible tube
2200098 Tiller arm LS 105 + screws & bolts
2200017 Oil (2 litre can)

On request:
Ø 12-17 fittings, flexible tube and by-pass

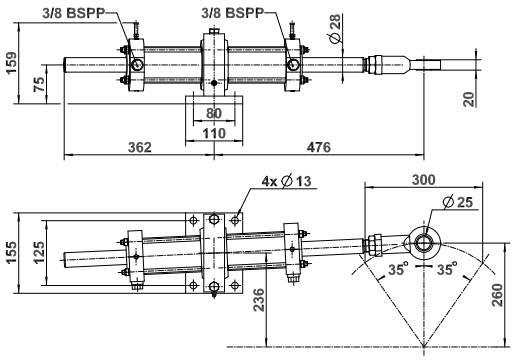
Maximum torque	140 kpm	1033 ft.lbs
Stroke	228 mm	9"
Maximum pressure	60 bars	870 PSI
Volume	268 cc	16.3 cu.in
Radius of tiller arm	200 mm	7 7/8"
Total rudder angle	70°	
Weight	10.9 kg	24 lbs



2200094 VHM 60 DT APD
2200096 Set of flex. tube and fitt. 3/8 BSPP Ø 12 mm
2200097 By-pass for Ø 12 mm inflexible tube
2200099 Tiller arm LS 155 + screws & bolts
2200017 Oil (2 litre can)

On request:
Ø 12-17 fittings, flexible tube and by-pass

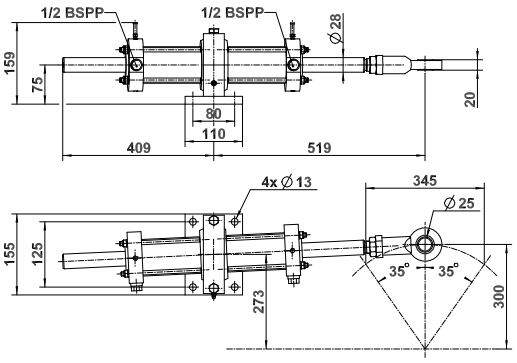
Maximum torque	265 kpm	1957 ft.lbs
Stroke	228 mm	9"
Maximum pressure	60 bars	870 PSI
Volume	505 cc	30.8 cu.in
Radius of tiller arm	200 mm	7 7/8"
Total rudder angle	70°	
Weight	14.2 kg	31.3 lbs



2200095 VHM 60 DT C300 APD
2200096 Set of flex. tube and fitt. 3/8 BSPP Ø 12 mm
2200097 By-pass for Ø 12 mm inflexible tube
2200100 Tiller arm LS 330 + screws & bolts
2200017 Oil (2 litre can)

On request :
Ø 12-17 fittings, flexible tube and by-pass

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 ¼"
Total rudder angle	70°	
Weight	15.5 kg	34.2 lbs

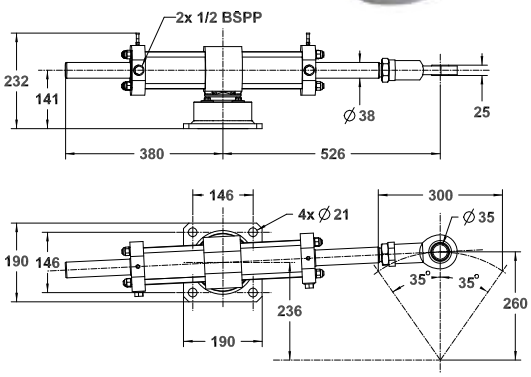


2202932 VHM 63 DT C345 APD
2200109 Set of flex. tube and fitt. 1/2 BSPP Ø 18 mm
2200015 By-pass for Ø 18 mm inflexible tube
2201540 Tiller arm LS 450 + screws & bolts
2200017 Oil (2 litre can)

On request :
Ø 15-21 fittings, flexible tube and by-pass

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



2202700 VHM 80 DT APD

2200109 Set of flexible tubes and fittings 1/2 BSPP Ø 18 mm

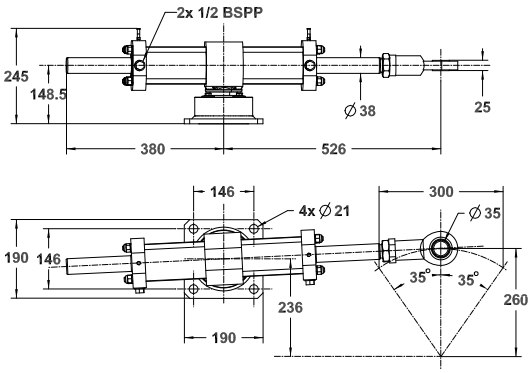
2200015 By-pass for Ø 18 mm inflex. tube

2200113 Tiller arm LS 550 - 840 + screws & bolts

2200017 Oil (2 litre can)

On request:
Ø 15-21 fittings, flexible pipe and by-pass

Maximum torque	600 kpm	4430 ft.lbs
Stroke	300 mm	11 13/16"
Maximum pressure	60 bars	870 PSI
Volume	1167 cc	71.2 cu.in
Radius of tiller arm	260 mm	10 ¼"
Total rudder angle	70°	
Weight	30 kg	66.2 lbs



2202699 VHM 90 DT APD

2200109 Set of flexible tubes and fittings 1/2 BSPP Ø 18 mm

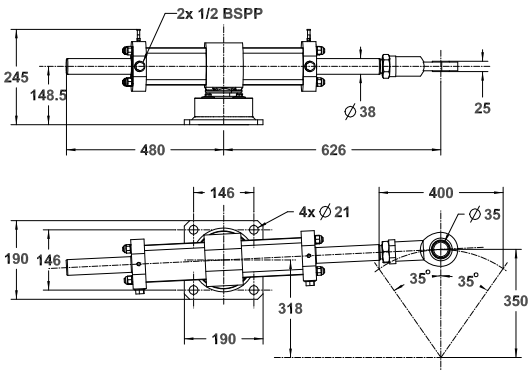
2200015 By-pass for Ø 18 mm inflex. tube

2200113 Tiller arm LS 550 – 840 + screws & bolts

2200017 Oil (2 litre can)

On request:
Ø 15-21 fittings, flexible pipe and by-pass

Maximum torque	840 kpm	6076 ft.lbs
Stroke	300 mm	11 13/16"
Maximum pressure	60 bars	870 PSI
Volume	1567 cc	95.6 cu.in
Radius of tiller arm	260 mm	10 ¼"
Total rudder angle	70°	
Weight	32.5 kg	71.7 lbs



2202840 VHM 90 DT C400 APD

2200109 Set of flexible tubes and fittings 1/2 BSPP Ø 18 mm

2200015 By-pass for Ø 18 mm inflex. tube

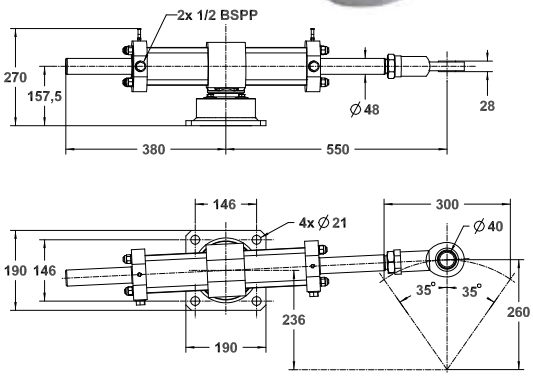
2202626 Tiller arm LS 1000 + screws & bolts

2200017 Oil (2 litre can)

On request:
Ø 15-21 fittings, flexible pipe and by-pass

Maximum torque	1000 kpm	7233 ft.lbs
Stroke	400 mm	15 3/4"
Maximum pressure	60 bars	870 PSI
Volume	2090 cc	128 cu.in
Radius of tiller arm	350 mm	13 3/4"
Total rudder angle	70°	
Weight	45 kg	100 lbs

CYLINDERS



2202815 VHM 110 DT C300 APD

2200109 Set of flexible tubes and fittings 1/2 BSPP Ø 18 mm

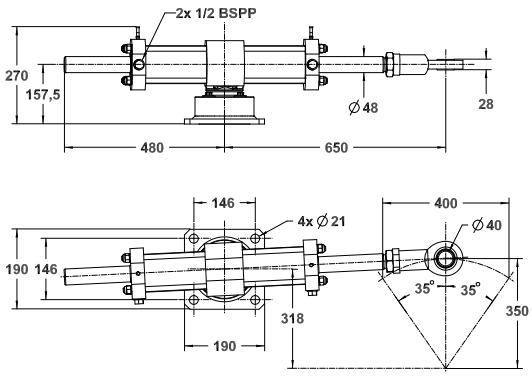
2200015 By-pass for Ø 18 mm inflex. tube

2201935 Tiller arm LS 1200 + screws & bolts

2200017 Oil (2 litre can)

On request:
Ø 15-21 fittings, flexible pipe and by-pass

Maximum torque	1200 kpm	8660 ft.lbs
Stroke	300 mm	11 13/16"
Maximum pressure	60 bars	870 PSI
Volume	2307 cc	141 cu.in
Radius of tiller arm	260 mm	10 ¼"
Total rudder angle	70°	
Weight	50 kg	110 lbs



2202698 VHM 110 DT APD

2200109 Set of flexible tubes and fittings 1/2 BSPP Ø 18 mm

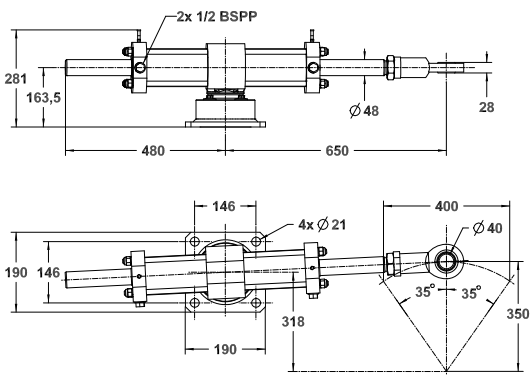
2200015 By-pass for Ø 18 mm inflex. tube

2200134 Tiller arm LS 1350 - 1660 + screws & bolts

2200017 Oil (2 litre can)

On request:
Ø 15-21 fittings, flexible pipe and by-pass

Maximum torque	1600 kpm	11800 ft.lbs
Stroke	400 mm	15 ¾"
Maximum pressure	60 bars	870 PSI
Volume	3076 cc	187.7 cu.in
Radius of tiller arm	350 mm	13 ¾"
Total rudder angle	70°	
Weight	53 kg	116 lbs



2202685 VHM 120 DT APD

2200109 Set of flexible tubes and fittings 1/2 BSPP Ø 18 mm

2200015 By-pass for Ø 18 mm inflex. tube

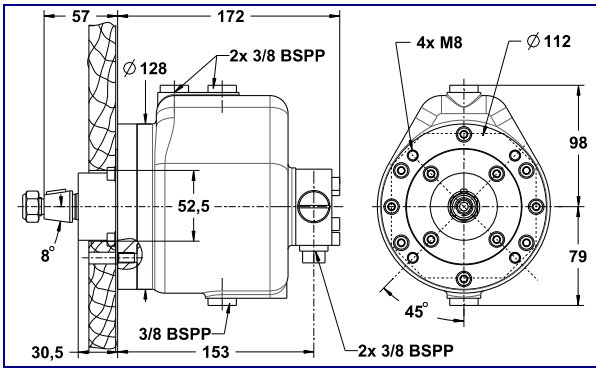
2200134 Tiller arm LS 1350 - 1660 + screws & bolts

2200017 Oil (2 litre can)

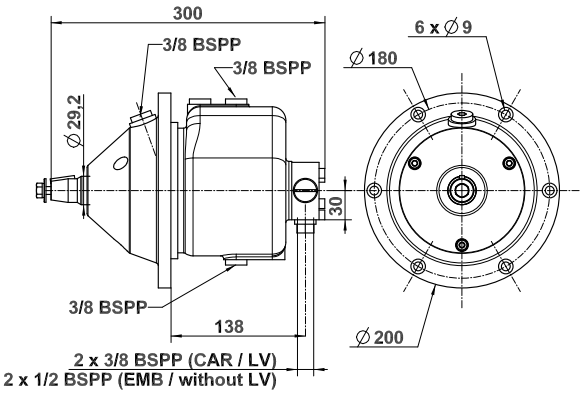
On request:
Ø 15-21 fittings, flexible pipe and by-pass

Maximum torque	2000 kpm	14770 ft.lbs
Stroke	400 mm	15 ¾"
Maximum pressure	60 bars	870 PSI
Volume	3798 cc	231.8 cu.in
Radius of tiller arm	350 mm	13 ¾"
Total rudder angle	70°	
Weight	60 kg	132 lbs

MANUAL HELM PUMPS

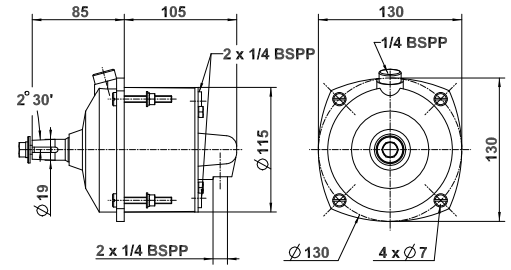


2200842	Pump 70 CT without lock valve double bearing **2200711** Pump 70 CT with lock valve double bearing **2202189** Pump 70 CT with lock valve double bearing BR	Flow rate 70 cc/t Minimum tubing size 16 x 18 mm Weight 6.5 kg Volume 660 cc Max. wheel diametre Ø 1000 mm
2200814	Pump 90 CT without lock valve double bearing **2200832** Pump 90 CT with lock valve double bearing **2201455** Pump 90 CT with lock valve double bearing BR	Flow rate 90 cc/t Minimum tubing size 16 x 18 mm Weight 6.5 kg Volume 660 cc Max. wheel diametre Ø 1000 mm



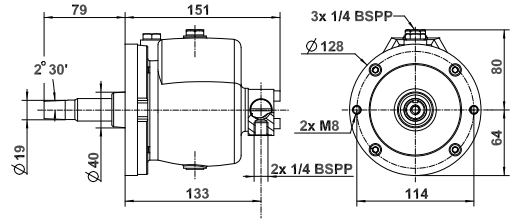
2201941	Pump 60 CT with lock valve - 8° - sailing-boat	Flow rate 60 cc/t Minimum tubing size 16 x 18 mm Weight 7.7 kg Volume 660 cc Max. wheel diametre Ø 1000 mm
2201942	Pump 70 CT with lock valve - 8° - sailing-boat	Flow rate 70 cc/t Minimum tubing size 16 x 18 mm Weight 7.7 kg Volume 660 cc Max. wheel diametre Ø 1000 mm
2201857	Pump 90 CT with lock valve - 8° - sailing-boat	Flow rate 90 cc/t Minimum tubing size 16 x 18 mm Weight 7.7 kg Volume 660 cc Max. wheel diametre Ø 1000 mm
2200605 **2201420**	Pump 115 CT without lock valve - 8° Pump 115 CT with lock valve - 8°	Flow rate 115 cc/t Minimum tubing size 16 x 18 mm Weight 8.4 kg Volume 1000 cc Max. wheel diametre Ø 1200 mm
2201421	Pump 170 CT without lock valve – 8°	Flow rate 170 cc/t Minimum tubing size 16 x18 mm Weight 8.5 kg Volume 1000 cc Max. wheel diametre Ø 1200 mm

OTHER PUMP AND CYLINDER MODELS



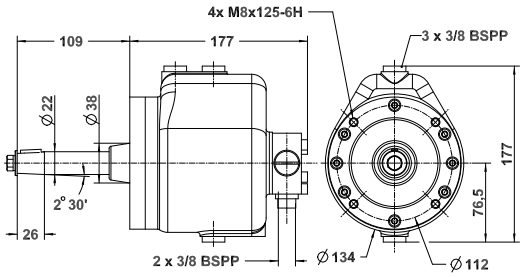
2201762	Pump 23 HB – LV		
Flow rate	23 cc/rev	1.4 cu.in / rev	
2200037	Pump 29 CT HB – LV		
Flow rate	29 cc/rev	1.7 cu.in / rev	
2200019	Pump 35 CT HB – LV		
Flow rate	35 cc/rev	2.14 cu.in/ rev	

Minimum size of tubing	8x10mm	.31"x.39"
Weight	3,3 kg	7.3 lbs
Volume	400 cc	24.4 cu.in
Max. wheel diametre	Ø 520 mm	20 ½ ''



2200282	Pump 29 CT 30 – LV		
Flow rate	29 cc/rev	1.7 cu.in / rev	
2200073	Pump 40 CT – LV		
Flow rate	40 cc/rev	2.44 cu.in / rev	

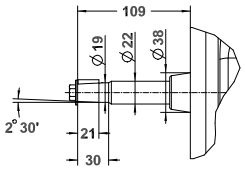
Minimum size of tubing	8x10 mm	.31''x.39''
Weight	3,9 kg	8.6 lbs
Volume	400 cc	24.4 cu.in
Max. wheel diametre	Ø 800 mm	31 ½ ''



2200248	Pump 36 CT - LV		
Flow rate	36 cc/rev	2.2 cu.in / rev	
2200353	Pump 60 CT - LV		
Flow rate	60 cc/rev	3.66 cu.in / rev	
2201896	Pump 36 CT – LV - SC		
Flow rate	36 cc/rev	2.2 cu.in / rev	
2200413	Pump 60 CT – LV - SC		
Flow rate	60 cc/rev	3.66 cu.in / rev	

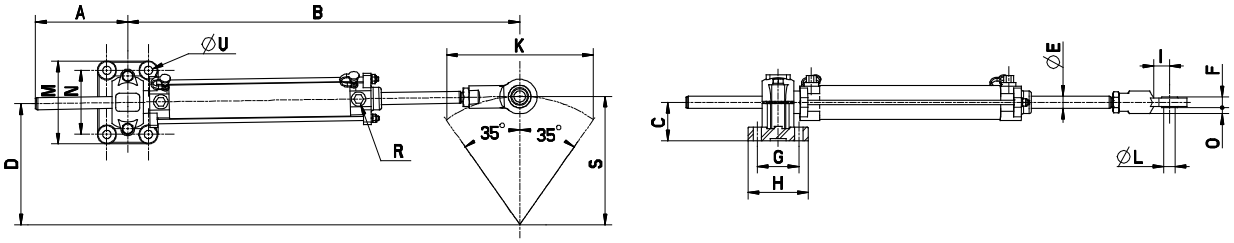
Minimum size of tubing	10x12 mm	.39''x.47''
Weight	5,5 kg	12.1 lbs
Volume	660 cc	40 cu.in
Max. wheel diametre	Ø 1000 mm	39 ⅜ "

BOUT ARBRE POMPE 36/60/70/90 CT - CAR - PC
/ SHAFT END PUMP 36/60/70/90 CT - LV - SC



2200262	Pump 70 CT – LV - SC		
Flow rate	70 cc/rev	4.27 cu.in / rev	
2200567	Pump 90 CT – LV - SC		
Flow rate	90 cc/rev	5.5 cu.in / rev	

Minimum size of tubing	15x18 mm	.59''x.70''
Weight	5,5 kg	12.1 lbs
Volume	660 cc	40 cu.in
Max. wheel diametre	Ø 1000 mm	39 ⅜ "



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

OPTIONAL ADDITIONS TO OUR STEERING SYSTEMS

Speedy Purge

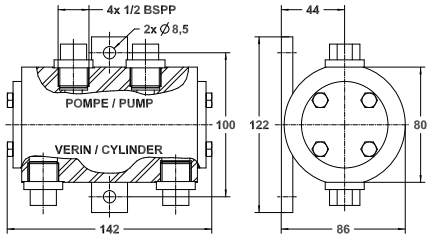
LS Speedy Purge makes it possible for one single operator to **fill in and bleed** a hydraulic steering system perfectly well and neatly within 10 minutes.

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

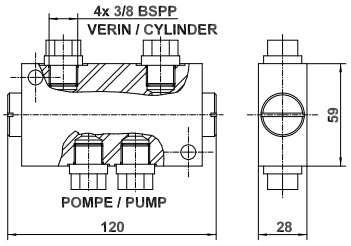
2200110 Lock valve on line LS 170

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

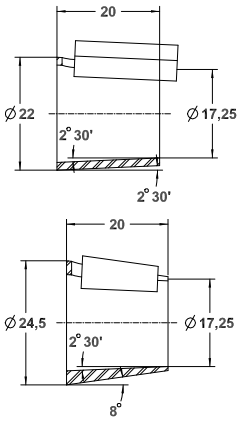
with pin Ø 22 - 2.30° angle

For pumps :
30 HB, 35 HB, 40 HB

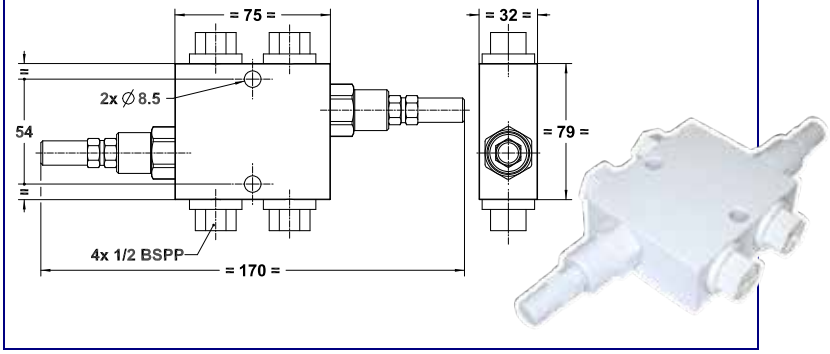
2200029 Adaptable cone

with pin Ø 24.5 - 8° angle

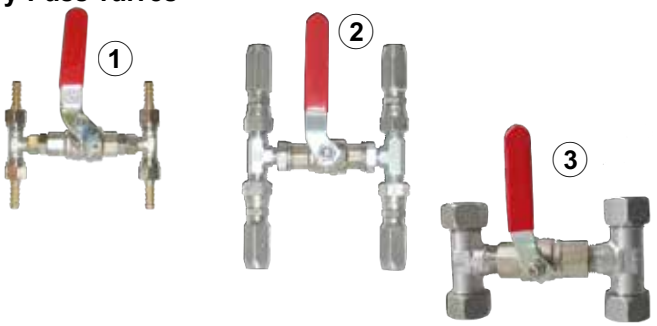
For pumps :
30 HB, 35 HB, 40 HB



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 ∅ 8 mm
	2200067	By-pass valve–flexible tube ∅ 10 mm
3	**2200683**	By-pass valve–inflexible tube 6 x 8
	2200045	By-pass valve–inflexible tube 8 x 10
	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

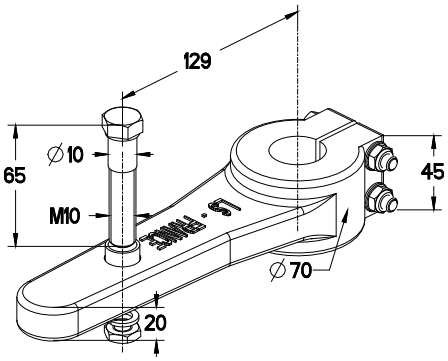
2200017 2 Litre oil can
Dexron II

2203045 20 Litre oil can
white oil ISO 22

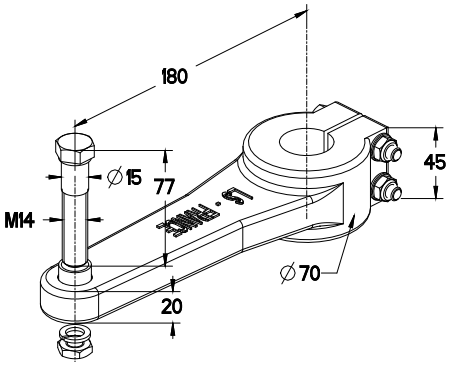
2203201 20 Litre oil can
Dexron II

TILLER ARMS

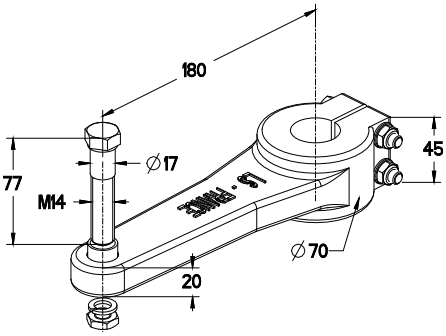
2200003
Pilot bored equipped tiller arm LS 30 P
Ø 22 pilot bored – maxi Ø 40



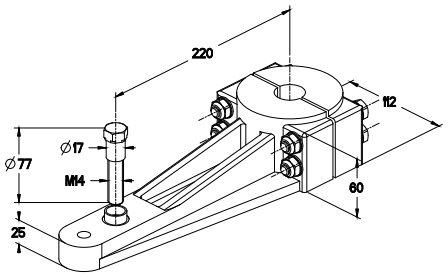
2200060
Pilot bored equipped tiller arm LS 50 P
Ø 22 pilot bored – maxi Ø 40



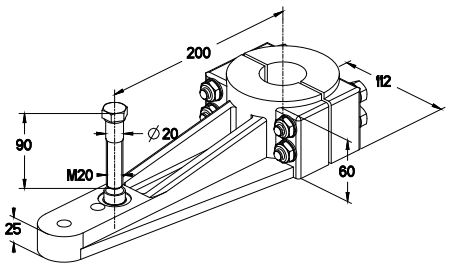
2200499
Pilot bored equipped tiller arm LS 75 P
Ø 22 pilot bored – maxi Ø 40



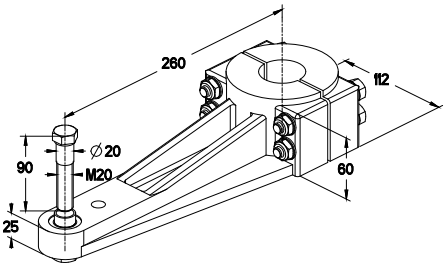
2200533
Pilot bored equipped tiller arm LS 105 P
Ø 28 pilot bored – maxi Ø 50



2200534
Pilot bored equipped tiller arm LS 185 P
Ø 28 pilot bored – maxi Ø 50

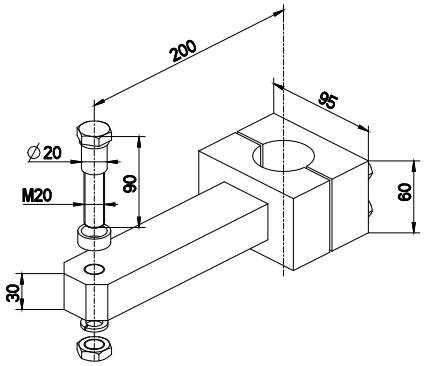


2200535
Pilot bored equipped tiller arm LS 240 P
Ø 28 pilot bored – maxi Ø 50

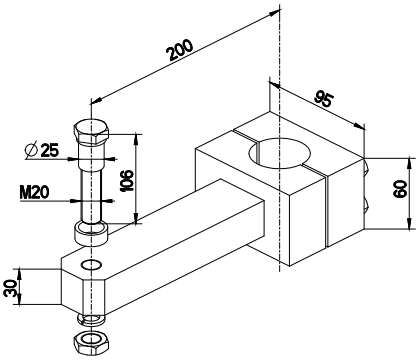


TILLER ARMS

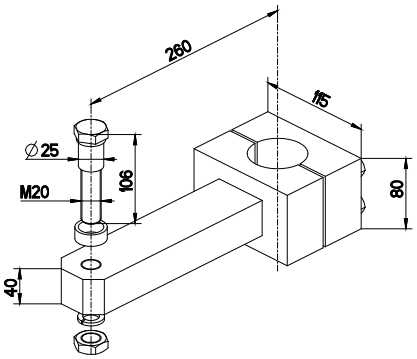
2200098
Pilot bored equipped tiller arm LS 105
∅ 20 pilot bored – maxi ∅ 50



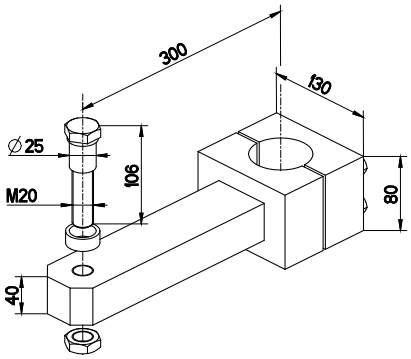
2200099
Pilot bored equipped tiller arm LS 155
∅ 20 pilot bored – maxi ∅ 50



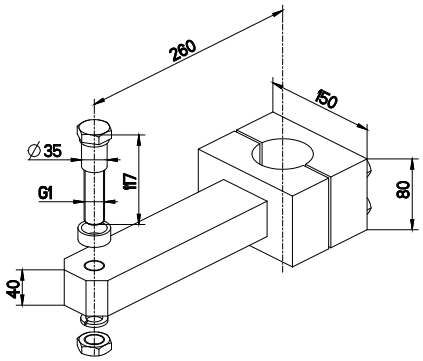
2200100
Pilot bored equipped tiller arm LS 330
∅ 20 pilot bored – maxi ∅ 64



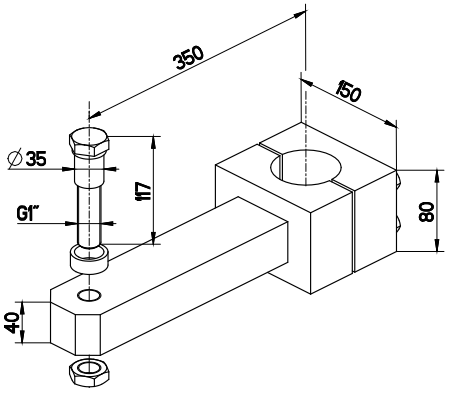
2201540
Pilot bored equipped tiller arm LS 450
∅ 20 pilot bored – maxi ∅ 64



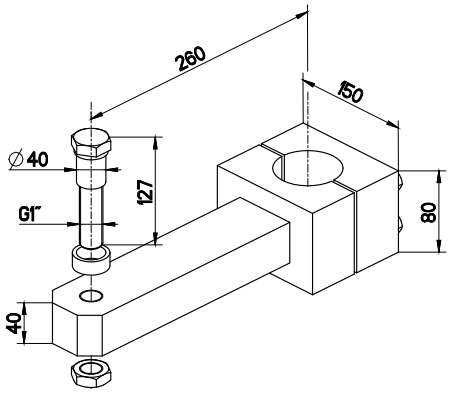
2200113
Pilot bored equipped tiller arm LS 550-840
∅ 20 pilot bored – maxi ∅ 88



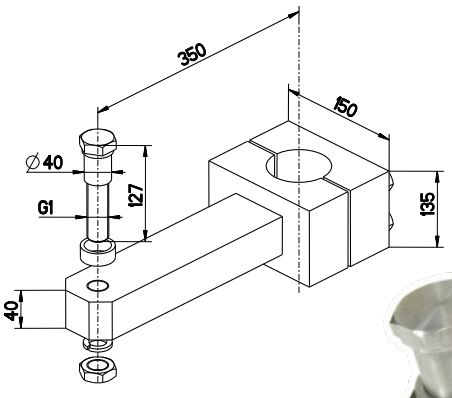
2202626
Pilot bored equipped tiller arm LS 1000
∅ 20 pilot bored – maxi ∅ 88



2201935
Pilot bored equipped tiller arm LS 1200
∅ 20 pilot bored – maxi ∅ 88

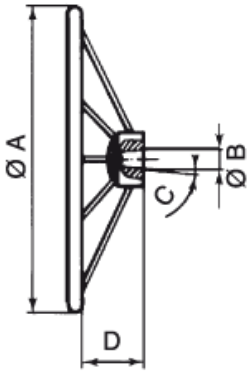


2200134
Pilot bored equipped tiller arm LS 1350-1660
∅ 20 pilot bored – maxi ∅ 100



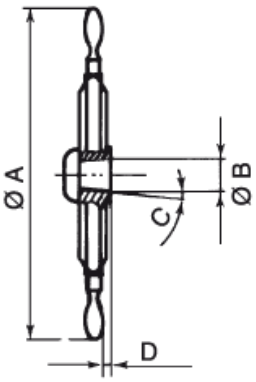
S/STEEL AND WOODEN STEERING WHEELS

S/STEEL WHEELS



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

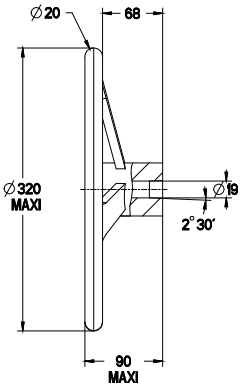
WOODEN WHEELS



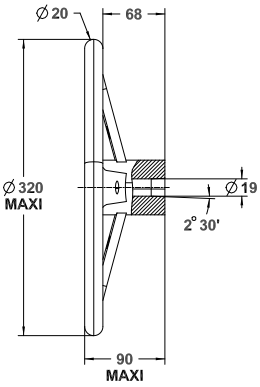
CODE	DESIGNATION	Ø A	Ø B	C	D
2200173	Wooden wheel 420 – 22	420 16 17/32"	22 7/8"	2°30'	15 19/32"
2200996	Wooden wheel 420 – 19	420 16 17/32"	19 3/4"	2°30'	15 19/32"
2200174	Wooden wheel 500 – 22	500 19 11/16"	22 7/8"	2°30'	15 19/32"
2200997	Wooden wheel 500 – 19	500 19 11/16"	19 3/4"	2°30'	15 19/32"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

RANGE OF STEERING WHEELS

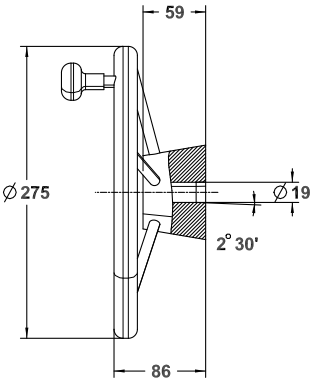
2200181 **Plastic Wheel ∅ 320**



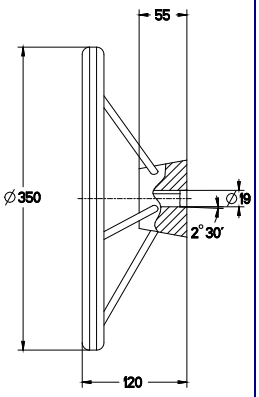
2200182 **Imitation Leather/Anodised Alu ∅ 320**



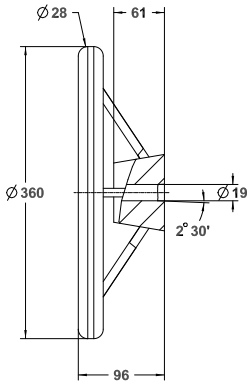
2202462 **S/Steel Wheel with knob ∅ 275**



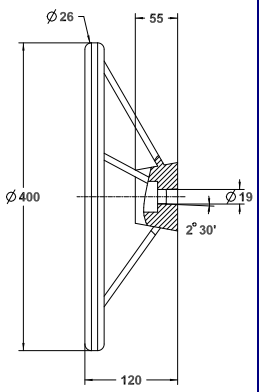
2200985 **S/Steel Wheel ∅ 350**



2203377 **Covered S/Steel Wheel ∅ 360**



2200986 **S/Steel Wheel ∅ 400**



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.

A few references:

- Ø6 Flexible tube - per metre	**2200810**
- Ø8 Flexible tube - per metre	**2200024**
- Ø10 Flexible tube - per metre	**2200070**
- Ø6 Flexible tube - length 8 m	**1204267**
- Ø6 Flexible tube - length 10 m	**1204268**
- Ø6 Flexible tube - length 12 m	**1204740**
- Ø6 Flexible tube - length 25 m	**1204985**
- Ø6 Flexible tube - length 35 m	**1205301**
- Ø6 Flexible tube - length 400 m	**1205359**
- Ø8 Flexible tube - length 10 m	**1204825**
- Ø8 Flexible tube - length 12 m	**1204742**
- Ø8 Flexible tube - length 20 m	**1205245**
- Ø8 Flexible tube - length 35 m	**1205300**
- Ø8 Flexible tube - length 400 m	**1205360**

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**

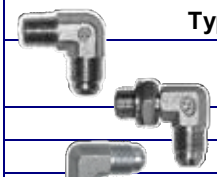
A few references in 18 L :

- 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**

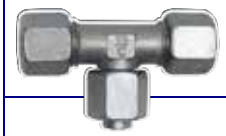
Other lengths on request. Possibility to make up specific kits as needed.

FITTINGS

FOR FLEXIBLE TUBE

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

FOR INFLEXIBLE TUBE

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

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 manufacturers supply has been installed and, in particular, to the performances of this equipment.

4) When the manufacturers 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 manufacturers supplies as the manufacturers 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 manufacturers 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, operators 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 anyone of the obligations defined above.

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Lecomble & Schmitt

156 Route de Briscous - 64240 URT - France

Sales Department
+33 (0)559 562 411 - commercial@ls-france.com
Technical Department
+33 (0)559 562 646 - commercial2@ls-france.com

Fax : +33 (0)559 569 571

Distributed by

Edition 10/2020