

# POWER PACKS AND LINEAR DRIVES FOR AUTOPILOTS

2016



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

BP N° 2  
64240 URT – France

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

<http://www.ls-france.com>

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# HYDRAULIC POWER PACKS AND LINEAR DRIVES FOR AUTOPILOTS

## INTRODUCTION

**LS** power packs and linear drives for autopilots **are perfectly adapted to the requirements of different applications**, such as pleasure boating, workboats, professional or amateur fishing, competition and its accompaniment.

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 **the most comprehensive range** available on the market with a guarantee of **efficiency, reliability and security**.

Our systems carry a 2 year warranty and are **CE** approved. They are fully compatible with all brands of autopilots on the market today.

## DESCRIPTION OF HYDRAULIC POWER PACKS AND LINEAR DRIVES FOR AUTOPILOTS

As a general rule, the basic set up of a hydraulic system for autopilot consists of:

- 1 hydraulic cylinder,
- 1 hydraulic power pack,
- Fittings and tubing to connect the cylinder to the power pack.

Other elements will be added to this basic set up in function of the configuration of the boat steering system – hydraulic steering, wire ropes, cables, etc.

### Cylinder

The cylinder is the dictating element in the selection of a system. It gives the pushing power to the steering system in function of its effective area and the pressure it receives from the power pack. To select the cylinder, follow the method given in paragraph "Selection of the System".

### Hydraulic Power Pack

Power packs are always composed of a reversible or non reversible electrical motor in 12 or 24 volts DC, or 220/240 V single-phased or three-phase, coupled to a reversible or non reversible axial piston pump or gear pump, with adjustable or fixed flow rate.

Receiving orders from the electronics, the power pack will suck or force back the oil in the circuit. The speed of correction is determined in function of the pump flow rate in litres per minute.

Our systems are fitted with lock valves which prevent cylinder movements once the boat is on the desired course until a new course correction is required.

They are also fitted with pressure relief systems to protect the circuit against abnormal pressure increases.

### Tubing

Tubing is designed for hydraulic oil transfer under pressure. Tubing diameter is selected in function of the power pack flow rate.

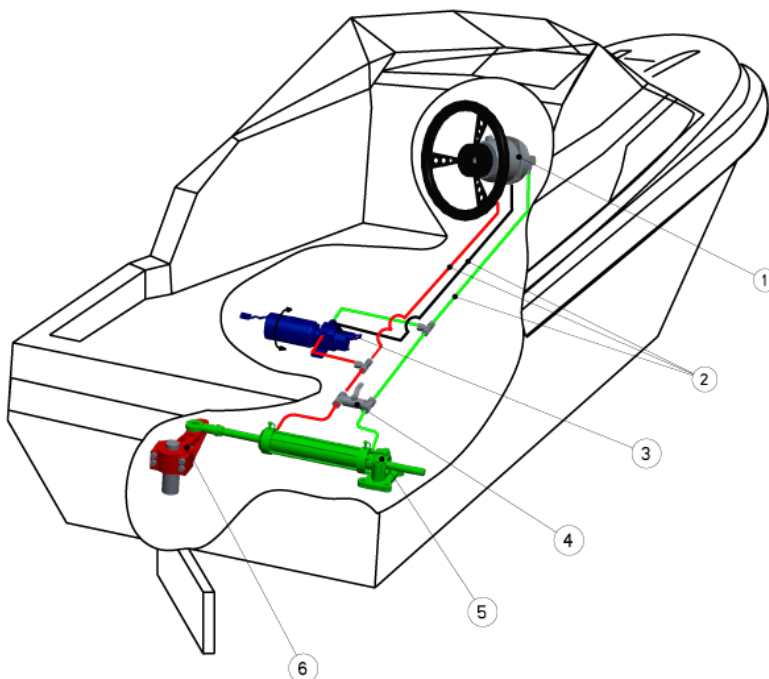
# HYDRAULIC POWER PACKS AND LINEAR DRIVES FOR AUTOPILOTS

## WORKING PRINCIPLE

When the boat moves away from the displayed course, the autopilot electronic computer sends current to the motor terminals or to the power pack electrovalve. Then, the cylinder will be supplied with oil and set in motion. As soon as the boat is back on the displayed course, the computer stops supplying the power pack and the cylinder stops moving.

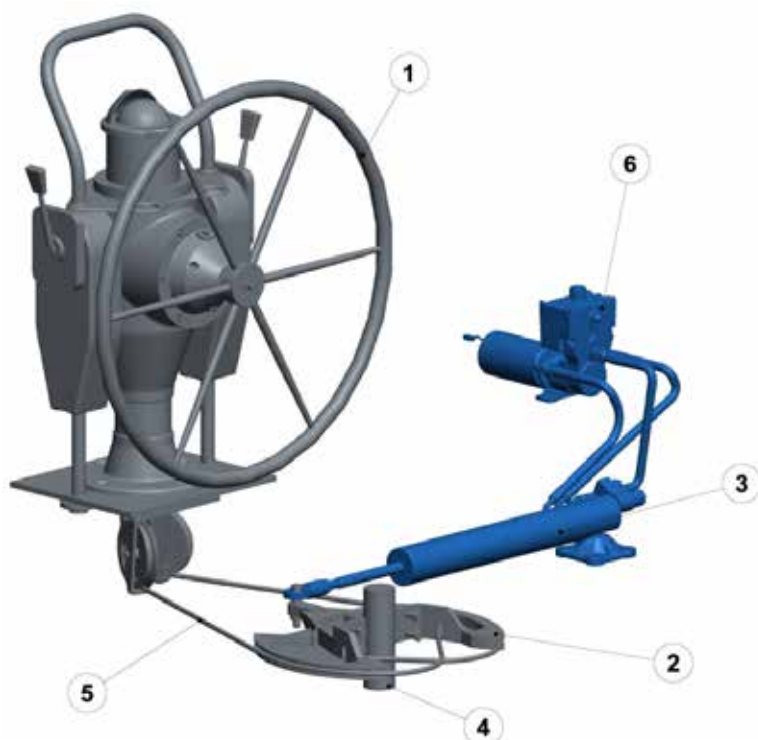
### • MOTORBOATS EQUIPPED WITH HYDRAULIC STEERING

- ① Pompe manuelle / Manual pump
- ② Tuyauterie / Tubing
- ③ Groupe / Power pack
- ④ By-pass / By-pass valve
- ⑤ Vérin / Cylinder
- ⑥ Bras de mèche / Tiller arm



### • SAILING BOATS EQUIPPED WITH WIRE ROPE STEERING

- ① Barre manuelle / Manual steering
- ② Secteur / Quadrant
- ③ Vérin linéaire / Linear cylinder
- ④ Mèche de safran / Rudder stock
- ⑤ Drosse de barre / Wire rope
- ⑥ Groupe / Power pack



# HYDRAULIC POWER PACKS AND LINEAR DRIVES FOR AUTOPILOTS

## SELECTION OF THE SYSTEM

- **For boats equipped with a hydraulic steering**, it will be necessary to determine:
  - The volume of the steering cylinder (take the biggest volume in case of a single rod cylinder)
  - Available voltage on board (12 VDC, 24 VDC, etc.)

**For planing or semi-planing hulls**, the power pack will be selected in function of its flow rate so that the steering cylinder will run its complete stroke within 10 to 12 seconds.

**For displacement hulls**, the power pack flow rate must enable the steering cylinder to run its complete stroke within 15 to 17 seconds.

*Examples :*

🚤 **Speed boat, planing hull with a 239 cc cylinder – Available voltage 12 VDC**

$$\frac{60 \text{ seconds (1 minute)}}{12 \text{ seconds (required time)}} \times 0.239 \text{ litre (239 cc)} = \mathbf{1.195 \text{ litre / minute}}$$

The flow rate of the required power pack will be 1.19 litre / minute, therefore we will select a **reversible power pack with adjustable flow rate type RV2 (12 V) – page 6**

🚤 **Fishing or work boat, displacement hull with a 2,307 cc cylinder – Available voltage 24 VDC**

$$\frac{60 \text{ seconds (1 minute)}}{15 \text{ seconds (required time)}} \times 2.307 \text{ litres (2,307 cc)} = \mathbf{9.228 \text{ litres / minute}}$$

The flow rate of the required power pack will be around 9 litres / minute, therefore we will select a **power pack type HF 1.5 – 9 (24 V) – page 7**

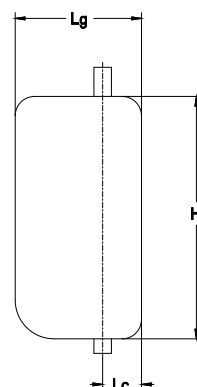
- **For boats equipped with a mechanical steering (wire ropes, cables, rack and pinion)**, it will be necessary to determine:
  - The rudder(s) torque
  - The available voltage on board (12 VDC, 24 VDC, etc.)

### Torque Calculation:

For boats fitted with a rudder with speed not exceeding 25 knots, the torque (**C**) of the rudder or rudders will be calculated according to the formula and correction coefficients below:

$$\mathbf{C = S \times [(0.4 L_g) - L_c] \times V^2 \times K}$$

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



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

- For sailing-boats **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.

*Examples:*

H = 1.2 m      Speed under sail = 12 knots  
 Lg = 0.7 m      Speed with motor = 8 knots  
 Lc = 0.18      S = 1.2 x 0.7 = 0.84 m<sup>2</sup>

**Torque under sail** =  $0.84 \times [(0.4 \times 0.7) - 0.18] \times 12^2 \times 15.89 \times 0.5 = \mathbf{96.11 \text{ kpm}}$

**Torque with motor** =  $0.84 \times [(0.4 \times 0.7) - 0.18] \times 8^2 \times 15.89 = \mathbf{85.42 \text{ kpm}}$

### Selection of the linear drive :

|                              |  |        |
|------------------------------|--|--------|
| Torque not exceeding 50 kpm  | Linear drive type <b>32ST16 NEWAVE</b> | page 8 |
| Torque not exceeding 100 kpm | Linear drive type <b>40ST16 NEWAVE</b> | page 8 |
| Torque not exceeding 200 kpm | Linear drive type <b>50ST20 NEWAVE</b> | page 8 |

*In the above example, the calculated torque is 96.11 kpm. Therefore the correct selection will be a linear drive type 40ST16 NEWAVE.*

**Note:** for sailing boats with a modern hull and balanced rudder, the selection can be made in function of the boat length as below:

|                                     |  |        |
|-------------------------------------|--|--------|
| <b>Length not exceeding 33 feet</b> | Linear drive type <b>32ST16 NEWAVE*</b>  | page 8 |
| <b>Length not exceeding 44 feet</b> | Linear drive type <b>40ST16 NEWAVE *</b> | page 8 |
| <b>Length not exceeding 60 feet</b> | Linear drive type <b>50ST20 NEWAVE *</b> | page 8 |

(\*) Data given as an indication only

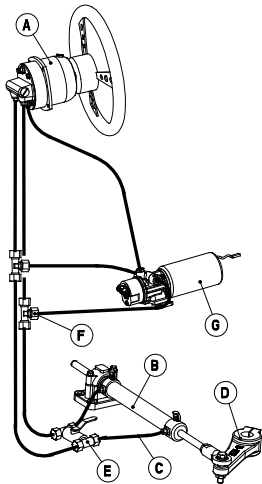


# HYDRAULIC POWER PACKS AND LINEAR DRIVES FOR AUTOPILOTS

## DIFFERENT TYPES OF INSTALLATIONS

### Reversible Power Pack

Single steering station  
+ Power pack

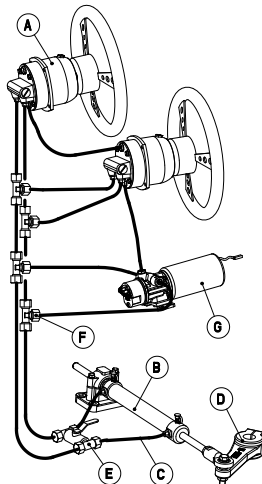


A – 1 pump + LV + fittings  
B – 1 cylinder  
C – 2 hoses + fittings  
F – tees + connection fittings  
G – 1 power pack

Option D – tiller arm  
E – by-pass valve

### Reversible Power Pack

Double steering station  
+ Power pack



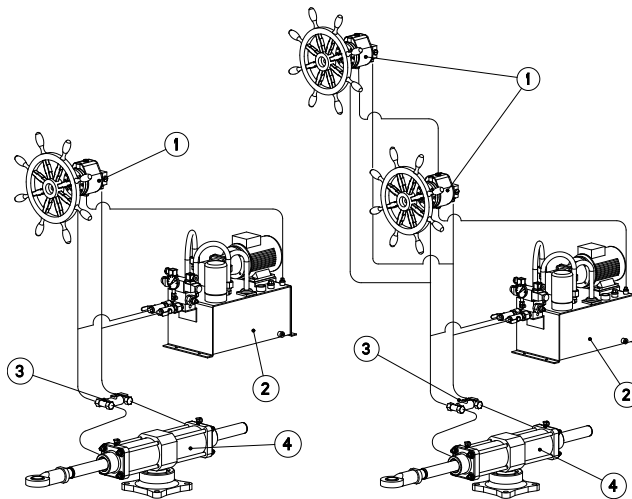
A – 2 pumps + LV + fittings  
B – 1 cylinder  
C – 2 hoses + fittings  
F – tees + connection fittings  
G – 1 power pack

Option D – tiller arm  
E – by-pass valve

### Power packs with electrovalves

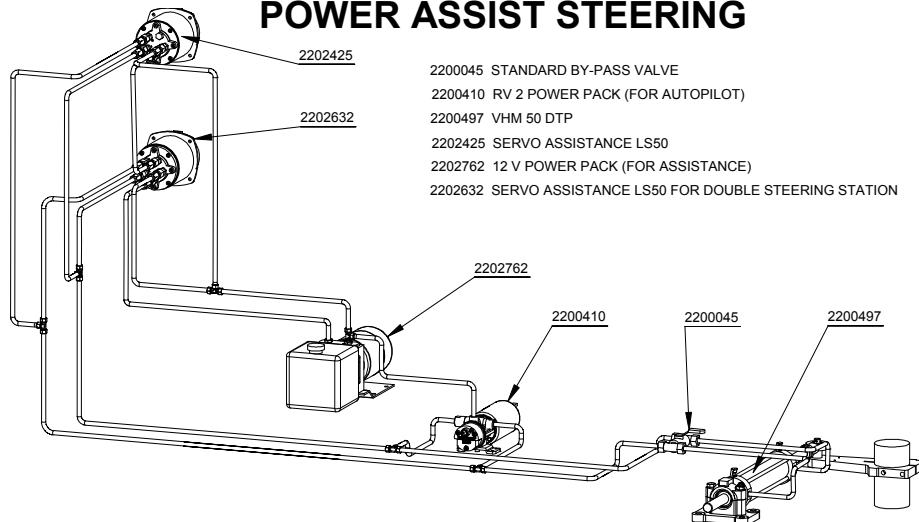
Single steering station

Double steering station



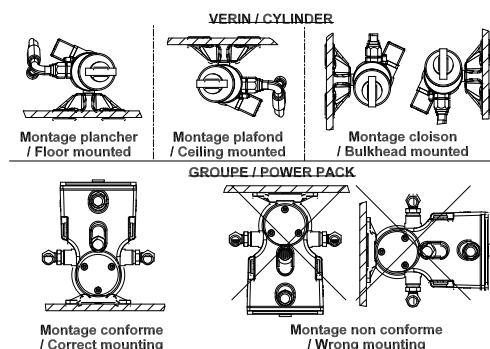
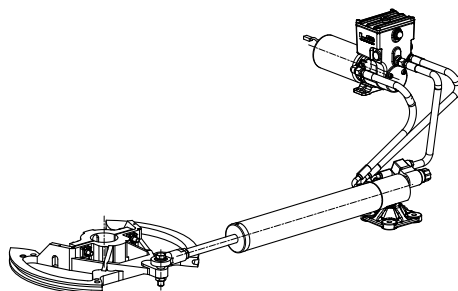
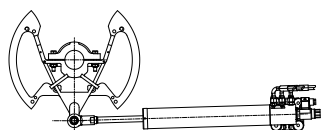
1 - Pump + LV  
2 - Power pack  
3 - By-pass valve  
4 - Cylinder

## POWER ASSIST STEERING



2200045 STANDARD BY-PASS VALVE  
2200410 RV 2 POWER PACK (FOR AUTOPILOT)  
2200497 VHM 50 DTP  
2202425 SERVO ASSISTANCE LS50  
2202762 12 V POWER PACK (FOR ASSISTANCE)  
2202632 SERVO ASSISTANCE LS50 FOR DOUBLE STEERING STATION

## SAILING BOATS WITH QUADRANT



# POWER PACKS FOR MOTORBOATS OR SAILING BOATS EQUIPPED WITH HYDRAULIC STEERING

## REVERSIBLE POWER PACKS FOR DOUBLE ROD CYLINDERS

Hydraulic power packs with adjustable flow in 12 or 24 V for pleasure, fishing and work boats. They are reversible by changing the polarity on the motor terminals. Flow adjustment is done through a screw which allows accurate regulation of the time required for lock to lock displacement. These power packs are fitted with lock valves.

|              | 12 VOLTS       | 24 VOLTS       |
|--------------|----------------|----------------|
| <b>R V 1</b> | <b>2200843</b> | <b>2200944</b> |
| <b>R V 2</b> | <b>2200410</b> | <b>2200945</b> |
| <b>R V 3</b> | <b>2200403</b> | <b>2200946</b> |

## REVERSIBLE POWER PACKS FOR SINGLE ROD CYLINDERS

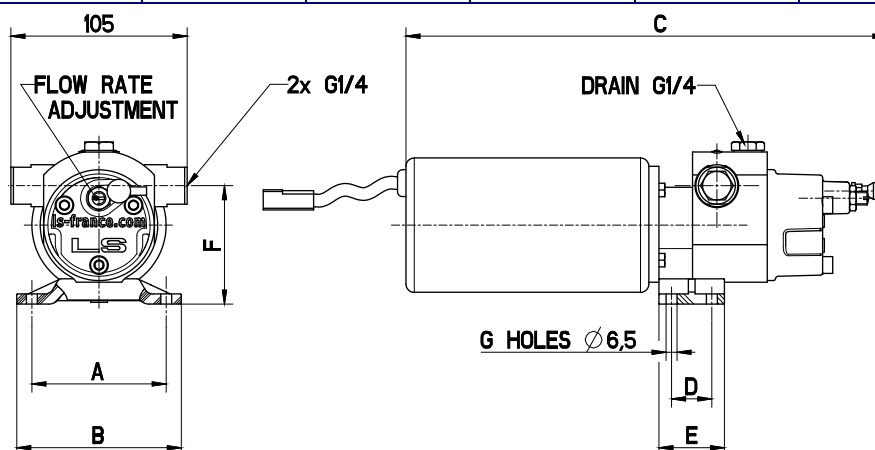
Hydraulic power packs with adjustable flow in 12 or 24 V for pleasure, fishing and work boats fitted with a single rod cylinder (unbalanced cylinder on outboard or stern-drive motors). They are reversible by changing the polarity on the motor terminals. Flow adjustment is done through a screw which allows accurate regulation of the time required for lock to lock displacement. These power packs are fitted with lock valves.

|                | 12 VOLTS       | 24 VOLTS       |
|----------------|----------------|----------------|
| <b>R V 2-Z</b> | <b>2203240</b> | <b>2203261</b> |



| Type of power pack                    | <b>R V 1</b> | <b>R V 2 / R V 2-Z</b> | <b>R V 3</b> |
|---------------------------------------|--------------|------------------------|--------------|
| <b>Maximum cylinder capacity (cc)</b> | 216          | 432                    | 650          |
| <b>Power pack flow rate (l/mn)</b>    | 0,1 à 1      | 0,2 à 2                | 0,3 à 3      |
| <b>Recommended protection 12/24V</b>  | 16 A / 6 A   | 25 A / 16 A            | 32 A / 16 A  |

|                        | <b>A</b>                     | <b>B</b>                     | <b>C</b>                      | <b>D</b>                    | <b>E</b>                    | <b>F</b>                    | <b>G</b> |
|------------------------|------------------------------|------------------------------|-------------------------------|-----------------------------|-----------------------------|-----------------------------|----------|
| <b>R V 1</b>           | 80<br>(3 <sup>5</sup> /32)   | 98<br>(3 <sup>7</sup> /8)    | 290<br>(11 <sup>27</sup> /64) | 24<br>(1 <sup>15</sup> /16) | 39<br>(1 <sup>35</sup> /64) | 70<br>(2 <sup>3</sup> /4)   | 4        |
| <b>R V 2 / R V 2-Z</b> | 80<br>(3 <sup>5</sup> /32)   | 98<br>(3 <sup>7</sup> /8)    | 290<br>(11 <sup>27</sup> /64) | 24<br>(1 <sup>15</sup> /16) | 39<br>(1 <sup>35</sup> /64) | 70<br>(2 <sup>3</sup> /4)   | 4        |
| <b>R V 3</b>           | 100<br>(3 <sup>15</sup> /16) | 120<br>(4 <sup>23</sup> /32) | 330<br>(13)                   | 0                           | 60<br>(2 <sup>23</sup> /64) | 88<br>(3 <sup>15</sup> /32) | 2        |



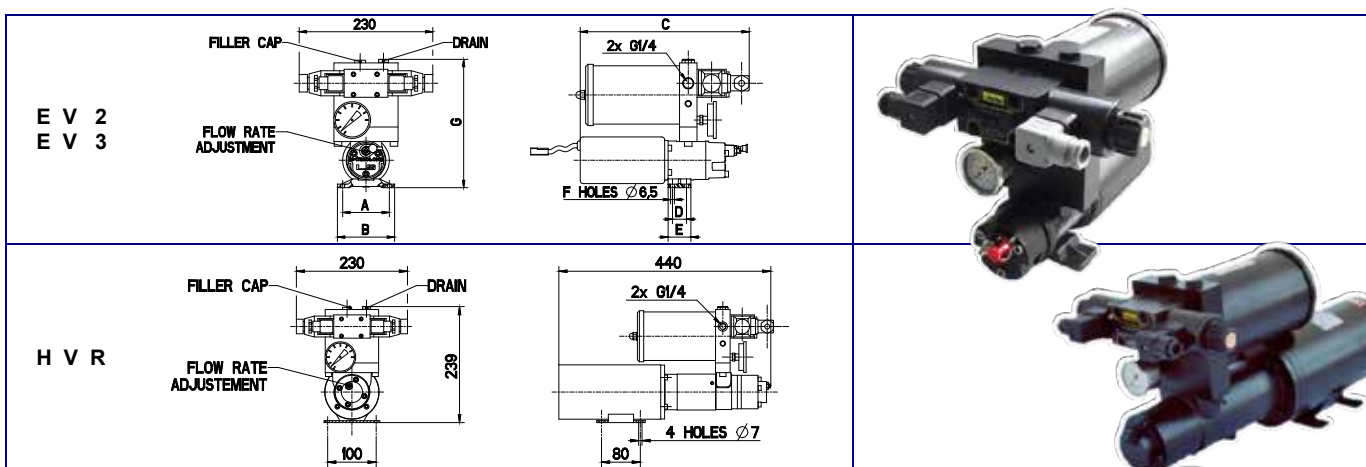


## POWER PACKS WITH ELECTROVALVES

| Type of power pack             | EV2         | EV3         | HVR         |
|--------------------------------|-------------|-------------|-------------|
| Maximum cylinder capacity (cc) | 432         | 650         | 860         |
| Power pack flow rate (l/mn)    | 0.2 to 2    | 0.3 to 3    | 0.3 to 4    |
| Oil reservoir capacity         | 1 L         | 1 L         | 1 L         |
| Recommended protection 12/24 V | 25 A / 14 A | 32 A / 16 A | 32 A / 20 A |

|       | 12 V    | 24 V    |
|-------|---------|---------|
| E V 2 | 2200409 | 2200980 |
| E V 3 | 2200844 | 2200981 |
| H V R | 2200147 | 2200982 |

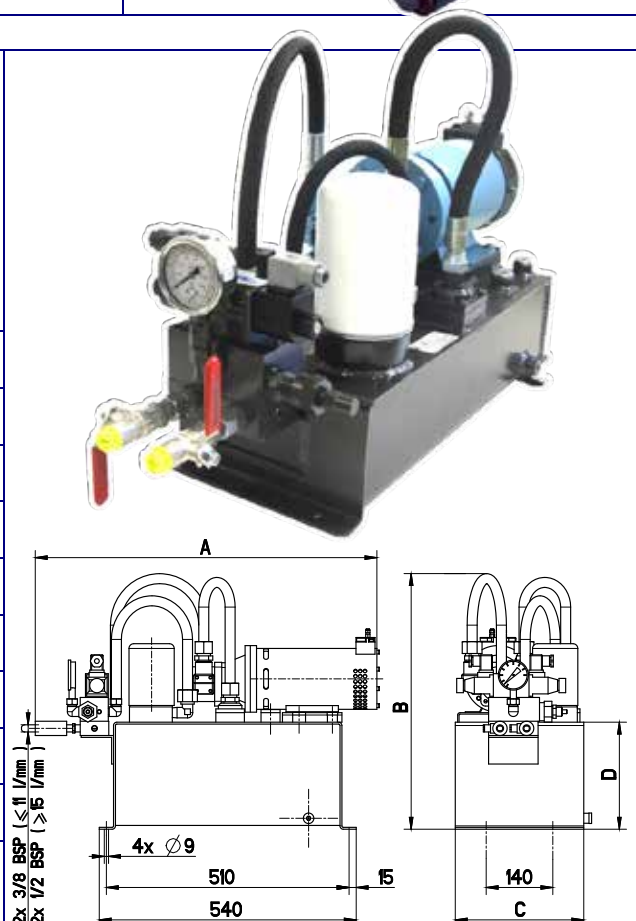
|             | A                            | B                            | C                             | D                          | E                           | F | G                            |
|-------------|------------------------------|------------------------------|-------------------------------|----------------------------|-----------------------------|---|------------------------------|
| <b>EV 2</b> | 80<br>(3 <sup>5</sup> /32)   | 98<br>(3 <sup>7</sup> /8)    | 302<br>(11 <sup>57</sup> /64) | 24<br>(1 <sup>5</sup> /16) | 39<br>(1 <sup>35</sup> /64) | 4 | 220<br>(8 <sup>11</sup> /16) |
| <b>EV 3</b> | 100<br>(3 <sup>15</sup> /16) | 120<br>(4 <sup>23</sup> /32) | 330<br>(13)                   | 0                          | 60<br>(2 <sup>23</sup> /64) | 2 | 236<br>(9 <sup>19</sup> /64) |



Hydraulic H.F. units are mainly designed for large pleasure boats, fishing and work crafts. Owing to a very strong construction, large oil tanks, high reliability of the pumps and distributors and to the easily accessible external mounting of elements connected with flexible tubes, these devices are the leaders on the market in the field of hydraulic electro-pump units.

| Type code                          | Tank volume               | Flowrate weight   | A                           | B                           | C                         | D                          |
|------------------------------------|---------------------------|-------------------|-----------------------------|-----------------------------|---------------------------|----------------------------|
| <b>HF 1-2.5</b><br><b>2200190</b>  | 10 litres<br>2.65 US.gall | 2.5 l/mn<br>35 kg | 750<br>29 <sup>17</sup> /32 | 460<br>18 <sup>7</sup> /64  | 220<br>8 <sup>5</sup> /8  | 125<br>4 <sup>59</sup> /64 |
| <b>HF 1-3</b><br><b>2200148</b>    | 10 litres<br>2.65 US.gall | 3 l/mn<br>35 kg   | 750<br>29 <sup>17</sup> /32 | 460<br>18 <sup>7</sup> /64  | 220<br>8 <sup>5</sup> /8  | 125<br>4 <sup>59</sup> /64 |
| <b>HF 1-4</b><br><b>2200149</b>    | 10 litres<br>2.65 US.gall | 4 l/mn<br>35 kg   | 750<br>29 <sup>17</sup> /32 | 460<br>18 <sup>7</sup> /64  | 220<br>8 <sup>5</sup> /8  | 125<br>4 <sup>59</sup> /64 |
| <b>HF 1-6</b><br><b>2200150</b>    | 25 litres<br>6.62 US.gall | 6 l/mn<br>45 kg   | 750<br>29 <sup>17</sup> /32 | 560<br>22 <sup>3</sup> /64  | 270<br>10 <sup>5</sup> /8 | 225<br>8 <sup>7</sup> /8   |
| <b>HF 1.5-9</b><br><b>2200151</b>  | 25 litres<br>6.62 US.gall | 9 l/mn<br>57 kg   | 750<br>29 <sup>17</sup> /32 | 560<br>22 <sup>3</sup> /64  | 270<br>10 <sup>5</sup> /8 | 225<br>8 <sup>7</sup> /8   |
| <b>HF 1.5-11</b><br><b>2200195</b> | 25 litres<br>6.62 US.gall | 11 l/mn<br>57 kg  | 770<br>30 <sup>5</sup> /16  | 560<br>22 <sup>3</sup> /64  | 270<br>10 <sup>5</sup> /8 | 225<br>8 <sup>7</sup> /8   |
| <b>HF 1.5-15</b><br><b>2200955</b> | 50 litres<br>13.2 US.gall | 15 l/mn<br>61 kg  | 810<br>31 <sup>57</sup> /64 | 785<br>30 <sup>29</sup> /32 | 270<br>10 <sup>5</sup> /8 | 450<br>17 <sup>3</sup> /8  |
| <b>HF 1.5-18</b><br><b>2200562</b> | 50 litres<br>13.2 US.gall | 18 l/mn<br>62 kg  | 810<br>31 <sup>57</sup> /64 | 785<br>30 <sup>29</sup> /32 | 270<br>10 <sup>5</sup> /8 | 450<br>17 <sup>3</sup> /8  |

60 bars maximum pressure  
Nota : Standard 24 VDC. Other voltages upon request



# HYDRAULIC LINEAR DRIVES FOR SAILING BOATS EQUIPPED WITH MECHANICAL STEERING

## INTERNAL INSTALLATION

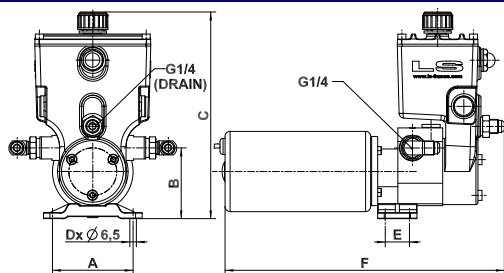


- Single rod hydraulic cylinder with integrated electrical by-pass.
- Compact overall dimensions.
- Directly fitted on the quadrant.
- **Possible floor, ceiling or bulkhead installation of the cylinder.**
- Separate reversible power pack for installation at your selected location.
- The kit is supplied assembled and bled with 1.20 metre flexible tube\*.
- Features the best thrust/electrical consumption ratio on the market.

### COMPLETE KITS

|                |                                    |
|----------------|------------------------------------|
| <b>2203063</b> | Linear drive 32ST16 NEWAVE 12V RI  |
| <b>2203064</b> | Linear drive 32ST16 NEWAVE 24V RI  |
| <b>2203066</b> | Linear drive 40ST16 NEWAVE 12V RI  |
| <b>2203067</b> | Linear drive 40ST16 NEWAVE 24V RI  |
| <b>2203068</b> | Linear drive 50ST20 NEWAVE 12V RI  |
| <b>2203069</b> | Linear drive 50ST20 NEWAVE 24V RI  |
| <b>2203070</b> | Linear drive 50ST203 NEWAVE 12V RI |
| <b>2203071</b> | Linear drive 50ST203 NEWAVE 24V RI |

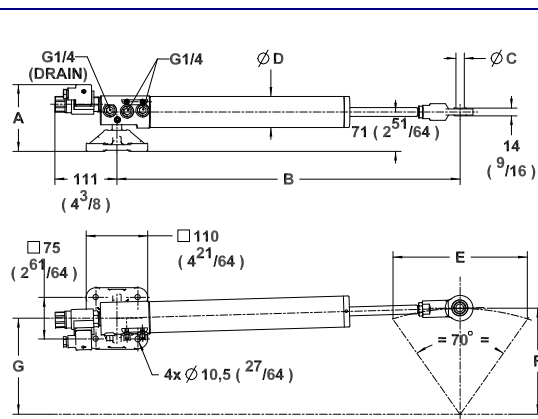
\* Other lengths on request.



**2203074** RV1 NEWAVE 12V  
**2203077** RV2 NEWAVE 12V  
**2203080** RV3 NEWAVE 12V

**2203075** RV1 NEWAVE 24V  
**2203078** RV2 NEWAVE 24V  
**2203081** RV3 NEWAVE 24V

|            | A                               | B                               | C                               | D | E                                | F                                |
|------------|---------------------------------|---------------------------------|---------------------------------|---|----------------------------------|----------------------------------|
| RV1 NEWAVE | 80                              | 70                              | 206                             |   | 24                               | 280                              |
| RV2 NEWAVE | 3 <sup>5</sup> / <sub>32</sub>  | 2 <sup>3</sup> / <sub>4</sub>   | 7 <sup>7</sup> / <sub>64</sub>  | 4 | 15 <sup>15</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>64</sub>  |
| RV3 NEWAVE | 100                             | 88                              | 223                             | 2 | 0                                | 320                              |
|            | 3 <sup>15</sup> / <sub>16</sub> | 3 <sup>15</sup> / <sub>32</sub> | 8 <sup>25</sup> / <sub>32</sub> |   |                                  | 12 <sup>23</sup> / <sub>32</sub> |



| TYPE           | VHM 32ST16 NEWAVE                       | VHM 40ST16 NEWAVE                      | VHM 50ST20 NEWAVE                       |
|----------------|---|--|---|
| Code 12V       | <b>2203084</b>                          | <b>2203086</b>                         | <b>2203088</b>                          |
| Code 24V       | <b>2203085</b>                          | <b>2203087</b>                         | <b>2203089</b>                          |
| Maximum thrust | 280 kg 617 lbs                          | 450 kg 992 lbs                         | 700 kg 1543 lbs                         |
| Weight         | 3,5 kg 7.71 lbs                         | 3,5 kg 7.71 lbs                        | 5 kg 11 lbs                             |
| A              | 120 mm 4 <sup>23</sup> / <sub>32</sub>  | 120 mm 4 <sup>23</sup> / <sub>32</sub> | 120 mm 4 <sup>23</sup> / <sub>32</sub>  |
| B              | 563 mm 22 <sup>11</sup> / <sub>64</sub> | 613 mm 24 <sup>1</sup> / <sub>8</sub>  | 715 mm 28 <sup>9</sup> / <sub>64</sub>  |
| C              | 15 mm 1 <sup>19</sup> / <sub>32</sub>   | 15 mm 1 <sup>19</sup> / <sub>32</sub>  | 17 mm 1 <sup>43</sup> / <sub>64</sub>   |
| D              | 46 mm 1 <sup>13</sup> / <sub>16</sub>   | 56 mm 2 <sup>55</sup> / <sub>64</sub>  | 70 mm 2 <sup>3</sup> / <sub>4</sub>     |
| E              | 210 mm 8 <sup>17</sup> / <sub>64</sub>  | 240 mm 9 <sup>7</sup> / <sub>16</sub>  | 300 mm 11 <sup>13</sup> / <sub>16</sub> |
| F              | 170 mm 6 <sup>11</sup> / <sub>16</sub>  | 190 mm 7 <sup>31</sup> / <sub>64</sub> | 240 mm 9 <sup>29</sup> / <sub>64</sub>  |
| G              | 160 mm 6 <sup>19</sup> / <sub>64</sub>  | 172 mm 6 <sup>61</sup> / <sub>64</sub> | 218 mm 8 <sup>37</sup> / <sub>64</sub>  |

# HYDRAULIC LINEAR DRIVES FOR SAILING BOATS EQUIPPED WITH MECHANICAL STEERING

## EXTERNAL INSTALLATION



- Systems fitted on sailing boats type "MINI".
- Double rod hydraulic cylinder.
- Compact dimensions.
- Reversible power pack with integrated electrical by-pass valve and oil reservoir.
- Separate reversible power pack for installation at your selected location.
- The kit is supplied assembled and bled with 1.50 metre flexible tube\*.
- Stainless steel fittings.

### COMPLETE KITS

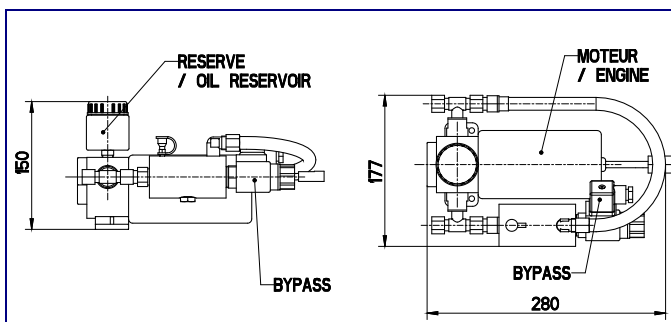
**2201909**

**Linear drive 28 DTP  
RV 07 12 V – BP – RI**

**2201910**

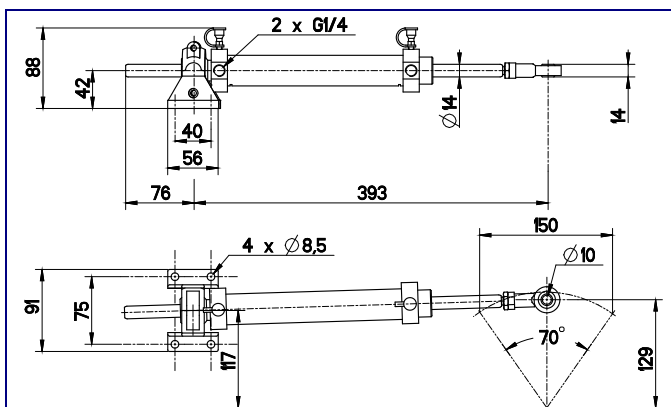
**Linear drive 28 DTP  
RV 07 24 V – BP – RI**

*\* Other lengths on request.*



### POWER PACK RV07

|                      |              |
|----------------------|--------------|
| Maximum flow rate    | 0.6 l/mn     |
| Adjustable flow rate | No           |
| Voltage              | 12 / 24 V DC |



|                                   |                           |
|-----------------------------------|---------------------------|
| Peak thrust                       | 120 kg                    |
| Tiller arm radius                 | 129 mm                    |
| Cylinder stroke                   | 150 mm                    |
| Time lock to lock (rod going out) | 9 s                       |
| Time lock to lock (rod going in)  | 9 s                       |
| Length of flexible tubes          | 1200 mm                   |
| Location of by-pass valve         | On the power pack         |
| Type of power pack                | RV07                      |
| Flow rate                         | 0.6 litre                 |
| Electrical consumption            | 7.5 A – 12 V / 4 A – 24 V |
| Weight                            | 3 kg                      |

# HYDRAULIC LINEAR DRIVES FOR SAILING BOATS EQUIPPED WITH MECHANICAL STEERING

## EXTERNAL INSTALLATION

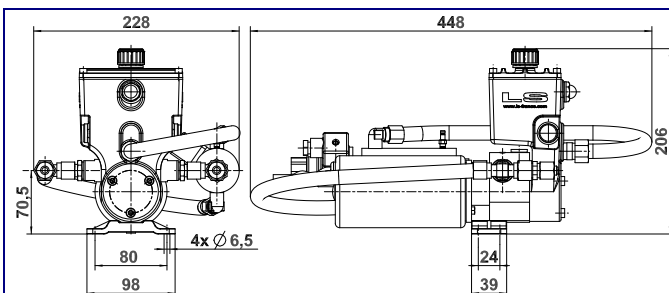


- Single rod hydraulic cylinder with stainless steel fittings.
- Compact overall dimensions for installation on most types of boats.
- Directly connectable to the quadrant or the tiller arm.
- Separate reversible power pack with integrated electrical by-pass, for installation at your selected location.
- The kit is supplied assembled and bled with 1.50 metre flexible tube\*.

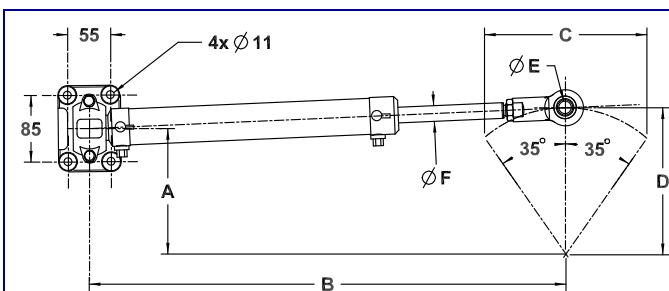
### COMPLETE KITS

|                |   |
|----------------|---|
| <b>2203065</b> | <b>Linear drive 32ST16BP NEWAVE 12 V</b>                                |
| <b>2203073</b> | <b>Linear drive 40T254BP NEWAVE 12 V<br/>Elbow fittings on cylinder</b> |

\* Other lengths on request.



|                |                                     |
|----------------|-------------------------------------|
| <b>2203076</b> | <b>Power pack RV1BP NEWAVE 12 V</b> |
| <b>2203079</b> | <b>Power pack RV2BP NEWAVE 12 V</b> |



|                |                                   |
|----------------|-----------------------------------|
| <b>2201261</b> | <b>Cylinder VHM 32 ST 16 C172</b> |
| <b>2201960</b> | <b>Cylinder VHM 40 T C254</b>     |

| CODE           | TYPE                     | A     | B   | C   | D   | E  | F  | Thrust |
|----------------|--------------------------|-------|-----|-----|-----|----|----|--------|
| <b>2201261</b> | <b>VHM 32 ST 16 C172</b> | 136.5 | 482 | 172 | 150 | 15 | 16 | 280 kg |
| <b>2201960</b> | <b>VHM 40 T C254</b>     | 200   | 609 | 254 | 220 | 17 | 20 | 450 kg |

# LINEAR DRIVES ACCESSORIES

## TILLER ARMS

### 2202106

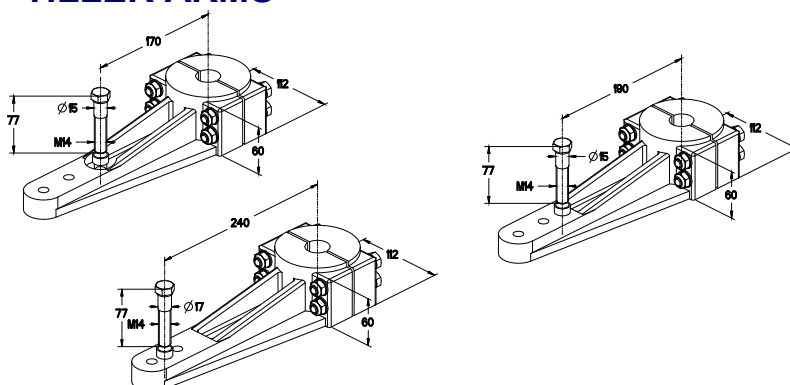
Rough equipped tiller arm 32 ST 16  
Ø 28 rough boring – Maxi Ø 50

### 2201291

Rough equipped tiller arm 40 ST 16  
Ø 28 rough boring – Maxi Ø 50

### 2201441

Rough equipped tiller arm 50 ST 20  
Ø 28 rough boring – Maxi Ø 50



## QUICK COUPLINGS

**2201557** S/steel quick coupling Ø 15

**2201558** S/steel quick coupling Ø 17



## ENERGY SAVING DEVICE "ECOPILOT"

The "Ecopilot" energy saving device was designed to meet the demand for electrical energy saving on sailing-boats. Power reserve on board is often very limited, however it is essential for the operation of an autopilot system.

The "Ecopilot" acts on the electro-valve which engages the autopilot. The power consumption of this electro-valve represents a major part of the total autopilot consumption.

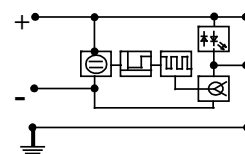
Its action consists of letting through - during a short moment - the necessary current for the electro-valve to switch on. Then the current is significantly reduced but still sufficient to maintain the electro-valve in position.

**Thanks to this system, the daily consumption of the electro-valve is reduced in average from 30Ah to 5Ah.**

**2202047** ECOPILOT 12 V

**2202048** ECOPILOT 24 V

Power supply..... 12 or 24VDC, 30VDC max  
Own Consumption..... 0.01A  
Output current at switching ( $I_e$ )..... 2.2A max  
Output current after switching..... around  $I_e / 6.5$   
Switching time ..... 0.2s  
Protection ..... IP65  
Power supply indicator ..... LED yellow  
Working temperature..... -20°C to +70°C



## MAINTENANCE KITS FOR LINEAR DRIVES

**2202457** Maintenance kit for linear drives standard and Newave **32ST16 / 40ST16 – 12 V**



**2202459** Maintenance kit for linear drives standard and Newave **32ST16 / 40ST16 – 24 V**

**2202458** Maintenance kit for linear drives standard and Newave **40T254 / 50ST20 – 12 V**

**2202460** Maintenance kit for linear drives standard and Newave **40T254 / 50ST20 – 24 V**



Simple, handy, compact (Weight = 950 g)

| Maintenance kit composition   |   | Code           |
|---|---|----------------|
|  | Electro-hydraulic clutch 12 V                 | <b>1202453</b> |
|   | Electro-hydraulic clutch 24 V                 | <b>1202454</b> |
|  | Swivel yoke Ø 15                              | <b>1200387</b> |
|   | Swivel yoke Ø 17                              | <b>1200436</b> |
|  | Brush holder + Brushes<br>All types RV1 – RV2 | <b>1200904</b> |



# HYDRAULIC FLEXIBLE TUBES

## FLEXIBLE TUBES FOR CRIMP CONNECTIONS

Only the sole use of LS flexible tubes in Ø6, 8 or 10 mm will guarantee the global performances of LS steering systems.

### A few references:

|                                   |                |
|-----------------------------------|----------------|
| - Ø6 Flexible tube - per metre    | <b>2200810</b> |
| - Ø8 Flexible tube - per metre    | <b>2200024</b> |
| - Ø10 Flexible tube - per metre   | <b>2200070</b> |
| - Ø6 Flexible tube - length 8 m   | <b>1204267</b> |
| - Ø6 Flexible tube - length 10 m  | <b>1204268</b> |
| - Ø6 Flexible tube - length 12 m  | <b>1204740</b> |
| - Ø6 Flexible tube - length 25 m  | <b>1204985</b> |
| - Ø6 Flexible tube - length 35 m  | <b>1205301</b> |
| - Ø6 Flexible tube - length 400 m | <b>1205359</b> |
| - Ø8 Flexible tube - length 10 m  | <b>1204825</b> |
| - Ø8 Flexible tube - length 12 m  | <b>1204742</b> |
| - Ø8 Flexible tube - length 20 m  | <b>1205245</b> |
| - Ø8 Flexible tube - length 35 m  | <b>1205300</b> |
| - Ø8 Flexible tube - length 400 m | <b>1205360</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  | <b>1290013</b> |
| - Flex. tube R1T8 lg 1000 – 2 x EFT10L | <b>1290023</b> |
| - Flex. tube R1T8 lg 1500 – 2 x EFT10L | <b>1290025</b> |
| - Flex. tube R1T8 lg 2000 – 2 x EFT10L | <b>1290027</b> |
| - Flex. tube R1T8 lg 3000 – 2 x EFT10L | <b>1290117</b> |

### A few references in 12 L :

|  |                |
|--|----------------|
| - Flex. tube R1T10 lg 500 – 2 x EFT12L   | <b>1290042</b> |
| - Flex. tube R1T10 lg 1000 – 2 x EFT12L  | <b>1290052</b> |
| - Flex. tube R1T10 lg 1500 – 2 x EFT12L  | <b>1290054</b> |
| - Flex. tube R1T10 lg 2000 – 2 x EFT12L  | <b>1290056</b> |
| - Flexi. tube R1T10 lg 3000 – 2 x EFT12L | <b>1290130</b> |

### A few references in 15 L :

|   |                |
|---|----------------|
| - Flex. tube R1T13 lg 500 – 2 x EFT15L  | <b>1290385</b> |
| - Flex. tube R1T13 lg 1000 – 2 x EFT15L | <b>1290376</b> |
| - Flex. tube R1T13 lg 2000 – 2 x EFT15L | <b>1290387</b> |
| - Flex. tube R1T13 lg 2500 – 2 x EFT15L | <b>1290378</b> |

### A few references in 18 L :

|   |                |
|---|----------------|
| - Flex. tube R1T16 lg 500 – 2 x EFT18L  | <b>1290077</b> |
| - Flex. tube R1T16 lg 1000 – 2 x EFT18L | <b>1290087</b> |
| - Flex. tube R1T16 lg 1500 – 2 x EFT18L | <b>1290089</b> |
| - Flex. tube R1T16 lg 2000 – 2 x EFT18L | <b>1290091</b> |
| - Flex. tube R1T16 lg 3000 – 2 x EFT18L | <b>1290112</b> |










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> | G 1/4 conic JIC M. 9/16     | 2200321        | 2200309          |
|   | G 3/8 conic JIC M. 9/16     | 2200426        |                  |
|  <b>Straight fittings</b>  | G 1/4 conic JIC M. 9/16     | 2200427        | 2200447          |
|   | G 1/4 cylindric JIC M. 9/16 | 2200199        | 2200448          |
|   | G 3/8 conic JIC M. 9/16     | 2200428        |                  |
|   | G 3/8 cylindric JIC M. 9/16 | 2200429        | 2202039          |
|   |                             |                |                  |
|  <b>Adapters</b>           | G 1/4 conic JIC F.T. 9/16   | 2200430        |                  |
|   | G 3/8 conic JIC F.T. 9/16   | 2200356        |                  |
|  <b>Connection fitt.</b>   | JIC M. 9/16                 | 2200288        |                  |
|  <b>Tee fittings</b>        | G 1/4 conic 2 x JIC M. 9/16 | 2200431        | 1203946          |
|   | G 3/8 conic 2 x JIC M. 9/16 | 2200432        |                  |
|  <b>Equal tee fittings</b>  | JIC M. 9/16                 | 2200433        | 2202009          |
|  <b>Straight fittings</b>  | JIC M. 9/16 inner diam. 8   | 2200299        | 2200449          |
|  <b>Elbow fittings</b>      | JIC M. 9/16 inner diam. 8   | 2200302        |                  |
|   | JIC M. 9/16 inner diam. 10  | 2200303        |                  |
|  <b>Connection fitt.</b>    | Inner diam. 8               | 2200373        |                  |
|   | Inner diam. 10              | 2200434        |                  |


## FOR INFLEXIBLE TUBE

|   |                          |         |  |
|---|--------------------------|---------|--|
|  <b>Straight fittings</b>  | G 1/4 cylindric diam. 8  | 2200435 |  |
|   | G 1/4 cylindric diam. 10 | 2200436 |  |
|   | G 3/8 cylindric diam. 10 | 2200437 |  |
|   | G 3/8 cylindric diam. 12 | 2200438 |  |
|   | G 3/8 cylindric diam. 17 | 2201016 |  |
|   | G 1/2 cylindric diam. 18 | 2200439 |  |
|   | G 1/2 cylindric diam. 21 | 2200388 |  |
|   |                          |         |  |
|  <b>Elbow fittings</b>     | G 1/4 conic diam. 10     | 2200440 |  |
|   | G 3/8 conic diam. 12     | 2200306 |  |
|   | G 3/8 conic diam. 17     | 2201541 |  |
|   | G 1/2 conic diam. 18     | 2200441 |  |
|   | G 1/2 conic diam. 21     | 1202330 |  |
|   |                          |         |  |
|  <b>Tee fittings</b>       | G1/4 conic diam. 10      | 2200442 |  |
|   | G 3/8 conic diam. 12     | 2200443 |  |
|   | G 3/8 conic diam. 17     | 2201542 |  |
|   | G 1/2 conic diam. 18     | 2200339 |  |
|   | G 1/2 conic diam. 21     | 2201543 |  |
|   |                          |         |  |
|  <b>Connection fitt.</b>   | Diam. 10                 | 2200469 |  |
|   | Diam. 12                 | 2200585 |  |
|   | Diam. 17                 | 2201302 |  |
|   | Diam. 18                 | 2200270 |  |
|   | Diam. 21                 | 2201303 |  |
|   |                          |         |  |
|  <b>Equal tee fittings</b> | Diam. 8                  | 2200444 |  |
|   | Diam. 10                 | 2200259 |  |
|   | Diam. 12                 | 2200445 |  |
|   | Diam. 17                 | 2201544 |  |
|   | Diam. 18                 | 2200446 |  |
|   | Diam. 21                 | 2201545 |  |
|   |                          |         |  |
|  <b>Reductions</b>         | G 1/8 M – G ¼ F          | 1202438 |  |
|   | G 1/4 M – G 3/8 F        | 2200390 |  |
|   | G 1/4 M – G 1/2 F        | 2200389 |  |
|   | G 3/8 M – G 1/4 F        | 2200374 |  |
|   | G 3/8 M – G 1/2 F        | 2200396 |  |
|   | G 1/2 M – G ¼ F          | 2200221 |  |
|   | G 1/2 M – G 3/8 F        | 2200332 |  |
|   |                          |         |  |

# CONNECTION KITS FOR RAYMARINE AUTOPILOTS WITH LS OUTBOARD STEERING SYSTEMS


|  |         |  |         |
|---|---------|--|---------|
| Designation   | Code    | Designation  | Code    |
| RAYMARINE Connection kit S1000 - Ø6   | 2202481 | RAYMARINE Connection kit S1000 - Ø8 REC  | 2202483 |
| RAYMARINE Connection kit S1000 - Ø8   | 2202482 | GARMIN Connection kit - Ø8 REC   | 2203007 |
| GARMIN Connection kit - Ø6  | 2203005 |  |         |
| GARMIN Connection kit - Ø8  | 2203006 |  |         |

| LS Outboard Steering | Ø 6 Flex. Tube for crimping (collar) |                       | Ø 8 Flex. Tube for crimping (collar) |                       | Ø 8 Flex. Tube reusable fittings |                       |
|----------------------|--------------------------------------|-----------------------|--------------------------------------|-----------------------|----------------------------------|-----------------------|
|                      | RAYMARINE Connection kit             | GARMIN Connection kit | RAYMARINE Connection kit             | GARMIN Connection kit | RAYMARINE Connection kit         | GARMIN Connection kit |
| LS 2024              | 2202481*                             | 2203005*              |                                      |                       |                                  |                       |
| LS 226               | 2202481*                             | 2203005*              |                                      |                       |                                  |                       |
| LS 2428              | 2202481*                             | 2203005*              |                                      |                       |                                  |                       |
| LS 75 PRO / 80 PRO   | 2202481*                             | 2203005*              |                                      |                       |                                  |                       |
| LS 125 PRO / 150 PRO | 2202481*                             | 2203005*              |                                      |                       |                                  |                       |
| LS 228               |                                      |                       |                                      |                       | 2202483                          | 2203007               |
| LS 2832 / 200 PRO    |                                      |                       | 2202482*                             | 2203006*              | 2202483                          | 2203007               |
| LS 175 PRO / 225 PRO |                                      |                       | 2202482*                             | 2203006*              | 2202483                          | 2203007               |
| LS 232               |                                      |                       |                                      |                       | 2202483                          | 2203007               |
| LS 350 PRO           |                                      |                       |                                      |                       | 2202483                          | 2203007               |



Each kit is supplied with 8 m flexible tube

\* For double steering station, add to the standard kit:

|  | Designation                    | Code    |
|---|--------------------------------|---------|
|   | Tee fitting for flex. tube Ø 6 | 2202498 |
|   | Tee fitting for flex. tube Ø 8 | 2202499 |

## 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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**www.ls-france.com**



**Lecomble & Schmitt**  
BP n° 2 - 64240 URT - France



**Sales Department**

+33 (0)559 562 411 - [commercial@ls-france.com](mailto:commercial@ls-france.com)

**Technical Department**

+33 (0)559 562 646 - [commercial2@ls-france.com](mailto:commercial2@ls-france.com)

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**Brief history...**

At the time of its setting up in the Paris region in 1944, Lecomble & Schmitt was designing and manufacturing volumetric pumps with flow-rate regulation. It was not until 1963 that boosted by 40 years of experience in hydraulics the adventure in the nautical industry started. In the meantime, the company had moved to the Basque Country in the milder south west of France.

Nowadays, Lecomble & Schmitt is the only French manufacturer to offer hydraulic and mechanical steering systems for pleasure boats, fishing and work crafts.

Since 1998 LS has been a subsidiary of the industrial group Artzavak which is also established in the Basque Country. The activities of the group and its know-how are as varied as complementary and include design, precision machining, sheet-metal working, plastics technology (injection and thermoforming) and composite moulding.



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