“On Everything That’s On Sea”

Corporation
Anchor Windlass & Capstan
Steering Gear
Towing Hook
Towing Pin
Winch
CONTENTS

HYDRAULIC STEERING CYLINDERS
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NON RETURN VALVES & DISTRIBUTION BLOCKS
TILLERS
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DOUBLE CYLINDERED STEERING SYSTEMS
RESERVE OIL TANKS & HEADER TANK
STEERING GEAR CONTROL SYSTEMS
RUDDER ANGLE INDICATORS
FEEDBACK UNITS
STEERING GEAR INQUIRY FORM
NOTES
DATA designs and manufactures several lines of marine hydraulic steering systems in complete ranges starting from 50 daN.m up to 55000 daN.m, as well as steering controls, hydraulic power units, motor starters and rudder angle indicators ensuring overall system responsibility for all types of commercial vessels, navy ships, pleasure boats and mega yachts.

on everything that’s on sea...
With many years’ experience of manufacturing steering gears, we are well aware of the problems concerning operation in marine atmospheric conditions. DATA steering systems are designed and manufactured to meet the highest standards and serve in long term with minimum maintenance.

Beside the standard range, DATA is flexible to modify designs according to customer needs or produce an unique solution.

Steering systems are compatible with the rules of all well known class societies and can be certified and delivered with class certificate upon customer request.
DATA hydraulic steering cylinders are available in 6 sizes suitable to fit on various sizes of vessels. Cylinders are balanced type and specially designed for marine steering use. CE certificates are available meeting ISO EN10592:2000 standards (excluding DS660).

**HYDRAULIC STEERING CYLINDER TECHNICAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th></th>
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</tr>
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<tbody>
<tr>
<td>Nominal Torque daN.m</td>
<td>50</td>
<td>70</td>
<td>150</td>
<td>290</td>
<td>460</td>
<td>660</td>
</tr>
<tr>
<td>Recommended boat length m</td>
<td>6 - 8</td>
<td>7 - 11</td>
<td>9 - 16</td>
<td>13 - 21</td>
<td>19 - 27</td>
<td>25 - 34</td>
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<tr>
<td>Recommended pump type</td>
<td>DP 30 / 42</td>
<td>DP 30 / 42</td>
<td>DP 63 / 75</td>
<td>DP 75 / 88</td>
<td>DP 88 / 120</td>
<td>DP 120</td>
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<td>5.4 / 3.8</td>
<td>5.2 / 4.4</td>
<td>9.1 / 7.8</td>
<td>13.2 / 9.6</td>
<td>15</td>
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<tr>
<td>Cylinder stroke mm</td>
<td>160</td>
<td>172</td>
<td>218</td>
<td>275</td>
<td>275</td>
<td>344</td>
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<tr>
<td>Pressure for nominal torque bar</td>
<td>58</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>55</td>
<td>52</td>
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<tr>
<td>Tiller length</td>
<td>140</td>
<td>150</td>
<td>190</td>
<td>240</td>
<td>240</td>
<td>300</td>
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<tr>
<td>Cylinder oil volume cm³</td>
<td>121</td>
<td>162</td>
<td>329</td>
<td>688</td>
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<td>Total rudder angle 2x37°</td>
<td>2x37°</td>
<td>2x37°</td>
<td>2x37°</td>
<td>2x37°</td>
<td>2x37°</td>
<td>2x37°</td>
</tr>
<tr>
<td>Cylinder connection ports BSP</td>
<td>1/4&quot;</td>
<td>1/4&quot;</td>
<td>3/8&quot;</td>
<td>1/2&quot;</td>
<td>1/2&quot;</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>Min. tube dimensions (inside) mm</td>
<td>ø10</td>
<td>ø10</td>
<td>ø15</td>
<td>ø15</td>
<td>ø15</td>
<td>ø19</td>
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<tr>
<td>Weight kg</td>
<td>3.8</td>
<td>6.2</td>
<td>12.5</td>
<td>21.5</td>
<td>33</td>
<td>53</td>
</tr>
</tbody>
</table>

Note: Above table is intended to give a quick idea for selection. Suitable steering gear may change due to the displacement, type, speed, rudder blade shape and dimensions of the vessel. Always consult to DATA or an authorized DATA dealer when selecting the steering gear. Refer to relevant classification society rules.
Reduction of the number of steering wheel revolutions:
It is the hydraulic cylinder which determines the torque of a hydraulic steering system. When a reduced number of steering wheel revolutions from hardover to hardover is required, a steering pump with larger capacity should be selected. On the other hand, pump with larger capacity will cause relatively greater load on the steering wheel. An optimum selection should be made by checking “technical specifications table”. It should be remembered that when a larger diameter steering wheel is selected, the force to be applied to the steering wheel becomes relatively lower.

If steering wheel revolutions can not be reduced to the desired numbers with manual helm pumps, DATA offers various types of hydraulic power units for a comfortable operation. Please check next pages for HPUs and other steering system parts suitable for your steering system.

The choice of correct cylinder is determined by rudder torque (in daN.m) which is effected by rudder blade shape, dimensions and the vessel speed. Please feel free to consult to DATA after filling the inquiry form at the end of this catalogue.

<table>
<thead>
<tr>
<th>Cylinder type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>O</th>
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</thead>
<tbody>
<tr>
<td>DS 50</td>
<td>140</td>
<td>40</td>
<td>160</td>
<td>12</td>
<td>390</td>
<td>136</td>
<td>115</td>
<td>8.5</td>
<td>64</td>
<td>84</td>
<td>104</td>
<td>max.35</td>
<td>42</td>
<td>56</td>
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<tr>
<td>DS 70S</td>
<td>150</td>
<td>45</td>
<td>172</td>
<td>16</td>
<td>485</td>
<td>213</td>
<td>123</td>
<td>10</td>
<td>71</td>
<td>92</td>
<td>116</td>
<td>max.35</td>
<td>50</td>
<td>52</td>
</tr>
<tr>
<td>DS 150S</td>
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<td>218</td>
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<td>630</td>
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<td>60</td>
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<tr>
<td>DS 290S</td>
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<td>75</td>
<td>275</td>
<td>25</td>
<td>743.5</td>
<td>328</td>
<td>200</td>
<td>16</td>
<td>130</td>
<td>155</td>
<td>190</td>
<td>max.60</td>
<td>94</td>
<td>85</td>
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<tr>
<td>DS 460S</td>
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<td>275</td>
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<td>788.5</td>
<td>338</td>
<td>201</td>
<td>16</td>
<td>160</td>
<td>195</td>
<td>230</td>
<td>max.80</td>
<td>125</td>
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<td>DS 660S</td>
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<td>344</td>
<td>35</td>
<td>944.5</td>
<td>415</td>
<td>245.5</td>
<td>20</td>
<td>190</td>
<td>230</td>
<td>270</td>
<td>max.90</td>
<td>145</td>
<td>120</td>
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</tbody>
</table>

FEATURES

Designed for heavy duty use.
Stainless steel and hard chrome plated piston rod is precision ground.
Maintenance free spherical rod ends.
Self aligning spherical and maintenance free cylinder support.
Micro-honed, heavy duty and seamless cylinder tube.
Air bleeding nipples.
High pressure seals.
Equipped with wiper seals at both ends.
Ports on both sides of cylinder for convenience of hydraulic installation.
Painted with epoxy enamel white (RAL 9016).

OPTIONS

Hydraulic cylinders are manufactured with 2 options.
Cylinders can be either with steel/brass parts (designated with S) or stainless steel/brass parts (designated with SL).
Certification from classification societies.
In manually operated steering systems hydraulic power is created through rotation of the steering wheel which is connected to the shaft of a helm pump. Help pumps can be either used on small boats with a cylinder only or can be used as an auxiliary or emergency unit to a power operated system on larger vessels.

DATA hydraulic helm pumps are available in 8 displacements suitable to fit with various sizes of hydraulic cylinders. Helm pumps are axial piston type and specially designed for marine steering use. CE certificates are available meeting ISO EN10592:2000 standards (excluding DP120, DP160 and DP240).

<table>
<thead>
<tr>
<th>Helm pump type</th>
<th>DP 30 / DP 30K</th>
<th>DP 42 / DP 42K</th>
<th>DP 63 / DP 63K</th>
<th>DP 75 / DP 75K</th>
<th>DP 88 / DP 88K</th>
<th>DP 120 / DP 120K</th>
<th>DP 160 / DP 160K</th>
<th>DP 240 / DP 240K</th>
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<tr>
<td>Pump displacement cm³/r</td>
<td>30</td>
<td>42</td>
<td>63</td>
<td>75</td>
<td>88</td>
<td>120</td>
<td>160</td>
<td>240</td>
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<tr>
<td>Revs from St.Bd. To Port</td>
<td>4 / 5.4</td>
<td>2.9 / 3.8</td>
<td>5.2</td>
<td>4.4 / 9.1</td>
<td>7.8 / 13.2</td>
<td>9.6 / 14.6</td>
<td>11</td>
<td></td>
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<tr>
<td>Design pressure bar</td>
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<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
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</tr>
<tr>
<td>Hyd. connection ports BSP</td>
<td>1/4&quot;</td>
<td>1/4&quot;</td>
<td>3/8&quot; / 1/2&quot;</td>
<td>3/8&quot; / 1/2&quot;</td>
<td>3/8&quot; / 1/2&quot;</td>
<td>1/2&quot;</td>
<td>1/2&quot;</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>Min. tube dimensions (inside) mm</td>
<td>ø10</td>
<td>ø10</td>
<td>ø15</td>
<td>ø15</td>
<td>ø15</td>
<td>ø19</td>
<td>ø19</td>
<td>ø19</td>
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<tr>
<td>Weight kg</td>
<td>6.5</td>
<td>6.5</td>
<td>12.2</td>
<td>10.5</td>
<td>10.5</td>
<td>17</td>
<td>35</td>
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HYDRAULIC HELM PUMP DIMENSIONS (mm)

<table>
<thead>
<tr>
<th>Pump type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>O</th>
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<tbody>
<tr>
<td>DP 30/30K/42/42K</td>
<td>145</td>
<td>146</td>
<td>7</td>
<td>197</td>
<td>69</td>
<td>75</td>
<td>53</td>
<td>13</td>
<td>31</td>
<td>9</td>
<td>130</td>
<td>19,6/2,38</td>
<td>2/5</td>
<td>160</td>
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<tr>
<td>DP 63/63K/75/75/88/88K</td>
<td>200</td>
<td>182</td>
<td>9</td>
<td>340</td>
<td>160</td>
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<td>30</td>
<td>152</td>
<td>25,3</td>
<td>28,2/6,6</td>
<td>-</td>
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<tr>
<td>DP 120/120K</td>
<td>210</td>
<td>190</td>
<td>9</td>
<td>368</td>
<td>237</td>
<td>40</td>
<td>91</td>
<td>5</td>
<td>56</td>
<td>30</td>
<td>195</td>
<td>25,3</td>
<td>28,2/6,6</td>
<td>215</td>
</tr>
<tr>
<td>DP 160/240</td>
<td>260</td>
<td>240</td>
<td>9</td>
<td>398,5</td>
<td>216</td>
<td>55</td>
<td>127,5</td>
<td>32,5</td>
<td>70</td>
<td>25</td>
<td>287</td>
<td>30</td>
<td>33/8</td>
<td>320</td>
</tr>
</tbody>
</table>

**FEATURES**

- Designed for heavy duty use.
- Integrated valve system and oil reservoir for self air bleeding and balancing.
- Suitable to use with balanced and unbalanced cylinders (except DP30/42).
- Stainless steel shaft (DP30/42 bronze shaft).
- Marine grade cast aluminium body (die cast for DP30/42/63/75/88).
- DP30/42/63/75/88 are painted with semi gloss epoxy enamel black (RAL 9005).
- DP120/160/240 are painted with high gloss epoxy enamel white (RAL 9016).

**OPTIONS**

- Integrated non return valve (designated with K, not available for DP160 and DP240).
Non return valve is a check valve system which keeps the hydraulic cylinder fixed against external forces. It is normally closed from cylinder side. When oil is sent from one port of helm pump, cylinder return port is opened automatically. It is specially designed for manual steering systems to allow high oil flow with minimum pressure loss. It is an essential part of hydraulic steering systems and it can be either integrated on helm pumps or can be used in line. If the helm pump(s) are with integrated non return valves, it is not required to use additional non return valve. There are various models to meet different requirements. All non-return valves have BSP ½” ports.

**DKV-4B** is for one helm pump. There is integrated by-pass valve to allow use of manual tiller. Material is marine grade aluminium.

**DKV-6** is for the installation of two helm pumps. While one pump is used the other is kept fixed. Material is marine grade aluminium.

**DKV-4G** allows higher oil flow and recommended to use with DP160 and DP 240. Material is steel.

**DKV-4E** 24VDC electric activated valves are integrated on DKV-4. It is used in systems with a HPU. Electric activated valves are normally open. They are closed automatically when HPU valves are activated to prevent conflict between power operated system and manual helm pump which may cause oil loss in helm pump reservoir. DKV-5E is the version without DKV-4 and it is equipped with only electric activated valves. Material is marine grade aluminium.
Distribution blocks are equipped with cross relief valves to prevent steering system from external forces which may create high pressures in the system. They are also equipped with a by-pass valve to allow the use of manual tiller. By-pass function is also useful for air bleed during the start up of the system. Distribution blocks are made of marine grade aluminium and there are models with different number of ports.

Options

**Tillers**

Tillers are available in different sizes suitable to combine with DS series hydraulic steering cylinders. Tillers are produced of high strength cast steel material and painted with epoxy enamel white (RAL 9016).

**OPTIONS**

- Double armed tiller for parallel tie bar connection.
- Custom tillers according to customer requirements.
Hydraulic power units are specially designed to support steering systems. According to classification societies’ rules, steering gear HPUs must be independent and should not be common with other systems on board. Steering system HPUs are equipped with all necessary sensors required by rules. Hydraulic systems are designed using the same demanding priorities as all other DATA parts, focusing on:

- Reliability
- Safety
- Performance
- Easy & safe installation
- Easy maintenance
- Long operating life

Steering system HPU with 4 variable displacement pump units mounted on a skid. System is delivered prewired and almost ready to start running.
Perhaps, the most important feature of any complete hydraulic system is for it to be delivered as ready as possible for installation. DATA hydraulic systems require only the external hydraulic and electric connections (which can only be done on board), saving time and trouble for the installers. Our hydraulic systems are delivered with all necessary drawings and installation manuals to ensure an easy and correct installation and lifetime of reliability.

**FEATURES**

- First quality hydraulic equipments from well known brands.
- Large oil tanks for easy heat transfer and self cooling.
- Suction filter and tank return filter with service gauge.
- Oil level switch for low oil alarm.
- Oil level and temperature gauge.
- Oil fill caps with filter and breathing.
- Pressure switches for hydraulic lock alarm.

**OPTIONS**

- DC or AC electric motor driven pumps.
- Main engine PTO driven pumps.
- Main engine belt driven pumps.
- Electric motor and PTO driven pump combined systems.
- Double pump unit.
- Auto-fill system to keep manual helm pump reservoirs full.
- HPU with fixed displacement or variable displacement pump.
- Cooling with sea water exchanger or air fan exchangers.
- Proportional valve control.
- Pressure filter.
- Anti-vibration mounts.
- Special HPUs for different customer demands.
DATA produces double cylindered hydraulic steering systems for pleasure yachts, mega yachts, commercial ships, offshore vessels and navy ships. Double cylindered systems start from 1100 daN.m up to 55000 daN.m (550 kN.m). They are manufactured to provide long term consistency, low maintenance and designed compatible with all well known classification societies’ rules.
## DOUBLE CYLINDERED STEERING SYSTEMS SPECIFICATIONS

<table>
<thead>
<tr>
<th>Single tiller</th>
<th>Double tiller</th>
<th>Nominal torque @ 35° daN.m</th>
<th>Maximum torque @35° daN.m</th>
<th>Nominal working pressure bar</th>
<th>Rudder angle</th>
<th>HPU Tank capacity lt.</th>
<th>El. motor power (50 hz-S1) kW</th>
<th>Total cylinder Displacement cm³</th>
<th>Hydraulic cylinders (rod-piston-strok) mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDM 1100</td>
<td>DDM 2x550</td>
<td>1100</td>
<td>1375</td>
<td>103</td>
<td>2x35°</td>
<td>27 / 2x27</td>
<td>1.5 / 2x1.5</td>
<td>1495</td>
<td>ø32-ø63 275</td>
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<tr>
<td>DDM 1600</td>
<td>DDM 2x800</td>
<td>1600</td>
<td>2000</td>
<td>90</td>
<td>2x35°</td>
<td>40 / 2x40</td>
<td>2.2 / 2x2.2</td>
<td>2503</td>
<td>ø35-ø80 275</td>
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<tr>
<td>DDM 2000</td>
<td>DDM 2x1000</td>
<td>2000</td>
<td>2500</td>
<td>99</td>
<td>2x35°</td>
<td>40 / 2x40</td>
<td>2 / 2x2.2</td>
<td>2825</td>
<td>ø40-ø80 321</td>
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<tr>
<td>DDM 3000</td>
<td>DDM 2x1500</td>
<td>3000</td>
<td>3750</td>
<td>95</td>
<td>2x35°</td>
<td>63 / 2x70</td>
<td>3 / 2x3</td>
<td>4415</td>
<td>ø50-ø100 321</td>
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<td>DDM 4000</td>
<td>DDM 2x2000</td>
<td>4000</td>
<td>5000</td>
<td>95</td>
<td>2x35°</td>
<td>90 / 2x90</td>
<td>4 / 2x4</td>
<td>5999</td>
<td>ø55-ø115 321</td>
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<td>DDM 6000</td>
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<td>6000</td>
<td>7500</td>
<td>99</td>
<td>2x35°</td>
<td>2x110</td>
<td>2x5.5</td>
<td>6522</td>
<td>ø65-ø125 402</td>
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<tr>
<td>DDM 8000</td>
<td>DDM 2x4000</td>
<td>8000</td>
<td>10000</td>
<td>110</td>
<td>2x35°</td>
<td>2x120</td>
<td>2x5.5</td>
<td>10230</td>
<td>ø65-ø125 482</td>
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<td>DDM 10000</td>
<td>DDM 2x5000</td>
<td>10000</td>
<td>12500</td>
<td>120</td>
<td>2x35°</td>
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<td>2x7.5</td>
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<td>ø65-ø125 551</td>
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<td>DDM 12000</td>
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<td>15000</td>
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<td>2x35°</td>
<td>2x165</td>
<td>2x11</td>
<td>13810</td>
<td>ø75-ø140 516</td>
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<td>20000</td>
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<td>2x200</td>
<td>2x11</td>
<td>18320</td>
<td>ø80-ø140 711</td>
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<td>DDM 21000</td>
<td>DDM 2x1000</td>
<td>21000</td>
<td>26250</td>
<td>122</td>
<td>2x35°</td>
<td>2x230</td>
<td>2x15</td>
<td>24080</td>
<td>ø90-ø160 711</td>
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<td>DDM 27000</td>
<td>DDM 2x13500</td>
<td>27000</td>
<td>33750</td>
<td>124</td>
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<td>2x300</td>
<td>2x18.5</td>
<td>30610</td>
<td>ø100-ø180 711</td>
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<td>DDM 33000</td>
<td>DDM 2x16500</td>
<td>33000</td>
<td>41250</td>
<td>133</td>
<td>2x35°</td>
<td>2x330</td>
<td>2x22</td>
<td>34660</td>
<td>ø110-ø180 837</td>
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<tr>
<td>DDM 44000</td>
<td>DDM 2x20000</td>
<td>44000</td>
<td>55000</td>
<td>130</td>
<td>2x35°</td>
<td>2x300</td>
<td>2x30</td>
<td>47280</td>
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<td>2x37</td>
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<td>ø125-ø220 987</td>
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</tbody>
</table>

DDS 8000x2 Electronic synchronised steering gears under test at factory

DDS 2x4000 custom design steering gear on a ferryboat

DDS 2x1000-45 Rudder Bearing
Features

- Reliability.
- Easy maintenance.
- Easy installation.
- Designed at medium pressures for heavy duty use.
- 100% torque with 2 cylinder and 1 pump unit. 50% torque with 1 cylinder 1 pump unit.
- Bronze rudder axial bearing.
- Composite rudder radial bearing.
- Self aligning spherical bearings at both ends of cylinder.
- Hard chrome plated piston rod is precision ground.
- Oversize piston and piston rod bearings.
- Micro-honed, heavy duty and seamless cylinder tube.
- Heavy duty & high pressure seals.
- Piston rod wiper seals.
- Tiller - tiller pin connection with clamping sets for easy assembly and disassembly.
- HPU installed on steering gear for models DDM 6000 and above.
- First quality hydraulic equipments from well known brands.
- Large oil tanks for easy heat transfer and self cooling.
- Sensors for all necessary alarms required by class rules.

Options

- 45° or 65° (for some models only) rudder angle.
- Split type bolted tiller.
- Different tiller and tiller bore options.
- Rudder stock-tiller connection with key or keyless hydraulic fit or with clamping set.
- Separate cylinder configuration with tie bar.
- Custom designs according to customer demands.
- HPU with fixed displacement or variable displacement pump.
- Proportional valve.
- Cooling with sea water or air type heat exchanger.
- Starter with soft starter or frequency converter.
- Special HPUs for different customer demands.
- Automatic bearing grease lubrication pump.
- Automatic isolation system for tankers 10000 Gross tonnage and above.
Reliability.
Easy maintenance.
Easy installation.
Designed at medium pressures for heavy duty use.
100% torque with 2 cylinder and 1 pump unit. 50% torque with 1 cylinder 1 pump unit.
Bronze rudder axial bearing.
Composite rudder radial bearing.
Self aligning spherical bearings at both ends of cylinder.
Hard chrome plated piston rod is precision ground.
Oversize piston and piston rod bearings.
Micro-honed, heavy duty and seamless cylinder tube.
Heavy duty & high pressure seals.
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Proportional valve.
Cooling with sea water or air type heat exchanger.
Starter with soft starter or frequency converter.
Special HPUs for different customer demands.
Automatic bearing grease lubrication pump.
Automatic isolation system for tankers 10000 Gross tonnage and above.

DRT130 Reserve oil tank

In addition to the power unit reservoir, a fixed hydraulic oil storage tank independent of the reservoir is to be provided according to class rules. The storage tank is to have sufficient capacity to recharge at least one power actuating system, including the power unit reservoir. The tank is to be permanently connected by piping in such a manner that the system can be readily recharged from a position within the steering gear compartment. DATA offers various sizes of reserve oil tanks suitable to be used with its steering systems. Reserve oil tank must be installed higher than the HPU tanks to allow oil transfer with gravity. Otherwise, a pump should be installed on the line.

DGT-2

The purpose of the header tank is to allow for the steering gear oil to expand and contract due to the temperature variations. Also it is useful to keep the helm pumps reservoirs full against leakages to tank if an auto-fill system is not available. Header tank can be used with manual filled system as well as on an auto-filled system. If used with an auto-fill system, breather should be sealed and it should be vented to the HPU tank. Header tank must be installed above the highest helm pump onboard. Header tank is made of stainless steel and have a capacity of 2 lt. Sight glasses are available in standard.
STEERING GEAR CONTROL SYSTEMS

Data offers full package of steering gear control system starting from the feedback unit up to bridge controls meeting all classification societies’ rules. Systems are designed modular and can be configured according to different customer and classification demands. With the help of modular and flexible design, systems are also easily adapted to integrated bridge systems.

Steering gear control systems are compatible with all auto-pilots, VDRs and DP Systems. Marine approved electric and electronic parts are selected meticulously to be used in the systems for highest reliability.

Bridge control cabinet is the center of the system where all steering components and other parties involved in steering control such as auto-pilot and DP are connected. Follow-up control, synchronisation of two rudders and station selection are managed in bridge control cabinet. There are several versions depending on the configuration of the steering system.

**FEATURES**

- Power Supply: Vessels main supply and supply from starter cabinet.
- Dimensions: Varies according to system configuration.
- Degree of protection: IP65.
- Color: RAL 9001 white.
- Operating Temperature: -20°C ... +70°C.

Steering gear alarm management complying class rules.

Network with can-bus to SCP-CAN and SAP-CAN control/Alarm panel.

Local-remote control selection.

Digital output to alarm monitoring system and VDR.

DOL starter up to 5.5 kW, delta-star starter from 7.5 kW and up.

**OPTIONS**

- Different color or material.
- Motor start with frequency converter or soft starter.
- Ammeter.
- Hourmeter.
- SAP-CAN installation on the cover.
- NMEA2000, MODBUS RTU serial communication to vessel’s AMS and VDR.

There are various types of steering gear starter cabinets suitable for AC and DC motors.
STEERING GEAR PUMP CONTROL & ALARM PANELS

Steering gear pump control & alarm panels are used to start/stop pump motors and alarm monitoring. SAP-CAN is the version for engine control room. SAP-CAN does not have pump start/stop function. Multiple panels can be installed thanks to the can-bus system.

FEATURES

- Power Supply: 24 V DC.
- Dimension: H136 x W96 x D70 mm.
- Degree of protection: IP65 (front).
- Operating Temperature: -20° C ... +70° C.
- Network: Can-Bus (Control Area Network, with 2x2x0.50 twisted Pair, Double Cable for Redundancy).
- Connection: Phoenix Contact TFMC 1,5/ 5-STF-3,5 Female connector.
- Motor start/stop running (SAP-CAN does not have start/stop function).
- Monitoring of 9 visual & acoustical alarm.
- Indicator backlight dim. control.
- Buzzer silence.
- Lamp test.
- Network fail alarm indication.
- Material: black anodized aluminium.
- Touch pad control with real tact switch.
- Multiple panels can be installed thanks to the can-bus system.
- Marine type approved.

OPTIONS

Different labeling for 24VDC, 220VAC 1ph., 380VAC 3phs.
Digital input/outputs instead of can-bus.

SAP-V3

FEATURES

- Power Supply: 24 V DC.
- Dimension: H96 x W72 x D70 mm.
- Degree of protection: IP65 (front).
- Operating Temperature: -20° C + 70° C.
- Connection: Wago 713-1106/037-000 Female connector.
- Monitoring of 5 Visual & acoustical alarm.
- Material: black anodized aluminium.
- Touch pad control with real tact switch.
- Buzzer silence.
- Lamp test.

SCP-V3

SAP-S Steering gear pump alarm panel

SAP-S Steering gear pump control & alarm panels are used to start/stop pump motors and alarm monitoring. SAP-CAN is the version for engine control room. SAP-CAN does not have pump start/stop function. Multiple panels can be installed thanks to the can-bus system.

FEATURES

- Power Supply: 24 V DC.
- Dimension: H500 x W400 x D210 mm (DC and AC DOL).
- Degree of protection: IP65.
- Color: RAL9001 white.
- Operating Temperature: -20°C...+70°C.
- Steering gear alarm management complying class rules.
- Network with can-bus to SCP-CAN and SAP-CAN control/Alarm panel.
- Local-remote control selection.
- Digital output to alarm monitoring system and VDR.
- DOL starter up to 5.5 kW, delta-star starter from 7.5kW and up.
- Different color or material.
- Motor start with frequency converter or soft starter.
- Ammeter.
- Hourmeter.
- SAP-CAN installation on the cover.
- NMEA2000, MODBUS RTU serial communication to vessel’s AMS and VDR.
This panel consists of steering control system failure alarms, auto-pilot activation and auto-pilot over ride alarm and reset functions. This panel is offered for vessels above 500 GRT.

**FEATURES**

- Power Supply: 24 V DC.
- Dimension: H136 x W96 x D70 mm.
- Degree of protection: IP65 (front).
- Operating Temperature: -20°C + 70°C.
- Connection: Wago 713-1108/037-000 Female connector.
- Monitoring of up to 9 Visual & acoustical alarms.
- Material: black anodized aluminium.
- Touch pad control with real tact switch.
- Indicator backlight dim. control.
- Buzzer silence.
- Lamp test.

**OPTIONS**

- Different labeling is possible.

For customers who prefer to have a conventional panel, Data also offers SCAP-C Conventional Steering Gear Control & Alarm Panel with selector switch. Control stations and auto-pilot can be selected by means of the selector switch and selections are indicated with lamps. It also consists of steering control system failure alarms, auto-pilot activation and auto-pilot over ride alarm and reset functions. This panel is offered for vessels above 500 GRT.

**FEATURES**

- Power Supply: 24 V DC.
- Dimension: H136 x W200 x D135 mm.
- Degree of protection: IP54 (front).
- Operating Temperature: -20°C + 70°C.
- Connection: Wago 260-301 Terminal Block, DIN Rail.
- Conventional lights and switches.
- Flexibility for different system configurations.
- Material: black anodized aluminium.
- Station selection by rotating switch.
- Indicator lights dim. control.
- Buzzer silence.
- Lamp test.

**OPTIONS**

- For 45° steering gears, 35° and 45° rudder limit selection.
What is Non follow-up?

Non follow up is a type of steering control. Non follow up system directly controls direction control valves of the HPU. Therefore it is the simplest and safest way of control. When joystick is pushed to one side, rudder starts turning to this direction and turns as long as joystick is pushed or tiller reaches to limit switch. Rudder stays at the position where joystick is released. To take the rudder at center, joystick must be pushed in the opposite direction.

FEATURES

- Power Supply: 24 V DC.
- Dimension: H96 x W72 x D70 mm.
- Degree of protection: IP65 (front).
- Operating Temperature: -20° C + 70° C.
- Material: black anodized aluminium.
- Connection: Wago 713-1106/037-000 Female connector.
- Spring centered, On-Off Joystick.
- Separate contacts for each pump unit.

OPTIONS

- NFU-B with activation buttons, NFU-S without activation buttons.

SYNCHRON CONTROL NFU PANEL

Synchron or independent control of electronic synchronised steering gears are selected through SSCP synchron control NFU panel. When synchron control is selected port joystick is master.

FEATURES

- Power Supply: 24 V DC.
- Dimension: H96 x W144 x D70 mm.
- Degree of protection: IP65 (front).
- Operating Temperature: -20° C ... +70° C.
- Material: black anodized aluminium.
- Spring centered two On-Off NFU joystick.
- Separate contacts for each pump unit.
- Synchron control with 1 joystick.
- Independent control with 2 joysticks.
- Station active button.
- Synchron active/deactive button.
- Synchron failure.
- Buzzer silence.
- Lamp test.
DEH-NFU6203 is an electronic steering input unit working without a feedback requirement from rudder. Therefore it is named as NFU Helm. DEH-NFU6203 is a mechatronic solution with integrated electronic control unit, embedded software and CAN bus interface, which can replace the traditional steering column offering a robust steering input function to be fitted in electro-hydraulic steering systems. The solution translates the steering wheel's rotational movement into safe digital information on the CAN bus, offering a resistive steering feedback with redundant control. Engineered to withstand severe operating conditions and tested to fulfill the severe steering input requirements for marine. The unit provides a flexible, light-weight and compact solution with smart functions for drivers’ comfort such as programmable endstops and controllable resistive steering feedback. Moreover the steering feedback can be dynamically adapted to different driving conditions. For example, the steering wheel “resistance” can be controlled proportionally to the steering wheel turning speed: this enables more accurate, comfortable and safe steering.

FEATURES
- Power Supply: 12/24 V DC.
- Dimensions: Ø138 x D130 mm.
- Degree of protection: IP67.
- Operating Temperature: -40°C +85°C.
- Material: black anodized aluminium, stainless steel shaft.
- Connection: CAN-BUS.
- Contactless sensors.
- Weight: 4 kg.
- Max. rotation speed: 180 rpm.

OPTIONS
- 35, 45 or 65 rudder angle
- 4-20 mA or 1 kOhm output
- Up to 4 output

What is follow up?
Follow up is a type of steering control. A rudder order is given by means of a FU unit and rudder is rotated to the ordered direction. A feedback unit sends actual rudder angle signal to the control system. Control system compares the rudder order and actual rudder angle and stops the rudder at ordered angle given by FU Helm.

FEATURES
- Power Supply: 24 V DC.
- Dimensions: H165 x W165 x D110 x Ø250 mm.
- Degree of protection: IP54 (front).
- Operating temperature: -20°C +70°C.
- Material: black anodized aluminium.
- Output: 4-20 mA (Option 1 kOhm)
- Max. 4 outputs
- Activation button.
- Illuminated scale.
- Dimmer.
- Weight: 3.8 kg.
DEH-FU120 Mini FU Helm is designed to install on the console for control of single steering gear.

**FEATURES**

- Power Supply: 24 V DC.
- Dimensions: H120 x W120 x D110 mm.
- Degree of protection: IP54 (front).
- Operating temperature: -20° C to +70° C.
- Material: black anodized aluminium.
- Output: 4-20 mA (Option 1 kOhm).
- Max. 4 outputs.
- Activation button.
- Illuminated scale.
- Dimmer.

**OPTIONS**

- 35, 45 or 65 rudder angle
- 4-20 mA or 1 kOhm output
- Up to 2 outputs

DEH-FU120SY Mini FU Helm is designed to install on the console for control of double (electronic synchronised) steering gear.

**FEATURES**

- Power Supply: 24 V DC.
- Dimensions: H120 x W252 x D110 mm.
- Degree of protection: IP54 (front).
- Operating temperature: -20° C to +70° C.
- Material: black anodized aluminium.
- Output: 4-20 mA (Option 1 kOhm).
- Max. 2 outputs from each FU.
- Synchron control with 1 knob.
- Independent control with 2 knobs.
- Station active button.
- Synchro active/deactive button.
- Synchro failure.
- Buzzer silence.
- Lamp test.
- Illuminated scale.
- Dimmer.

**OPTIONS**

- 35, 45 or 65 rudder angle
- 4-20 mA or 1 kOhm output
- Up to 2 outputs from each FU control
These gauges automatically detect if they are installed as MASTER or SLAVE and make no longer necessary to have two different versions. The instrument connected directly to the sensor acquires the signal and convert it in a CAN Bus that is transmitted to the other instruments that will work then as SLAVE. Just by pressing the two rear buttons and moving the rudder from port to starboard, the instrument calibrates itself automatically, recording permanently the data in the microprocessor memory. The instruments are SOLAS/MED approved.

**FEATURES**

- Power Supply: 12/24 V DC.
- Dimensions: 96x96 mm.
- Degree of protection: IP66 (front).
- Operating temperature: -25° C … +70° C.
- Input: 1-5 kOhm, 4-20 mA and CAN Bus.
- Range: +/-45°.
- Dimmable led backlight.
- Easy adjustment.
- No amplifier is required.

XL144 is a DEIF product produced for DATA. It is a console mounting type indicator. The instruments are SOLAS/MED approved.

**FEATURES**

- Power Supply: 24 V DC.
- Dimensions: 144x144 mm.
- Degree of protection: IP52 (front).
- Operating temperature: -25° C … +70° C.
- Input: -/+ 10V.
- Range: +/-45°.
- Dimmable led backlight.
- Easy adjustment.
- Amplifier is required (TDG 210-DG).
BW144 is a DEIF product produced for DATA. The BW type is designed for bridge wing and tiller compartment mounting and is basically an XL indicator with a pivot foot, a rear part and a built-in dimmer. The flexible BW type allows for either mounting, hanging or standing. The instruments are SOLAS/MED approved.

**FEATURES**

- Power Supply: 24 V DC.
- Dimensions: 144x144 mm.
- Degree of protection: IP66.
- Operating temperature: -25° C … +70° C.
- Input: +/- 10V.
- Range: +/-45°.
- Dimmer installed on housing.
- Easy adjustment.
- Amplifier is required (TDG 210-DG).

TRI-2 is a DEIF product. It is a panoramic 3 face indicator for wheel house ceiling. The instruments are SOLAS/MED approved.

**FEATURES**

- Power Supply: 24 V DC.
- Dimensions: Ø370 x 115 mm.
- Degree of protection: IP54.
- Operating temperature: -25° C … +70° C.
- Input: +/- 10V.
- Range: +/-45°.
- Dimmer installed on housing.
- Easy adjustment.
- Readable from up to 5 meters.
- Amplifier is required (TDG 210-DG).
TAB40205 feedback unit is used in combination with IAB19696/DH rudder angle indicators.

**FEATURES**

- Power Supply: 12/24 V DC.
- Dimensions: Ø84x93 mm.
- Degree of protection: IP65.
- Operating temperature: -25° C … +70° C.
- Potentiometer resistance: 5kOhm
- Max. measure angle: +/-45°.
- Material: Housing plastic, shaft stainless steel.
- Easy installation and adjustment.

DFU100 feedback unit comes with 1 potentiometer. It is used for rudder feedback to IAB19696/DH rudder angle indicators. In addition to feedback function, two or four adjustable limit switches can be installed in the unit.

**FEATURES**

- Power Supply: 12/24 V DC.
- Dimension: Ø115x122 mm.
- Degree of protection: IP65.
- Operating temperature: -25° C … +70° C.
- Potentiometer resistance: 5kOhm
- Max. measure angle: +/-55°
- Weight: 1.3 kg.
- Material: Housing aluminium, shaft stainless steel.
- Easy installation and adjustment.

**OPTIONS**

- DFU100-1P - 1 potentiometer
- DFU100-1P-2LS - 1 potentiometer + 2 Limit Switch (1 pump unit)
- DFU100-1P-4LS - 1 potentiometer + 4 Limit Switch (2 pump units)
- DFU100-2LS - 2 Limit Switch (1 pump unit)
- DFU100-4LS - 4 Limit Switch (2 pump units)
DFU200 feedback unit can accommodate up to 4 potentiometers. It is used for rudder feedback to IAB19696/DH rudder angle indicators and FU system. Two or four adjustable limit switches can be installed in the unit.

**FEATURES**

- Power Supply: 24 V DC.
- Dimension: Ø200x164 mm.
- Degree of protection: IP65.
- Operating temperature: -40° C … +70° C.
- Potentiometer resistance: 1 kOhm
- Max. measure angle: +/-45° (+/-65° is available on request)
- Weight: 4 kg.
- Material: Housing aluminium, shaft stainless steel.
- Angle scale and pointer on the feedback unit.
- Easy installation and adjustment.

**OPTIONS**

- DFU200-1P - 1 potentiometer
- DFU200-2P - 2 potentiometers
- DFU200-3P - 3 potentiometers
- DFU200-4P - 4 potentiometers
- DFU200-1P-2LS - 1 potentiometer + 2 Limit Switch (1 pump unit)
- DFU200-1P-4LS - 1 potentiometer + 4 Limit Switch (2 pump units)
- DFU200-2P-2LS - 2 potentiometers + 2 Limit Switch (1 pump unit)
- DFU200-2P-4LS - 2 potentiometers + 4 Limit Switch (2 pump units)

RTA 602 is a DEIF product. This rudder feedback unit is used in combination with DEIF rudder angle indicators.

**FEATURES**

- Power Supply: 24 V DC.
- Dimension: Ø102x122.5 mm.
- Degree of protection: IP67.
- Operating temperature: -40° C … +80° C.
- Analog output: 4-20 mA.
- Max. measure angle: +/-45°.
- Material: Housing aluminium, shaft stainless steel.
- Easy installation and adjustment.
# Steering Gear Inquiry Form

## Customer Information

<table>
<thead>
<tr>
<th>Customer Name</th>
<th>Date (dd/mm/yy)</th>
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<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Shipyard</th>
<th>Hull/Yard No.</th>
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<table>
<thead>
<tr>
<th>Vessel Name</th>
<th>Phone / Fax</th>
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</thead>
<tbody>
<tr>
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<table>
<thead>
<tr>
<th>E-mail</th>
<th>Address</th>
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## Technical Data

### Rudder Dimensions (mm)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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</table>

### Rudder Type

(Single plate-Göttingen-Flat-side-Hollow-Flap-Fishtail-Nozzle)

### Vessel Information

<table>
<thead>
<tr>
<th>Vessel length</th>
<th>Displacement</th>
<th>Gross tons.</th>
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<tbody>
<tr>
<td>m.</td>
<td></td>
<td></td>
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<table>
<thead>
<tr>
<th>Hull type (specify if other)</th>
<th>Number of propellers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planing</td>
<td>(In propeller jet: 1 / Out of propeller jet: 0.9)</td>
</tr>
</tbody>
</table>

### Max. Speed (ahead) (knots)

<p>| |</p>
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<tr>
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</table>

### Number of Rudders

### Location of the Rudder Blade

### Degree of Rudder Angle 2X

<table>
<thead>
<tr>
<th>35º (standard)</th>
<th>45º</th>
<th>Other</th>
</tr>
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<tbody>
<tr>
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<td></td>
<td></td>
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</table>

### Torque per Rudder *

<table>
<thead>
<tr>
<th>Torque per rudder</th>
<th>Net available</th>
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</thead>
<tbody>
<tr>
<td>kN.m</td>
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### Power Supply

<table>
<thead>
<tr>
<th>V</th>
<th>Hz</th>
<th>Phase</th>
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### Type of Valve Control

(proportional, mechanic, electronic)

### Wing Stations

### Auto-pilot

### DP System

<table>
<thead>
<tr>
<th>DP</th>
<th>x station</th>
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### Follow-up Control

### Eng. Cont. Room alarm panel

### Rudder Angle Indicator

### Power Steering

### Classification

### Special Requirements/Notes

---

**Rudder dimensions:**

A = 
B = 
C = 
D = 
E =

**Alternative drawing or attach rudder blade drawing:**

AB
C
E
centre of
rudder stock

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