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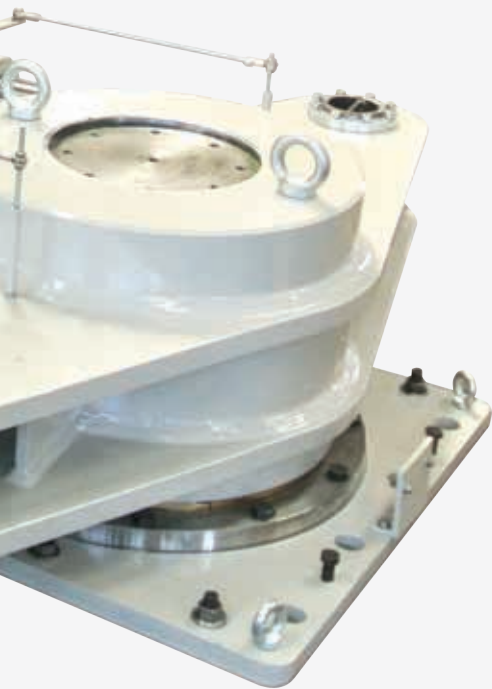


DDM 55000-35

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 a 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.



HYDRAULIC STEERING CYLINDERS



DS 70S / DS 660S



DS 50

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 RECOMMENDED VESSEL LENGTH

metres	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34
feet	20	26	33	39	46	52	59	66	72	79	85	92	98	105	112
DS 50															
DS 70S															
DS 150S															
DS 290S															
DS 460S															
DS 660S															

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.

HYDRAULIC STEERING CYLINDER TECHNICAL SPECIFICATIONS

Cylinder type	DS 50	DS 70S / 70SL	DS 150S / 150SL	DS 290S / 290SL	DS 460S / 460SL	DS 660S / 660SL
Nominal Torque daN.m	50	70	150	290	460	660
Recommended boat length m	6 - 8	7 - 11	9 - 16	13 - 21	19 - 27	25 - 34
Recommended pump type	DP 30 / 42	DP 30 / 42	DP 63 / 75	DP 75 / 88	DP 88 / 120	DP 120
Revs from St.Bd. To Port	4 / 2.9	5.4 / 3.8	5.2 / 4.4	9.1 / 7.8	13.2 / 9.6	15
Cylinder stroke mm	160	172	218	275	275	344
Pressure for nominal torque bar	58	60	60	60	55	52
Tiller length	140	150	190	240	240	300
Cylinder oil volume cm ³	121	162	329	688	1162	1757
Total rudder angle	2x37°	2x37°	2x37°	2x37°	2x37°	2x37°
Cylinder connection ports BSP	1/4"	1/4"	3/8"	1/2"	1/2"	1/2"
Min. tube dimensions (inside) mm	ø10	ø10	ø15	ø15	ø15	ø19
Weight kg	3.8	6.2	12.5	21.5	33	53

Reduction of the number of steering wheel revolutions:

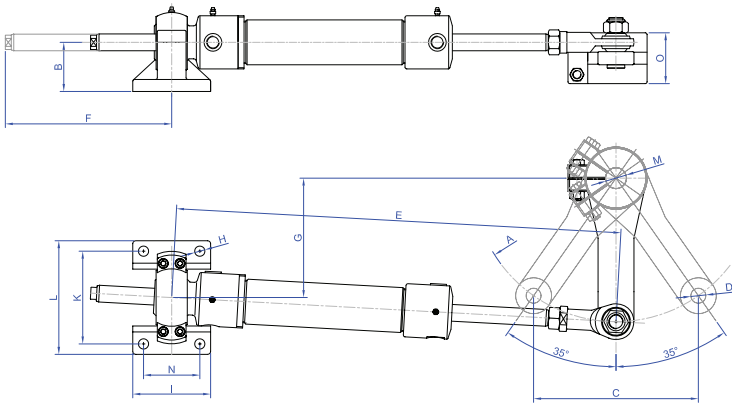
It is the hydraulic cylinder which determines the torque of a hydraulic steering system. When a reduced number of steering wheel revolutions from hardover to hardover is required, a steering pump with larger capacity should be selected. On the other hand, pump with larger capacity will cause relatively 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 HPU 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.

HYDRAULIC STEERING CYLINDER DIMENSIONS (mm)

Cylinder type	A	B	C	D	E	F	G	H	I	K	L	M	N	O
DS 50	140	40	160	12	390	136	115	8.5	64	84	104	max.35	42	56
DS 70S	150	45	172	16	485	213	123	10	71	92	116	max.35	50	52
DS 150S	190	60	218	20	630	285	156	12	110	125	150	max.45	85	60
DS 290S	240	75	275	25	743.5	328	200	16	130	155	190	max.60	94	85
DS 460S	240	90	275	30	788.5	338	201	16	160	195	230	max.80	125	105
DS 660S	300	105	344	35	944.5	415	245.5	20	190	230	270	max.90	145	120



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/bronze parts (designated with S) or stainless steel/bronze parts (designated with SL).

Certification from classification societies.

HYDRAULIC HELM PUMPS



DP 30 - 42



DP 63-75-88



DP120



DP160 PUMP & DPS100
WHEEL INSTALLED ON
STEERING COLUMN

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. Helm 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.

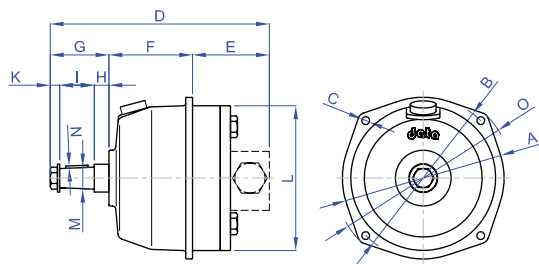
DATA hydraulic helm pumps are available in 8 displacements suitable to fit with various sizes of hydraulic cylinders. Helm pumps are axial piston type and specially designed for marine steering use. CE certificates are available meeting ISO EN10592:2000 standards (excluding DP120, DP160 and DP240).

HYDRAULIC HELM PUMP TECHNICAL SPECIFICATIONS

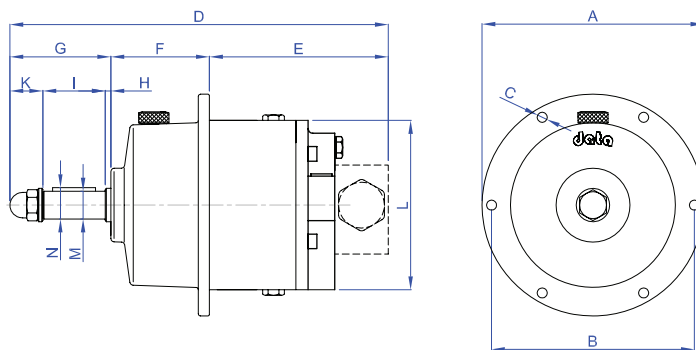
Helm pump type	DP 30 / DP 30K	DP 42 / DP 42K	DP 63 / DP 63K	DP 75 / DP 75K	DP 88 / DP 88K	DP 120 / DP 120K	DP 160 / DP 160K	DP 240 / DP 240K
Pump displacement cm ³ /r	30	42	63	75	88	120	160	240
Recommended cylinder type	DS 50 / DS 70S	DS 50 / DS 70S	DS 150S	DS 150S / DS 290S	DS 290S / DS 460S	DS 460S / DS 660S	DS 660S	
Revs from St.Bd. To Port	4 / 5.4	2.9 / 3.8	5.2	4.4 / 9.1	7.8 / 13.2	9.6 / 14.6	11	
Design pressure bar	60	60	60	60	60	60	60	60
Hyd. connection ports	BSP 1/4"	1/4"	3/8" / 1/2"	3/8" / 1/2"	3/8" / 1/2"	1/2"	1/2"	1/2"
Min. tube dimensions (inside) mm	ø10	ø10	ø15	ø15	ø15	ø19	ø19	ø19
Weight kg	6.5	6.5	12.2	10.5	10.5	17	35	35



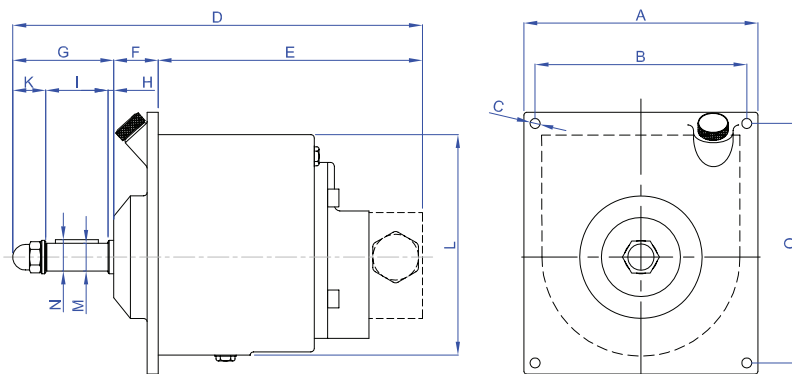
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DP 30-42



DP 63-75-88



DP 120-160-240

HYDRAULIC HELM PUMP DIMENSIONS (mm)

Pump type	A	B	C	D	E	F	G	H	I	K	L	M	N	O
DP 30/30K/42/42K	145	146	7	197	69	75	53	13	31	9	130	19,6/2,38	2/5	160
DP 63/63K/75/75K/88/88K	200	182	9	340	160	89	91	5	56	30	152	25,3	28,2/6,6	-
DP 120/120K	210	190	9	368	237	40	91	5	56	30	195	25,3	28,2/6,6	215
DP 160/240	260	240	9	398,5	216	55	127,5	32,5	70	25	287	30	33/8	320

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 VALVES & DISTRIBUTION BLOCKS



DKV-4 is for one helm pump.
Material is marine grade aluminium



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-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.

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 1/2" ports.



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

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.



DRB-4, 2 in-2 out,
Ports BSP 3/8" or 1/2"



DRB-6, 2 in-4 out,
Ports BSP 3/8, 1/2" or 3/4"



DRB-8, 4 in-4 out,
Ports BSP 3/8", 1/2" or 3/4"



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).

TILLERS

OPTIONS

- Double armed tiller for parallel tie bar connection.
- Custom tillers according to customer requirements.

HYDRAULIC POWER UNITS



Steering system HPU with 4 variable displacement pump units mounted on a skid. System is delivered prewired and almost ready to start running.

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



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Single AC Motor driven HPU for steering system



Steering system HPU with double AC motor and a PTO driven pump unit

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.

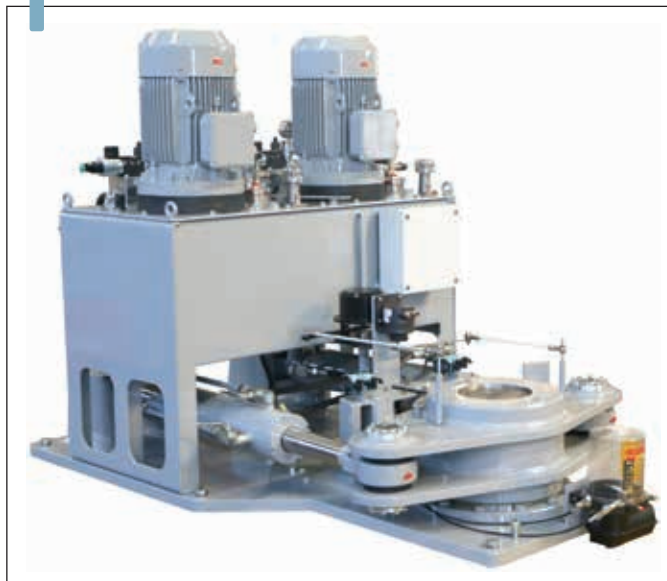
FEATURES

- 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.

DOUBLE CYLINDERED STEERING SYSTEMS



DDM 12000-35

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



DDM 2000



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DOUBLE CYLINDERED STEERING SYSTEMS SPECIFICATIONS

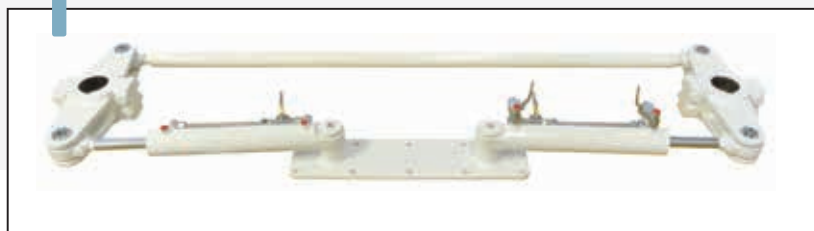
Single tiller	Double tiller	Nominal torque @ 35° daN.m	Maximum torque @35° daN.m	Nominal working pressure bar	Rudder angle	HPU Tank capacity lt.	El. motor power (50 hz-S1) kW	Total cylinder Displacement cm³	Hydraulic cylinders (rod-piston-strok) mm
DDM 1100	DDM 2x550	1100	1375	103	2x35°	27 / 2x27	1.5 / 2x1.5	1495	ø32-ø63 275
DDM 1600	DDM 2x800	1600	2000	90	2x35°	40 / 2x40	2.2 / 2x2.2	2503	ø35-ø80 275
DDM 2000	DDM 2x1000	2000	2500	99	2x35°	40 / 2x40	2 / 2x2.2	2825	ø40-ø80 321
DDM 3000	DDM 2x1500	3000	3750	95	2x35°	63 / 2x70	3 / 2x3	4415	ø50-ø100 321
DDM 4000	DDM 2x2000	4000	5000	95	2x35°	90 / 2x90	4 / 2x4	5909	ø55-ø115 321
DDM 6000	DDM 2x3000	6000	7500	99	2x35°	2x110	2x5.5	8522	ø65-ø125 402
DDM 8000	DDM 2x4000	8000	10000	110	2x35°	2x120	2x5.5	10230	ø65-ø125 482
DDM 10000	DDM 2x5000	10000	12500	120	2x35°	2x130	2x7.5	11690	ø65-ø125 551
DDM 12000	DDM 2x6000	12000	15000	123	2x35°	2x165	2x11	13610	ø75-ø140 516
DDM 16000	DDM 2x8000	16000	20000	122	2x35°	2x200	2x11	18320	ø80-ø140 711
DDM 21000	DDM 2x10500	21000	26250	122	2x35°	2x230	2x15	24080	ø90-ø160 711
DDM 27000	DDM 2x13500	27000	33750	124	2x35°	2x300	2x18.5	30610	ø100-ø180 711
DDM 33000	DDM 2x16500	33000	41250	133	2x35°	2x330	2x22	34660	ø110-ø180 837
DDM 44000	DDM 2x22000	44000	55000	130	2x35°	2x300	2x30	47280	ø120-ø200 918
DDM 55000	DDM 2x27500	55000	68750	122	2x35°	2x300	2x37	62900	ø125-ø220 987



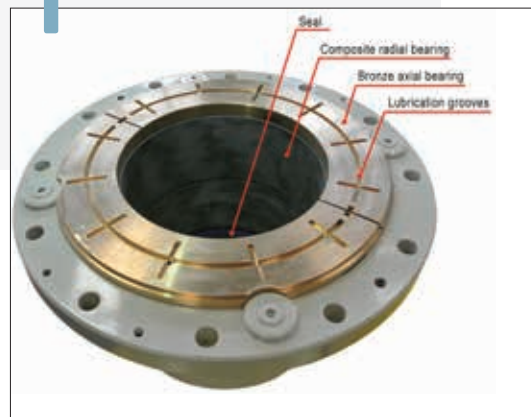
DDM 2x4000 custom design steering gear on a ferryboat



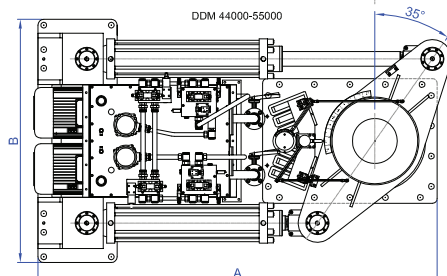
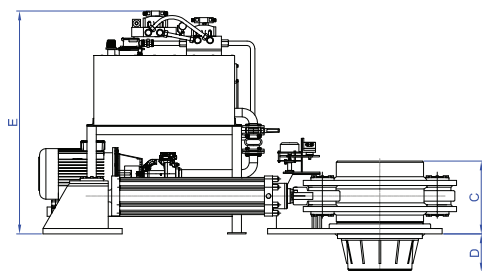
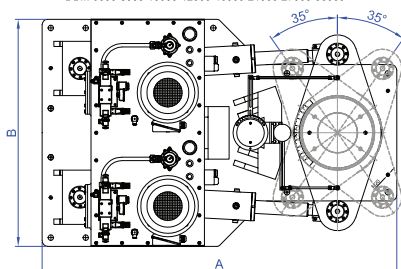
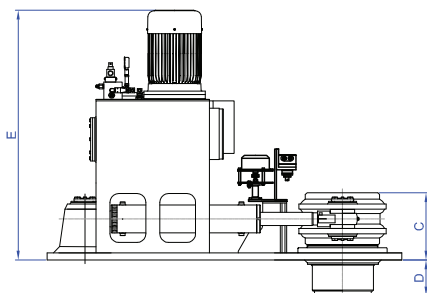
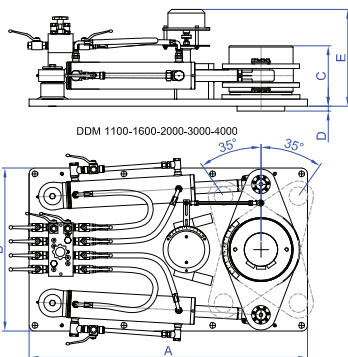
DDS 8000x2 Electronic synchronised steering gears under test at factory



DDM 2x1000-45



Rudder Bearing



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DOUBLE CYLINDERED STEERING GEARS DIMENSIONS (mm)

Steering Gear Type		A	B	C	D	E
DDM 1100	35°	990	560	127	0	415
DDM 1600	35°	1060	560	147	0	415
DDM 2000	35°/45°	1127 / 1185	610/700	209	21	415
DDM 3000	35°/45°	1195 / 1381	700	259	21	450
DDM 4000	35°/45°	1420 / 1600	750	265	160	460
DDM 6000	35°/45°	1562 / 1696	1100	295	179	1177
DDM 8000	35°/45°	1730 / 1891	1200	355	186.5	1177
DDM 10000	35°/45°	1840 / 2030	1300	375	216.5	1215
DDM 12000	35°/45°	2030 / 2204	1300	385	205.5	1435
DDM 16000	35°/45°	2415 / 2655	1600	475	223.5	1440
DDM 21000	35°/45°	2415 / 2655	1700	475	250.5	1484
DDM 27000	35°/45°	2515 / 2760	1750	475	250.5	1567
DDM 33000	35°/45°	2826 / 3109	1900	480	265.5	1622
DDM 44000	35°/45°	3182 / 3400	1930	550	315.5	1685
DDM 55000	35°/45°	3428 / 3759	2088	605	315.5	1912

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.
- Seperate 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.



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.

STARTER CABINETS

There are various types of steering gear starter cabinets suitable for AC and DC motors.



BRIDGE CONTROL CABINETS

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 : RAL9001 white .
Material : Powder coated steel.
Operating Temperature : -20° C ... +70° C.



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FEATURES

Power Supply : Vessels main supply voltage and 24VDC for alarm system.
Dimensions : H500 x W400 x D210 mm (DC and AC DOL),
Degree of protection : IP65.
Color : RAL9001 white .
Material : Powder coated steel.
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 out put to alarm monitoring system and VDR.
DOL starter up to 5.5 kW, delta-star starter from 7.5kW 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.



SCP-CAN



SAP-CAN

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 TFM 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.

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.

SAP-S Steering gear pump alarm panel is used to monitor limited alarms.. This panel does not have pump start/stop function. It is designed to combine with DEH-NFU6203 NFU helm unit.



SAP-S Steering gear pump alarm panel

STEERING GEAR BRIDGE CONTROL & ALARM PANELS



SCAP Steering Gear Bridge Control & Alarm Panel

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 alarm.
- Material : black anodized aluminium .
- Touch pad control with real tact switch.
- Indicator backlight dim. control.
- Buzzer silence.
- Lamp test.

OPTIONS

Different labeling is possible.



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SCAP-C
Conventional
Steering Gear
Bridge Control
& Alarm Panel
with selector
switch

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.

NFU JOYSTICK CONTROL PANEL

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.



NFU-B Control Panel

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.
- Seperate 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.



SSCP Synchron Control
NFU Panel

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.
- Seperate contacts for each pump unit.
- Synchron control with 1 joystick.
- Independent control with 2 joysticks.
- Station active button.
- Syncho active/deactive button.
- Syncho failure.
- Buzzer silence.
- Lamp test.

NFU HELM



DEH-NFU6203 NFU Helm

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.



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DEH-FU165 FU Helm

FU HELM

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.
Potentiometer: 1kOhm.
Up to 4 highest quality potentiometer installation.
Activation button.
Illuminated scale.
Dimmer.
Weight : 3.8 kg.

OPTIONS

DEH-FU165-35/1P	-	+/-35° - 1 potentiometer
DEH-FU165-35/2P	-	+/-35° - 2 potentiometer
DEH-FU165-35/3P	-	+/-35° - 3 potentiometer
DEH-FU165-35/4P	-	+/-35° - 4 potentiometer
DEH-FU165-45/1P	-	+/-45° - 1 potentiometer
DEH-FU165-45/2P	-	+/-45° - 2 potentiometer
DEH-FU165-45/3P	-	+/-45° - 3 potentiometer
DEH-FU165-45/4P	-	+/-45° - 4 potentiometer

MINI FU HELM

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 +70° C.
 Material : black anodized aluminium.
 Potentiometer: 1kOhm.
 Up to 2 highest quality potentiometer installation.
 Activation button.
 Illuminated scale.
 Dimmer.



DEH-FU120

OPTIONS

DEH-FU120-35/1P - +/-35° - 1 potentiometer
 DEH-FU120-35/2P - +/-35° - 2 potentiometer
 DEH-FU120-45/1P - +/-45° - 1 potentiometer
 DEH-FU120-45/2P - +/-45° - 2 potentiometer

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



DEH-FU120SY

FEATURES

Power Supply : 24 V DC.
 Dimensions : H120 x W252 x D110 mm.
 Degree of protection : IP54 (front).
 Operating temperature : -20° C..+70° C.
 Material : black anodized aluminium.
 Potentiometer : 1kOhm.
 Up to 2 highest quality potentiometer installation for each FU.
 Synchro 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

DEH-FU120SY-35/1P - +/-35° - 1 potentiometer
 DEH-FU120SY-35/2P - +/-35° - 2 potentiometer
 DEH-FU120SY-45/1P - +/-45° - 1 potentiometer
 DEH-FU120SY-45/2P - +/-45° - 2 potentiometer

RUDDER ANGLE INDICATORS



IAB19696/DH Rudder angle indicator

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 micro-processor 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.



XL144 Rudder angle indicator

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).



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BW144 Rudder angle indicator

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 : $\pm 10V$.
- Range : $\pm 45^\circ$.
- Dimmer installed on housing.
- Easy adjustment.
- Amplifier is required (TDG 210-DG).



TRI-2 Panoramic rudder angle indicator

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 : $\varnothing 370 \times 115$ mm.
- Degree of protection : IP54.
- Operating temperature : -25° C ... +70° C.
- Input : $\pm 10V$.
- Range : $\pm 45^\circ$.
- Dimmer installed on housing.
- Easy adjustment.
- Readable from up to 5 meters.
- Amplifier is required (TDG 210-DG).

RUDDER FEEDBACK UNITS



TAB 40205 Rudder Feedback unit

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 Rudder feedback unit

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)



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DFU200 rudder feedback unit

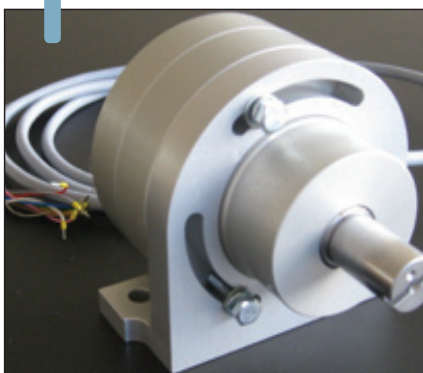
DFU200 feedback unit can accommodate up to 4 potentiometers. It is used for rudder feedback to IAB19696/DH rudder angle indicators and FU system. Two or four adjustable limit switches can be installed in the unit.

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



RTA 602 Rudder feedback unit

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

Customer Name		Date (dd/mm/yy)	
Shipyard		Hull/Yard No.	
Vessel Name			
Phone / Fax			
E-mail			
Address			

TECHNICAL DATA

Rudder dimensions (mm)

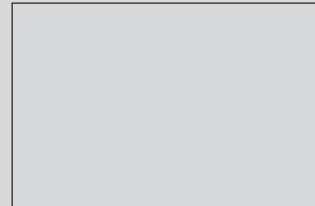
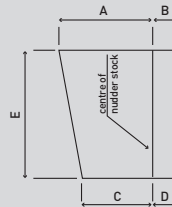
A =

B =

C =

D =

E =



alternative drawing
or attach rudder blade drawing

Rudder type

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

Vessel length

m. Displacement Gross tons.

Vessel type

(Motor yacht: Sail: Workboat, Tug etc.)

Hull type (specify if other)

Planing ☐ Displacement ☐ Sail ☐ Catamaran ☐

Max. Speed (ahead)

knots

Number of rudders

Number of propellers

Location of the rudder blade

(In propeller jet: 1 / Out of propeller jet: 0.9)

Degree of rudder angle 2X

35° [standart] ☐

45° ☐

Other

Torque per rudder *

kN.m

(* if calculated)

Power Supply

V

Hz Phase

Number of control stations

Specify

Hydraulic power unit

☐ Not required (Only manual control)

☐ Engine driven pump

☐ AC EL. motor driven

☐ 24 VDC EL. motor driven

☐ On/Off (bang-bang)

☐ Hydraulic (only for catamaran)

☐ Available

☐ Available

☐ Available

☐ Available

☐ Required

☐ Required

☐ Required

☐ Required

☐ Available

V Hz

x1 ☐

x2 ☐

x1 ☐

x2 ☐

x1 ☐

x2 ☐

☐ Proportional

☐ Mechanic

☐ Not available

☐ Not available

☐ Not available

☐ Not available

☐ Not available

☐ Not available

☐ Not available

☐ Not available

☐ Not available

(For 30 kN.m and below)

Type of valve control

Dual rudder synchronisation

Wing stations

Auto-pilot

DP system

VDR

Follow-up control

Eng.Cont.Room alarm panel

Rudder angle indicator

Power steering

Classification

Special requirements / Notes



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