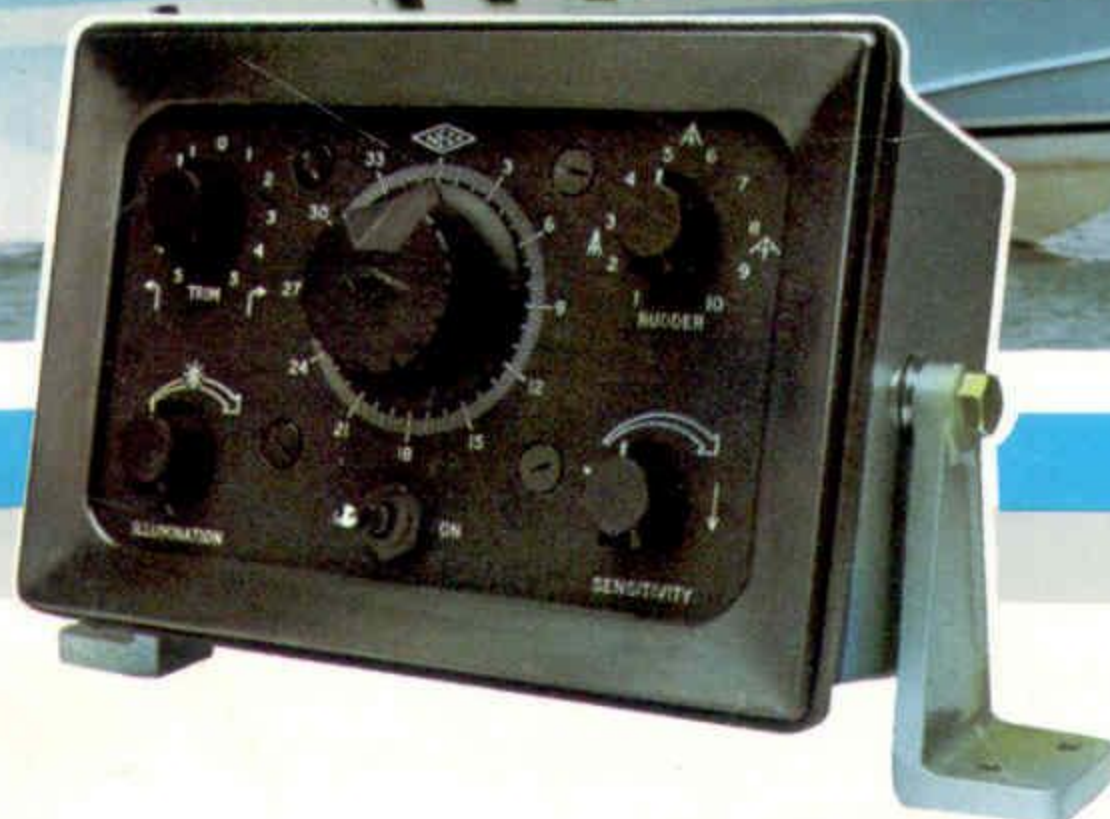


NECO MARINE



AUTOPILOTS



NECO 692 and 693 AUTOMATIC PILOTS bring a new dimension to the pleasure of yachting

In the past an automatic pilot was considered to be a luxury, but is generally accepted today to be one of the most useful pieces of equipment aboard. The helmsman is relieved of the often tedious and fatiguing task of watching the compass whilst holding the boat on course, and with a quality autopilot a more accurate course will be steered. Any Skipper will appreciate the advantages of being free to carry out navigational checks, sail trim adjustments, or simply to relax and enjoy his boating. Providing a crewman remains on watch for any unexpected hazard to the boat's free passage, there is no limit to how long the boat can be left with the autopilot in control.

The design of the Neco Marine series of autopilots is modern in appearance and will complement any boat. These pilots are simple to operate, easy to install, versatile in application, and compatible with most types of steering gear.

NECO Marine have established themselves as leaders in the manufacture of high quality and reliable Autopilots.

The NM692 provides superior performance for pleasure craft (and work boats) both power and sail. Over 8,000 have been installed in all types of craft.

The basic autopilot consists of a control unit, remote transmitting compass, and mechanical drive unit or relay box for switching power hydraulic systems. A single on/off switch energises the autopilot, automatically engaging an electromagnetic clutch in the drive unit. The course is selected by the course setter at the control unit and subsequent alterations may be made at any time by resetting the control. The course error signal is detected electronically thus dispensing with moving parts or light sensitive cells in the sensing element of the control unit. The autopilot is of the 'non hunting' type, comparison of rudder feedback information with the course error signal together with the effects of rudder ratio, trim and sensitivity settings determining the amount of rudder movement.

Optional extras include a Wind Vane Steering system for sailing yachts; an Auxiliary Control for flying bridges, which overrides the master control unit, and a Remote Steering Control which enables the operator to steer from a remote location, temporarily overriding the master or auxiliary control unit.

The NM 693 is a direct development of the 692, designed to achieve the more accurate course holding required by today's planing and semi-planing motor cruisers. This autopilot will predict impending large course deviations before they actually arise, and has increased sensitivity in calm conditions. The autopilot is able to apply rudder rapidly under adverse conditions and also has the ability to apply very small increments of rudder at full torque.



The Basic Systems

NM692 SERIES

The choice of system to use for a particular installation from the NM692 series should be made by taking into consideration the torque required to turn the rudder, when under way, at the point where the autopilot drive will be connected into the steering system, and the number of turns from hardover to hardover at that point.

The output shaft torque and the number of turns from hardover to hardover at the different voltages for each drive unit is given on page 3, e.g. an installation requiring 16 lbf.ft with $4\frac{1}{2}$ turns hardover to hardover of the steering gear would use the NM692/35DR8 with a 2:1 sprocket ratio giving 24 lbf.ft torque approx on a 12 volt system.

If either the NM692/35DR8 or 17DR8 systems are used to drive hydraulic installations it will be necessary to fit a rudder feedback unit because of 'slip' inherent in all hydraulic systems.

In hydraulic systems using a reversible pump motor or solenoid operated valves, the NM692H is suitable.

NM693

The NM693/35DE8HS is designed to apply hardover to hardover rudder in 8 seconds and in this case on craft requiring 12lbf. ft with 3 turns HO/HO a 1.5:1 sprocket ratio should be used giving 18lbf. ft torque approx on a 12 volt system.

NM692/35DR8 or 17DR8

The basic NM692 system, which is suitable for most types of yacht, sail or power, consists of the transmitting compass, control unit and drive unit. Details of the two drive units are given on the following page. All optional units, such as the auxiliary control or wind vane steering system and remote steering control are suitable for use with these systems. Versions for 12, 24 or 32v d.c.

NM692/35DE4

The NM692/35DE4 Automatic Pilot is for craft requiring a more powerful drive unit not catered for in the basic system, and only available for 24 volt d.c. operation. The control unit and compass are similar to the basic unit but the higher powered drive unit is switched electronically. The switching arrangements are contained in the power amplifier and switch line conversion unit. As the drive unit is not fitted with integral feedback, a rudder feedback unit is supplied with the system.

All optional units are suitable as in the basic system.

NM692H

This system has the compass and control unit as in the basic Automatic Pilot, but a relay box replaces the mechanical drive unit. It is for use with hydraulic steering and can switch either a reversible pump motor or the solenoid operated valve unit in unidirectional hydraulic systems. A rudder feedback unit is necessary for hydraulic steering and is supplied with the system.

All optional units are available as in the basic system.

Versions for 12, 24 or 32v d.c.

NM692H/16H or 30H

This system uses the previously described NM692H with the addition of a Neco hydraulic power pack. The power pack consists of a Neco electric motor, driving a unidirectional hydraulic pump with solenoid operated control valves. A simple means of flow rate adjustment to satisfy a wide range of installations is provided. A start/interrupt box supplied with the power pack enables either continuous or interrupted operation to be selected.

See separate data sheet.

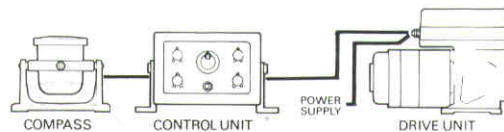
Versions for 12, 24, or 32v d.c.

NM693/35DE8HS

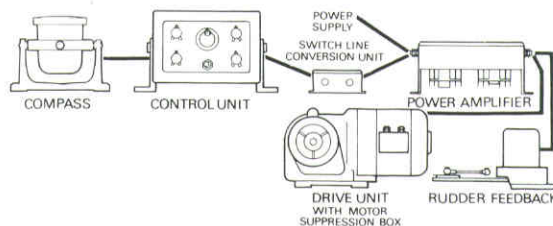
The NM693 system is designed for use on planing powercraft and consists of a transmitting compass, control unit, power amplifier and drive unit. The remote steering control or remote feedback unit are available as optional extras to this system.

Versions for 12, 24v d.c.

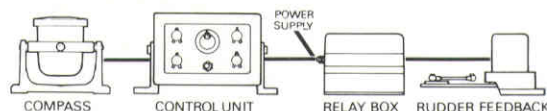
NM692/35DR8 or 17DR8 – the basic system



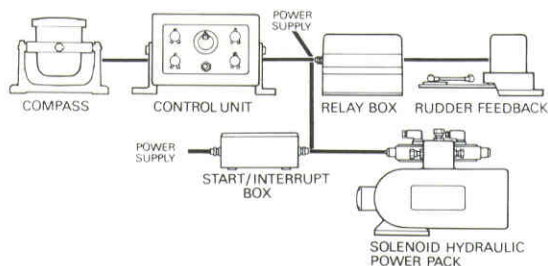
NM692/35DE4 – for boats requiring a more powerful drive unit



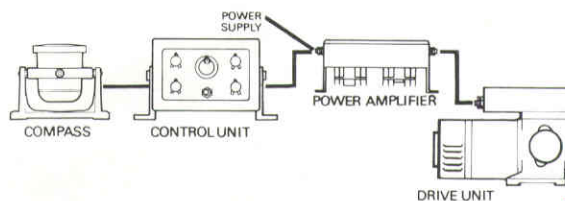
NM692H – for powered hydraulic systems



NM692H/16H or 30H – incorporating a Neco powered hydraulic pump



NM693/35DE8HS – for accurate course holding with planing and semi-planing craft



THE NM692 AND 693 SERIES OF AUTOPILOT SYSTEMS CONSIST OF THE FOLLOWING:-

Control Unit

Type 692CU and 693CU

This is available for either flush or bracket mounting. The controls are located on an attractive internally illuminated panel. 5 metres of cable are provided, connected to the control unit by means of an enclosed plug and socket.

LENGTH	9 ⁵ / ₁₆ in	244mm
DEPTH	6 ¹ / ₂ in	165mm
HEIGHT	6 ⁵ / ₁₆ in	168mm
WEIGHT	10 ¹ / ₂ lb	4.8kg

COURSE SETTER

Large diameter with illuminated pointer for precise setting.

TRIM CONTROL

Compensates for weather helm, turning effect of propeller etc.

ILLUMINATION CONTROL

Controls panel lighting.

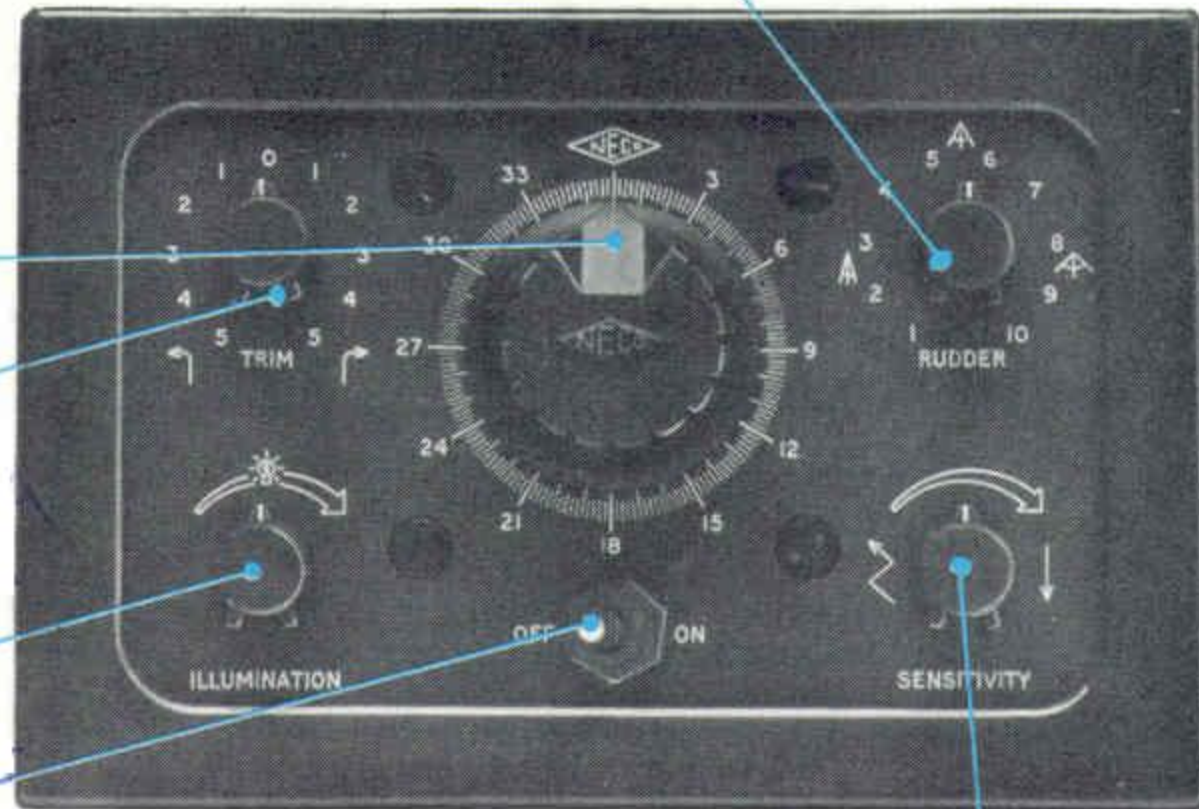
ON-OFF SWITCH

Automatically energises pilot, engages and releases clutch.

RUDDER CONTROL

Increases or decreases rudder angle to cater for differing steering characteristics and conditions.

Preset counter rudder control (693 only).



SENSITIVITY CONTROLS

Tunes pilot for optimum steering or to the desired yaw band.

Compass Unit

Type NM3

A weatherproof, transmitting magnetic compass with a built in sensor. Each unit is tested from -20°C to +60°C. It is mounted in gimbals, or alternatively, in a locking bracket. The unit is supplied with factory-fitted cable-end terminations and a connector box to facilitate installation and removal. The compass may be placed anywhere in the craft where deviations, and/or movement are small.

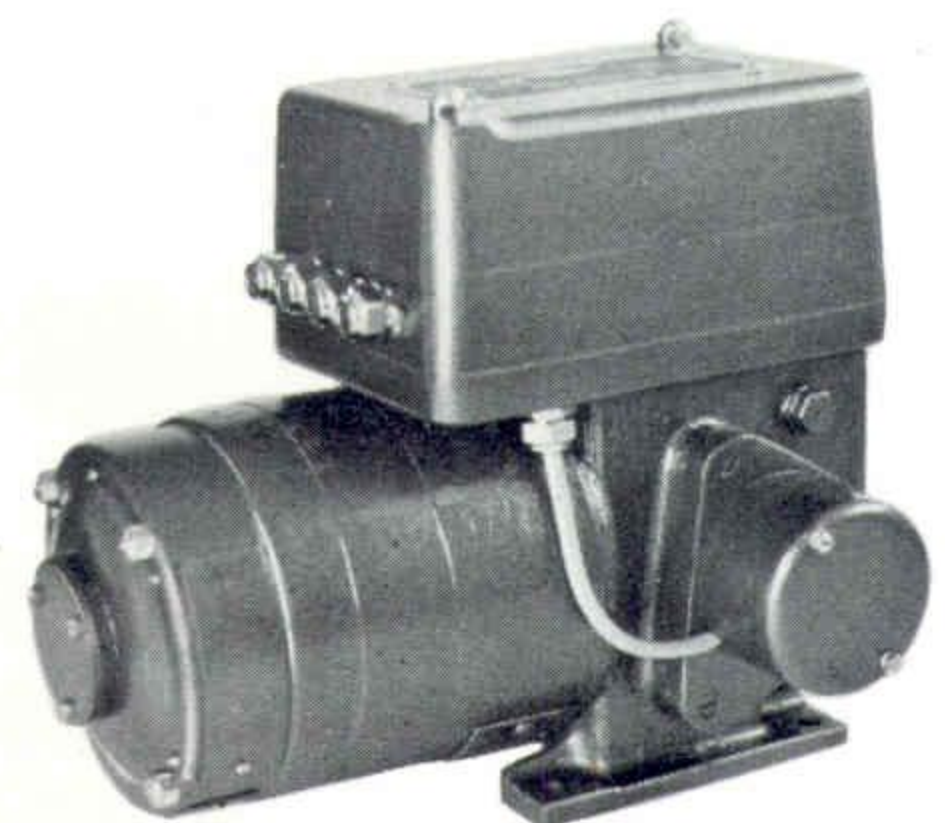


Length	9 ⁷ / ₁₆ in	240mm
Width	7in	178mm
Height	7 ¹ / ₁₆ in	181mm
Weight	5 lb.	2.3kg

Drive Units

Types 35DR8 or 17DR8 for NM692

A Neco Geared Motor drives the output shaft at nominally 35 r.p.m. or 17¹/₂ r.p.m. through a multi-tooth, electro-magnetic clutch. Drive is from a ⁵/₈" dia. output shaft (milled to accept ³/₁₆" featherway key) and is normally connected to the steering gear by chain and sprocket, moving the rudder through its full range in approx. 15 seconds in standard installations. Limit switches are fitted to prevent possible mechanical damage and are contained in the integral feedback section. Conveniently located on top of the motor are the fuses, relays and terminal block for wiring connections. Factory-fitted trailing power input leads, five metres in length are supplied as standard, other lengths to order.



Length	12in	305mm
Width	9 ¹ / ₄ in	235mm
Height	10 ¹ / ₄ in	261mm
Weight	40 lb.	18kg

FULL LOAD TORQUE AT O/P SHAFT

35DR8	12 lbf. ft at 12v ,	15 lbf. ft at 24v or 32v
17DR8	16 lbf. ft at 12v ,	20 lbf. ft at 24v or 32v

Output shafts, turns hardover to hardover

35DR8 = 9
17DR8 = 4 ¹ / ₂

Drive Units

Type 35DE4 for NM692

A more powerful 24 volt only Drive Unit which drives the output shaft at nominally 35 r.p.m. through a multi-tooth, electro-magnetic clutch. The output shaft is 24mm diameter and is milled for 8mm featherway key. Drive to the steering gear is normally connected by chain and sprocket, moving the rudder through the full range in approximately 15 seconds in standard installations. The motor is specially designed for relayless electronic drive and must therefore, be used with Power Amplifier type 250PA.

FULL LOAD TORQUE AT O/P SHAFT

35 lbf. ft at 24v only.

Output shaft, turns hardover to hardover = 9

Type 35DE 8HS for NM693

This drive unit consists of a Neco geared motor driving a 5/8" dia shaft through a multi-tooth electro-magnetic clutch. The output shaft is milled to accept a 3/16" featherway key. The motor is specially designed for relayless electronic drive and must be used with Power Amplifier type 125 PA. The output shaft speed is 35 r.p.m. and the unit is designed to move the rudder through its full range in approx. 8 seconds.

FULL LOAD TORQUE AT O/P SHAFT

15 lbf. ft at 12v, 15 lbf. ft at 24v

Output shaft turns hardover to hardover = 4 1/2

Relay Box

Type 100RBH

For use with hydraulic steering systems where a remote station pump can be driven by an electric motor or where solenoid valves can be fitted. The box contains power relays capable of switching shunt or compound wound electric motors up to 1/8 h.p. output in reversing hydraulic systems or the solenoid valves in unidirectional systems. The relay box may be mounted in any convenient position and forms part of the basic NM692 H system.

Rudder Feedback Units

Types RFB & 101RFB

On the NM692/35DR8, NM692/17DR8 and NM693/35DE8HS systems the feedback unit and limit switches are normally built into the electric drive unit since, in most mechanical steering gear, movement of the rudder corresponds exactly with movement of the output shaft of the autopilot. Where there is considerable backlash, or if the rudder is moved hydraulically this may not be so. As precise information of the rudder position is required it is necessary, in such cases, to fit a Rudder Feedback Unit linked directly to the rudder head. Type 101RFB has the additional built in facility for driving a rudder position indicator.



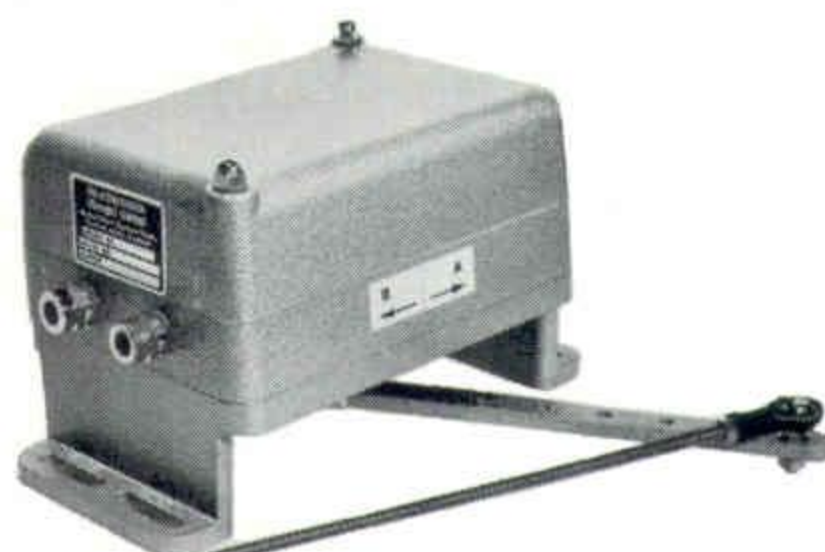
Length	13 1/2 in	371.5mm
Width	13 in	330.3mm
Height	8 1/4 in	210mm
Weight	7 1/2 lb.	32.5kg



Length	12 in	305mm
Width	9 1/4 in	235mm
Height	9 in	229mm
Weight	40 lbs.	18kg



Length	7 1/2 in	191mm
Width	7 in	178mm
Height	6 in	152mm
Weight	12 lb.	5.4kg



Length of link - variable		
Length of arm	6 1/2 in	165mm
Height	5 5/8 in	143mm
Diameter	6 in	153mm
Weight	3.1 lbs.	1.4kg

Power Amplifiers

Type 250PA

The Power Amplifier is a transistorised electronic drive system for use with type 35DE4 Drive Units. A power transistor is used to switch the armature current eliminating the use of heavy current relays.

Operating voltage – 24v only.

Type 125PA

As above but for use with the type 35DE8HS Drive Unit. Operating voltage – 12 volt or 24 volt.

Switch Line Conversion Unit

Type 100SCU

This is required for the electronically switched NM692/35DE4 system only and arranges for correct polarity switching of the amplifier unit.

Optional Extras

AUXILIARY CONTROL UNIT

Type 100ACU

The auxiliary station control is an optional flying bridge unit for use with NM692 systems, which, when engaged, assumes control of the vessel, completely overriding the master control unit. When engaged, the course setter may be used to select any course independent of that set on the master control unit. Controls facilitating the adjustment of permanent helm and rudder amount are also provided. The auxiliary station relies upon the master control unit being switched on, and is brought into operation by turning the mode selector clockwise and then allowing it to spring back to its neutral position. The pilot may be quickly disengaged at the flying bridge by turning the mode selector in an anticlockwise direction, allowing immediate reversion to manual steering. Turning the mode selector clockwise once again will re-engage the pilot under auxiliary station control. Thus the autopilot may be switched in and out at will from the remote location. Control may be regained at any time at the master control unit by simply switching Off and then On again at this unit, when the auxiliary station will become completely inactive.

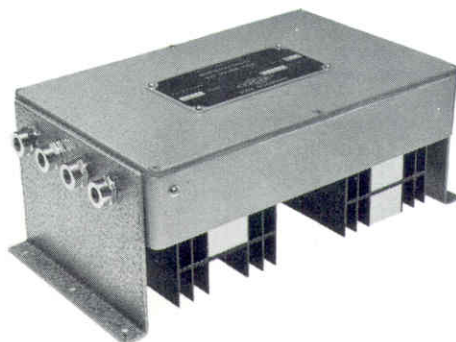
In the event that the vessel is under the control of the master control unit, the autopilot may still be disengaged at the auxiliary station by simply turning the mode selector anticlockwise. Autopilot control may be resumed at the auxiliary station by clockwise rotation of the mode selector or at the master unit, by switching Off and then On.

The remote steering control may be used when the vessel is under the control of either station.

The Auxiliary Control Unit may be panel mounted or used free standing when the angle may be adjusted to suit the operator. Connection into the system is by means of a distribution box and two sockets provided in the back of the master control unit.

NOTE:

The wind vane steering system cannot be used on a system fitted with the auxiliary station.



Length	12¾in	314mm
Width	6¾in	171mm
Height	4¾in	121mm
Weight	6 lb.	2.7kg



Length	7¾in	194mm
Width	5¾in	133mm
Height	2¾in	60mm
Weight	2½ lb.	1.1kg



Dimensions (overall, including bracket)

Length	9¾in	250mm
Height	6¾in	162mm
Width	5½in	140mm
Weight	4½ lb.	2.0kg

REMOTE STEERING CONTROL

Type RSC

This is a portable hand held control moulded in synthetic rubber and supplied with a stowage clip. It is brought into circuit by an ON/OFF thumb pressure switch on the handle, overriding the pilot and allowing proportional power steering by means of the control knob.

When switched off, the vessel will automatically revert to the course set on the control unit of the autopilot.

HOLD ON SWITCH

Type HO

For use with the remote steering control, when switched on it provides continuous operation overriding the thumb pressure switch.

WIND VANE STEERING SYSTEM

Type WV1

This ancillary offers the choice of sailing at a constant angle to the relative wind as an alternative to the normal autopilot facility of steering a selected compass course. The system is particularly applicable when sailing 'on the wind' and a close hauled course can be maintained in a variable wind.

A switch-unit provides for the changeover from compass steering to wind vane steering. The relative wind angle to be steered is selected by setting the course setter control on the control unit by an appropriate amount either side of the north point of the scale, i.e. The 'NECO' Insignia. The 'NECO' Insignia represents the direction from which the relative wind is coming and the marker line on the knob represents the track to be sailed by the yacht.

Wind direction is sensed by the vane unit, normally mounted at the masthead, and a course error signal is obtained as with compass steering in the basic NM692. Flutter and short-term movement of the wind vane is damped out by a variable time-delay. A control for this is provided on the switch-unit.

The wind vane steering system is connected into the NM692 Autopilot through a socket provided for this purpose, situated in the side of the plug-box fitted in the rear of the NM692 control unit.

WIND VANE UNIT

This is fitted to an arm and bracket which is drilled for mounting on the masthead or any other appropriate flat surface. The arm and vane may be detached from the bracket. 20 metres of screened cable for running down the mast are factory fitted to the bracket. Provision is made for slewing the arm for precise alignment.

SWITCH UNIT

Containing the compass/wind selector switch and the variable delay control, the unit is suitable for flush mounting or alternatively for mounting in an optional pod.

ISOLATOR SWITCH AND FUSE BOX

Type 1F

The battery cables to NM692 should lead direct from the battery terminals. Some form of isolator is, nevertheless, most desirable and the item illustrated has been specially designed for autopilot installations.



NECO MARINE

	NM692/35DR8 NM692/17DR8	NM692/35DE4	NM692H	NM693/35DE8HS
INPUT VOLTAGE Nominal dc Range	12v 24v 32v +3v +6v +8v -1.2v -2.4v -3v	24v +6v -2.4v	12v 24v 32v +3v +6v +8v -1.2v -2.4v -3v	12v 24v +3v +6v -1.2v -2.4v
POWER CONSUMPTION (AH) Cruise (Average) Peak (Less than 1/2 sec)	4-5 2½-3 2-2½ 30A 25A 22A	5½-7 35A	¼ + Pump Load — —	4-5 2½-3 30A 25A
FULL LOAD TORQUE At output shaft of Drive Unit (lbf.ft.)	16 20 20 (17 DR8 unit) 12 15 15 (35 DR8 unit)	35	— —	12 15
At Rudder (lbf.ft.)	315 390 390 (17 DR8 unit) 470 590 590 (35 DR8 unit)	1380	Depends upon Hydraulic System Installed	235 295
(Based on 70° Total Rudder Movement and 85% Steering Gear efficiency)				
OUTPUT SHAFT SPEED	17½ or 35 r.p.m. Nom.	35 r.p.m. Nom.	— —	35 r.p.m. Nom.
BEST COURSE ERROR SENSITIVITY	± ½°	± ½°	± ½°	± ½°
OPERATING TEMP. RANGE DEG. C	-20°/+50°	-20°/+50°	-20°/+50°	-20°/+50°
WEIGHTS				
Control Unit	10.5lb (4.8kg.)	10.5lb (4.8kg.)	10.5lb (4.8kg.)	10.5lb (4.8kg.)
Drive Unit	40lb (18kg.)	71.5lb (32.5kg.)	—	40lb (18kg.)
Motor Suppression Box	—	2.5lb (1.1kg.)	—	—
Amplifier	—	6lb (2.7kg.)	—	6lb (2.7kg.)
Compass	5lb (2.3kg.)	5lb (2.3kg.)	5lb (2.3kg.)	5lb (2.3kg.)
Relay Box	—	—	12lb (5.4kg.)	—
Rudder Feedback Switch Line	—	3.1lb (1.4kg.)	3.1lb (1.4kg.)	—
Convers. Unit	—	2.5lb (1.1 kg.)	—	—

DEALERS NAME

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