

SPECIFICATION FOR NAVAIDS CRANE

Composite crane control panel with integral joystick controls and indication with provision for remote joystick controls and indication. The panel contains the following starters:

Topping:	61.6/30.8/7.6KW A.C. Starter
Slewing:	39.9/19/4.1KW A.C. Starter
Main Hoist:	70.8KW D.C. Thyristor Drive
Aux Hoist No.1:	40.2KW D.C. Thyristor Drive
Aux Hoist No. 2:	39.3KW D.C. Thyristor Drive

The A.C. starters will be used for crane position control and will comprise 3 speed pole changing forward and reversing direct on line.

The D.C. starters will be used for crane hoist and will comprise 3 phase, 6 pulse, 4 quadrant thyristor drive with torque limiting device.

Control of these starters would be by means of (a) pedestal or deck type console(s) remotely sited.

The composite panel will be built to IP42 and will comprise five cubicles, each of which would house the drive components, access to which will be via doors hinged on the front. The panel is manufactured from zinc coated (zintec) sheet steel which is cut, formed and seam welded to produce a robust unit. The metal surfaces are prepared, degreased and primed and finished in a two pack polyurethane paint, Admiralty Grey in colour unless an alternative to BS4800 is requested on your order.

Composite Dimensions (mm)

Height:	1800
Width:	3000
Depth:	600
Main Electrical Supply:	600 volt 3 phase 60 hz
Control Electrical Supply:	120 volt via an internal double wound transformer with earth screen

Crane Positioning

the motors will comprise:

Topping Motor Data

Frame Size T42/315

<u>Output</u>	<u>Full Load Current</u>	<u>Speed</u>
61.6KW	75 amp	1800 rpm
30.8KW	59 amp	900 rpm
7.6KW	33 amp	225 rpm

Slewing Motor Data

Frame Size T36/250

<u>Output</u>	<u>Full Load Current</u>	<u>Speed</u>
39.9KW	38 amp	1800 rpm
19.0KW	33 amp	900 rpm
4.1KW	22 amp	225 rpm

Each starter is mounted in its own enclosure and will comprise:
(Mounted within the enclosure)

- 1 - Door interlocked circuit breaker.
- 3 - Low speed motor circuit protection breaker.
- 2 - 1800 rpm mechanically and electrically interlocked contactors.
- 1 - 1800 rpm overload relay.
- 2 - 900 rpm mechanically and electrically interlocked contactors.
- 1 - 900 rpm overload relay.
- 2 - 450 rpm mechanically and electrically interlocked contactors.
- 1 - 450 rpm overload relay.
- 1 - Pole change contactor.
- 1 - Current transformer for use with the remote mounted ammeter.
- 1 - Double wound control transformer 600 volt primary,
120 volt secondary.
- 1 - Set control circuit fuse links mounted in fuse holders.
- 6 - Control timers.
- 1 - Set control relays.
- 1 - Brake contactor.
- 1 - Brake transformer-rectifier.
- 1 - Panel anti-condensation heater and thermostat.

- 1 - 110V A.C 2 pin socket for inspection lamp
- 1 - Set control terminals

The control panels would accept signals from limit switches mounted on the crane to limit its movement.

Mounted on the panel door would be:-

- 1 - Supply on lamp
- 1 - Ready lamp
- 1 - Lock off stop pushbutton - key reset

The panel will be complete with all main and control interconnectors having all cables terminated with crimped lugs and identified with internationally colour coded cable numbers.

A pocket will be provided in the inner side of the door to hold the necessary equipment drawings.

Crane Hoist

Motor data:

Main Hoist	Frame Size	DD315
Output	Armature Current	Speed
70.8KW	265 amp	800 rpm
70.8KW	135 amp	1600 rpm
Field Weakening To		2500 rpm
Aux Hoist No.1 Motor Data	Frame Size	DD280
Output	Armature Current	Speed
40.2KW	78 amp	958 rpm
0-958	Constant Torque	
Field Weakening To		2500 rpm
Aux Hoist No.2 Motor Data	Frame Size	DD250
Output	Armature Current	Speed
39.5KW	77 amp	1320 rpm
0-1320	Constant Torque	
Field Weakening To		2250 rpm

Each D.C drive will be mounted in its own enclosure and will comprise:-
Mounted within the enclosure

- 1 - Door interlocked circuit breaker
- 1 - Suitably rated triple pole main line A.C contactor
- 1 - Motor cooling fan starter comprising contactor, thermal overload, fuses
- 3 - High speed fuses complete with tripped fuse interlocks arranged to stop the drive in the event of a high speed fuse failure

- 6 - Limb chokes for fault limitation and transient voltage protection
- 2 - Fully controlled, anti parallel connected, suppressed half, 3 phase, 6 pulse thyristor converter bridges rated continuously for use in an ambient temperature to BS587 (max 40°C with average 35°C) each bridge complete with device suppression networks, cooling fans and over-temperature protection circuit
- 1 - Brake transformer rectifier
- 1 - Panel anti-condensation heater and thermostat
- 1 - 110V A.C 2 pin socket for inspection lamp
- 1 - Transducer for current feedback purposes and indication purposes

Electronic Modules

- 1 - Set electronic control modules consisting of:-

Regulator Board incorporating:

Speed control circuit containing the speed error amplifier, speed setting reference and current limiting circuitry.

Current control circuit containing the current amplifier stability circuits and current suicing networks.

Electronic instantaneous overload circuit offering sub cycle protection against high levels (the instantaneous overload provides firing circuit pulse suppression and does not rely on the main contactor clearing the high level fault current).

Comprehensive forward and reverse bridge protection and inhibit circuits.

"S Law" Ramp Board incorporating:

Acceleration control circuit providing controlled rate of change of tachometer generator voltage for accelerating the drive to the required speed.

Four Quadrant DCVT providing:

Forward and Reverse Current Feedback.

Twin Firing Circuit Boards providing:

The 6 block pulses which control the conduction of each fully controlled armature bridge.

Auxiliary Components Board incorporating:

Preset potentiometers to allow the setting up of the following control parameters:

Reverse Current Stability

Reverse Current Limit

Forward Current Limit

Forward Current Stability
Speed Stability
Set Minimum Speed
Set Maximum Speed
Ammeter Trim

Main Components of Field Circuit

- 1 - Single phase field supply transformer complete with secondary resistors for fixed field weakening
- 1 - Set interlocked field voltage selection contactors
- 1 - Full wave, single phase diode bridge rectifier
- 1 - Set field failure protection equipment

CONTROL CIRCUIT

- 1 - 600/110V centre tapped, double wound control circuit transformer
- 1 - Set suitably rated HRC fuses for protection of control circuit wiring

Provision is made for reception of following remote operator controls:-

Raise/Lower Speed	}	All on a Joystick Control
High Speed		
Start		
Stop		
Emergency Stop		

Mounted on the panel door is:-

Lock Off Stop Pushbutton - key reset
Ready Lamp
Supply Available Lamp
Reset Pushbutton

Monitoring

Armature current and voltage

Test meter and flying lead

Alarm indication and tripping of drive will occur in event of:-

- Motor Field Failure
- Stack Overtemperature
- Electronic Overload
- External Interlocks
- Motor Overtemperature
- Phase Rotation Wrong/Loss

Protection

Phase Loss

Undervoltage

Electronic Current Limit

Limb Harmonic Suppression Reactor

Field Failure

A.C. Internal Overload

D.C. Overload

Converter Ventilation Failure

The panel is complete with all main and control interconnections having all cables terminated with crimped lugs and identified with internationally colour coded cable numbers. A pocket is in the inner side of the door to hold the necessary equipment drawings.

A.C. & D.C. MOTORS FOR CRANE WINCH DRIVES

All machines offered conform to the relevant British Standards and Lloyd's Unrestricted Requirements, being wound with class 'F' insulation 1 hour rated and suitable for use on the supplies specified.

D.C. MOTORS

The D.C. Motors are totally enclosed, deck watertight, shunt wound interpoler, horizontal C flange mounting type have 2 end plate mounted grease lubricated bearings and a bare splined shaft extension at the driving end. A terminal box is provided suitable for cable termination. Radio interference suppressors are fitted internally. A tacho generator is fitted for speed control.

Motor Data:

Main Hoist	Frame Size DD315	
Output	Armature Current	Speed
70.8KW	265 amp	800 rpm
70.8KW	135 amp	1600 rpm
Field Weakening to		2500 rpm

Aux Hoist No.1 Motor Data		Frame Size DD280
Output	Armature Current	Speed
40.2KW	78 amp	958 rpm
0-958 Constant Torque		
Field Weakening to		2500 rpm

Aux Hoist No.2 Motor Data		Frame Size DD250
Output	Armature Current	Speed
39.5KW	77 amp	1320 rpm
0-1320 Constant Torque		
Field Weakening to		2250 rpm

A.C. MOTORS

The A. C. motors are totally enclosed, deck watertight, squirrel cage induction, 3 speed horizontal speed foot mounting type having 2 end plate mounted grease lubricated bearing and a bare splined shaft extension at the driving end.

A terminal box are provided suitable for cable termination.

Topping Motor Data		Frame Size T42/315
Output	Full Load Current	Speed
61.6KW	75 amp	1800 rpm
30.8KW	59 amp	900 rpm
7.6KW	33 amp	225 rpm

Slewing Motor Data		Frame Size T36/250
Output	Full Load Current	Speed
39.9KW	48 amp	1800 rpm
19.0KW	33 amp	900 rpm
4.1KW	22 amp	225 rpm

BRAKES

Electromagnetic brakes are supplied separately for each drive. The brakes are spring loaded fail-safe protected against seawater to IP65.

Topping

Type 41 Standard 55mm bore with keyway Static Torque 690 Nm

Slewing

Type 37 Standard 48mm bore with keyway Static Torque 440 Nm

Main Hoist

Type 54 Standard 70mm bore with keyway Static Torque 1760 Nm

Aux Hoist No.1

Type 41 Standard 55mm bore with keyway Static Torque 690 Nm

Aux Hoist No.2

Type 47 Standard 60mm bore with keyway Static Torque 1100 Nm

CONTROL CONSOLE

This will comprise a 6mm aluminium plate set into a pedestal structure and inclined for ease of operation.

The console will consist of:

- 1 - 4 direction joystick for slewing and topping control
- 1 - Long scale topping ammeter
- 1 - Long scale slewing ammeter
- 1 - Raise/lower joystick for main hoist
- 1 - Raise/lower joystick for aux hoist no.1
- 1 - Raise/lower joystick for aux hoist no.2
- 1 - Long scale main hoist ammeter
- 1 - Long scale aux hoist no.1 ammeter
- 1 - Long scale aux hoist no.2 ammeter
- 1 - Port/Starboard duty switch (only required on dual control systems)
- 5 - Motor overtemperature lamps
- 3 - Fault lamps
- 3 - Overtravel lamps
- 1 - Power available lamp
- 1 - Port selected lamp - optional
- 1 - Starboard selected lamp - optional
- 1 - Override limit pushbutton for crane parking
- 1 - Emergency stop lock off mushroom head pushbutton
- 1 - Set terminals

Each raise/lower joystick has a high speed request pushbutton in the top of the joystick.

Each joystick is fully screened from others by aluminium barrier plates which also serve to strengthen the unit.