

HCM25 Portable Sub-Sea MPI System

Data Sheet

The HCM25 hand portable MPI was designed in response to the need for a rapidly deployable and reliable system. It has six main components - an electromagnetic yoke, a U.V. Lamp, a battery pack, an interface to run the yoke from a conventional MPI transformer, a hand operated ink pump and a combined battery charger and topside PSU.

The yoke and the lamp are world 'firsts' in that HCL have designed them for sub-sea or in-air use. Both operate from 24V DC, are rated for continuous use, and in both cases can operate from batteries or umbilical. Thus, for the first time, sub-sea MPI can be entirely independent of the surface. As with all HCL products, the HCM25 system is designed and engineered to provide maximum cost/performance benefits to the user. Its ease of deployment, independence of the surface, operational reliability and attractive price combine to make the system almost indispensable to any operator or diving company.

Yokes generally in use are designed for AC operation, which dictates the use of laminated cores and pole pieces, and non diver-safe voltages. Core laminations are a known water ingress path and the high voltages demand the use of earth leakage trips. The HCM25 yoke has a solid core and operates from 24V DC, thereby saving the need and cost of expensive diver protection measures. Additionally, the solid core and pole pieces allow the introduction of two-axis articulation of the pole pieces. The solid core, together with the oil-filled pressure-compensated housing, improves sub-sea reliability beyond measure. Radial articulation of the pole pieces dramatically increases the number of possible applications, even in complex multi-planar geometries. Previously, only articulated permanent magnets could have been used in these situations, with all that entails in loss of field strength or frequent re-magnetisation. The HCM25 will always give an adequate field - even at 22V (the 'battery low' voltage), the HCM25 will life more than 25kg, exceeding the BS6072 requirement by 7kg.

The HCM25 U.V. Lamp is the result of extensive R&D; like the Yoke, it meets the criteria for diver safety and BS6072. An extremely compact unit only 340mm long with a major diameter of 42mm, access in tight structural geometries is excellent.

The lamp radiates from a broad area along one side of the housing. The U.V. source is a 225mm long, gas discharge tube, with peak emission at about 360nm (long wave U.V.), and made from a cobalt glass that filters out most of the visible light. The external pressure envelope is a special glass with high physical strength and a very high U.V. transmission (about 95% - compared with only around 70% for ordinary float glass). In order to achieve the levels of irradiation required by BS6072, the lamp has custom-designed electronics, and is used in conjunction with a reflector specially coated to maximise U.V. reflection and minimise absorption. The epoxy-encapsulated electronics are contained within the aluminium handle section of the pressure hull. As with most gas-discharge tubes, the U.V. tube should give a life of several thousand hours, and a balance has been achieved between lamp life and high U.V. output. The housing design provides optimum protection for the tube with the additional advantage that replacement tubes are very economical.

The system is designed to allow the user several supply options. The lamp and yoke can be operated from HCL's battery pack, a single pack driving both units providing for about 1hour 40 minutes use. With each unit having its own pack, about 3hours 30 minutes may be expected. Wet-mateable connectors are used throughout, allowing battery packs to be changed underwater. If surface power is required, the battery charger/topside PSU will drive both units via a single two-core umbilical. If there is a requirement to use the yoke in conjunction with standard OIS/OSEL type MPI transformers, the yoke can be powered by the transformer via HCL's MPI interface. This small unit hangs from the handle of the pot, and is connected to the AC terminals in place of the coils. As the main system will already have a U.V. lamp available, the interface unit is designed to drive only the yoke.

Battery Pack:

The battery pack is a 24V 2.3Ah sealed lead-acid unit, fitted with an on/off switch and has an indicator light - this shows green when the battery is good, orange when the battery has about 10 minutes use left, and red when the battery has reached full discharge. The output is automatically disconnected at this point to prevent both over-discharge and excessive reduction in field strength. The pack is fitted with a pressure relief valve that eliminates the need to vent it during charging, and has a thermal cutout to prevent over-heating, and an output protection fuse.

Battery Charger/Topside PSU:

The battery charger is a current-limited constant voltage unit, and will recharge a flat battery in about 4 hours. It has an auxiliary output that is designed to power the yoke and/or the lamp (via an umbilical) when not in use as a battery charger. The unit has a three-colour indicator, which shows red when the unit is charging, orange when the battery is charged (or disconnected) and green when the yoke auxiliary output is on. A press button switch on the front selects the mode of use.

MPI Transformer Interface:

The MPI interface power supply hooks onto the handle of the transformer pot, and is connected in place of the coils to the AC terminals. It has a red power-on lamp, and is controlled from the surface unit, exactly as the MPI coils would be. The output current control should be set to maximum, although little or no indication will show on the ammeter. Any device that will provide 6V AC at about 3 amps may be used to power this interface.

Ink Pump:

This economical unit solves the problem of seawater dilution of ink that is inherent in most other flexible ink dispensers. By utilising a collapsible reservoir in combination with a trigger-operated pump, the module prevents seawater from being drawn into the reservoir. The reservoir capacity is about half a litre, and the price of the module is such that several may be deployed at the same time without undue expense - this will obviously be an advantage where larger areas are to be inspected.

HCM25 Yoke	
Lifting Pull	25kg min. at 24V DC
Pole Spacing	230mm maximum 85mm minimum
Leg Articulation Axial	90 degrees
Leg Articulation Radial	360 degrees
Weights	3.2kg In Air
	2.4kg In Water
Depth Rating	Infinite, limited only by connector rating

Hull	Oil-filled, Pressure-Compensated
Power Requirement	24V DC 400mA (10w)
Duty Cycle	100% in water or air
Connector	1 pin 2-way male EO style in-lin
HCM25 Lamp	
Peak Emission Wavelength	360nm
Output Power	800 microwatts/cm sq. @ 100mm
Weights	0.65kg In Air
	0.25kg In Water
Depth Rating	600m
Power Requirement	24V DC, 550mA (13w)
Duty Cycle	100% in water or air
Connector	1 pin 2-way right angle EO style b/h
HCM25B Battery Pack	
Capacity & Type	24V 2.3Ah sealed lead-acid with low battery detect/cut-off
Weights	3kg In Air
	1.3kg In Water
Dimensions	116mm Diameter, 240mm Long
Duration	4 hours Yoke Only (continuous)
	3.5 hours Lamp Only (continuous)
	1 hour 40 minutes Lamp + Yoke (continuous)
Depth Rating	600m
HCM25BC Battery Charger/Topside PSU	
Recharging Time	4 hours from full discharge
Charger Output	29.3V, 800mA maximum
Auxiliary Output	24.3V, 1100mA maximum

Input	120/240V AC
HCM25IF MPI Interface	
Voltages	5.5-7V in, 24V DC out
Weights	1kg In Air
	0.8kg In Water
Dimensions	116mm Diameter, 70mm high
Depth Rating	600m
HCM25P Ink Pump	
Capacity	Approximately 500ml
Reservoir Specification	Collapsable, operating at ambient pressure. Non return valves to prevent sea water ingress.