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HARDWARE TECHNICAL SPECIFICATIONS

KELVIN HUGHES MANTA NEO X-BAND RADAR

GENERAL	Dimensions	388 mm x 360 mm x 335 mm (To top of antenna) Antenna length: 1945 mm	
	Weight	Sensor	16 kg
		Antenna	12 kg
		VCU	2.5 kg
	Supply voltage Using VCU	10.2 to 31.2 V DC Nominal 12 V / 24 V DC	
	Power consumption (typical)	70 W	
	Power consumption (Max)	170 W	
	Power consumption (Standby)	28 W	
	Maximum range scale	72 Nm	
	Boot up time	40 seconds	
	Standby to transmit	Less than 5 seconds	
ENVIRONMENTAL	Waterproof rating	IPX6	
	Operating temperature range	-25°C to +55°C	
	Humidity	Up to 40°C at 93% relative humidity.	
	Maximum wind speed	Starts in winds up to 100Kn	
TRANSMITTER	Frequency	9370, 9400, 9430 MHz	
	Peak output power	110 W	
RECEIVER	Receiver characteristics:	Linear	
	Receiver noise:	Less than 5 dB	
ANTENNA	Beamwidth (vertical)	25° nominal	
	Beamwidth (horizontal)	1.32° nominal	
	Polarisation	Horizontal	
	Rotation speed	24 RPM	
APPROVALS	IEC60945 IEC62388		

EMPLOYER RECOGNITION SCHEME
SILVER AWARD 2021
Proudly supporting those who serve.

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Registered Office: Voltage, Mollison Avenue,
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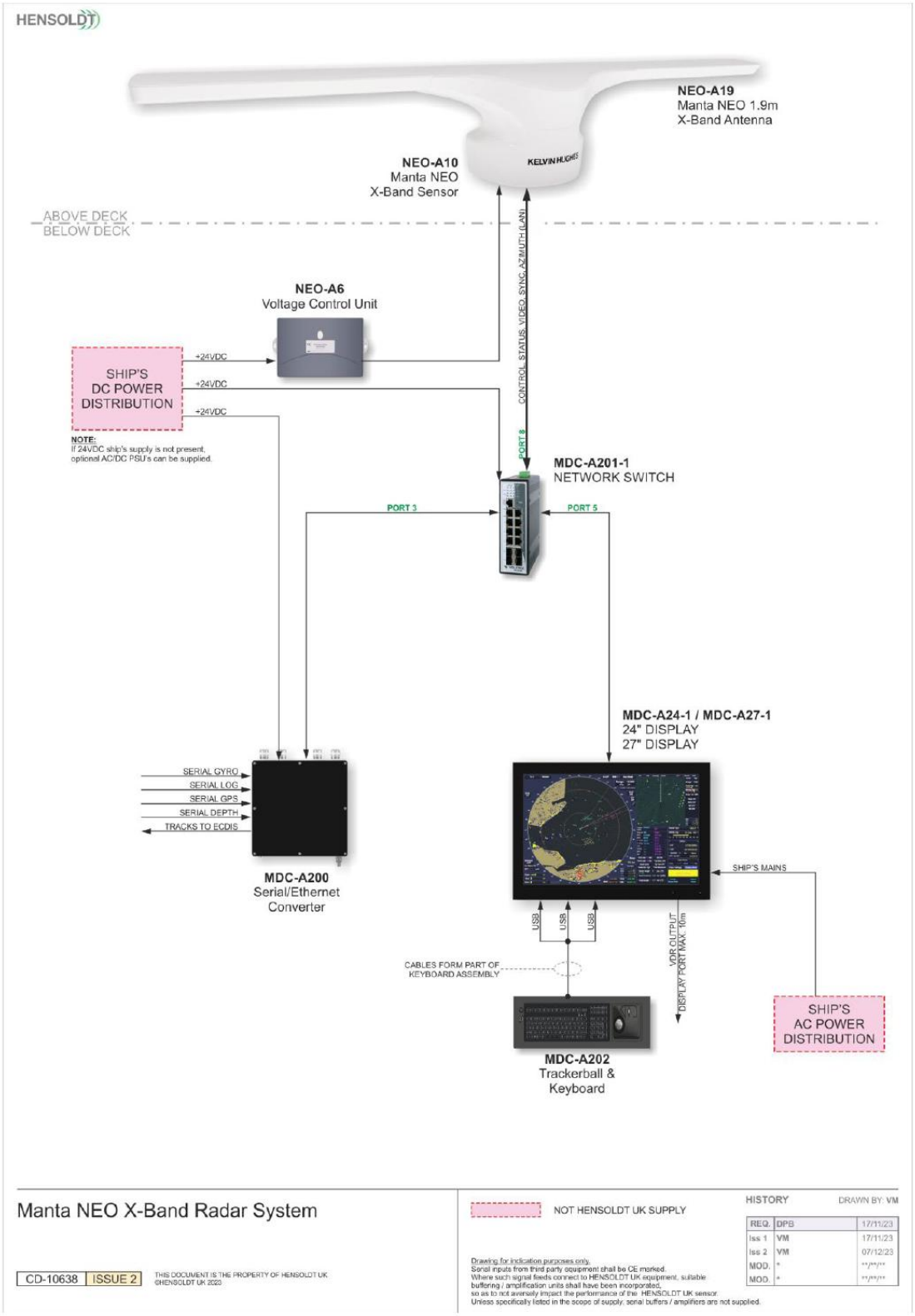
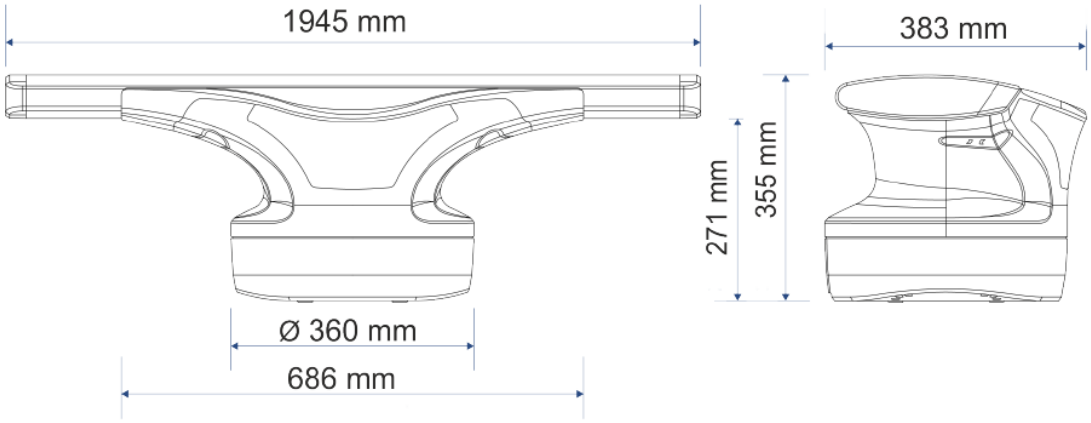
Incorporated in England and Wales No: 01030135

TYPICAL SYSTEM DIAGRAM

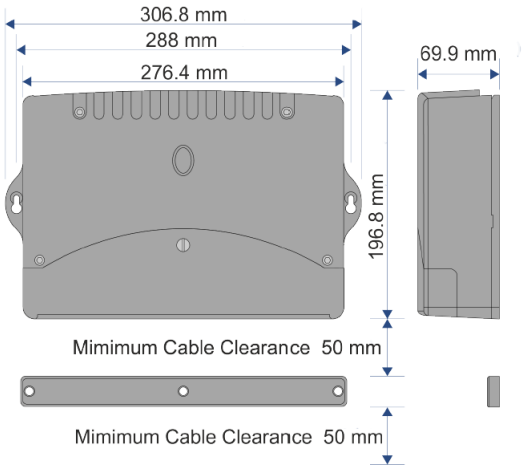


DIMENSIONS

Radar Transceiver & Antenna:



NEO-A6 Voltage Control Unit:



DC Supply

Where no ships +24VDC is available, an optional AC/ DC power supply can be supplied. Part number MDC-A205-2.

HENSOLDT
Detect and Protect.

KELVIN HUGHES MFD DISPLAY UNIT

The Kelvin Hughes Multi-Function Display is an IMO compliant radar display with following standard features;

Target tracking (ARPA)

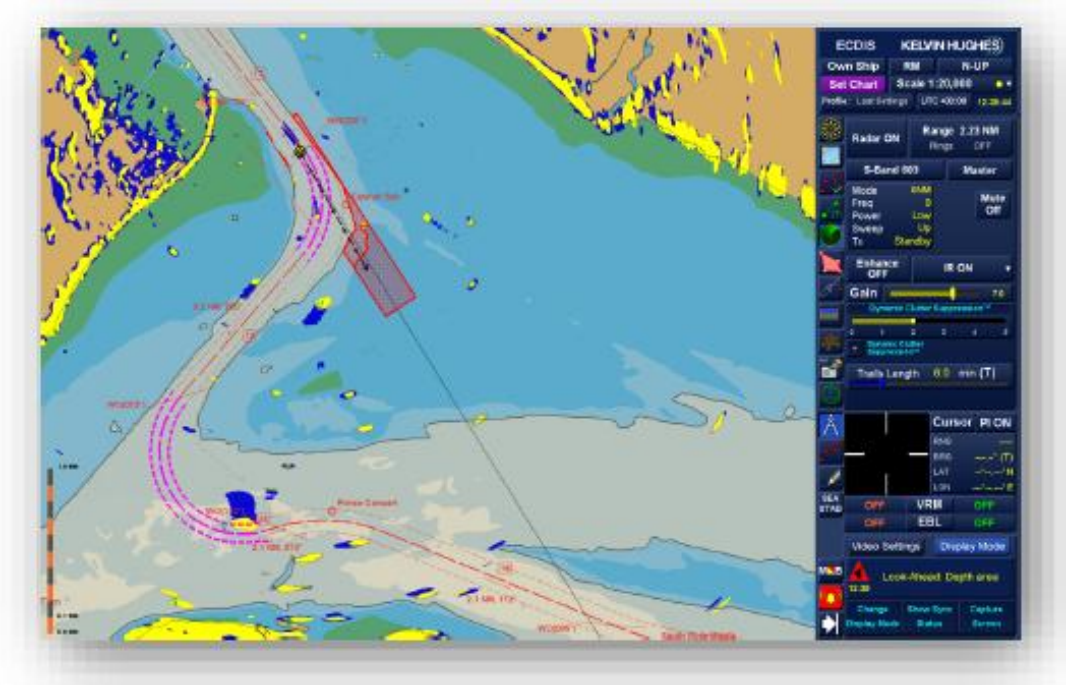
Target acquisition:	Up to 450 targets
Auto tracking:	Yes
ARPA tracking range:	0.5 to 24nm
AIS target capacity:	500 targets

Feature	Description
Display 24" & 27"	LED Backlight Technology, Colour Active Matrix • 27.0 / 24.0 inch viewable image size, Widescreen, Aspect Ratio 16:9 • a-Si (amorphous silicon) Thin Film Transistor (TFT). Zoned operational data/control fields Operational controls facilitated by use of a trackball and three pushbuttons. The centre button doubling as a scroll wheel.
TFT characteristics	• Native Resolution : 1920 x 1080 (FHD) • Pixel Pitch (RGB) ▪ 0.31125 (H) x 0.31125 (V) mm (27") ▪ 0.276 (H) x 0.276 (V) mm (24") • Response Time : 12 ms (typical) (27") / 25 ms (typical) (24") • Contrast Ratio : 3000:1 (typical) • Light Intensity : 300 cd/m² (typical) • Viewable Angle : +/- 89 deg. (typical) (Up/Down/Left/Right) • Active Display Area : ▪ 597.6 (H) x 336.15 (V) mm (27") ▪ 531.36 (H) x 298.89 (V) mm (24") • Max Colours : 16.7 million
Video Processing	Manual Selectable gain, target enhancement and scan/scan correlation. Multiple correlation modes
Radar Trails	Relative and true trails variable from 0 to 30 minutes in 0.1 minute steps. The trails are retained during range change.
Range Scales/Rings	Range scale (nm) / Range rings (nm) / No of rings 0.125 / 0.05 / 2 0.25 / 0.1 / 2 0.5 / 0.1 / 5 0.75 / 0.25 / 3 1.5 / 0.25 / 6 3.0 / 0.5 / 6 6.0 / 1.0 / 6 12.0 / 2.0 / 6 24.0 / 4.0 / 6 48.0 / 8.0 / 6 96.0 / 12.0 / 8
Motion Modes	Relative Motion, True Trails, RM(T) Relative Motion, Relative Trails, RM(R) True Motion, True Trails, TM(T) True Motion, Relative Trails, TM(R)
Presentation Modes	Head Up - Stabilised Head Up - Unstabilised (Fallback mode) North Up Course Up
Range Discrimination:	Better than IEC 62388 specification of 40m on 0.75nm range scale.
Range Ring Accuracy:	Better than IEC 62388 specification of 1% of range scale in use or 30m, whichever is greater
Lat/Lon	Readout of Own Ship's Lat/Lon and cursor range/bearing and Lat/Lon
Range	Variable Range Markers (1 and 2) VRMs variable from 0.001 to 96 nm displayed on screen

Feature	Description
Bearing Data	Bearing scale: electronically generated 1°, 5° and 10° marks from 0 to 359° Electronic Bearing Lines (EBL1 and EBL2) EBLs variable in 0.1° increments Parallel Index lines: Four navigation lines
Target Tracking	ARPA compliant with requirements of IEC 62388
AIS	Shows Class A and Class B AIS targets, AIS locating devices (EPIRBs, SARTS & MOBs) and AIS data reports including AIS Aids to Navigation (ATON), Airborne Search and Rescue Aircraft (ASAR) and AIS Base Stations. Maximum number of sleeping targets displayed: 500. Filtered by Range, CPA and TCPA. Each class of target can be shown or hidden.
Target Association	Selected using a combination of Range, Bearing, COG and SOG. The criteria are user adjustable.
Target Display and Tote	Up to 6 most dangerous targets displayed.
Target Vectors	Vectors for radar and AIS targets, variable for 0 to 10 minutes in 1 minute steps, then 12,15,18,24,30,45,60,120 mins intervals.
Target Past Positions	Past positions for radar and AIS targets, variable 0 to 30 minutes, displayed at 0.1 minute intervals.
Charts (Only available if chart option is taken)	Shows vector charts: - ENCs (IHO S57). - Encrypted ENCs (IHO S63). - C-Map Professional, C-Map Professional+, C-Map ENC and other C-Map Services. **NOTE:** Does not display raster (RNC/ARCS) charts.
Mapping	Allows user maps to be created, stored and retrieved Maps are ground referenced (True) or ownship/target referenced (Relative).
Wind Display (option)	Option to show True or Relative Wind.
Alarms	Audible and visual alarms.
User Profiles	Allows individual User Profiles to be set up and stored. The screen can be customised for each user.
User Controls	Behind front bezel - Glass Display Control™ (GDC) IP66: • Power On/Off, Brightness Control (-/+). • Power LED, Mode Status Indicators (ECDIS, HDD, Service). • Buzzer (through glass) (75-85dB).
Power Supplies	• 100-240V AC - 50/60Hz. • +24V DC. Note: You may connect either AC power or DC power or both. In case both sources are connected, power will be sourced from the AC input. If AC input is lost, there will be an uninterrupted switch-over to DC input. **Power Consumption:** • 27" Operating AC/DC: 72W (typical) - 156W (max). • 27" Operating AC: 72W (typical) - 250W (max). • 24" Operating AC/DC: 88W (typical) - 156W (max). • 24" Operating AC: 88W (typical) - 250W (max).
Mechanical Construction	fabricated sheet metal display.
IP Rating	IP20 rear / IP66 front.
Mounting:	Console or desktop mounting. Note: it is advised that you do not mount the unit in a vertical angle lower than ±30°.
Cooling:	convection cooling.
Environmental:	To IEC 60945 Ed 4. Ergonomic design to ISO recommendations.

KELVIN HUGHES MFD as an ECDIS display

ECDIS Display is accessed through the Standby Mode (via APP) and when accessed as part of the MFD is regarded as no longer being in a radar navigation mode.
Designed for ease of operation the Kelvin Hughes Electronic Chart Display and Information System (ECDIS) provides the operator with an intuitive and clear display of relevant information.
This advanced decision making tool enhances safety and efficiency at sea.



The Kelvin Hughes range of displays are Type Approved and designed with multifunction and flexibility in mind. Providing a platform for ECDIS compliance, a route to paperless navigation as well as options to operate as a radar and chart radar, a single workstation can be a dedicated ECDIS or operate as a wider integrated bridge or navigator's workstation.
The ECDIS system allows electronic navigation charts to be presented and user generated routes and maps shown on the display. AIS targets and, where connected to a suitable radar system, radar tracked target data can also be viewed and managed.
Chart maintenance allows the installation, updating, and general management of electronic charts and chart licences on the processor. Charts can be loaded via the USB port.

Navigational Features:

Total waypoints capability:	2000 or more
Route capability:	50 route plans or more.

KELVIN HUGHES MFD DISPLAY

CONNECTIVITY

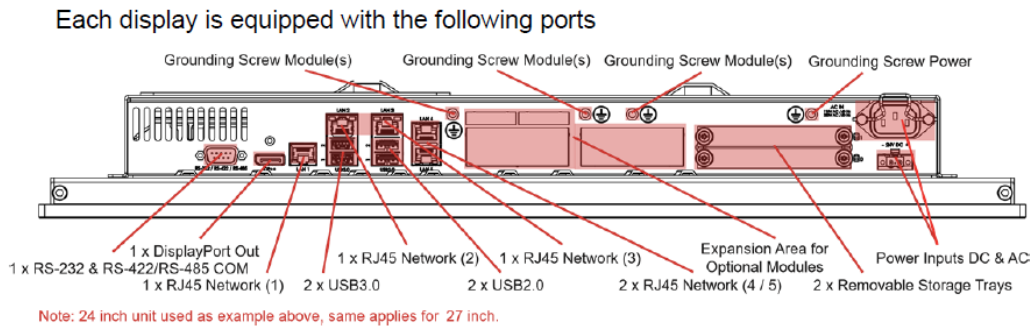


Figure 4 - Console Mounted Display – Connectivity (Options)

Port	Qty (27")	Qty (24")	Remarks
VGA	1	1	Not Used
Display port	1	1	Used as the output to a VDR system
LAN	5	5	Connection to Asterix based network
USB3.0	2	2	Configuration
USB2.0	2	2	Configuration and Keyboard and Trackball
Serial	1	1	Future use

Network System

The Kelvin Hughes MFD system relies upon a reliable, dedicated network. The network carries the ASTERIX based radar video, control and status messages between the radars and displays, along with additional information when extended to a full bridge system.
The network also carries the encapsulated navigation data between the ship and the displays through the use of a serial Ethernet interface. See later section for message types supported.
The network switch for this system is equipped with 8 port 10/100/1000Base-T and 4 Gigabit SFP Slots. It has redundant power supply capability and is suitable for DIN rail mounting within a ship's console.

Figure 6 - MDC-A201-2 – Managed Network Switch

KELVIN HUGHES MFD DISPLAY

OPERATIONAL ENVIRONMENT:

- Operating : Temperature -15°C to +55°C
- Storage : Temperature -20°C to +60°C
- Humidity : Up to 95% (Operating / Storage)
- Shock - Vibration : 5g/11ms - 0.7g (IEC 60945 / IACS E10)
- Air Pressure Maximum Altitude : Operating: 4000m - Storage: 12912m
- IP-Rating Protection : IP66 front - IP20 rear (EN60529)
- Compass Safe Distance (27”): Standard: 85cm - Steering: 50cm
- Compass Safe Distance (24”): Standard: 140cm - Steering: 85cm
- CPU Fan Cooler/Heatsink : Rear external air flow. FAN speed temp. controlled

Note: Lifetime Considerations:
Even though the test conditions for bridge units provide for a maximum operating temperature of 55°C, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25°C. This is a necessary prerequisite for long life and low service costs.

Electromagnetic Compatibility
The display hardware is designed to meet the applicable requirements of IEC 60945, Edition 4. Certification is available for standard IMO approved hardware

EXTERNAL INTERFACES

Power supplies

Typical power consumption values are as follows:

Part Number	Input Voltage		Frequency (Hz)		Power	Inrush Current (A)	Power Factor
	Min	Max	Min	Max			
MDC-A27-1	100 V AC	240 V AC	50	60	72W (typ) 250W (max)		
MDC-A27-1	24V DC	24V DC			72W (typ) 156W (max)		
MDC-A24-1	115 Vac	230 Vac	47	63	88W (typ) 250W (max)		
MDC-A24-1	24V DC	24V DC			88W (typ) 156W (max)		
MDC-A200	10 Vdc	32 Vdc	N/A	N/A	2.5 W	2A peak @ 24VDC	N/A
MDC-A202	Powered by USB from display						
MDC-A201-2	12 Vdc	48 Vdc	N/A	N/A	13.2W		

Note: These are typical values and there may be some variation dependent upon any options taken up.

Standard Serial Messages

For ships that use IEC 61162-1 Ed5 serial messages the Kelvin Hughes Serial to Ethernet interface can be used. This bi-directional interface transforms the serial messages into Ethernet packets and vice versa for distribution via a network switch to each of the radar displays.

It is equipped with 6 ports that are compliant to IEC-61162-1 Ed 4. It also has 4 independent changeover relay contacts under the control of messages received through the MDC-A200 Ethernet interface

The following are a sub-set of the standard IEC61162 Ed5 messages accepted by the hardware and software.

MDC-A200 serial Navigation input/output messages				
Serial Ports	Standard: 6 x IEC61162 input/output connections (RS422) for each MDC-A200			
	ACK	Acknowledge (alarms)	RPM	Engine revolutions per minute and pitch
	AIS	Automatic identification system (VDO & VDM)	RSA	Rudder sense angle
	ALR	Local alarm status	RTE	Routes
	DBT	Water depth reference to the transducer	THS	True heading and status
	DPT	Water depth referenced to the transducer	TLB	Target label
	DTM	Position datum	TTM	Target data
	GGA	Global position system fix data	VBW	Dual ground/ water speed
	GLL	Geographic position latitude and longitude	VDM	AIS data link message
	GNS	GNSS fix data	VHW	Water speed and heading
	HDT	Heading true	VTG	Actual track and ground speed
	MWV	Wind speed and angle	WPL	Waypoint location
	NRX	Navtex messages	XDR	Transducer data or VDR-A4 DIU
	PPRS	Proprietary Rolls Royce thruster message	ZDA	Time and date
	RMC	Position and ground velocity	-	-
	ROT	Rate of turn	-	-

Display Equipment Weights and Dimensions

Part Number	Weight (kg) ±10%	Width (mm) ±10%	Height (mm) ±10%	Depth (mm) ±10%
MDC-A27-1	12.1	650	437	81.5
MDC-A24-1	10.0	593	384	82
MDC-A200	1	188	67.5	233
MDC-A201-2	0.779	54.3	145.1	108.3