

Datex-Ohmeda

S/5™ Interface Module, M-INT (Rev. 01)

Technical Reference Manual



All specifications are subject to change without notice.

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Interface Module, M-INT (Rev. 01)

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INTRODUCTION

The Interface Module, M-INT, provides an interface between the S/5 Critical Care and Anesthesia Monitors and other external monitors such as, Datex-Ohmeda Cardiocap and Capnomac Ultima, Criticon Dinamap 1846 SX, and Abbott Oximetrix 3.

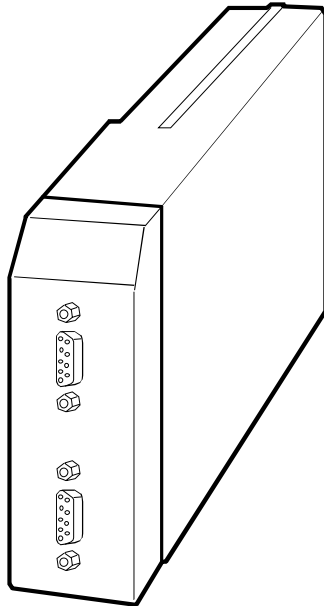


Figure 1 **Interface Module, M-INT**

NOTE: The Interface Board, B-INT, and Interface Module, M-INT, cannot be used simultaneously in the same monitor.

1 SPECIFICATIONS

1.1 Serial I/O Definitions

- RS-232 buffered (channels 1-2)
- All standard baud rates are possible from 300 to 115200
- Each interfaced device has fixed baud rate.

1.2 Analog definitions

- There are four analog inputs available on channel 1 and four on channel 2.
- All analog inputs are Op-Amp buffered, with an input impedance of 1 M Ω . Each analog input is also equipped with a 1 M Ω pull-down resistor to -12 V for NC detection.
- Sampling rate: 10 ms/sample/channel
- Input range: -10 V...+10 V
- Resolution: 10 bits \rightarrow 1024 voltage levels in input range

2 FUNCTIONAL DESCRIPTION

The Interface Module, M-INT, detects and identifies the external monitors connected to the module. The identification is made by a serial string, sent by the external monitor.

When an external monitor is connected to the Interface Module, numeric data is always displayed on the monitor screen. Also, analog real time waveforms are displayed, if the external monitor is able to send them.

Connections from the Interface Module to external monitors are isolated from S/5 monitor.

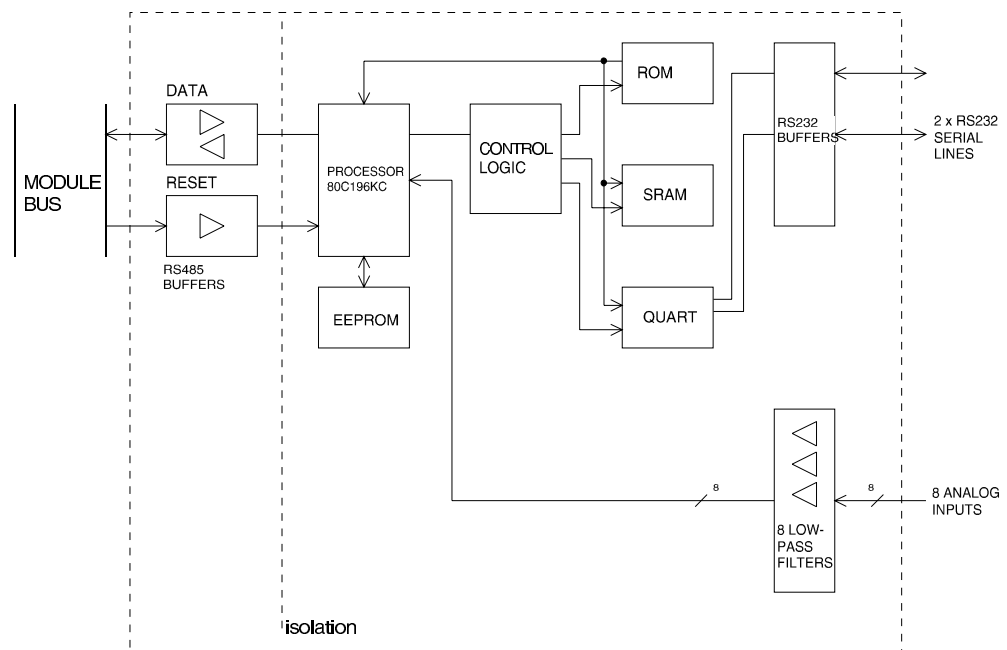


Figure 2 Interface Module, M-INT, block diagram

2.1 Main components

The Interface Module contains an 80C196KC16 microprocessor.

External Connections

The connectors on the Interface Module are:

- One 25-pin D-connector X1 for the module bus.
- Two 9-pin connectors, X2 and X3, for external monitors. These are internally connected to two 9-pin female D-connectors via ribbon cables.

Each X2 and X3 connector has an RS-232 serial communication channel and four analog inputs.

RS-485 Serial Communication

The Interface Module uses RS-485 signal levels when communicating with the external monitor. The RS-485 signals are transformed to digital signal levels and fed via an opto-isolator to the microprocessor. The communication signals for transmitting (TxD) and receiving (RxD) data are sent to the microprocessor ports. The direction of the communication is controlled by REC/SND signals, generated by the microprocessor, via the opto-isolator. When the module bus is reset, the communication is always set to the receiving state.

Reset

The interface board resets when module bus is reset. The RESET signal is converted from an RS-485 signal level to a digital signal level and then fed to an opto-isolator. The RESET signal is renamed to POWEROK signal. The POWEROK signal resets the microprocessor and the GAL circuit.

RS-232 Serial Communication

A QUART is used to provide four serial communication channels with external monitors. However, only two channels are used. The microprocessor controls resetting of the QUART during normal operation. When the microprocessor is reset the QUART is also reset.

Memories

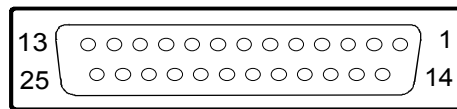
There are static RAM, ROM, EEPROM memories fitted to the Interface Module. The memory decoding is done by the GAL circuit. The microprocessor communicates with the EEPROM in serial mode.

Analog Inputs

Eight analog inputs from the serial/analog connectors are connected to eight low pass filters. The frequency limit (-3 dB) is set to 35 Hz. The input signal levels are between -10 V and +10 V, and the output signals are scaled between 0 V and 5 V. The output signals are then fed to the microprocessor A/D inputs.

2.2 Connectors and signals

2.2.1 Module bus connector



Module Bus Connector (X1)

Pin No	I/O	Signal
1	0	RESET_RS485
2	0	-15 VDC
3	0	+15 VDIRTY
4	0	+15 VDC
5	I/O	-DATA_RS485
6	I/O	DATA_RS485
7		Ground & Shield
8	0	-RESET_RS485
9	0	CTSB
10	I	RTSB
11	0	RXDB
12	I	TXDB
13		Ground & Shield
14	0	+32 VDIRTY
15	0	GroundDIRTY
16	0	CTSC
17	I	RTSC
18	0	RXDC
19	I	TXDC
20		ON/STANDBY
21		BITOIN
22		RXDD_RS232
23		TXDD_RS232
24	0	+5 VDC
25	0	+5 VDC

2.2.2 Interface board connectors

Power test connector (X11)

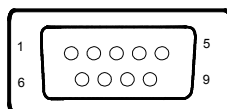
Pin No	Signal
1	+5 V TEST
2	+5 V ref
3	+12 V
4	GND
5	-12 V
6	NC

Analog test connector (X5)

This connector is for factory tests only.

Pin No	Signal
1	ACH0
2	ACH1
3	ACH2
4	ACH3
5	ACH4
6	ACH5
7	ACH6
8	ACH7
9	GND

2.2.3 Front panel connectors



Serial/Analog connector(X2) CH 1 (floating, off-board)

Pin No	Definition
1	A0 analog input
2	RXD
3	TXD
4	A1 analog input
5	GND
6	A2 analog input
7	RTS
8	CTS
9	A3 analog input

Serial/Analog Connector (X3) CH 2 (floating)

Pin No	Definition
1	A4 analog input
2	RXD
3	TXD
4	A5 analog input
5	GND
6	A6 analog input
7	RTS
8	CTS
9	A7 analog input

3 SERVICE PROCEDURES

3.1 General Service Information

Field service of the Interface Module, M-INT, is limited to replacing faulty circuit boards. A faulty circuit board should be returned to Datex-Ohmeda for repair.

Datex-Ohmeda is always available for service advice. Please provide the unit serial number, full type designation, and a detailed description of the fault.


CAUTION Only trained personnel with appropriate equipment should perform the tests and repairs outlined in this section. Unauthorized service may void warranty of the unit.

3.2 Service check

These instructions include complete procedures for a service check. The service check is recommended to be performed after any service repair. However, the service check procedures can also be used for determining possible failures.

The procedures should be performed in ascending order.

The instructions include a check form (*Appendix A*) which should be filled in when performing the procedures.

The mark  in the instructions means that the check form should be signed after performing the procedure.

The procedures are designed for monitors with S/5 monitor software of revision 01. However, most of the procedures also apply to monitors, which contain some other monitor software type/revision.

3.2.1 Recommended tools

Tool	Order No.	Notes
Datex-Ohmeda gas monitor with the SpO ₂ measurement		e.g. ULT-S
INT Interface cable	892377	
Calibration gas		
SpO ₂ probe		
Screwdriver		

- Detach the module box by removing the two screws from the back of the module. Be careful with the loose latch and spring locking pin.
- 1. Check internal parts:
 - screws are tightened properly

- cables are connected properly
- all socket mounted IC's are inserted properly
- the EMC cover is attached properly
- there are no loose objects inside the module



2. Check external parts:

- the front cover and the front panel sticker are intact
- the block screws for cables are in place and are tightened properly
- the block screw threads are intact
- all connectors are intact and are attached properly
- the module box, latch and spring locking pin are intact



Reattach the module box and check that the latch moves properly.

3. Plug the Interface Module into the monitor Central Unit. Check that it goes in smoothly and locks up properly.



- Connect the Datex-Ohmeda gas monitor with the interface cable (order code 892377) to Interface Module, M-INT, connector 1. Lock the cable properly.
- Turn both monitors on.
- Make sure the serial output mode of the Datex-Ohmeda gas monitor being used is set to NUMERIC.
- Configure the S/5 monitor screen so that all required parameters are shown, for example:

**Monitor Setup - Screen 1 Setup - Waveform Fields - Field 5 - Pleth
Field 6 - Co₂**

4. Set the interface for the Datex-Ohmeda gas monitor being used:

**Monitor Setup - Install/Service (password 16-4-34) - Installation -
Interfacing - Gases/Spiro - XXX
SpO₂ - XXX**

XXX = the gas monitor being used

Check that the menus NIBP and SvO₂/C.O. are selectable from the menu.



5. Enter the service menu:

Monitor Setup - Install/Service (password 16-4-34) - Service (password 26-23-8)

Take down the information regarding Interface Module, M-INT, software by selecting SCROLL VERS and turning the ComWheel.



6. Enter the M-INT service menu:

Parameters - More - Interface

Check that the “Timeouts”, “Bad checksums” and “Bad c-s by mod” values are not increasing faster than by 50 per second. Check that the Interface Module M-INT memories have passed the internal memory test, i.e. “RAM” and “ROM” state OK.



7. Check that the interfaced gas monitor is identified, i.e. the required waveform fields are shown on the screen and the gas monitor type is shown correctly on the service menu.

Check that the communication state is “online”.



8. Select GASES from the M-INT service menu.

Check that “id:” states the correct monitor and interface type, “Active” states YES and “Timeout” NO.

Check that the numeric values on the service menu are reasonable.

Simulate breathing by feeding calibration gas into the Datex-Ohmeda gas monitor sampling line and check that the values on the service menu correspond with the values on the gas monitor screen.

Check that the values in the S/5 monitor gas waveform field are correct and a proper CO₂ waveform is shown.

Stop feeding the calibration gas. Check that the message “Apnea” appears in the S/5 monitor waveform field, and in the message field, if the selected interface type is ULT/al.



9. Select SpO₂ from the M-INT service menu.

Check that “id” states the correct monitor and interface type, “Active” states YES and “Timeout” NO.

Check that “ProbeOff” shows 1 when no SpO₂ probe is connected to the interfaced gas

monitor. Connect the SpO₂ probe and check that the “NoProbe” shows 1.

Attach the SpO₂ probe to your finger and check that the values on the menu correspond with the values on the gas monitor screen.

Check that the values in the S/5 monitor pleth waveform field are correct and a proper pleth waveform is shown.

Disconnect the SpO₂ probe. Check that the message “Probe off “ appears in the S/5 monitor waveform field, and “SpO₂ probe off” appears in the message field, if the interface type is ULT/al.



10. Turn the gas monitor off. Check that the messages “Interfaced Gas monitor removed” and “Interfaced SpO₂ monitor removed” appear on the S/5 monitor screen.



11. Turn the S/5 monitor off. Connect the gas monitor with interface cable to Interface Module, M-INT connector 2.

Turn the monitors on and check that the necessary numerics and waveforms are still interfaced, together with the alarms, if the interface type is ULT/al.



12. Disconnect the Interface Module, M-INT, for a moment, then plug the module back into the monitor.
Check that interfacing with the gas monitor is restored.



13. Perform an electrical safety check and a leakage current test.



14. Check that the Interface Module, M-INT, functions normally after performing the electrical safety check.



- Set the interface back for modules:

**Monitor Setup - Install/Service (password 16-4-34) - Installation -
Interfacing - Gases/Spiro - Module
SpO₂ - Module**

15. Clean the module with suitable detergent.



- Fill in all necessary documents.

3.3 Disassembly and reassembly

Disassemble the Interface Module, M-INT, in the following way (see figure 3).

1. Remove the two screws from the back of the module.
2. Pull the module box slowly backwards and remove it from the main body.
3. To detach the circuit board, remove four screws and disconnect the two ribbon cables from the front panel.

To reassemble the module, reverse the order of the disassembly steps.

4 TROUBLESHOOTING

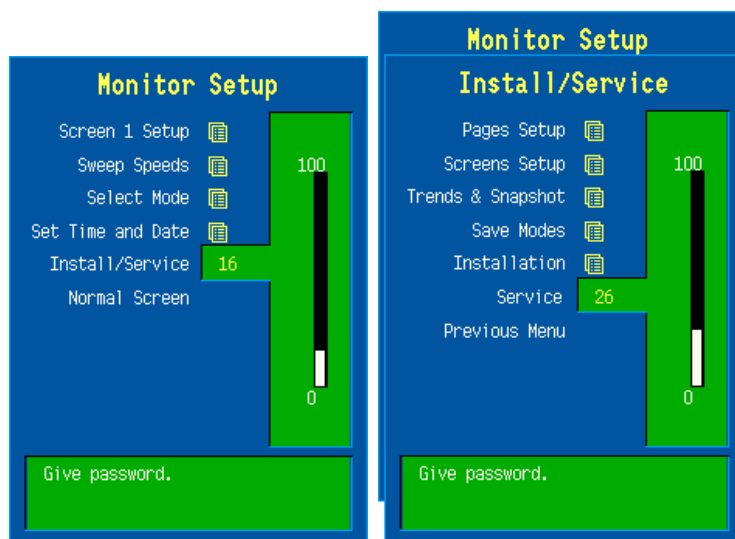
Enter the Service Menu (see chapter 5). Select Scroll Vers and scroll down the SW version/Unit id list. Make sure that the software code and level, control and serial numbers of the Interface Module, M-INT, are displayed under B-INT/M-INT.

If they are not displayed, the Interface Module, M-INT, is faulty.

4.1 Troubleshooting chart






Trouble	Cause	Treatment
M-INT not active in the Service Menu. Software version and ID data are not available in the Service Data field.	Module is not connected properly. M-INT is faulty	Check that the module is firmly pushed into the module slot. Replace M-INT Interface board.
Measured values from the interfaced monitor do not appear on the display after approximately one minute.	Monitor not selected for interface. Poor contact in the interface cables. Wrong interface cable.	Select the right monitor from the Interfacing menu. Check the cables and connections. Change the cable to another connector. Check cable type and change if necessary.

5 SERVICE MENU



1. Press the **Monitor Setup** key.
2. Select **Install/Service** (password 16-4-34).
3. Select **Service** (password 26-23-8).
4. Select **Parameters - More - Interface**.

5.1 Interface menu

Interface	Service Data
Gases 	I-INT: id: state:
SpO2 	B-INT: ch:0 id:Ultima state:online
NIBP 	ch:1 id: state:
Spirometry 	ch:2 id:Dinamap state:online
SvO2/C.O. 	ch:3 id: state:
Previous Menu	rt : CO2
	rt : Pleth
	Timeouts 0 RAM OK
	Bad checksums 0 ROM OK
	Bad c-s by mod 0

Interface

Gases, SpO₂, NIBP, Spirometry, SvO₂/C.O. indicate the parameters for which service data is available. The data which can be seen on those pages is raw data from the interfaced monitors, which will be processed for the normal screen.

Service Data

I-INT: Indicates the status of the interface via the UPI4(NET) Board.

B-INT: Indicates the status of the interface via the 4 interface channels of B-INT or two channels of M-INT module.

id: The name of the interfaced monitor, e.g. Ultima.

state: describes the state of the connection, alternatives are:
 'init' - the channel is initialized
 'wait' - the monitor is waiting for the external monitor
 'online' - the connection is ready
 'search' - the external monitor is being searched

rt: real time values that are available via the interface.

Timeouts is a cumulative number that indicates how many times the module has not responded to the monitor's inquiry.

Bad checksums is a cumulative number that indicates how many times communication from the module to the monitor has failed.

Bad c-s by mod is a cumulative number that indicates how many communication errors the module has detected.

The monitor starts counting these items at power up and resets to zero at power off. The nonzero values do not indicate a failure, but the continuous counting (more than 50 per second) indicates either serial communication failure, or module not in place. Also other modules can cause communication errors which cause these numbers rise.

RAM indicates the state of the RAM memory.

ROM indicates whether the checksum in the ROM is in accordance with the software calculated value.

The state is either **OK**, **Fail** or **?** (module not in place or a communication error).

6 SPARE PARTS

6.1 Spare Parts List

NOTE: Accessories are listed in the *Patient Monitor Supplies and Accessories*.

6.1.1 Interface Module, M-INT, Rev. 00

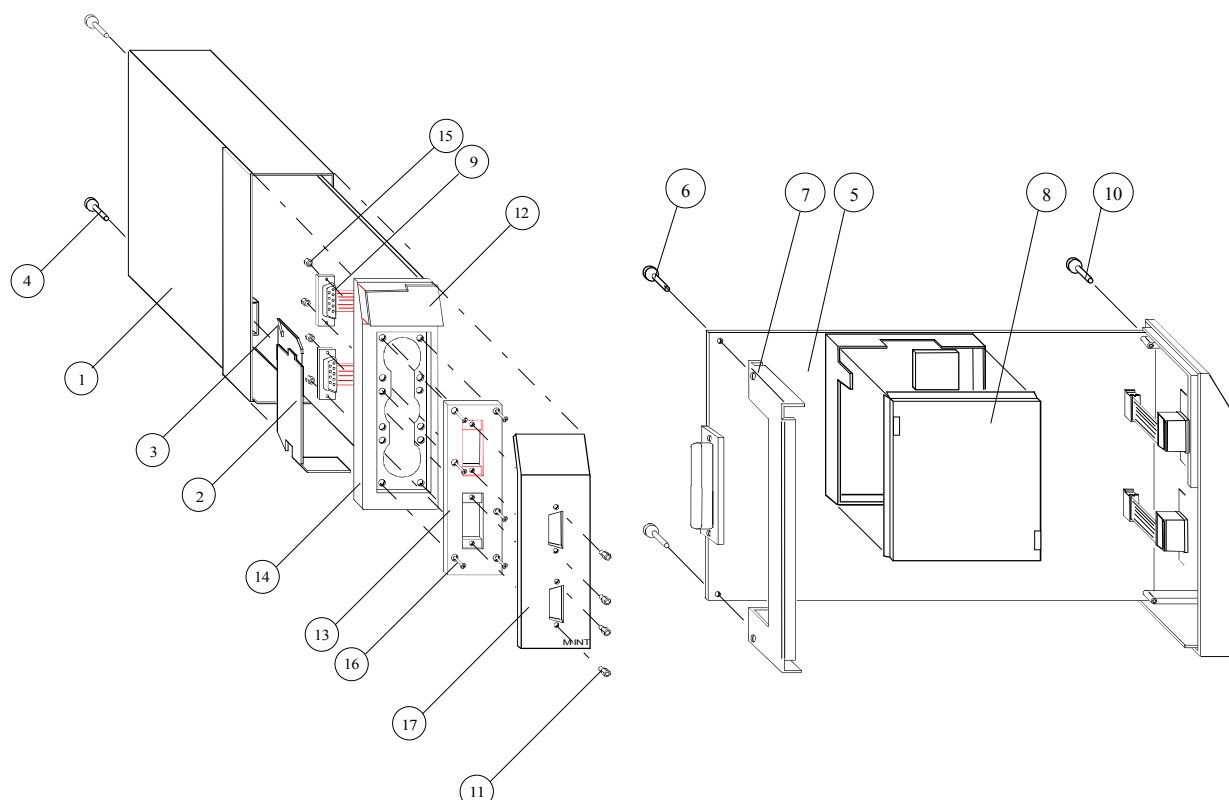


Figure 3 Exploded view of module box and M-INT

Item	Description	Order No.	Item	Description	Order No.
1	Module box (single width)	886167	10	Cross cylinder-head screw M3x12	628700
2	Latch	879181	11	Block screw for cables, M-INT	*891033
3	Spring pin	879182	12	Fitting plate, M-INT	890869
4	Cross recess screw M3x8 black	616215	13	Connector plate, M-INT	890357
5	Interface board, M-INT (Rev. 00)	*890843	14	Front panel frame	879094
6	Cross cylinder-head screw M3x6	61721	15	Nut, hexagon M3	63116
7	Metal frame	879184	16	Cross cylinder-head screw M2.5x10	628708
8	EMC cover	884099	17	Front panel sticker (Eng)	890896
9	D-connector with flat cable, M-INT	891432	-	-	-

*this part is recommended for stock

6.1.2 Interface Module, M-INT, Rev. 01

Item	Description	Order No.
-	Front panel sticker	8000214

7 EARLIER REVISIONS

All main differences of Interface Module, M-INT (rev. 00), are noted in this manual.

APPENDIX A

SERVICE CHECK FORM

Interface Module, M-INT

Customer			
Service	Module type	S/N	
Service engineer		Date	



OK = Test OK



N.A. = Test not applicable



Fail = Test Failed

	OK	N.A.	Fail		OK	N.A.	Fail
1. Internal parts	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	2. External parts	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>
3. Installation	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>				
Notes 							

4. Interface selection	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>				
5. Module software	M-INT						
6. Communication and memories	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	7. Recognition of connection	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>
8. Gas interface (1)	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	9. SpO ₂ interface (1)	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>
10. Recognition of disconnection	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	11. Interface (2)	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>
12. Restarting	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>				
Notes 							

13. Electrical safety check	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	14. Functioning after electrical safety check	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>
15. Final cleaning	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>	<input style="width: 30px; height: 20px;" type="checkbox"/>				

Notes
Used Spare Parts
Signature

