

Datex-Ohmeda

S/5™ Device Interfacing Solution, N-DISxxx (Rev. 00)

Technical Reference Manual Slot



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INTRODUCTION

This Technical Reference Manual Slot provides information for the maintenance and service of the Device Interfacing Solution, N-DISxxx. Please see also related *Technical Reference Manual* for information related to system e.g. related documentation, conventions used, symbols on equipment, safety precautions, system description, system installation, interfacing, functional check and planned maintenance.

The purpose of the Device Interfacing Solution is to produce a data connection between an external bedside device and an S/5 monitor.

The N-DISxxx is a new interfacing solution and works beside the previous interface solutions, B-INT and M-INT that are still available.

Up to 10 devices can be connected simultaneously via device specific N-DISxxx modules.

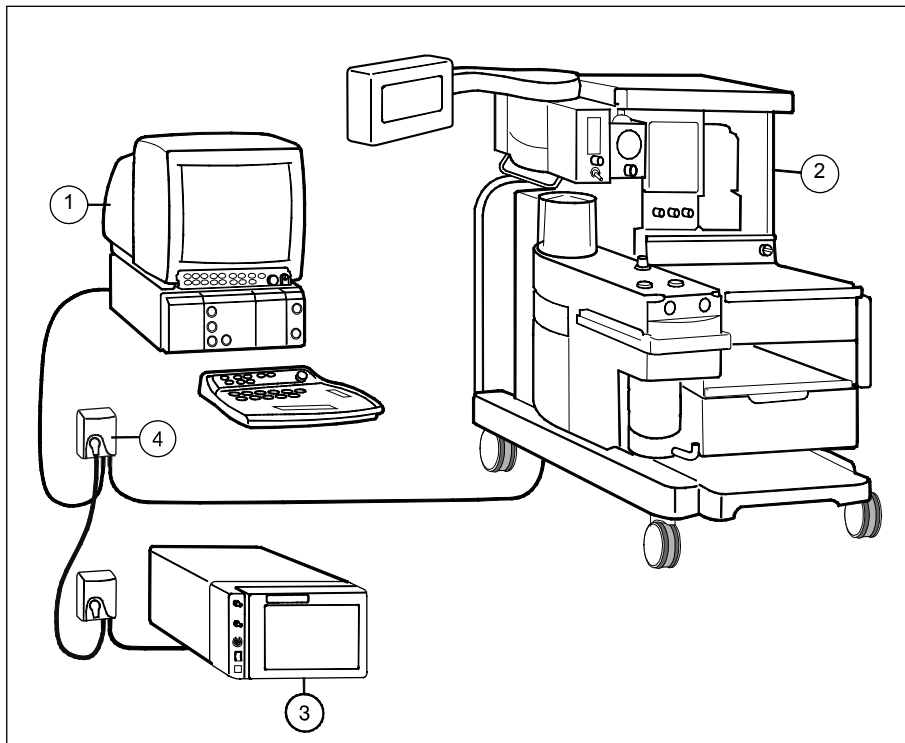


Figure 1 Example of interfacing via the Device Interfacing Solution, N-DISAEST and N-DISRGM

- (1) Datex-Ohmeda S/5 Anesthesia Monitor (with the L-ANE01(A) software)
- (2) Aestiva3000 anesthesia machine
- (3) RGM monitor
- (4) DIS module (max. 10 pcs)

1 SPECIFICATIONS

1.1 Environmental specification

Operating temperature	+10...+35 °C (50...95 °F)
Storage and transport temperature	-10...+50 °C (14...122 °F)
Relative humidity	10...90 % (non condensing)
Atmospheric pressure	660...1060 hPa (66...106 kPa/660...1060 mbar/500...800 mmHg)

1.1.1 Protection against ingress of liquids

According to IEC/EN 60592 class IPX 1.
DIS module must always be used in a vertical position to prevent water from entering the module.

1.2 Technical specifications

1.2.1 General

Max 10 DIS modules or 10 m (393 in) cable length.

Module

Size (W × D × H)	60 × 27 × 85 mm/2.4 × 1.1 × 3.4 in
Weight	0.1 kg/0.2 lbs

Bus cables

8 pin Hirose HR12/HR212 connector

Material	black PVC
Lenght/Weight	1 m/47 g (39 in/3.3 ft./0.104 lbs.) 2 m/85 g (79 in/6.6 ft./0.187 lbs.) 6 m/220 g (236 in/19.7 ft./0.485 lbs.)

Device cables

Depends on device.

Material	elastollan
Lenght	0.5...1 m (19...39 in/1.6...3.3 ft.)
Weight	40...70 g (0.088...0.154 lbs.)

1.3 Electrical specification

There is no isolation in DIS module. Interfaced device, DIS module and monitor must be situated in the same patient environment (as defined in IEC 60601-1-1).

WARNING Connecting electrical equipment together, or using the same extension cord for more than one device, may cause their leakage currents to exceed the limit specified in relevant safety standards. Always make sure that the whole combination complies with the international safety standard IEC 60601-1-1 for medical electrical systems and with the requirements of local authorities.

1.4 Maximum power consumption

600 mW (75 mA @ 8 V)

1.5 Module communication

Bus communication speed is 500 kbps. RS422 implementation.

Device communication speed depends on the interfaced external device. RS232 implementation.

2 FUNCTIONAL DESCRIPTION

The S/5™ Device Interfacing Solution provides a seamless link between external patient care devices and the Datex-Ohmeda S/5 monitoring system. You can interface simultaneously up to ten external devices: monitors, ventilators, blood gas analyzers, etc.

The Device Interfacing Solution is designed for use with S/5 Anesthesia Monitor and Compact Anesthesia Monitor, and S/5 Critical Care Monitor and Compact Critical Care Monitor. The Device Interfacing Solution (DIS) is only compatible with the S/5 Anesthesia and S/5 Critical Care Monitor when the monitor has B-UIP4(NET) and B-CPU4 boards installed. Also, DIS is only compatible with the S/5 version (i.e. F-CM(REC)1 frame) of the Compact Anesthesia and Compact Critical Care monitor. In addition, the S/5 Monitors must be equipped with DIS compatible main software. The Device Interfacing Solution, N-DISxxx can not be used with AS/3 and CS/3 Compact Monitors.

WARNING The manufacturer guarantees a reliable functioning of the devices with tested software versions only. Always refer to the Installation guide accompanying the DIS module and verify the compatibility before use.

2.1 Main components

The implementation of Device Interfacing Solution can be divided into five parts:

- Device specific software
- Device specific module
- Device specific cable
- Bus cables
- Software in Datex-Ohmeda monitor

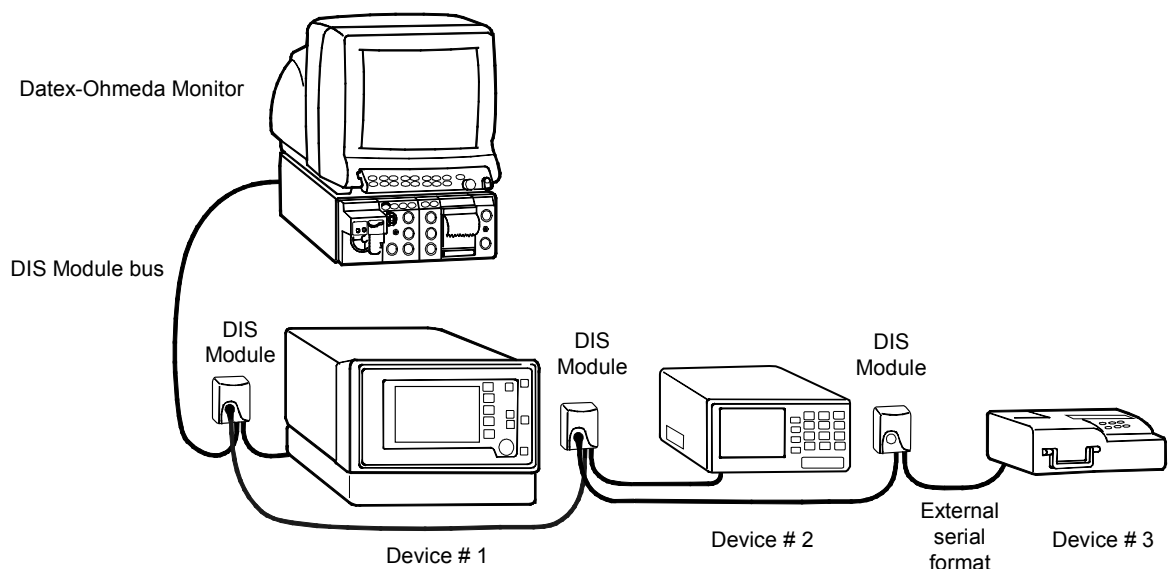


Figure 2 Implementation of Device Interfacing Solution

2.2 DIS module

A DIS module receives data from an external device, modifies the data to a suitable mode and sends the data to the connected monitor. The main board contains the power supply with current limiter, microcontroller, reset circuits, memory and serial communication buffers. The board communicates with the Datex-Ohmeda monitor through the DIS bus.

A DIS module consists of:

- Power supply with current limiter and reset circuit parts
- Microcontroller H8, internal and external RAM, non volatile memory etc.
- Programming connection
- Device communication connection and RS232 driver
- Bus communication connection and RS422 driver
- LEDs, that indicate the status of the communication
- Device specific software

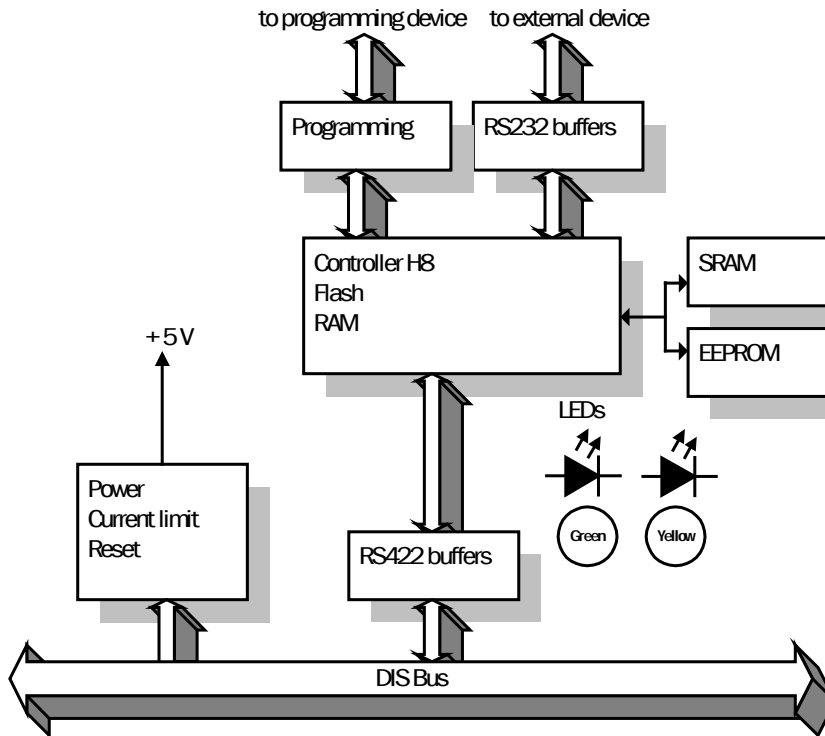
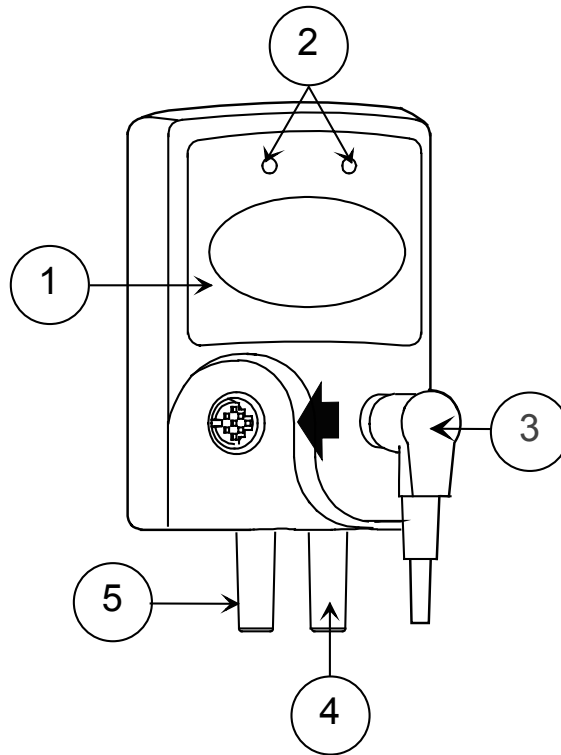


Figure 3 DIS module

2.3 Connections

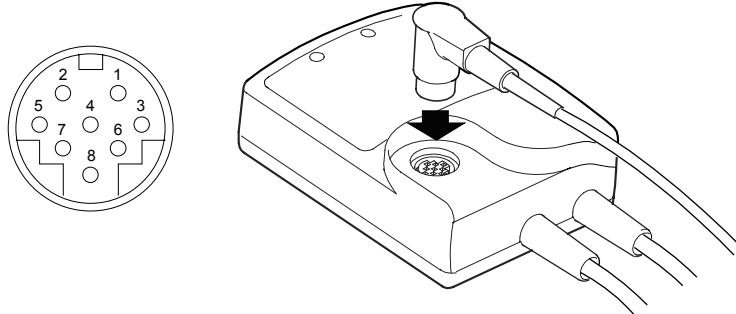
Connect the device specific cable to the external device and the bus cable to the D-O monitor's B-UIP4(NET) board, or to another DIS module.



- (1) Label specifying the external device
- (2) LED indicators
- (3) Bus cable from another DIS module (if used)
- (4) Device specific cable to the external device
- (5) Bus cable to the D-O monitor's B-UIP4(NET) board (or to another DIS module)

2.4 Connectors and signals

Male bus cable connector



Pin no	Signal	Color
1	Data from UPI +	brown
2	Data from UPI -	red
3	VDD 9 V to 18 V (max 1 A)	orange
4	GND	yellow
5	VCC 7 V to 8 V (max 1 A)	blue
6	GND	grey
7	Data to UPI +	white
8	Data to UPI -	black

2.5 Interfaced devices, parameters and communication

Ventilator interfaces

Device	Device set values for trends	Measured numeric values	Waveforms	
Datex-Ohmeda SmartVent 7900	Vent. mode, I:E ratio, RR, TV, PEEP, P _{insp} , InspPause	FiO ₂ , TV _{exp} , MV, RR, P _{mean} , P _{peak} , P _{plat}	Paw, Flow, Vol	N-DIS7900
Datex-Ohmeda Aestiva /5 Aestiva /5 7100 Aestiva /5 Compact	Vent. mode, I:E ratio, RR, TV, PEEP, P _{insp} , InspPause	FiO ₂ , TV _{exp} , MV, RR, P _{mean} , P _{peak} , P _{plat}	Paw, Flow, Vol	N-DISAEST
Dräger Evita 4	FiO ₂ , Vent. mode, I:E ratio, RR, TV, PEEP, P _{insp}	FiO ₂ , EtCO ₂ , TV _{exp} , MV, MV _{spont} , RR, P _{peak} , P _{plat} , P _{mean} , Raw, Compl, PEEPi	Paw, Flow, Vol	N-DISEV4
Nellcor Puritan Bennett 7200	Vent. mode, RR, TV, PEEP, O ₂ setting	expTV, expMV, expMV _{spont} , RR, P _{peak} , P _{plat} , P _{mean} , Dyn. Raw, Dyn. Compl, I:E ratio		N-DIS7200
Nellcor Puritan Bennett 840	Vent. mode, I:E ratio, RR, TV, PEEP, O ₂ setting.	expTV, expMV, expMV _{spont} , RR, P _{peak} , P _{plat} , P _{mean} , I:E ratio		N-DIS840
Siemens Servo 300	CMV freq set, SIMV freq set, Insp. Time, Pause time, MV, PEEP, P _{insp} , Plimit, Vent mode, O ₂ concentr	O ₂ insp, TV exp, TV insp, MV exp, MV insp, RR, P _{peak} , P _{plat} , P _{mean} , PEEP, P _{Ambient}	Paw, Flow, Vol	N-DISS300

Monitor interfaces

Device	Numeric values	
Abbott Qvue/Q2	CO, CCO, Tblood, and SvO ₂ (Q2 only)	N-DISQVUE
Abbott Oximetrix 3	CO, SvO ₂	N-DISOXIM3
Aspect A-2000 BIS Monitor	BIS, SQI, EMG	N-DISA2000
Baxter Vigilance	CO, CCO, SvO ₂ , TBLOOD	N-DISVIGIL
Datex-Ohmeda RGM	CO ₂ , O ₂ , N ₂ O, AA, RR, SpO ₂ , HR, Paw, TV, MV	N-DISRGM
Datex-Ohmeda Tonocap	PgCO ₂	N-DISTONO
Datex-Ohmeda Capnomac, Capnomac II, Satlite, Satlite trans and Satlite Plus	EtCO ₂ , FiCO ₂ , EtO ₂ , FiO ₂ , EtN ₂ O, FiN ₂ O, EtAA, FiAA, AA selection, RR, PAmbient Pulse, SpO ₂	N-DISWHITE
Oscar II, Oscar oxy, Cardiocap 1GS and Cardiocap 2GS	EtCO ₂ , FiCO ₂ , EtO ₂ , FiO ₂ , EtN ₂ O, FiN ₂ O, RR, Pulse, SpO ₂ %	
Capnomac Ultima	EtCO ₂ , FiCO ₂ , EtO ₂ , FiO ₂ , EtN ₂ O, FiN ₂ O, EtAA, FiAA, AA selection, RR, PAmbient, Auto id AA, Pulse, SpO ₂ %, MV exp, MV insp, TV exp, TV insp, Compl, Ppeak, Pplat, PEEP, I:E	
Normocap CD-200	EtCO ₂ , FiCO ₂ , EtN ₂ O, FiN ₂ O, RR, PAmbient	
Multicap, Normocap CD2-02,	EtCO ₂ , FiCO ₂ , EtO ₂ , FiO ₂ , EtN ₂ O, FiN ₂ O, RR, PAmbient	

Heart-lung machines

Device	Device set values for trends	Measured numeric values in trends	
Jostra HL20	bypass on, bypass off, aorta closed, aorta open	speed, flow rate, systolic pressure, diastolic pressure, mean arterial pressure, FiO ₂ , FiCO ₂ , cardioplegia amount	N-DISHL20

Bloodgas analyzers

Device	Numeric values	
AVL Opti CCA	pH, PCO ₂ , PO ₂ , ctHb, SO ₂ , barometric pressure, HCO ₃ , BE, Temp, Kalium, Natrium, O ₂ Ct	N-DISOPT

3 SERVICE PROCEDURES

3.1 General service information

Field service of the Device Interfacing Solution is limited to replacing faulty mechanical parts that are listed as spare parts. Faulty DIS modules 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 for Datex-Ohmeda Device Interfacing Solution. The service check is recommended to be performed after any service repair, however, the service check procedures can be used also for determine possible failures.

The instructions include an [Appendix A: Service Check form](#), to be filled in when performing the corresponding procedures.

The symbol  in the instructions means that the performed procedure should be signed in the check form.

The procedures are designed for monitors running the S/5 monitor software of rev. 01.

Recommended tools

Tool	Order No.	Notes
Screwdrivers		

Recommended parts

No recommended parts.

3.2.1 Visual inspection

- Disconnect the DIS module from the DIS bus and from the interfaced external device.

1. Internal inspection

- Disassemble the DIS module.
- Make sure there are no loose parts inside the DIS module.
- Check the screws holding the PC board are tightened properly.
- Check that the cables are attached properly and the connectors are intact.



2. External inspection

- Check that the DIS module case and label are clean and intact.
- Reassemble the DIS module.
- Check that the screws for the DIS module case are secured properly.
- Check that the bus cable connector is intact.
- Check that the DIS bus and device specific cables are intact.



3.2.2 Functional inspection

3. DIS module interface status

- Connect the DIS module to the DIS bus and to the external device that is specified in the DIS module label, if possible. Turn on the interfaced external device.
- Check that no error messages are displayed on the monitor screen.
- Check via the Interfacing menu that the connected DIS module status is correct:

Monitor Setup - Interfacing - Status Page

- Check that the waveforms and numeric fields are transferred to the monitor according to the configuration.



4. Recognition of interface

- Disconnect the DIS bus cable and check that the '[device name] module removed' message appears onto the monitor screen. Reconnect the cable.
- Turn off the external device (if possible) and check that the '[device name] disconnected from module' message appears onto the screen. Turn the external device back on again.



5. DIS module service menu
 - Enter the service menu
Monitor Setup - Install/Service (password 16-4-34) -
Service (password 26-23-8) -
Parameters - More - DIS Interfacing
 - Check that the menu displays submenus for all connected DIS modules.
 - Enter the corresponding DIS module service menu and check that the displayed information corresponds with the information on the DIS module labels.
 - Check that the DIS bus voltage is between 6.00...8.00 V.
 - Check that the DIS module timeout and checksum error values do not increase more than by 50 per second.
 - Check that the status of each DIS module memory indicates OK.



6. Perform the electrical safety test and leakage current test. Check that the DIS module functions normally after the tests.



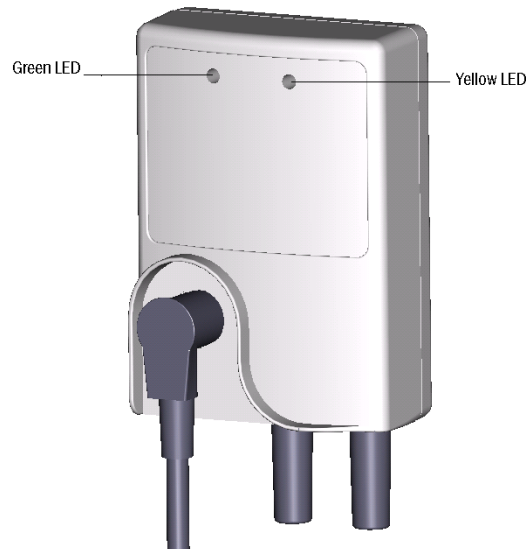
7. Clean the DIS module, the bus cable and the device specific cable with a suitable detergent.



8. Fill up all the necessary documents.

4 TROUBLESHOOTING

4.1 LED indicators



4.1.1 Green LED

The meaning of the green LED is to indicate that communication between the monitor and DIS module and communication between the DIS module and external device is working properly. When all cables are connected and the connected devices are on, the LED should be lit continuously.

4.1.2 Yellow LED

The meaning of the yellow LED is to alert user. The yellow LED is lit when any of the following conditions becomes true:

1. The DIS module is connected to the DIS bus but the external device is not connected.
2. The external device is in power off state.
3. The external device is not selected from the interfacing menu as an active source of data.

NOTE: The meaning of the yellow LED varies with some external devices. See *Installation Guide* delivered with the DIS module.









4.2 Quick functional check

You have two ways for checking the functioning of the Device Interfacing Solution:

- Press the **Monitor Setup** key and select **Interfacing** and open the **Status Page** menu. The status page shows you the current communication status of the interfacing modules connected to the bus (1...10 pcs).

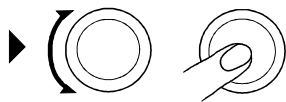
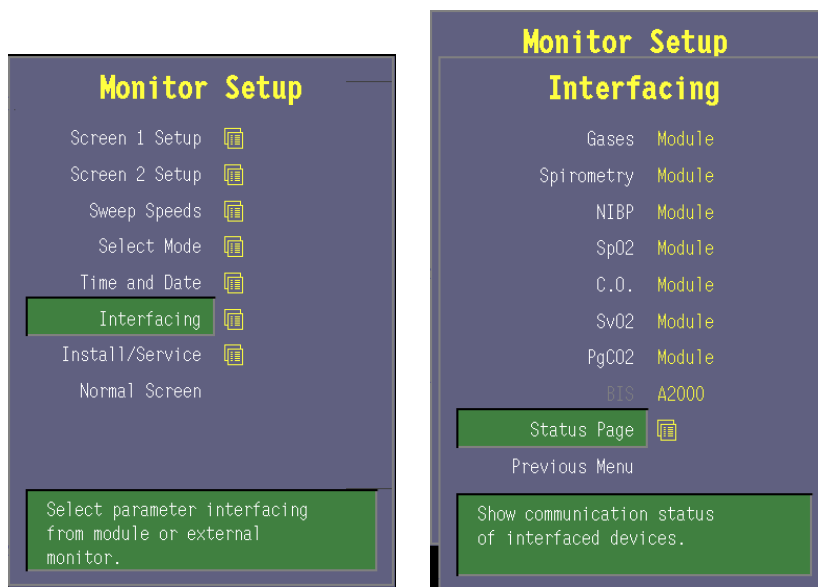
NOTE: The status message 'Connected' appears onto the monitor screen after you have connected the external device to the DIS module and turned it on, if the monitor and DIS module have already been initialized.

- Check the LED indicators on the DIS module (the green LED indicates the physical connections, the yellow LED software selections):

GREEN	YELLOW	INDICATION
lit 	dark 	physical connections between the monitor, DIS module and external device are in order and the device has been selected in the menu
dark 	lit 	physical connections between the monitor, DIS module and external device are not in order; the external device has not been selected in the menu (see the <i>User's Reference Manual</i> of the monitor)
lit 	lit 	physical connections between the monitor, DIS module and external device are in order but the external device has not been selected in the menu (see the <i>User's Reference Manual</i> of the monitor)
dark 	dark 	the DIS module is not connected to the monitor

5 DEVICE INTERFACING SOLUTION MENUS

5.1 DIS Status menu



Monitor Setup - *Interfacing* - Status Page

5.1.1 Interfacing

For selecting the parameter data source:

- Select the desired measurement parameter (e.g., **Gases**).
- Select the desired source by name (e.g., **Aest**).

NOTE: The name of the device is visible on the list only if the device is correctly connected to the module.

5.1.2 Status Page

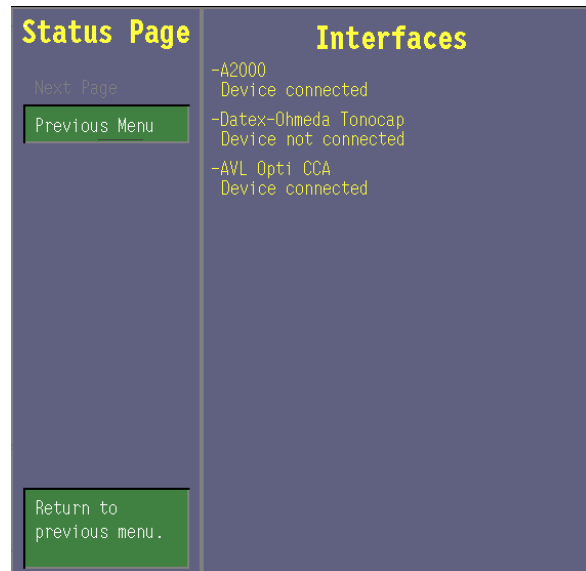
Status Page

The selection **Next page** is available, if more than 8 DIS modules are connected to the DIS bus simultaneously.

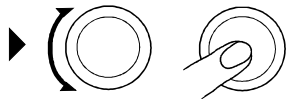
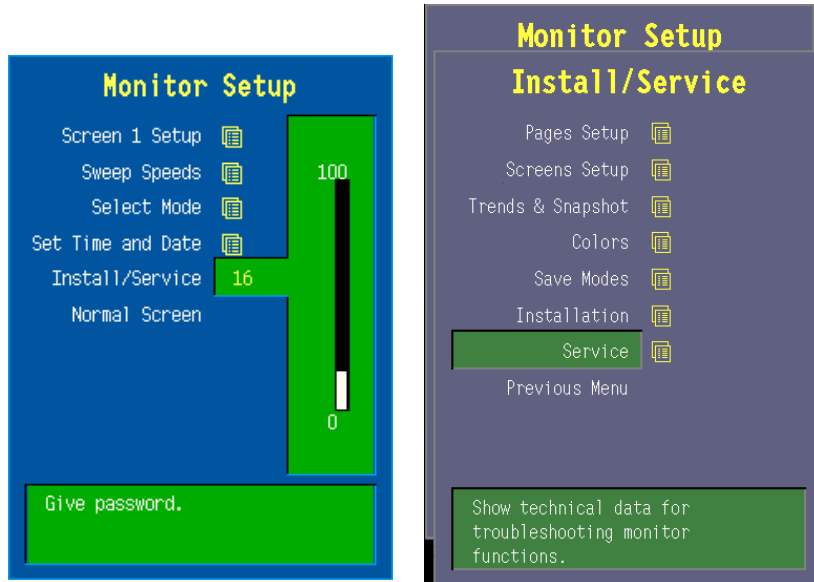
Interfaces

The menu displays a list of all connected DIS modules and the statuses of the corresponding external devices.

If the bus voltage is too low you can not add more devices. 'DIS module bus voltage low. Do not add more devices or reduce cable length' message appears.



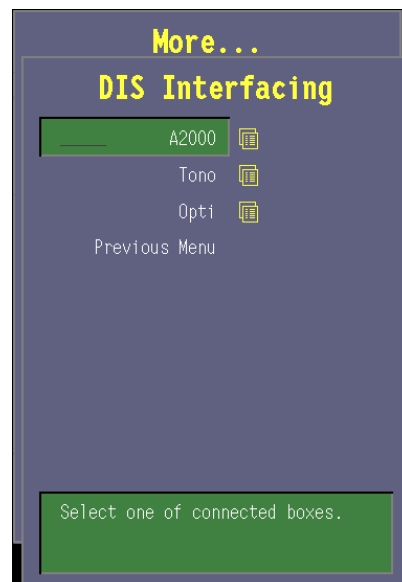
5.2 Service Menu



Monitor Setup - *Install/Service* (password 16-4-34) - ***Service*** (password 26-23-8) - ***Parameters – More – DIS Interfacing***

5.2.1 DIS Interfacing

The menu displays submenus for all connected DIS modules.



5.2.2 DIS Module specific page

Service Data

Product name: DIS module name.

Product type: DIS module type.

Driver sw id: DIS module software and its release date.

Short product name: DIS module name.

Module serial number: DIS module serial number.

HW card type: PCB type.

HW id: DIS module PCB identification number.

HW test date: DIS module PCB testing date.

Unit serial number: DIS module PCB serial number.

Comment field: Indicates the status of the external device.

bus voltage: DIS bus voltage, measured by the UPI4(NET) board or the Central Processing Board in S/5 Compact Monitor. The value should normally be within 6...8 V.

tout: DIS module timeouts, seen by the monitor. The value should not increase more than by 50 per second.

cse: DIS module checksum errors, seen by the monitor. The value should not increase more than by 50 per second.

rx: The number of data packets from the external device received by the DIS module.

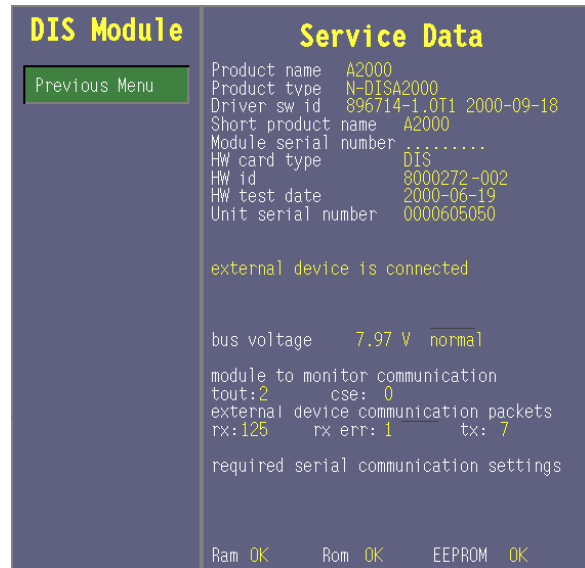
rx err: The number of data errors from the external device received by the DIS module.

tx: The number of data packets to the external device sent by the DIS module.

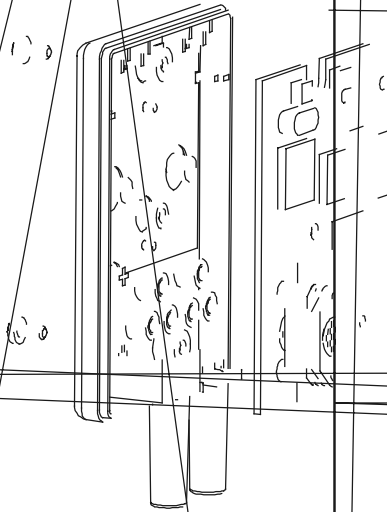
Ram: Status of DIS module RAM memory.

Rom: Status of DIS module ROM memory.

EEPROM: Status of DIS module EEPROM memory.



6 SPARE PARTS



Item	Description		Order no.
6	Label for Nellcor P-B 7200	N-DIS7200	897207
6	Label for Nellcor P-B 840	N-DIS840	8002435
6	Label for Datex-Ohmeda Aestiva/5	N-DISAEST	8002595
6	Label for Abbot Q-Vue/Q2	N-DISQVUE	897210
6	Label for Datex-Ohmeda Tonocap	N-DISTONO	897209
6	Label for Datex-Ohmeda Smartvent 7900	N-DIS7900	8002598
6	Label for AVL Opticca	N-DISOPT	897543
6	Label for Abbot Oximetrix 3	N-DISOXIM3	8000983
6	Label for Siemens Servo	N-DISS300	8000392
6	Label for Baxter Vigilance	N-DISVIGIL	8002434
6	Label for Datex-Ohmeda whiteline monitors	N-DISWHITE	8000405
	Device specific cables:		
8	Cable for Dräger Evita 4 Ventilator	N-DISEV4	897213
8	Cable for Aspect A-2000 EEG Monitor	N-DISA2000	897214
8	Cable for Datex-Ohmeda 5250 RGM Monitor	N-DISRGM	897215
8	Cable for Jostra HL20 Perfusion Machine	N-DISHL20	897216
8	Cable for Nellcor P-B 7200	N-DIS7200	897227
8	Cable for Nellcor P-B 840	N-DIS840	8002481
8	Cable for Datex-Ohmeda Aestiva/5	N-DISAEST	897228
8	Cable for Abbot Q-Vue/Q2	N-DISQVUE	897230
8	Cable for AVL Opticca	N-DISOPT	897544
8	Cable for Datex-Ohmeda Tonocap	N-DISTONO	897229
8	Cable for Datex-Ohmeda Smartvent 7900	N-DIS7900	8002597
8	Cable for Abbot Oximetrix 3	N-DISOXIM3	8002839
8	Cable for Siemens Servo	N-DISS300	8002838
8	Cable for Baxter Vigilance	N-DISVIGIL	88002841
8	Cable for Datex-Ohmeda whiteline monitors	N-DISWHITE	8002840
9	Strain relief	N-DISxxx	897443
10	Screw M2.5×10		61615

7 EARLIER REVISIONS

No earlier revisions.

APPENDIX A

APPENDIX A: SERVICE CHECK FORM

S/5™ Device Interfacing Solution, N-DISxxx (Rev. 00)

Customer					
Service		DIS module label	N-DIS_____	S/N	
Service engineer				Date	

OK = Test OK

N.A. = Test not applicable

Fail = Test failed

	OK	N.A.	Fail		OK	N.A.	Fail
Visual inspection							
1. Internal inspection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2. External inspection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Functional inspection							
3. DIS module interface status	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4. Recognition of interface	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. DIS module service menu	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6. Electrical safety check and leakage current test	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Final cleaning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

Notes:

Used Spare Parts

Signature

