

Instructions for use

Infinity[®] M300 and M300+ Series

WARNING

To properly use this medical device,
read and comply with these
instructions for use.

**Infinity[®] M300 and M300+ Series
Software VG3.0/VG3.0.1**

Typographical conventions

- 1 Consecutive numbers indicate steps of action, with the numbering restarting with “1” for each new sequence of actions.
- Bullet points indicate individual actions or different options for action.
- Dashes indicate the listing of data, options, or objects.
- (A) Letters in parentheses refer to elements in the related illustration.
- A Letters in illustrations denote elements referred to in the text.

Any text shown on the screen and any labeling on the device are printed in bold and italics, for example, ***Printer setup***.

The “greater than” symbol > indicates the navigation path in a dialog window.

In the example ***System setup > General settings***, ***System setup*** represents the dialog window title (which is often accessed by selecting a button), and ***General settings*** represents a horizontally aligned tab within the selected window.

Screen images

Schematic renderings of screen images are used, which may differ in appearance or in configuration from the actual screen images.

Use of terms

All references to M300 in these instructions for use include M300+ unless otherwise specified.

Trademarks

Trademarks owned by Dräger

Trademark
ACE® (Arrhythmia Classification Expert)
Infinity®
Pick and Go®
TruST®
MCable®
MonoLead®

The following web page provides a list of the countries in which the trademarks are registered:
www.draeger.com/trademarks

Trademarks owned by third-party manufacturers

All other brand or product names are trademarks of their respective owners, including, without limitation:

Trademark	Trademark owner
acryl-des	Schülke & Mayr
Actichlor	Ecolab
Cleanisept	Dr. Schumacher
Descogen	Antiseptica
Dismozon	BODE Chemie
Dispatch	Clorox
Incidin	Ecolab USA
Masimo	Masimo Corporation
Masimo SET	
Mikrozid	Schülke & Mayr
Nellcor	Medtronic
neodisher mediclean	Dr. Weigert
OxiMax	Medtronic
Oxivir Excel	Diversey
Oxycide	Ecolab USA
Oxygenon	Antiseptica
Perform	Schülke & Mayr
SteriMax	Aseptix

Open-source software

Dräger devices that use software may use open-source software, depending on their setup. Open-source software may be subject to different terms of license. Additional information regarding the open-source software used in this device is available at the following web page:

www.draeger.com/opensource

Safety information definitions

WARNING

A WARNING statement provides important information about a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

A CAUTION statement provides important information about a potentially hazardous situation which, if not avoided, may result in minor or moderate injury to the user or patient, or in damage to the equipment or other property.

NOTE

A NOTE provides additional information intended to avoid inconveniences during operation.

User group requirements

The term "user group" describes the personnel responsible who have been assigned by the operating organization to perform a particular task on a product.

Duties of the operating organization

The operating organization must ensure the following:

- Every user group has the required qualifications (e.g., has undergone specialist training or acquired specialist knowledge through experience).
- Every user group has been trained to perform the task.
- Every user group has read and understood the relevant chapters in this document.

User groups

Clinical users

This user group operates the product in accordance with the intended use.

Users have medical specialist knowledge in the application of the product.

Reprocessing personnel

This user group carries out the necessary activities to reprocess the product.

Reprocessing personnel has specialist knowledge in the reprocessing of medical devices.

Service personnel

This user group installs the product and performs the service activities.

Service personnel has specialist knowledge in electrical and mechanical engineering and experience in the servicing of medical devices.

Where product specific knowledge or tools are required, the service activities must be carried out by specialized service personnel. The specialized service personnel was trained by Dräger for these service activities on this product.

Abbreviations and symbols

Refer to "Device symbols" on page 63, and to "Abbreviations" on page 68 for explanations.

Product compatibility information

Contact DrägerService or specialized service personnel for product compatibility information.

For your safety and that of your patients

Mandatory reporting of adverse events	8
Strictly follow these instructions for use	8
Storing the instructions for use	8
Training	8
Unauthorized changes to hardware or software	8
Maintenance	9
Accessories	9
Installing accessories	10
Sterile accessories	10
Environment of Use	10
Restrictions for use	10
Restriction of distribution	10
Connected devices	11
Networking and connection to other devices . .	11
Connection to hospital network	11
Connection to other devices	12
Safe connection with other electrical equipment	12
Electrical safety	12
Patient safety	13
Patient monitoring	13
General safety information	13
Not for use in areas of explosion hazard	15
Information on electromagnetic compatibility . .	15
Site of operation	16
Defibrillator precautions	17

Mandatory reporting of adverse events

Serious adverse events with this product must be reported to Dräger and the responsible authorities.

Strictly follow these instructions for use

WARNING

Risk of incorrect operation and of incorrect use

Any use of the medical device requires full understanding and strict observation of all sections of these instructions for use. The medical device must only be used for the purpose specified under “Intended use” and in conjunction with appropriate patient monitoring.

Strictly observe all WARNING and CAUTION statements throughout these instructions for use and all statements on medical device labels. Failure to observe these safety information statements constitutes a use of the medical device that is inconsistent with its intended use.

Storing the instructions for use

WARNING

Risk of incorrect use

Instructions for use must be kept accessible for the user.

Training

Training for users is available from the responsible Dräger organization. See www.draeger.com.

Unauthorized changes to hardware or software

WARNING

Any changes or modifications to the device hardware or software must be performed exclusively by service technicians authorized by Dräger. Any unauthorized change can decrease patient safety, can void the user’s authority to operate the equipment, and will void the warranty.

Maintenance

WARNING

Risk of medical device failure and of patient injury

The medical device must be inspected and serviced regularly by service personnel. Repair and complex maintenance carried out on the medical device must be performed by experts.

If the above is not complied with, medical device failure and patient injury may occur. Observe chapter "Maintenance" on page 247.

Dräger recommends that a service contract is obtained with DrägerService or specialized service personnel and that all repairs are performed by DrägerService or specialized service personnel. For maintenance, Dräger recommends the use of authentic Dräger repair parts.

Accessories

WARNING

Risk due to incompatible accessories

Dräger has only tested the compatibility of accessories listed in the current list of accessories. If other accessories are used, there is a risk of patient injury due to medical device failure. Dräger recommends that the medical device is only used with accessories listed in the current list of accessories.

NOTE

Dräger accessories that come in contact with the patient do not contain natural rubber latex.

NOTE

At least once per year, check all cables, devices, and accessories for damage, and check patient leakage currents, and all alarm functions.

Installing accessories

CAUTION

Risk of device failure

Install accessories to the basic device in accordance with the instructions for use of the basic device. Make sure that there is a safe connection to the basic device.

Strictly observe instructions for use and assembly instructions.

Sterile accessories

CAUTION

Risk of medical device failure and of patient injury

Do not use sterile-packaged accessories if the packaging has been opened, is damaged, or if there are other signs of non-sterility.

Single-use accessories must not be reused, reprocessed, or re-sterilized.

Environment of Use

The device is intended to be used in an environment where patient care is provided by healthcare professionals, i.e. physicians, nurses, and technicians, trained on the use of the device, who will determine when use of the device is indicated, based upon their professional assessment of the patient's medical condition.

Restrictions for use

CAUTION

This device is intended for use in health care environments only and exclusively by persons with specific training and experience in its use.

Restriction of distribution

Federal Law (U.S.) restricts this device to sale by or on the order of a physician.

Connected devices

WARNING

Risk of electric shock and of device malfunction

Any connected devices or device combinations not complying with the requirements mentioned in these instructions for use can compromise the correct functioning of the medical device and leads to an electric shock. Before operating the medical device, strictly comply with the instructions for use of all connected devices and device combinations.

Networking and connection to other devices

When combining Dräger devices with other electrical devices, the owner must ensure that the resulting system meets the requirements of the following standards:

- IEC 60601-1 (EN 60601-1)
Medical electrical equipment
Part 1: General requirements for safety
- IEC 60601-1-2 (EN 60601-1-2)
Medical electrical equipment
Part 1-2: General requirements for safety
Collateral standard: Electromagnetic compatibility; Requirements and tests

Strictly follow the Assembly Instructions and Instructions for Use for each connected device.

Connection to hospital network

Many medical devices manufactured by Dräger use networks to transmit patient data in real-time and to notify clinical users of alarm conditions. Hospitals should refer to IEC 80001-1 before attempting to connect such medical devices to their IT networks.

IEC 80001-1 requires manufacturers (such as Dräger) to make technical documentation in support of such network connections available upon request. Contact your Dräger representative for that information or to facilitate negotiation of an IEC 80001-1 Responsibility Agreement for additional support from Dräger.

Connection to other devices

CAUTION

Combinations of Dräger devices and third-party devices that are not approved by Dräger may adversely affect operation of those devices and may put the patient at greater risk of injury.

CAUTION

The medical device must only be used with software tested and approved by Dräger. Any modifications of the operating system settings can impair operating safety. Responsibility for any such modifications lies with the owner.

Safe connection with other electrical equipment

WARNING

To protect the patient from possible injury due to electrical shock, peripheral devices should only be connected to a monitor within the same room. The installer or service provider should verify that the leakage current of the interconnected system meets the electrical safety requirements of IEC 60601-1.

The leakage current increases when multiple medical devices are connected to a patient. Make sure that the electrical isolation of each device is suitable for the intended application. Only equipment that is set up and tested according to IEC standards should be connected to the analog and digital signal inputs and outputs.

CAUTION

Risk of patient injury

Electrical connections to equipment not listed in these instructions for use or these assembly instructions must only be made when approved by each respective manufacturer.

Electrical safety

WARNING

Because of the danger of electric shock, never remove the cover of a device while it is in use or plugged into a power socket.

CAUTION

To ensure that it is properly grounded, connect the power cord of the power supply to hospital-grade electrical outlets only.

CAUTION

To avoid injuring the patient, do not touch any connector or mounting screw on the device when you are touching the patient. In addition, do not allow the conductive parts of electrodes and cables to contact other conductive parts or ground.

Patient safety

The design of the medical device, the accompanying documentation, and the labeling on the medical device are based on the assumption that the purchase and the use of the medical device are restricted to persons familiar with the most important inherent characteristics of the medical device. Instructions and WARNING and CAUTION statements are therefore largely limited to the specifics of the Dräger medical device.

These instructions for use do not contain any information on the following points:

- Risks that are obvious to users
- Consequences of obvious improper use of the medical device
- Potentially negative effects on patients with different underlying diseases

Medical device modification or misuse can be dangerous.

Patient monitoring

The user of the medical device is responsible for choosing a suitable patient monitoring system that provides appropriate information on medical device performance and patient condition.

Patient safety may be achieved by a wide variety of means ranging from electronic surveillance of medical device performance and patient condition to direct observation of clinical signs.

The responsibility for selecting the best level of patient monitoring lies solely with the user of the medical device.

General safety information

The following WARNING and CAUTION statements apply to general operation of the medical device. WARNING and CAUTION statements specific to subsystems or particular features of the medical device appear in the respective sections of these instructions for use or in the instructions for use of another product being used with this medical device.

See "Battery safety information" on page 56 for additional safety information.

WARNING

To properly use the M300 and M300+ medical device, read and comply with the latest instructions for use and supplement.

WARNING

Inaccurate SpO2 measurements may result under the following conditions:

- **Elevated levels of methemoglobin**
- **Elevated levels of total bilirubin**
- **Excessive patient motion**
- **Severe anemia**
- **Low arterial perfusion**

WARNING

Risk of electric shock and device malfunction.

Penetrating liquid may cause the following:

- **Damage to the device**
- **Electric shock**
- **Device malfunctions**

Ensure that no liquid penetrates the device.

WARNING

Pacemaker considerations

False low-rate alarms can result under the following conditions:

- **Asynchronous pacemaker with large amplitude pace pulses with no overshoot and at low heart rate (30 bpm)**

False high-rate alarms can result under the following condition:

- **Asynchronous pacemaker with large pace pulse tails and at low heart rate (30 bpm)**

CAUTION

Signs of wear, such as cracks, deformation, discoloration, or peeling, may occur with reprocessed products.

Check the products for signs of wear and replace them if necessary.

CAUTION

To avoid damaging the device, do not use sharp tools or abrasives. Never immerse electrical connectors in water or other liquids.

CAUTION

Do not autoclave accessories.

WARNING

Risk of explosion and of chemical burns

Improper handling of batteries can result in explosions and chemical burns.

Do not throw batteries into fire. Do not force batteries open.

WARNING

Follow local regulations for safe disposal of batteries. To prevent fire or explosion, never dispose of batteries in fire.

WARNING

To avoid electric shock, inspect all cables before use. Never use cables that appear cracked, worn, or damaged in any way. Doing so may compromise performance or put the patient at risk.

WARNING

When placing the device, make sure that adequate airflow exists. To prevent overheating, position the device with at least 5 cm (2 in) of space all around.

CAUTION

To avoid injuring the patient, disconnect all sensors that will not be used during transport before moving the patient.

CAUTION

Read all cleaning instructions (for example, originating from the disinfectant manufacturer and the hospital) carefully before cleaning the device. Refer to the chapter entitled “Reprocessing” for device-specific cleaning instructions. Moisture may damage the circuits, compromise critical performance, and present a safety risk.

Not for use in areas of explosion hazard

WARNING

Risk of fire

The medical device is not approved for use in areas where combustible or explosive gas mixtures are likely to occur.

Information on electromagnetic compatibility

General information on electromagnetic compatibility (EMC) according to international EMC standard IEC 60601-1-2:

Medical electrical equipment is subject to special precautionary measures concerning electromagnetic compatibility (EMC) and must be installed and put into operation in accordance with the EMC information provided on page 292.

Portable and mobile radio frequency communications equipment can affect medical electrical equipment.

WARNING

Recommended separation distances from RF communications equipment

RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 in) to any part of the medical device, including cables specified by the manufacturer. This device has been tested against foreseeable maximum EM phenomena according to IEC 60601-1-2. Nevertheless, locally higher levels may occur, caused by, e.g., metal detectors, RFID emitters, or 5G services. Therefore, it is necessary to monitor the device and increase the distance from interference sources if necessary. Otherwise, degradation of the performance of this equipment could result.

WARNING



Do not connect connectors with an ESD warning symbol and do not touch their pins without implementing ESD protective measures. Such protective measures may include antistatic clothing and shoes, touching a potential equalization pin before and during connection of the pins, or using electrically insulating and antistatic gloves. All users concerned must be instructed in these ESD protective measures.

Site of operation

Only use devices (monitors, chargers, accessories, etc.) in areas that meet the environmental requirements outlined in the Technical Data chapter.

WARNING

Do not operate the device in the following areas: magnetic resonance imaging (MRI) environments, aircraft, ambulance, home, or hyperbaric chambers.

WARNING

To avoid interfering with device operation, do not operate devices (monitors, accessories, etc.) within 10 m (33 feet) of equipment that emits microwave or other high-frequency emissions.

WARNING

To minimize the risk of patient strangulation, carefully position and secure sensor cables. Also position the sensor cables to minimize inductive loops.

WARNING

When placing the Infinity M300 and M300+, make sure adequate airflow exists. Do not cover the device with blankets.

CAUTION

After extended exposure in a cold environment, acclimate the device carefully so that condensation does not form on the electronic parts and damage the device.

CAUTION

To avoid damaging the touch-sensitive screen, do not allow sharp instruments to touch the front panel of the devices.

WARNING

To avoid short-circuiting and otherwise damaging the device, Dräger recommends that no fluids come in contact with the ICS devices when they are connected to a power socket. If fluids are accidentally spilled on the equipment, remove the affected device from service as soon as possible and have technical personnel verify that patient safety is not compromised.

Defibrillator precautions

The M300, Bedside Charger, and M300+ with battery are protected against high-frequency interference from defibrillators and against 50-Hz and 60-Hz power line interference.

CAUTION

To prevent burns and electric shock due to rerouting of electrical current through electrodes, do not position the defibrillator pads near any electrodes or sensors.

CAUTION

Only defibrillate across the chest.

CAUTION

Using ECG electrodes and cables specified by Dräger protects the device from damage during defibrillation and reduces noise and other interference on the ECG waveform.

CAUTION

Remove all non-defibrillation-proof applied accessories prior to defibrillation. Failure to remove non-defibrillation-proof applied accessories could potentially be harmful to both the patient and operator, as well as other medical devices connected to the patient.

This page has been left blank intentionally.

Cybersecurity

Definition of cybersecurity terminology. . . .	20
Cybersecurity safety information	21
Cybersecurity information and recommendations.	23
Passwords	25
Cybersecurity incident response	26
Product security information	26
Infinity network configuration	27
Security modes of operation.	28
Network security troubleshooting and error conditions	29
M300/M300+ network error message.	31
PSK security credential expiration	31
Network support matrix.	32

Definition of cybersecurity terminology

The following table lists the cybersecurity terms used in the instructions for use or displayed on the M300/M300+ and/or ICS.

Term	Description
ACS	Application Control Service. ACS is a Dräger-specific network functionality that allows remote control over the network or a patient monitor.
Denial of service	A situation where intended services or functions cannot be accessed due to unavailable resource. It is usually caused by excess resource consumption.
DSCP	Differentiated Services (DiffServ) value set in an IP packet for classification and management. DSCP is part of a Quality of Service (QoS) implementation.
Legacy mode	Disabled security protocol without authenticated and encrypted communication between devices. Legacy mode is a non-preferred mode of operation in which devices can operate without secure communications. When selected, authentication, integrity protection, and encryption will not be used for data in motion between devices on the Infinity network.
Man-in-the-middle attack	A type of security compromise where a third-party positions itself in the communication path between two or more entities. It usually compromises one or more of data authenticity, integrity and confidentiality.
Packet storm	An excessive amount of traffic on a computer network. The network congestion can delay or inhibit network communication between devices. A packet storm could cause latency, potentially preventing network communications between devices. It could also cause excessive load on devices as they attempt to manage the adverse condition.
PDS	Patient Data Service. PDS is a Dräger-specific network functionality that allows physiological patient data to be transferred across a network for other entities to consume.
PIN	Personal Identification Number.
PSK	Pre-shared Key. A PSK is a shared confidential phrase, code, or key used as a credential to mutually authenticate the peers.
Secure mode	A security protocol that enables authenticated and encrypted communication between devices. Secure mode is a preferred mode of operation in which devices operate with protected communication. This implementation provides mutual authentication, integrity protection, and encryption for data in motion between devices on the Infinity network.
Spoofing	A situation when another entity identifies as a third-party by falsifying authentication information. Strong authentication mitigates spoofing attacks.

Term	Description
Tampering	Malicious activities of altering data. Protecting integrity mitigates tampering activities.
TCP	Transmission Control Protocol. TCP is the industry standard transport layer protocol that provides an ordered and reliable byte stream of data between two network entities.

Cybersecurity safety information

The following WARNING and CAUTION statements apply to cybersecurity.

WARNING

Risk of cybersecurity attacks in Legacy mode

Disabling Secure mode and operating in Legacy mode exposes the Infinity network communication to cybersecurity attacks.

Always operate devices in Secure mode when possible.

WARNING

Risk of connection failure due to expired PSK

If the PSK security credential is not updated before the expiration date, the ICS and M300/M300+ cannot establish a connection and patient monitoring is suspended.

Make sure the PSK is valid and updated promptly when you receive the expiration warnings.

WARNING

Risk of connection failure due to PSK mismatch

If the PSK security credential does not match between the ICS and M300/M300+, the devices cannot establish a connection.

Make sure the PSK matches between the ICS and M300/M300+.

WARNING

Risk of connection failure due to security mode mismatch

If the security mode does not match between the ICS and M300/M300+, the devices cannot establish a connection. The M300/M300+ in Secure mode cannot connect to an ICS in Legacy mode. The M300/M300+ in Legacy mode cannot connect to an ICS in Secure mode.

Make sure the security mode of operation matches between the ICS and M300/M300+.

See "Network support matrix" on page 32.

WARNING

Risk of delayed response due to packet storms

When a sustained network packet storm occurs:

- **Network config error** is displayed in a banner in the screen's header bar.
- A delayed response such as display and keypad response, alarms, patient data, and/or notifications during this time may occur.
- If packet storm condition persists, transfer patient to a bedside monitor not connected to the network.

WARNING

Risk of connection failure due to AP out of range

When the M300/M300+ is out of range of the Access Point (AP), the device will automatically revert to offline mode and increase local alarms to 100%. The device will attempt reconnection when back in range of AP.

Make sure that the M300/M300+ remains in the network area of the hospital while patients are admitted to maintain monitoring on the ICS.

CAUTION

When Secure mode is selected for ICS and/or M300/M300+, you may notice a delayed response in performance such as display and keypad response, alarms, patient data, and notifications.

NOTE

When a patient is discharged at the M300/M300+ while the device is offline, the ICS will retain the patient demographics data until the device is discharged from the ICS. Both M300 and M300+ can be discharged directly from the M300 or M300+, as well as from the ICS. The M300 can also be discharged from the ICS by placing it into a Central Charger (M300 only, not M300+).

Cybersecurity information and recommendations

Dräger provides the following security information and recommendations:

- Dräger recommends always following network security best practices, such as:
 - Maintaining software
 - Segmenting via firewalls
 - Closing unused ports
 - Restricting user permissions
 - Limiting third party access
 - Monitoring network activity
- Dräger recommends the use of WPA2-Enterprise/EAP-TLS to provide for strong authentication and data protection for wireless communication between M300/M300+ and 802.11 access points. With this protection, clinical data will be secure in a wireless encrypted tunnel. Customers configuring wireless infrastructures with WPA or WPA+WPA2 will cause the M300/M300+ to use the deprecated TKIP cipher which may compromise security. Dräger recommends configuring the network infrastructure to use WPA2 only.
- Dräger uses TLS-PSK in Secure mode to provide for authentication and data protection for network communication between M300/M300+ and ICS. With this protection, clinical data will be secure in a wireless encrypted tunnel.
Without these measures there is an increased risk that critical events may go undetected in cases of malicious attack, which could result in patient harm.
- Dräger recommends that the responsible organization install and operate Infinity monitoring devices on separate, isolated, VLANs to reduce risk from network security vulnerabilities. Use of QoS with M300/M300+ is required to ensure optimal network data transmission.
Without these measures there is an increased risk that critical events may go undetected in cases of malicious attack, which could result in patient harm.
- The M300/M300+ device provides logging of software resets and presence of multicast. M300/M300+ error logs may be obtained using the device web page or via connection to SFTP, or a serial programming cable and appropriate terminal software. If errors are observed, report the condition to the hospital's biomedical and IT departments.
- Dräger recommends renewing PSKs periodically for higher security.
- For servicing Dräger patient monitors and connecting to the Infinity network, Dräger recommends using a dedicated service laptop.
- The device configurations can be recovered by one of the following methods:
 - Programming cable with password
 - Use SFTP with password
 - Manually discharge patient, re-admit and configure settings
 - Manually configure settings at the M300/M300+

- The M300/M300+ device contains the following interfaces:

Type	Purpose
Display	Visualize various clinical parameters and device configuration settings
Keypad	Provides for modest level of user interaction, such as startup/shutdown of device; alarm silence; and local discharge
Wireless Network	Provides for communication with other Infinity network devices and some diagnostic tools via 802.11
Serial Console	Provides access to the service menu to allow for configuration and maintenance of the device

The M300/M300+ device communicates via the 802.11 wireless LAN standard. Client ports are used outbound from the device, while server ports accept incoming connections inbound from other devices on the network:

Application protocol	Transport protocol	Port number	Client/Server
SFTP (SSH)	TCP	22	Server
Infinity ACS	TCP	1950	Server
Infinity PDS	TCP	2050	Client
Infinity NameService	TCP	2150	Client
Infinity Recorder	TCP	6000	Client
Infinity Recorder	TCP	6050	Client
Infinity RemoteRecord	TCP	7100	Server
Infinity LocalDischarge	TCP	9200	Client
Infinity LLIP	TCP	18000	Client

- In the presence of multicast network traffic, **Network config error** will be annunciated on the M300/M300+ display and will be captured in the error log. M300/M300+ error logs may be obtained using the device web page or via connection to a serial programming cable and appropriate terminal software.
 - If **Network config error** is observed, report the condition to the hospital's biomedical and IT departments.

In the event of sustained multicast traffic, the device may enter an offline condition. If an offline condition persists:

- 1 Assign each patient to a bedside monitor
- 2 Isolate the affected devices
- 3 Immediately contact your hospital's biomedical and IT departments for support
- 4 Do not place devices back into service until the situation is resolved

- To enhance network and device security, restrict physical access to the following based on job function and classification:
 - Infinity network
 - Monitoring devices
 - AccessoriesIn addition, physical access must also be restricted to:
 - Unused Ethernet ports
 - Unused USB ports
 - Unused serial ports
- Modifications to the Infinity network after initial installation could result in degraded performance and/or security risks. Contact DrägerService or specialized service personnel to ensure optimal network performance for any planned network modification. Modifications to network settings could degrade network performance and could result in patient harm due to delayed assessment or intervention.

NOTE

M300/M300+ is an embedded code device that verifies sensitive data integrity (i.e., code space, stored configuration data, and DRAM content) at startup and during operation. If the stored settings are corrupt, both audible and visual notifications alert the user that factory default settings are being restored, as the device assumes that DRAM has failed.

Passwords

Dräger recommends using custom passwords that are securely stored.

If passwords are compromised, the user can change all passwords by using the factory default.

Password creation must include the following:

- A minimum of 8 characters
- A maximum of 14 characters

The creation of strong passwords contain any of the following:

- Uppercase characters
- Lowercase characters
- Numbers
- Special characters

Examples of weak passwords include strings such as:

- Common names such as hospital names
- Sequential numbers
- “password” or “welcome”

WARNING

Risk due to lost passwords

If passwords are lost or forgotten, the user will no longer have access to the Service menu where the security settings are located. A factory reset is required if the service password is lost or forgotten.

Store your passwords in a safe location.

Cybersecurity incident response

M300/M300+ device settings may be compromised in the event of a cybersecurity attack or other configuration error. To restore device settings to their previous state:

- 1 Power cycle the unit.
- 2 Select **No** when prompted on the **New patient?** screen.

Device settings can be restored manually with patient discharge and re-admit at the M300/M300+.

In the event of a cybersecurity attack, the device enters an offline condition. If an offline condition persists:

- 1 Assign each patient to a bedside monitor.
- 2 Immediately contact your hospital's biomedical and IT departments for support.
- 3 Isolate the affected devices.
- 4 Do not place devices back into service until the situation is resolved.

To maintain the M300/M300+ logs for investigatory purposes:

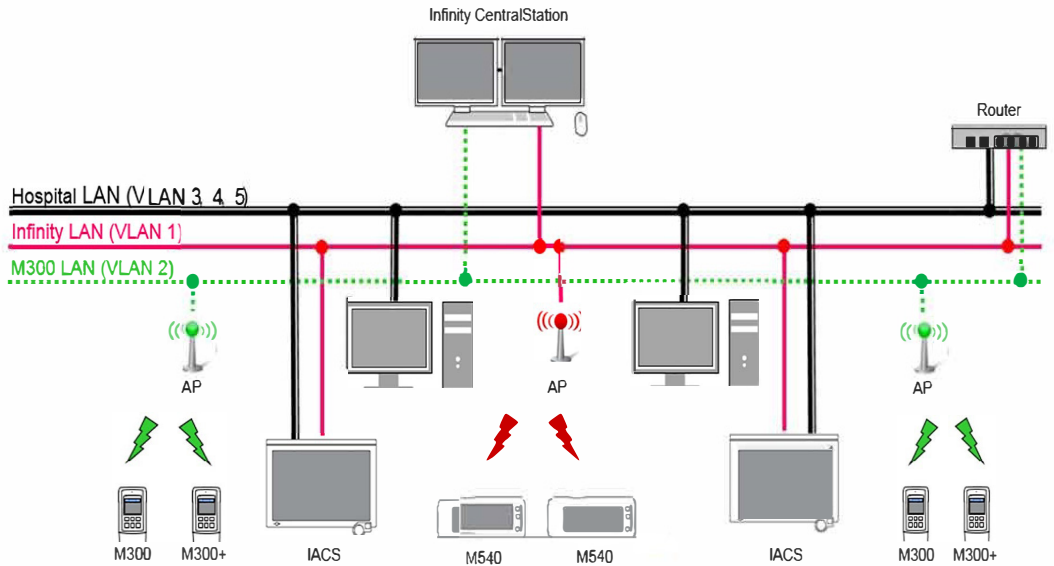
- 1 Isolate the affected M300/M300+ unit(s).
- 2 Place the M300 in a Bedside Charger or attach a fully-charged battery to the M300+.
- 3 Contact DrägerService or specialized service personnel for support and troubleshooting.
- 4 Do not place the M300 in the Central Charger as this will discharge the patient, thereby deleting useful data.

Product security information

Dräger maintains a product security page for continued visibility into cybersecurity threats in the field and possible vulnerabilities in our devices. In the event you encounter a cybersecurity threat or identify a security vulnerability in one of our products, please visit <https://static.draeger.com/security/> for instructions on how to provide this information to Dräger via encrypted email.

Infinity network configuration

The following diagram shows an example of the Infinity network configuration.



Security modes of operation

There are two security modes of operation for the M300/M300+ and ICS.

Secure mode

Secure mode is an enhanced Infinity network protocol that includes authentication, integrity and encryption. Secure communication can be intercepted but not read or altered by an unauthorized device. The ICS always uses Legacy communication (standard Infinity protocol) to communicate with all other non-M300/M300+ devices on the Infinity network.

For Secure mode, PSKs are loaded on the ICS and M300/M300+ to establish an authorized network connection. Both devices must share the same key to communicate. A mismatch, missing or expired key on one or both devices will prevent communication and patient monitoring.

NOTE
PSKs should always be loaded on the ICS first and then the M300/M300+.
All Infinity devices should contain the same pre-shared key.

DrägerService, specialized service personnel, or the hospital's trained biomedical staff loads the PSKs to the Infinity devices using the Dräger INST software tool.

Legacy mode

Legacy mode is the standard Infinity network protocol that exchanges data between the M300/M300+ and ICS, and other Infinity devices.

WARNING
Risk of cybersecurity attacks in Legacy mode
Disabling Secure mode and operating in Legacy mode lessens cybersecurity protection of the Infinity network communication. Legacy communication can be intercepted, read, or altered by an unauthorized device connected to the Infinity network, such as a malicious laptop.
Always operate devices in Secure mode when possible.

Secure/Legacy mode symbols

One of the following symbols displays on the ICS depending on which security mode is selected:

Symbol	Description
	Secure mode.
	Legacy mode.

Network security troubleshooting and error conditions

The following alarms may display on the M300/M300+ and/or ICS when secure communication is failed. If the device displays the error persistently, the clinician should contact the hospital's biomedical department, DrägerService, or specialized service personnel, or replace the device.

No.	Condition	Action/Condition that caused error	Error message	Admit screen pop-up
1	ICS in Secure mode and M300/M300+ in Legacy mode	Admit a new patient at M300/M300+.	ICS: Secure communication failure %s¹⁾ M300/M300+: Offline	Secure communication failed for %1. Please verify the M300 is in secure mode and the security PSK keys are valid.¹⁾
	ICS in Legacy mode and M300/M300+ in Secure mode	Admit a new patient at M300/M300+.	ICS: %s: remote control failed²⁾ M300/M300+: Secure Comm Failure and Offline	None
2	ICS in Secure mode and M300/M300+ in Legacy mode	There is a mismatch of security settings when remote viewing the M300/M300+.	ICS: Secure communication failure %s¹⁾ M300/M300+: None	None
	ICS in Legacy mode and M300/M300+ in Secure mode	There is a mismatch of security settings when remote viewing the M300/M300+.	ICS: %s: remote control failed²⁾ M300/M300+: Secure Comm Failure	None
3	Mismatch of PSKs between ICS and M300/M300+	Two devices do not contain the same PSK.	ICS: Secure communication failure %s¹⁾ M300/M300+: Network config error	None

No.	Condition	Action/Condition that caused error	Error message	Admit screen pop-up
4	ICS in Secure mode and PSK expired	Admit a new patient at M300/M300+.	ICS: None M300/M300+: Offline	<i>Infinity network security PSK keys expire in less than seven days. Telemetry devices cannot be admitted.</i>
5	ICS in Secure mode and PSK is expiring	PSK will expire in 90 days.	ICS: Low-priority alarm banner Service due (renew %1): %2³⁾	None
6	ICS in Secure mode and PSK is expiring	PSK will expire in 7 days.	ICS: Medium-priority alarm banner Service due (renew %1): %2³⁾	<i>Infinity network security PSK keys expire in less than seven days. Telemetry devices cannot be admitted.</i>
7	ICS in Secure mode and PSK is expiring	PSK will expire in 1 day.	ICS: High-priority alarm banner Service due (renew %1): %2³⁾	<i>Infinity network security PSK keys expire in less than seven days. Telemetry devices cannot be admitted.</i>
8	M300/M300+ in Secure mode and PSK is expiring	PSK will expire in 90 days.	M300/M300+: Low-priority alarm Service due (renew PSK): %2³⁾	None
9	M300/M300+ in Secure mode and PSK is expiring	PSK will expire in 7 days.	M300/M300+: Medium-priority alarm Service due (renew PSK): %2³⁾	None
10	M300/M300+ in Secure mode and PSK is expiring	PSK will expire in 1 day.	M300/M300+: High-priority alarm Service due (renew PSK): %2³⁾	None
11	ICS in Secure mode and ICS does not have a PSK		ICS: Error: Failed to read: %1⁴⁾	None
12	ICS in Secure mode and ICS does not have a PSK	Open BedView, System setup, Trends/Data, or Telemetry defaults.	ICS: Error: Failed to read: %1⁴⁾ and %s: remote control failed²⁾	None

1) <%s> is the IP address of the M300/M300+.

2) <%s> is the Bed label of the M300/M300+.

3) <%1> is the PSK filename, <%2> is the time remaining until expiration.

4) <%1> is the PSK filename.

M300/M300+ network error message

The following error message may display on the M300/M300+:

Priority	Message	Description	Action
None	Network config error	Multicast traffic is detected on the VLAN.	Contact your hospital's biomedical and IT departments for support.

PSK security credential expiration

The PSK security credential is valid for 2.5 years by default. The M300/M300+ will generate an expiration warning when the device is in Secure mode, and the security credential is about to expire.

Warning	Alarm	Action
90-day warning	A 90-day warning will be issued when the security credential is within 90 days of its expiration. The user will receive a single-shot advisory tone, and a persistent low-priority alarm banner in the header bar of the screen.	Contact your hospital's biomedical department, DrägerService, or specialized service personnel.
7-day warning	A 7-day warning will be issued when the security credential is within 7 days of its expiration. The user will receive a single-shot advisory tone, and a persistent medium-priority alarm banner in the header bar of the screen. The user will not be allowed to admit a patient on the M300/M300+. If the M300/M300+ travels out of wireless range while the patient is still admitted during the 7-day warning period, the device will re-connect when returned to the wireless range.	Contact your hospital's biomedical department, DrägerService, or specialized service personnel.
1-day warning	A 1-day warning will be issued when the security credential is within 1 day of its expiration. The user will receive a single-shot advisory tone, and a persistent high-priority alarm banner in the header bar of the screen. The user will not be allowed to admit a patient on the M300/M300+.	Contact your hospital's biomedical department, DrägerService, or specialized service personnel.

If you cannot admit an M300/M300+ patient to the ICS, refer to the clinical log for additional information and messages.

Network support matrix

The following matrix identifies the interaction of Dräger devices on the Infinity network when the operation mode is secure and legacy:

Product	Security Mode	ICS VG4	ICS VG4	ICS VG3 and below	M300 (+) VG3	M300 (+) VG3	M300 (+) VG2.4	IACS/ M540 VG7.1.1 and below	Delta ²⁾ VF10 and below	
Security Mode		Secure	Legacy	Legacy	Secure	Legacy	Legacy	Legacy	Legacy	Secure
Action		Admit	Admit	Remote View	Remote View	Remote View	Remote View	Remote View	Remote View	Transfer M300/ Bedside
ICS VG4	Secure	-	-	-	Y	Partial ¹⁾	Partial ¹⁾	Y	Y	-
ICS VG4	Legacy	-	-	-	Partial ¹⁾	Y	Y	Y	Y	-
ICS VG3 and below	Legacy	-	-	-	Partial ¹⁾	Y	Y	Y	Y	-
M300 (+) VG3	Secure	Y	N	N	-	-	-	-	-	Y
M300 (+) VG3	Legacy	N	Y	Y	-	-	-	-	-	N
M300 (+) VG2.4	Legacy	N	Y	Y	-	-	-	-	-	N
M540 VG7.1.1 and below	Legacy	Y	Y	Y	-	-	-	-	-	-
IACS VG7.1.1 and below	Legacy	Y	Y	Y	Partial ¹⁾	Y	Y	Y	Y	-
Delta²⁾ VF10 and below	Legacy	Y	Y	Y	Partial ¹⁾	Y	Y	Y	Y	N

1) In remote view with Legacy mode, the waveforms and patient parameters can be viewed. Remote control (alarm settings, arrhythmia settings, alarm silence, pause, and record) are not supported.

2) DSCP (Quality of Service) must be set to 0 for Delta devices.

Contents

Trademarks	4	Definition of cybersecurity terminology	20
Trademarks owned by Dräger	4	Cybersecurity safety information	21
Trademarks owned by third-party manufacturers	4	Cybersecurity information and recommendations	23
Open-source software	5	Passwords	25
Safety information definitions	5	Cybersecurity incident response	26
User group requirements	5	Product security information	26
Duties of the operating organization	5	Infinity network configuration	27
User groups	6	Security modes of operation	28
Abbreviations and symbols	6	Network security troubleshooting and error conditions	29
Product compatibility information	6	M300/M300+ network error message	31
For your safety and that of your patients	7	PSK security credential expiration	31
Mandatory reporting of adverse events	8	Network support matrix	32
Strictly follow these instructions for use	8	Intended purpose	39
Storing the instructions for use	8	Intended use	40
Training	8	Indications	40
Unauthorized changes to hardware or software	8	Contraindications	40
Maintenance	9	Environments of use	40
Accessories	9	Patient population	41
Installing accessories	10	System overview	43
Sterile accessories	10	Overview of the ICS relative to M300/M300+	44
Environment of Use	10	Overview of the M300/M300+	45
Restrictions for use	10	Infinity M300	45
Restriction of distribution	10	Infinity M300+	45
Connected devices	11	Infinity M300/M300+ communications	46
Networking and connection to other devices	11	Infinity M300/M300+ user interfaces and functions	46
Connection to hospital network	11	Front panel of the M300 and M300+	47
Connection to other devices	12	Battery status LED of the M300/M300+	47
Safe connection with other electrical equipment	12	Low battery alarm	48
Electrical safety	12	Critical battery alarm	48
Patient safety	13	Power-save mode	48
Patient monitoring	13	Back panel of the M300 and M300+	50
General safety information	13	Overview of the Bedside Charger (M300 only)	51
Not for use in areas of explosion hazard	15	Avoiding charger and adapter damage	51
Information on electromagnetic compatibility	15	M300 screen examples	52
Site of operation	16	Power on/off	52
Defibrillator precautions	17	Overview of the Central Charger (M300 only)	53
Cybersecurity	19	Infinity M300+	54
		M300+ swappable battery	55

Battery safety information	56	Using the Bedside Charger	97
Preventive Maintenance	57	Charging the M300+ swappable battery . . .	103
Caring for the M300+ lithium-ion swappable battery.	57	Overview	104
Charge status for swappable battery attached to the M300+	58	Battery status LED	104
To check the charge status on the swappable battery.	58	Using the Battery Charger.	104
M300+ battery charging station for swappable batteries	61	Getting started	107
Inserting the swappable battery into the battery charger	62	Overview of monitoring a patient.	108
Removing the swappable battery from the battery charger	62	Turning the M300/M300+ on/off	108
Device symbols	63	Telemetry/Parameters dialog window (BedView in ICS).	109
Abbreviations	68	The Layout/ Parameters page (in ICS)	109
Operating concept	71	M300/M300+ Demographics screen	111
Overview of M300/M300+ operating concept. .	72	Admitting a patient.	112
M300/M300+.	72	Admitting a new M300/M300+ patient . . .	113
ICS components.	73	Discharging a patient	116
Telemetry monitoring	74	Discharging an M300/M300+ patient. . . .	116
M300/M300+ power	75	Patient categories	118
Communication between an M300/M300+ and the ICS	75	Selecting a different patient category . . .	118
Volume control	75	Alarms	121
Minimum alarm volume.	76	Overview of alarms	122
Communicating with the Infinity network . . .	77	Alarm priorities	123
Offline condition notification	77	High-priority alarm conditions	123
Local ICS	78	Medium-priority alarm conditions.	123
Remote ICS	78	Low-priority alarm conditions.	123
M300/M300+.	78	Alarm processing.	123
Communication management	79	ICS general alarm processing	123
Supported symbols.	81	M300/M300+ alarm processing	124
Electronic patient data transfer.	83	Parameter box flashing rate	125
Transferring patient data.	84	Latching and non-latching alarm	126
ICS and M300/M300+ online help	86	Activating or deactivating alarm validation . .	127
Standby mode	87	Alarm validation times for the M300	127
Standby/ Discharge page	88	Alarm signals.	128
Enabling standby mode	89	Visual alarm indicators on the M300	128
M300/M300+ user interface	91	ICS and M300/M300+ audio alarm signals	128
M300/M300+ header bar	92	M300 speaker alarm tones	129
M300/M300+ keypad	93	Adjusting the M300/M300+ alarm volume . .	130
M300/M300+ waveforms	93	Pausing audio alarms for the M300/M300+ . .	131
Charging the M300 battery	95	Pausing audio alarms for the M300/M300+ from a remote network device.	132
Overview	96	Pausing alarms for the M300/M300+	132
Battery status LED	96	Pausing alarms for the M300/M300+ from a remote network device	133
		Alarm setup for multiple parameters	133

Alarm setup for arrhythmia parameters	136	Accessing the Arrhythmia setup page	165
Auto setting all alarm limits	138	Arrhythmia parameter setup function	165
Special conditions for alarm event recordings	138	Overview of ST monitoring	165
Special conditions for alarm event storage	139	Connecting lead wire sets for ST monitoring	167
Alarm groups	139	Standard ST monitoring	167
M300/M300+ alarm ranges and defaults	140	12-lead TruST monitoring	168
Parameter ranges and defaults	140	ST display	169
Arrhythmia parameter ranges and defaults	141	ST parameter box on an ICS BedView	169
ECG, arrhythmia, and ST segment monitoring with M300/M300+	143	ST complex pages	169
Overview of telemetry defaults	144	Viewing all ST complexes	170
ECG signal processing and display	144	Zooming in on an ST complex	172
Supported parameters	145	ST measuring and ISO points	173
Patient preparation for ECG monitoring	145	Adjusting ST measuring and ISO points	173
ECG precautions	146	ST reference	174
ECG display	146	Saving ST reference	174
ECG parameter box in a viewport of the ICS Main screen	146	Accessing the ST setup page	174
ECG parameter box in the ICS BedView	147	ST parameter setup functions	175
ECG parameter box on the M300/M300+	147	Learning/relearning QRS pattern	175
ECG waveform in a viewport of the ICS Main screen	147	SpO₂ and pulse rate monitoring with Masimo and M300/M300+	177
ECG waveform on a BedView page of the ICS	148	Overview of SpO ₂ monitoring with Masimo	178
ECG waveform on the M300/M300+	148	Supported parameters	178
ECG electrode colors	149	SpO ₂ precautions	179
Electrode placement	150	Starting SpO ₂ monitoring on a patient	180
Accessing the ECG setup page	153	Connecting the SpO ₂ cable to the M300/M300+	181
ECG parameter setup functions	154	Patient preparation for SpO ₂ monitoring	181
Monitoring paced patients	155	Applying the sensor	182
Pacemaker precautions	155	Turning SpO ₂ monitoring on/off	183
Pacemaker considerations	155	SpO ₂ display	183
Pacer Fusion mode	157	SpO ₂ parameter box in the ICS BedView	184
Device interference with pacemaker monitoring	157	SpO ₂ parameter box on an M300	184
Overview of arrhythmia monitoring	158	Accessing the SpO ₂ page	185
M300/M300+ Arrhythmia processing	159	SpO ₂ parameter setup functions	185
Selecting arrhythmia leads	160	SpO₂ and pulse rate monitoring with Nellcor and M300/M300+	187
Recommended remedies for lead-off notifications	163	Overview of SpO ₂ monitoring with Nellcor	188
Arrhythmia modes	163	Supported parameters	188
Arrhythmia display	164	SpO ₂ precautions	189
Arrhythmia parameter box on an ICS BedView	164	Starting SpO ₂ monitoring on a patient	190
		Connecting the SpO ₂ cable to the M300/M300+	191
		Patient preparation for SpO ₂ monitoring	192
		Applying the sensor	192
		Turning SpO ₂ monitoring on/off	193
		SpO ₂ display	194

SpO2 parameter box on an ICS BedView	194	Inspection	250
SpO2 parameter box on an M300/M300+	195	Safety checks - Infinity M300/M300+	250
Accessing the SpO2 setup page	196	Perform annual safety checks	250
SpO2 parameter setup functions	196	Preventive maintenance	251
Recordings/reports	197	Reprocessing.	253
Overview	198	Safety Information	254
Recorder	199	Information on reprocessing	254
Recorder setup	199	Classification for reprocessing	254
Initiating manual recordings	200	Classification of medical devices	254
Processing of strip recordings	200	Classification of device-specific	
Requesting a remote recording	200	components	255
Setting up a recording	200	Before reprocessing	256
Manual (timed) recordings	201	Observe before disassembly	256
Canceling a recording	205	Patient-specific accessories and	
Actions that affect recordings	206	consumables	257
M300/M300+ offline recordings	206	Device-specific components	258
System configuration	207	Validated reprocessing procedures	259
Overview	208	Overview of the reprocessing procedures	
The Biomed page	208	of the components	259
Telemetry default setup (System setup)	212	Cleaning	260
Telemetry setup (for each M300/M300+		Surface disinfection	260
device)	212	Supplementary information	261
The General settings page	213	Other agents and reprocessing procedures	261
General settings setup page	213	Disinfectants	261
The Alarms page (telemetry)	215	Reprocessing of patient-specific accessories	264
Alarms > Limits page	215	Categorization of accessories	264
Changing alarm limits settings	217	Reprocessing of the categories ECG mono-	
Alarms > Arrhythmia page	218	lead, SpO2 intermediate cable and SpO2	
Configuring the alarm settings of the		sensor	264
patient	221	Cleaning	265
The Layout/ Parameters page	221	Surface disinfection	265
The Find device page	232	Reprocessing of the category Pouch	266
The Device setup page	232	Storage and transport	266
Problem solving	235	Other agents and reprocessing	
Overview of problem solving	236	procedures	266
M300/M300+ – arrhythmia alarm messages	237	After reprocessing	268
M300/M300+ – ECG alarm messages	238	Assembling and attaching device-specific	
M300/M300+ – ST alarm messages	240	components	268
M300/M300+ – SpO2 alarm messages	242	To insert the swappable battery into the	
M300/M300+ messages	244	M300+	268
Maintenance	247	Preparation before next use of device	270
Overview	248	Checking the operational readiness	270
Definition of maintenance concepts	249	Disposal	271
		Disposal of the medical device	272

M300, Bedside Charger, and Central Charger; and M300+, swappable battery, and battery charger	272

**IFU CONTENT TO COMPLY WITH IEC
60601-1:2005 and with IEC 60601-1:2012**

CLAUSE 14.13.	273

Technical specifications

Site of operation	278
Infinity M300 Bedside Charger (MS29558)	284
Infinity M300 Central Charger (MS25699)	285
Infinity M300+	285
Infinity M300+ battery charging station.	290
M300/M300+ Performance data.	291
Electromagnetic compatibility (EMC)	292
Operating characteristics	296

List of accessories

M300/M300+ accessories overview	298
Accessories	298
General M300/M300+ accessories.	299
System components	299
ECG monitoring – reusable leadsets	301
ECG monitoring – single-patient use leadsets.	303
ECG monitoring – MonoLead.	305
ECG monitoring – Telemetry	307
ECG-leads Telemetry	308
Telemetry cables with single-pin connector	308
Pulse Oximetry (SpO ₂) monitoring with Masimo	309
Masimo SpO ₂ cables	310
Masimo LNCS disposable sensors.	310
Masimo LNCS reusable sensors	310
Pulse Oximetry (SpO ₂) monitoring with Nellcor	311
Nellcor SpO ₂ cables.	312
Nellcor disposable sensors.	312
Nellcor reusable sensors	312
Dräger disposable sensors	312
Dräger reusable sensors	312
M300/M300+ accessories overview	313
Index	315

This page has been left blank intentionally.

Intended purpose

Intended use	40
Indications	40
Contraindications	40
Environments of use	40
Patient population	41

Intended use

The Infinity M300/M300+ is intended for use with the Infinity CentralStation to monitor ECG and pulse oximetry on ambulatory and non-ambulatory adult and pediatric patients using wireless communication over the Infinity patient monitoring network.

The Infinity M300/M300+ with TruST is intended for 12-Lead ECG monitoring with a reduced set of electrodes. Reconstructed leads are intended for real-time assessment of ST segment changes.

Indications

Asystole (ASY), Ventricular Fibrillation (VF), Ventricular Tachycardia (VT), Bradycardia, Ventricular Run, Accelerated Idioventricular Rhythm, Supraventricular Tachycardia (SVT), Ventricular Couplet, Ventricular Bigeminy, Tachycardia, Pause, Artifact, and Premature Ventricular Contractions (PVC).

Contraindications

The Infinity M300/M300+ is not compatible for use in an MRI magnetic field.

Environments of use

This device is intended for use in health care environments only.

Implementation of the M300/M300+ in a hospital system connected to the Infinity network system and paired with one patient per device will allow the M300/M300+ to actively collect ECG and pulse oximetry data via sensors attached to the patient. This collected data is both presented on the M300/M300+ device itself and is transmitted to the ICS for primary monitoring and alarming.

The M300/M300+ is not intended for home care use or the following hospital environments:

- Hyperbaric chambers
- CT areas
- Environments containing MRI equipment

Patient population

Adult and pediatric ambulatory and non-ambulatory patients exhibiting heart irregularities including ASY, VF, VT, Bradycardia, Ventricular Run, Accelerated Idioventricular Rhythm, SVT, Ventricular Couplet, Ventricular Bigeminy, Tachycardia, Pause, Artifact, PVC/min as well as patients requiring hospital stay may require the use of the ICS and M300/M300+ devices.

NOTE

Clinical judgment must be used to determine when the M300/M300+ should be used on a specific pediatric patient. Assigning a specific weight or age to ECG performance is not practical as there are multiple factors to be considered when making a determination for patient care.

This page has been left blank intentionally.

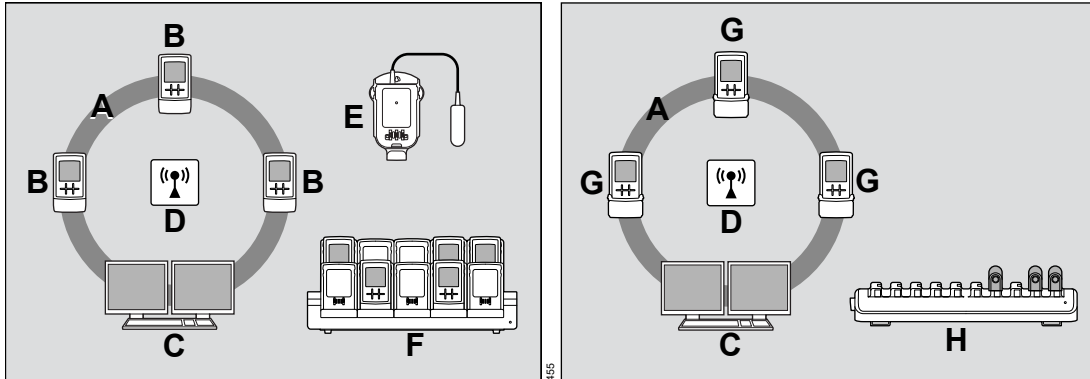
System overview

Overview of the ICS relative to M300/M300+	44	To insert the swappable battery into the M300+	60
Overview of the M300/M300+	45	M300+ battery charging station for swappable batteries	61
Infinity M300	45	Inserting the swappable battery into the battery charger	62
Infinity M300+	45	Removing the swappable battery from the battery charger	62
Infinity M300/M300+ communications	46		
Infinity M300/M300+ user interfaces and functions	46	Device symbols	63
Front panel of the M300 and M300+	47	Abbreviations	68
Battery status LED of the M300/M300+	47		
Low battery alarm	48		
Critical battery alarm	48		
Power-save mode	48		
Keys of the M300/M300+	49		
Back panel of the M300 and M300+	50		
Overview of the Bedside Charger (M300 only)	51		
Avoiding charger and adapter damage	51		
M300 screen examples	52		
Power on/off	52		
Overview of the Central Charger (M300 only)	53		
Infinity M300+	54		
M300+ front of the device	54		
M300+ swappable battery	55		
Battery safety information	56		
Swappable Battery run time on the M300+	56		
Preventive Maintenance	57		
Caring for the M300+ lithium-ion swappable battery	57		
Charge status for swappable battery attached to the M300+	58		
To check the charge status on the swappable battery	58		

Overview of the ICS relative to M300/M300+

The ICS acquires and displays information from bedside monitors and M300.

The following diagram shows the basic components of the ICS with M300/M300+.



- A** Infinity network
- B** M300 and/or bedside monitors
- C** ICS (displays)
- D** Access point
- E** Bedside charger for charging the M300 at the bedside (excluding M300+)
- F** Central Charger for charging multiple M300 devices (excluding M300+)
- G** M300+ (with swappable battery) and/or bedside monitors
- H** Battery charger for swappable batteries from M300+

CAUTION

All Dräger hardware and screen representations shown in these instructions for use are examples only. Actual product or screens may differ slightly.

NOTE

The ICS, Infinity M300 Central Charger, and M300+ battery charger are not intended for use in the patient vicinity.

The ICS provides centralized monitoring and critical care management for bedside-monitor and M300/M300+ patients.

From the ICS, clinicians gain access to patient information from devices on the Infinity network.

The ICS displays waveforms, parameters, and alarms for Infinity bedside monitors and M300/M300+.

Overview of the M300/M300+

WARNING

The M300/M300+ speaker is only intended for use in the patient vicinity. It is not intended for primary alarm annunciation. The ICS is the designated primary alarm annunciator for M300 patients.

The Infinity M300/M300+ is a wireless telemetry, patient-worn device with rechargeable lithium-ion battery which monitors ECG and SpO2 physiological data, features a color display, and local alarm alerts and keypad interface. ECG functions include heart rate, arrhythmia detection and ST segment analysis. SpO2 functions include pulse plethysmogram and pulse rate. Infinity M300/M300+ with TruST allows for 12-lead ECG monitoring with a reduced set of electrodes by deriving values for missing leads.

NOTE

The Infinity M300 is powered by an internal rechargeable lithium-ion battery. The Infinity M300+ is powered via a rechargeable, swappable lithium-ion battery.

Infinity M300

The standard Infinity M300 includes the following:

- Infinity M300 patient-worn transceiver
- Infinity M300 Bedside Charger
- Infinity M300 Central Charger
- Infinity M300 programming kit

To facilitate patient mobility the M300 can be placed in a disposable or re-usable shower pouch and worn by the patient. When the patient is sedentary (in bed or sitting) the clinician may attach the Infinity M300 to a bedside charger, which provides a slow charge to the device. When the Infinity M300 is not in clinical use, it may be stored and recharged at an accelerated rate in the Central Charger.

Infinity M300+

The standard Infinity M300+ includes the following:

- Infinity M300+ patient-worn transceiver
- Infinity M300+ swappable battery (2)
- Infinity M300+ battery retainer
- Infinity M300+ remote battery charging station (charging capacity of up to 10 swappable batteries)
- Infinity M300+ programming kit

When an Infinity M300+ swappable battery is exchanged it can be charged in the M300+ battery charger to be made ready for later use.

NOTE

TruST 6-wire calculated 12-lead ECG monitoring is optional.

Infinity M300/M300+ communications

Infinity M300/M300+ connects to the Infinity network via 802.11 wireless communication with hospital access points (AP). From the AP, data is routed over the Infinity network via wired Ethernet for real-time display and annunciation at the Infinity CentralStation Wide (Widescreen) central monitoring workstation. The Infinity CentralStation (ICS) Wide allows for simultaneous central monitoring of up to thirty-two (32) Infinity M300/M300+ devices to support wireless telemetry monitoring.

Infinity M300/M300+ user interfaces and functions

The Infinity M300/M300+ communicates bilaterally with the Infinity CentralStation (ICS) which serves as the primary display, user interface and alarm annunciator for acquired M300/M300+ physiological patient data. The Infinity M300/M300+ 6-button local keypad and display serves as a secondary user interface for clinicians to access local features and functions.

At the ICS clinicians may perform the following functions:

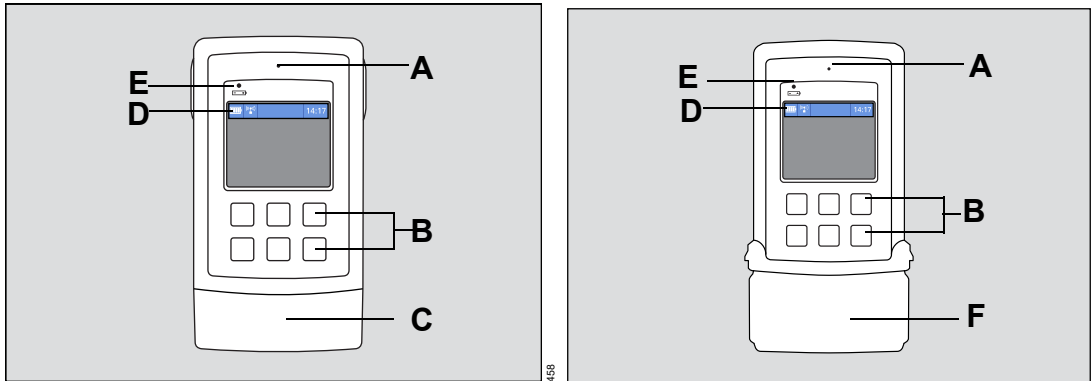
- Admit / Discharge patients
- Initiate / Discontinue M300/M300+ Standby
- Enter patient demographics
- Assign patient categories
- Assign alarm limits
- Manage M300/M300+ audio pause, alarm pause, alarm silence
- Access patient alarm history
- Access patient full disclosure records

At the Infinity M300/M300+ clinicians may perform the following functions:

- Turn device on and off
- Adjust alarm volume
- Manage alarm pause
- Scroll through waveforms
- Discharge patients
- Initiate strip recordings
- Issue staff alerts

Front panel of the M300 and M300+

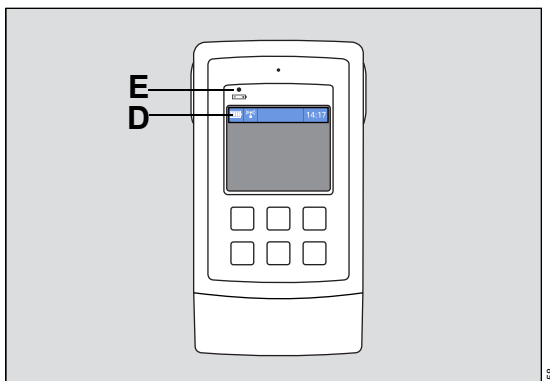
The following illustration shows the elements of the front panel of the M300 (left) and M300+ (right):



- A** Speaker for audio alarm signals
- B** Keys
- C** Internal battery compartment (M300 only)
- D** Battery symbol indicating the remaining charge
- E** Battery status LED
- F** Swappable battery (M300+ only)

Battery status LED of the M300/M300+

When the M300/M300+ screen is enabled, the battery symbol (D) indicates the available battery power. When the screen is disabled because it is in power-save mode, the battery condition is indicated with the battery LED (E).



Low battery alarm

When the battery power level has reached approximately 30 minutes of remaining charge, a **Low battery** message is reported visually and acoustically at both the ICS and M300/M300+ to indicate that the battery is low. The M300/M300+ displays the **Low battery** status once every three minutes, plus or minus five seconds.

Critical battery alarm

The M300/M300+ displays a critical battery alarm message, **Recharge battery**, to indicate a low battery when the M300/M300+ power level has reached approximately 15 minutes of remaining charge. The alarm is reported visually and acoustically at both the M300/M300+ and the ICS. After the user acknowledges the alarm, the message will rotate through any other displayed M300/M300+ messages.

NOTE

In the case of low or critical battery charge status, a message displays on the ICS and the M300/M300+, as a reminder to recharge the battery. These status messages disappear and the annunciation stops when the M300 is recharging in a Bedside Charger or Central Charger, or when the M300+ battery has been replaced with a freshly charged battery.

For information on the indications of the battery status LED and charging the M300/M300+ battery, see page 96.

Power-save mode

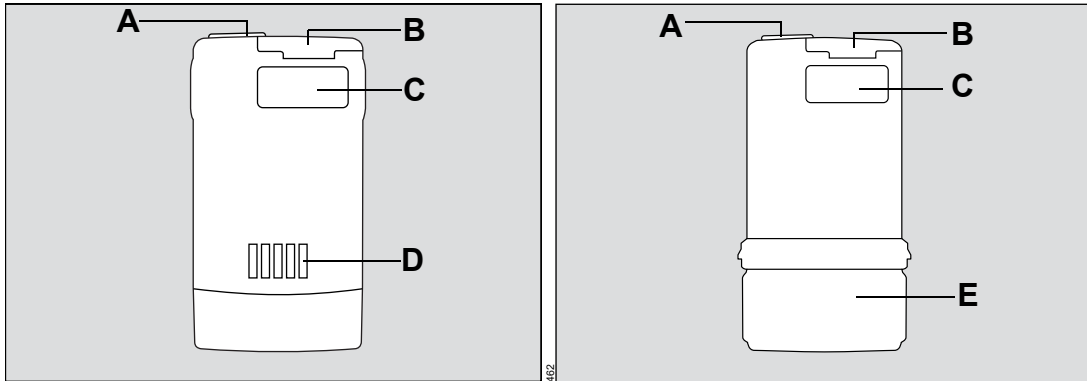
Power-save mode is on by default. When power-save mode is off, the battery will drain faster. When power-save mode is off, and the M300 is on the Bedside Charger, it is necessary to closely monitor the battery charge level.

Keys of the M300/M300+

Key	Function
	Depending on the enabled setting at the ICS (see page 211), pressing this key does one of the following: – Generates a strip recording and stores an event at the ICS – Cancels a strip recording that was initiated from the M300/M300+
	If the Staff alert setting is enabled at the ICS (see page 211), pressing this key does the following: – Sends the Staff alert message to the ICS – Triggers an alarm tone of medium priority at the ICS
 	Pressing these keys does the following: – Scrolls through waveforms on the M300/M300+ screen – Increases or decreases a setting in an M300/M300+ window – Turns the M300/M300+ on (press both keys longer than 3 seconds)
	Pressing this key does one of the following: – Turns the M300/M300+ screen on and off (press and hold the key longer than 3 seconds) – Scrolls through the <i>Main screen</i>, <i>Lead Status screen</i>, <i>Volume screen</i>, and <i>Demographics screen</i> – Cancels standby mode – Resumes monitoring and displaying the patient data at the M300/M300+ after discharge was initiated from the ICS – Accepts or confirms user-selected values
	If the Alarm pause setting is enabled at the ICS (see page 234), pressing this key does the following: – Suppresses alarm monitoring of the corresponding patient at the ICS and at the M300/M300+. The alarm pause period is a pre-configured time of 1 to 5 minutes (press and hold the key more than 3 seconds if the screen is turned on) – Cancels an alarm pause in progress. If an alarm condition is present, alarms sound again immediately

Back panel of the M300 and M300+

The following illustration shows the elements of the back panel of the M300 (left) and M300+ (right):



- A** Cover for SpO2/Aux port
- B** ECG lead connector
- C** Lead wire diagram
- D** Bedside Charger interface (M300 only)
- E** Swappable battery (M300+ only)

NOTE

The SpO2 port is also used to run diagnostics. If a service mode message appears, contact your technical personnel.

NOTE

The M300/M300+ serial port cannot be accessed during SpO2 monitoring.

Overview of the Bedside Charger (M300 only)

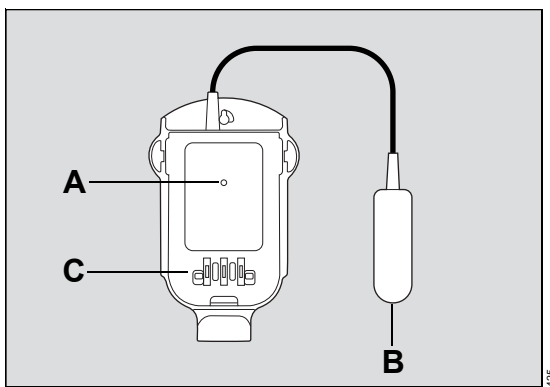
The following illustration shows a Bedside Charger which is used to charge the battery of the M300. For information on how to charge the battery, see “Using the Bedside Charger” on page 97.

Avoiding charger and adapter damage

To avoid causing damage to the Bedside Charger, the wall adapter should be grasped firmly and pulled straight from the wall when unplugging the charger. Before grasping the wall adapter, however, ensure that the wall adapter has not been damaged previously.

To avoid damaging the Bedside Charger, make sure that the Bedside Charger is no longer attached to the bed before attempting to move the bed.

To avoid damaging the wall adapter, the Bedside Charger should never be unplugged by pulling on the cord.

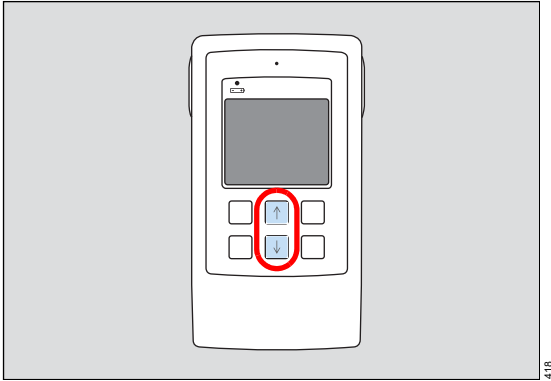


- A** Power LED – lights up green when the bedside charger is plugged in
- B** Power adapter (country-dependent)
- C** Charging pins

M300 screen examples

Power on/off

To turn on and off the Infinity M300/M300+, simultaneously press the Up (↑) arrow and Down (↓) arrow keys located in the middle of the Infinity M300/M300+ panel (shown circled in red in the illustration).



418

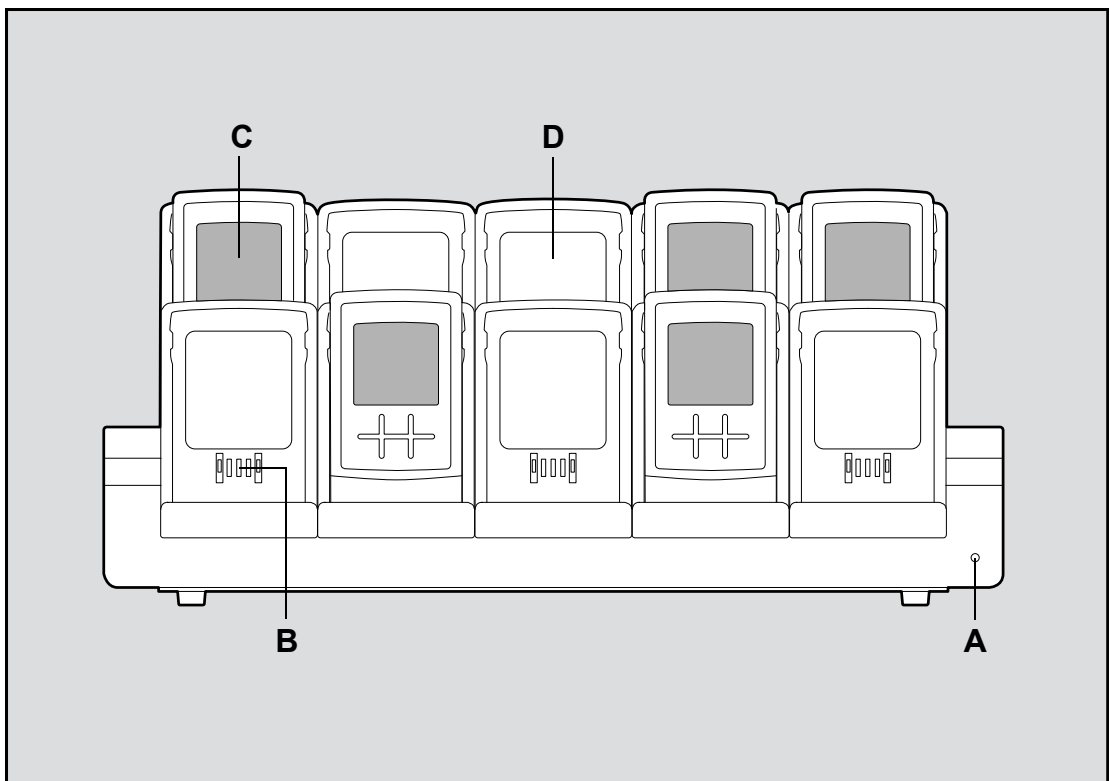
NOTE

M300/M300+ device settings, including clinical data and current alarm settings, are retained for a maximum of 2 minutes after the device is powered off. After 2 minutes of no power, the patient is discharged, and factory default settings are restored.

Overview of the Central Charger (M300 only)

The M300 Central Charger is a charging station used to store and recharge the batteries of up to ten unused M300s temporarily. The Central Charger is intended to be used outside the patient vicinity.

The following illustration shows a Central Charger and some of its identifiable parts. For information on how to charge the batteries of multiple M300 devices, see “Using the Central Charger” on page 99.



- A** Power LED – lights up green when the Central Charger is plugged in
- B** Charging pins that power the M300 when it is seated in the Central Charger
- C** An M300 device being charged (indicated by a small LED illuminated continuously)
- D** Empty slot available to receive an M300 for charging its battery

Infinity M300+

M300+ front of the device

The following figure shows the M300+ front of the device.

NOTE

Figures of products and screen content in this document may differ from the actual products depending on configuration and design.



NOTE

The battery retainer secures the battery to the M300+. The battery retainer should always be in place when using the device.

M300+ swappable battery

The new Infinity M300+ operates with a swappable, externally rechargeable battery with the following specifications:

- Battery recharging time of approximately 3.5 hours
- Battery swaps retain clinical data and current alarm settings for approximately two minutes
- Battery swaps do not require tools
- Battery provides a four LED charge level indicator when the battery is detached
- The complete unit, with the swappable battery pack and the battery retainer attached to the monitor, is rated IPX4, protected against splashing water

WARNING

Do not try to power up the M300+ without a battery installed. Attempting to power up the M300+ without a battery installed will result in erasing any stored patient information from the M300+.

NOTE

IPX ratings:

- Main unit with battery attached is IPX 4, protected against splashing water.
- Main unit without battery attached is IPX 7, protected against temporary immersion.
- Swappable battery alone, unattached, is IPX4, protected against splashing water

WARNING

During battery replacement, there is no data monitoring and no transmission of data to the ICS. However, clinical data and current alarm settings are retained in the M300+ for a maximum of two minutes. Exceeding this time limit will result in loss of clinical data and alarm settings.

Battery safety information

Observe the following warnings and cautions for the swappable battery.

WARNING
Risk if the swappable battery is not replaced properly.
If the swappable battery is not reattached or serviced and replaced properly, short circuits and high temperatures leading to explosion or fire may occur.

WARNING
Risk if the swappable battery contacts are wet.
If the battery is detached or removed for service and the electrical contacts are moistened with disinfectant, immediately reattaching or reinstalling the battery while the contacts are still wet could lead to corrosion and contact failure. Dry the contacts before reattaching the battery.

WARNING
Do not crush, drop, or puncture the swappable battery as this could lead to internal damage and internal short circuits which may not be visible externally.

WARNING
Do not incinerate or expose the swappable battery to high temperatures.

WARNING
Discontinue use of defective or damaged batteries, such as swappable batteries that do not lock into place on the M300+.

CAUTION
Use M300+ compatible Dräger swappable battery only.

CAUTION
Dispose of swappable batteries in compliance with your institution’s disposal instructions.

Swappable Battery run time on the M300+

M300+ with swappable battery		
Typical Battery Run Time		Load Conditions
802.11 b/g/n 2.4 GHz:	22 hours	– ECG only
802.11 a/n 5 GHz:	22 hours	– Display off
		– Audio off

M300+ with swappable battery	
Typical Battery Run Time	Load Conditions
802.11 b/g/n 2.4 GHz: 18 hours	– ECG – Continuous SpO₂ – Display off – Audio off
802.11 a/n 5 GHz: 18 hours	

Preventive Maintenance

The following table shows the preventive maintenance interval for the M300+ swappable battery:

Component	Interval	Measure	Personnel Responsible
M300+ swappable battery	Every 12 months	Replace swappable battery	Users (medical or technical personnel)
M300+ battery retainer	Every 12 months	Replace battery retainer	Users (medical or technical personnel)

Caring for the M300+ lithium-ion swappable battery

The following table provides care instructions for the M300+ swappable battery.

Activity	When to Perform
Visually inspect the swappable battery	Prior to inserting the swappable battery into the M300+
Clean the swappable battery	– When the swappable battery is exposed to contaminants – After each patient discharge
Charge stored swappable battery	When not in use for an extended time
Replace the swappable battery	Once every year. NOTE The duration of the swappable battery charge for the M300+ may be reduced by characteristics of the wireless environment such as signal quality, power levels, power-save mode, etc. The battery operating life can also gradually diminish over time.

Charge status for swappable battery attached to the M300+

The M300+ LED indicates battery charge status as follows:

LED	Battery charge status
Blinks green every 5 seconds	Power on
Blinks amber every 5 seconds	Low battery charge

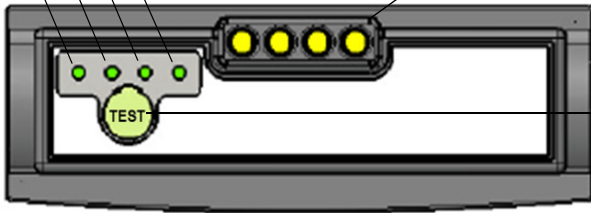
To check the charge status on the swappable battery

When you press the **TEST** button on the M300+ swappable battery, the battery LEDs light to indicate the battery charge status. Each lit LED indicates a charge percentage, as described below.

Charge Indicator Lights

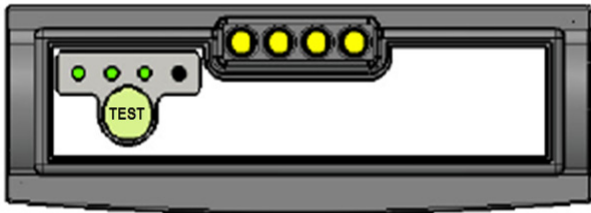
1 2 3 4

Connector Contacts

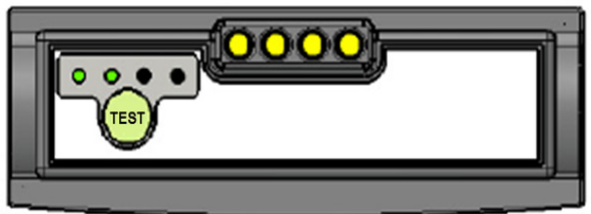


4 LEDs indicates a 90-100% charge

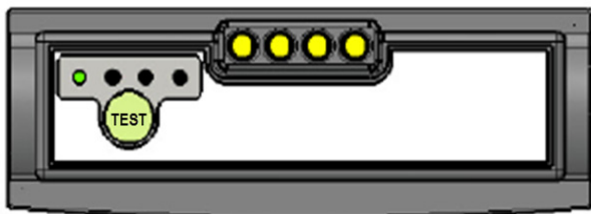
TEST button



3 LEDs indicates a 64-89% charge



2 LEDs indicates a 38-63% charge



1 LED indicates a 11-37% charge

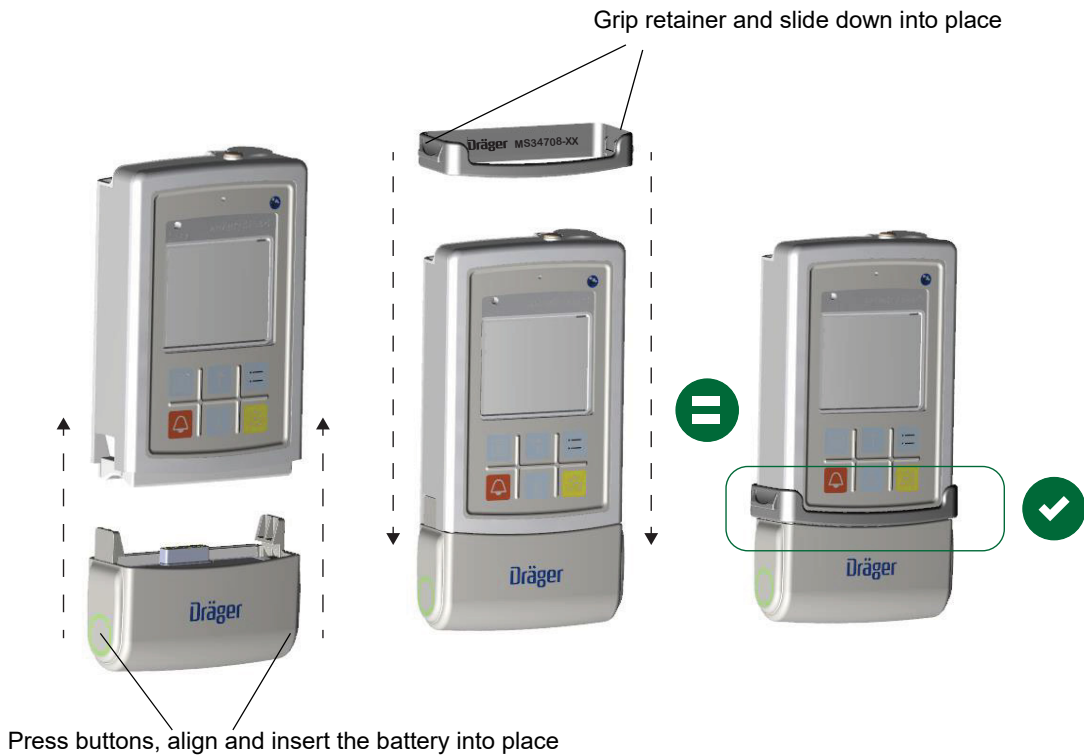
Note: When the charge is less than 11%, one LED will blink.

To insert the swappable battery into the M300+

- 1 Press the buttons on the swappable battery.
- 2 Align and insert the battery into place.
- 3 Slide the battery retainer down over the M300+ into place above the battery.

NOTE

Make sure the swappable battery correctly aligns with the M300+ before securing into place.



CAUTION

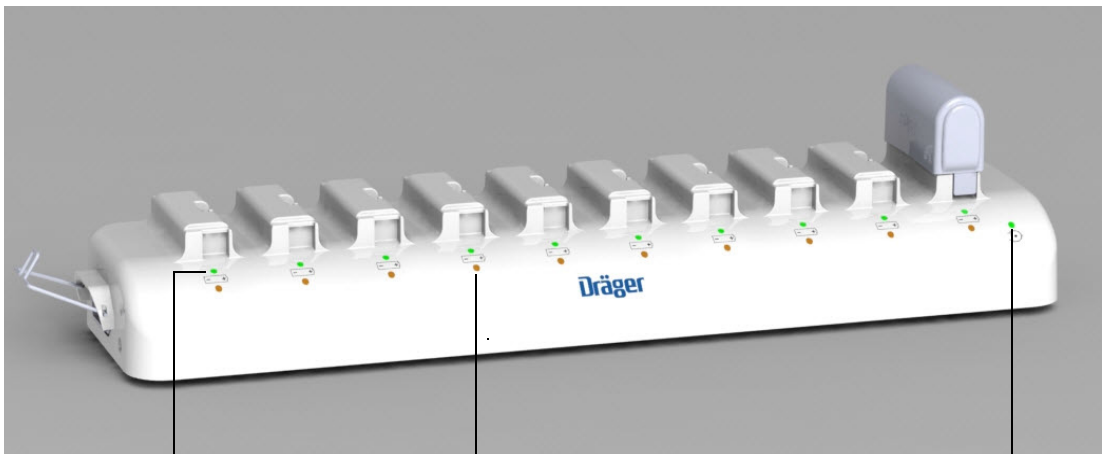
When inserting the swappable battery, carefully align the battery with the bottom of the monitor and press firmly from the bottom of the battery to avoid pinching fingers when the battery snaps into place. Ensure any objects or potential obstructions are clear before attaching the battery.

M300+ battery charging station for swappable batteries

The wall-mountable or counter top M300+ battery charging station recharges up to 10 M300+ batteries at a time. Contact your service representative for the wall mounting installation instructions.

Approximate charging time is 10 batteries within 4 hours. The battery charging station provides auto shut off to prevent overcharging, and indicates charging status through illuminated LEDs.

The following figure displays an illustration of the M300+ battery charging station. When the charging station is plugged into an AC outlet, a green LED indicator on the front of the unit is illuminated. Amber LEDs indicate a battery is charging and green LEDs indicate the battery is fully charged.



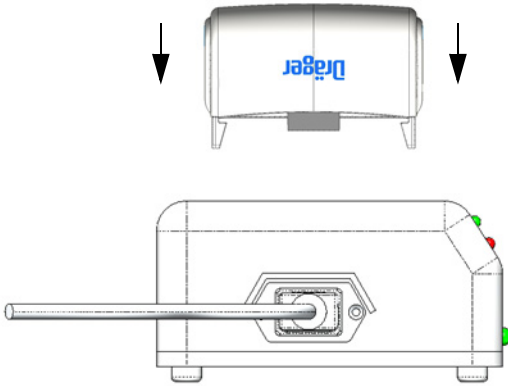
These LEDs are green and illuminated when a battery is connected to power and fully charged at 100%.

These LEDs are amber and illuminated when a battery is connected to power with a charge level less than 100%.

This LED is green and illuminated when the battery charger is plugged in.

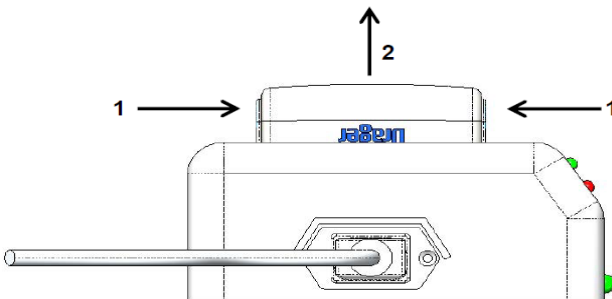
Inserting the swappable battery into the battery charger

- 1 After removing the swappable battery from the M300+, insert it into the charging station.
- 2 Press the battery into place.



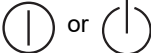
Removing the swappable battery from the battery charger

- 1 Press the two tabs on each side of the swappable battery.
- 2 Pull the battery up to remove.



Device symbols

The following table lists the hardware device symbols displayed on various Dräger hardware.

Symbol	Description
	Read accompanying IFU for specific safety information.
	Refer to the instruction manual/booklet.
	Electrical connectors caution symbol
	On/off
	AC power
	Defibrillator-proof equipment, type CF
	Non-disposable part
IPX1	Protected against dripping water
IPX4	Protected against splashing water
IPX7	Protected against the effects of temporary immersion
	USB connector

Symbol	Description
	ESD warning
Rx only	Caution: Federal law restricts this device to sale by or on the order of a physician
	European Union Representative
	Device part number and revision
	Device serial number
	Manufacturer
	Date of manufacture
	Complies with the European Medical Device Regulation (EU) 2017/745
	Complies with applicable EU regulations and directives.
	EU RoHS (Restriction of Hazardous Substances) certification
	TÜV SÜD NRTL safety certification mark

Symbol	Description
	Underwriters Laboratories certification (Canada and US)
	BSMI certification (Taiwan)
	China Compulsory Certification
	ETL listed
	GOST-R certification
	Certification that device is tested to comply with 802.11 b/g standards for interoperability of wireless devices by WI-FI Alliance
FCC ID:	Certification marking and number for wireless devices with FCC approval
IC:	Certification that Industry Canada technical specifications were met
	Japanese wireless logo and approval number
	Brazilian Anatel wireless logo

Symbol	Description
	INMETRO certification mark
	TÜV Rheinland testing approval
	Chinese Metrological Compliance symbol with approval number
	Expiration date
	Quantity
	China RoHS mark
 Do not re-use	Do not re-use, single patient use
	Not made with natural rubber latex

Symbol	Description
	Not made with natural rubber latex
	Medical Device
For USA: Rx only	Caution: Federal law restricts this device to sale by or on the order of a physician.
	Keep this device outside the MRI scanner room
	Importer
	Importer
	Revision index

Abbreviations

The following table lists the abbreviations used in these instructions for use and those that are displayed on the ICS and/or M300/M300+. For any abbreviations of parameters originating from external devices, refer to the corresponding instructions for use.

Abbreviation	Description
% Paced	Percentage of paced beats
AHA	American Heart Association
AIVR	Accelerated idioventricular rhythm
APN	Apnea
ARR	Arrhythmia
ARTF	Artifact
ASY	Asystole
aVF	ECG lead aVF
aVL	ECG lead aVL
aVR	ECG lead aVR
BGM	Ventricular bigeminy
BRADY	Bradycardia
CISPR	International Special Committee on Radio Interference
CPT	Ventricular couplet
DVI	Digital Video Interface
dV1, dV3, dV4, dV6	Derived chest leads
ECG	Electrocardiogram
HR	Heart rate
I	ECG lead I
ICS	Infinity CentralStation
IDS	Infinity Docking Station
IEC1	International Electrotechnical Commission (IEC) standard used for the labeling and coloring of European ECG electrodes and lead wires that follow the IEC standard
IEC2	International Electrotechnical Commission (IEC) standard used for the labeling and coloring of US/AHA ECG electrodes and lead wires that follow the IEC standard
II	ECG lead II
III	ECG lead III
LA	Left arm (ECG)
LA	Left atrial pressure

Abbreviation	Description
LL	Left leg (ECG)
Low	Advisory (alarm)
LT	Life-threatening (alarm)
LV	Left ventricular pressure
PA	Pulmonary arterial pressure
PLS	Pulse rate from SpO2
PVC/min	Rate of PVC per minute
R	Resistance
RA	Right arm (ECG)
RL	Right leg (ECG)
RUN	Ventricular run
SER	Serious (alarm)
SpO2	Oxygen saturation measured by pulse oximetry
ST(x)	ST deviation of lead (x)
STd(x)	ST deviation of derived leads (dV1 to dV6)
SVT	Supraventricular Tachycardia
TACH	Tachycardia
TruST	Algorithm that provides a TruST-12-lead ECG (including derived chest leads dV1, dV3, dV4, dV6) using a 6-lead wire set that provides ECG leads I, II, III, aVL, aVR, aVF, V2, V5.
V	Chest lead from a 5- or 6-lead wire set.
V+	Second chest lead from a 6-lead wire set
VESA	Video Electronics Standard Association
VF	Ventricular fibrillation
VGA	Video Graphics Array
VTach (VT)	Ventricular tachycardia

This page has been left blank intentionally.

Operating concept

Overview of M300/M300+ operating concept	72
M300/M300+	72
M300 terminology	72
ICS components	73
Telemetry monitoring	74
M300/M300+ power	75
Communication between an M300/M300+ and the ICS	75
Volume control	75
Minimum alarm volume	76
Communicating with the Infinity network	77
Offline condition notification	77
Local ICS	78
Remote ICS	78
M300/M300+	78
Communication management	79
Moving an M300/patient from one room (viewport) to a different room (viewport)	80
Supported symbols	81
Electronic patient data transfer	83
Transferring patient data	84
ICS and M300/M300+ online help	86
Standby mode	87
Standby/ Discharge page	88
Enabling standby mode	89
Canceling standby mode	89
M300/M300+ user interface	91
M300/M300+ header bar	92
M300/M300+ keypad	93
M300/M300+ waveforms	93

Overview of M300/M300+ operating concept

NOTE

The ICS is the primary user interface and alarm annunciator for Infinity M300 patient data.

M300/M300+

The M300/M300+ is a patient-worn transceiver used to monitor adult and pediatric patients. It uses the ICS as the primary patient monitoring display and primary alarm source. The M300/M300+ provides continuous ambulatory monitoring of the following parameters:

- ECG including heart rate, arrhythmia, and ST segment analysis
- Pulse oximetry including SpO₂, pulse plethysmogram waveform, and pulse rate

The data is exchanged via two-way wireless and wired communication between the M300/M300+ and the ICS.

M300 terminology

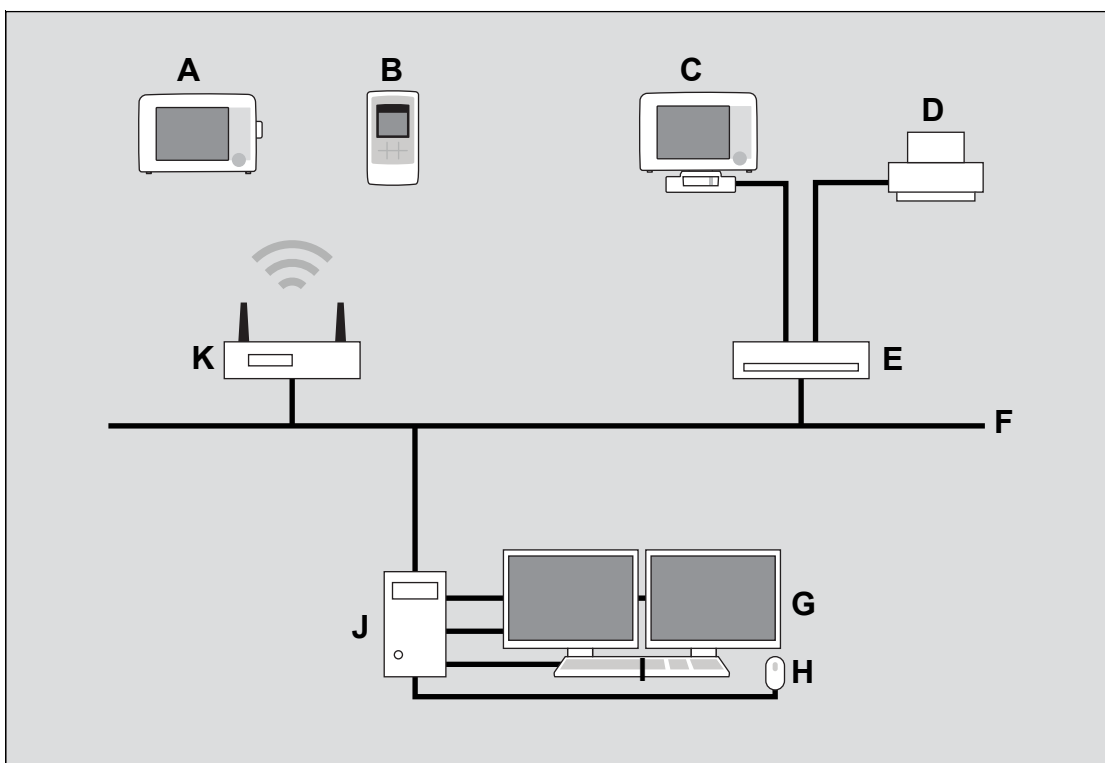
The following list describes some important terms used in these instructions for use:

- **Local M300/M300+** – an M300/M300+ that is admitted to the referenced ICS for primary monitoring.
- **Remote M300/M300+** – an M300/M300+ admitted at another ICS but viewed remotely by the referred ICS.
- **Local ICS** – an ICS that is the primary monitor for all admitted M300s/M300+s. The ICS also provides the primary alarm signals for any network issues related to recorders.
- **Remote ICS** – an ICS that is viewing M300/M300+-monitored patients who are not admitted to it for central monitoring. From a remote ICS, an M300/M300+ is viewed as any other bedside. The ICS makes its M300/M300+ patients available to the Infinity network for remote viewing by any remote ICS or bedside monitor.
- **BedView** – a window on the ICS displaying the content of a bedside monitor or M300/M300+.
- **Local (primary and secondary) monitoring units** – a group of up to 64 bedside monitors and M300/M300+ that are pre-configured for a specific ICS. The ICS can select these patients for central monitoring. The ICS can control any bedside monitor in its monitoring units.
- **Remote monitoring unit** – a monitoring unit that is assigned to the ICS for remote viewing. These bedside monitors can only be viewed remotely but not controlled.
- **Main screen** – the primary ICS screen displaying up to 16 patients (up to 32 patients in a dual screen configuration) who are assigned at the ICS for central monitoring.
- **Viewport** – a slot on the ICS Main screen that is assigned to a patient; it consists of a waveform area, a parameter box, and a header.

- **Local Telemetry Viewport**
a viewport assigned to the Main screen, with a Telemetry Bed Label configured on that same ICS.
- **Remote Telemetry Viewport**
a remote viewport represents a patient who is assigned to an ICS Main screen, but is actually admitted to a different ICS.

ICS components

The following diagram shows one possible configuration with an ICS.



- A Wireless monitor
- B M300
- C Docked monitor
- D Network printer
- E Network switch

- F** Infinity network
- G** Primary displays in dual-configuration
- H** Mouse
- I** Keyboard
- J** CPU of the ICS
- K** Wireless access points

Telemetry monitoring

The M300/M300+ monitors ECG and SpO₂ parameters for adult and pediatric patients.

M300/M300+ patients typically require ambulatory activity as part of their therapeutic regimen. To provide comfort for mobile patients, the M300 should be placed in a disposable pouch (part number MS22905), a reusable shower pouch (part number MS32401), or the patient's hospital gown pocket while the patient is ambulatory. The carrying pouches have a clear front cover to provide a view of the color display, and can be worn on a loose strap around the patient's neck. The M300+ should be placed in a disposable pouch (part number MS34194) or a reusable pouch (part number MS33867).

WARNING

To minimize the risk of strangulation and improve patient comfort, ensure that the M300 with carrying pouch and parameter cables are properly positioned on the patient.

CAUTION

Do not use the Infinity M300 disposable pouch (part number MS22905) or M300+ disposable pouch (part number MS34194) if the patient is to come in contact with liquid. Instead, use the Infinity M300 shower pouch (part number MS32401) or M300+ shower pouch (part number MS33867) in the presence of water.

When wearing the M300/M300+ Shower Pouch, the lead sets must be threaded in the front of the shower pouch to avoid water from running down the lead set into the shower pouch.

When a patient is discharged, the trends and demographic data are erased from the M300/M300+. However, the Trends data, Full disclosure data, and Events data remain in the ICS database.

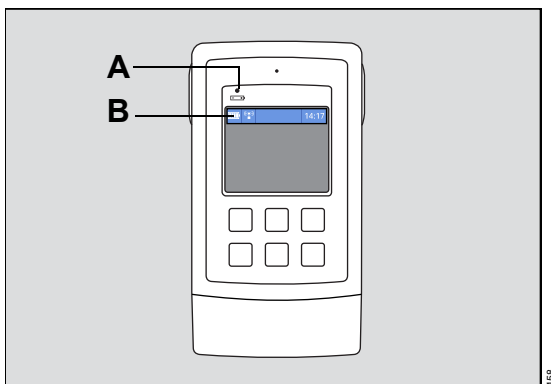
For information about the ICS database, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

M300/M300+ power

The M300/M300+ has a rechargeable battery. When the M300 screen is active, a battery symbol () displays to indicate the remaining battery power. When the M300/M300+ is in power-save mode, the LED can be used to identify the status of the battery. Battery life is approximately 12 months.

CAUTION

Contact your technical personnel when the M300 battery requires replacing (M300 only).



A Battery status LED

B Battery symbol indicating the remaining charge

For information on the indications of the battery status LED and charging the M300/M300+ battery, see "Battery status LED" on page 96.

Communication between an M300/M300+ and the ICS

When an M300/M300+ patient is admitted at the ICS (see "Admitting a patient" on page 112), the M300/M300+ relays the acquired waveforms, parameters, and alarms to the ICS for primary display and alarm announcement.

Volume control

The M300/M300+ has its own volume control, which allows you to change the M300/M300+ alarm volume, provided that function has been activated at the ICS (see "Alarm volume [%]" on page 211).

Note that, if communication between the M300/M300+ and the ICS is interrupted, you will be unable to adjust the volume below 10 %.

The ICS also broadcasts the patient data across the Infinity network. The ICS identifies an M300/M300+ with the  symbol, which appears in the viewport header bar, next to the bed label.

- If the volume control has been enabled in the configuration menu, you can adjust the M300/M300+ alarm volume freely in the ICS BedView for the M300/M300+, and on the M300/M300+ transmitter.
- If the volume control is disabled in the configuration menu, you will be able to change the alarm volume in the ICS BedView for the M300/M300+, but you will not be allowed to access the alarm volume menu on the M300/M300+ transmitter.
- If the volume control is set to **Per patient**, enabling the volume in the M300/M300+ BedView will work in the same way as the first item in this list where you can adjust the M300/M300+ alarm volume freely in the ICS BedView for the M300/M300+ and on the M300/M300+ transmitter.
- Disabling the volume control in the BedView will enable you to change the alarm volume at the ICS BedView for the M300/M300+, but prevent you from accessing the alarm volume menu at the M300/M300+ transmitter.

If the M300/M300+ stops communicating with the ICS (for example, if a patient walks out of wireless range, or if an M300/M300+ shuts down due to a low battery), the ICS displays an **Offline** message.

NOTE

If communication is interrupted between the network and the M300/M300+, the M300/M300+ continues to monitor the patient and automatically sets its alarm volume to 100%. Any alarms that were active while the M300/M300+ was offline, and all future alarms, will be reported by the M300/M300+ when communication is restored with the ICS.

If an alarm condition occurs while the M300/M300+ has lost connection to the ICS, the M300/M300+ screen does not go blank, regardless of the **Screen shut-off time [min]** value set at the ICS.

Minimum alarm volume

The minimum alarm volume (%) is configurable for the M300/M300+ while the device is in Monitoring mode, but not being monitored by the ICS (i.e., offline).

Available volume settings:

10 %	60 %
20 %	70 %
30 %	80 %
40 %	90 %
50 % (default)	100 %

The available alarm volume settings on the M300/M300+ in Monitoring mode is based on the minimum alarm volume configuration.

NOTE

The configured minimum alarm volume will not be in effect while M300/M300+ is in Networked mode (being monitored by an ICS).

Communicating with the Infinity network

The Infinity network allows data exchange among Infinity bedside monitors, M300/M300+, and the ICS. The Infinity network supports wired and wireless devices.

WARNING

Loss of communication between the ICS and a monitor is possible.

If the ICS loses communication with the Infinity Network, an audio alarm signal sounds at the ICS and displays a message indicating that the bedsides are offline. The bedside monitor displays a message indicating an offline condition.

Dräger recommends using the bedside monitor for primary diagnosis and the ICS for patient viewing.

For an M300/M300+, the ICS broadcasts an audio alarm signal and displays a message indicating an offline condition. The M300/M300+ displays a message indicating an offline condition.

For detailed information about the configuration, installation and operation of devices in the Infinity network, contact DrägerService or specialized service personnel.

Offline condition notification

If an offline condition occurs where the connection to the Infinity CentralStation (or the network) is lost while a patient is admitted on the M300/M300+, a single audible tone notification sounds within 25 seconds (+/- 2 seconds) in Legacy mode and 40 seconds in Secure mode, to indicate the offline condition at the M300/M300+. In addition, a message displays in the local offline message area until the condition is cleared.

The M300/M300+ will also display a local offline message when communication is interrupted between the Infinity CentralStation and the M300/M300+.

During an offline condition, the alarms will annunciate at maximum volume at the M300/M300+. Pausing the audio or the alarm will not affect the offline single tone notification.

NOTE

For information regarding hazards associated with non-Dräger wireless components, refer to the manufacturer's documentation.

Communicating with the Infinity network has the following benefits:

- Patient data are sent to connected devices for remote viewing of that data at various locations.
- The alarm status of patients is reported to connected devices and other configured CentralStations.
- Reports and strip recordings can be requested from the ICS for multiple patients at one location.
- A monitor can be controlled remotely from any ICS provided the remote control function is enabled and the patient is within an assigned monitoring unit (see "ICS and M300/M300+ online help" on page 86).
- Any monitor on the Infinity network can be configured to be viewed or controlled by the ICS.

- A patient's demographic data can be imported via the Infinity network by using the **Get data** function (see page 115).

Local ICS

A local ICS is the primary display for all admitted M300s/M300+s. The ICS also provides the primary alarm signals for any network issues related to recorders.

The ICS makes its M300/M300+ patients available to the Infinity network for remote viewing by any remote ICS or bedside monitor.

CAUTION

The loss of remote view of an M300/M300+ at a bedside monitor could result in alarms not being viewed by the intended caregiver while at that bedside. The ICS is intended to be the primary alarm source for the M300/M300+ and should always be used as the primary reference for caregivers to monitor patients on the M300/M300+.

Remote ICS

From a remote ICS, an M300/M300+ is viewed as any other bedside.

M300/M300+

For M300/M300+ data to appear at the ICS, the patient must first be admitted at the ICS. Once admitted and communicating with the ICS, monitoring settings can be customized.

Patient data are no longer displayed at the ICS under the following conditions:

- After a patient discharge
- When the battery charge is depleted
- During a network interruption

An **Offline** message appears at the M300/M300+, and a **Offline** message appears when communication to the ICS is interrupted. A **Discharged** message appears at the ICS when a patient is discharged.

The M300/M300+ uses a power-save mode that automatically shuts off the M300/M300+ display if there is no user interaction between 1 and 5 minutes, as defined by the user in **System setup > Biomed > Configure telemetry > Telemetry settings** (see page 211). Power-save mode does not interrupt monitoring. Parameters, waveforms, alarms, and other information continue to be monitored and displayed at the ICS even though the M300/M300+ screen appears blank.

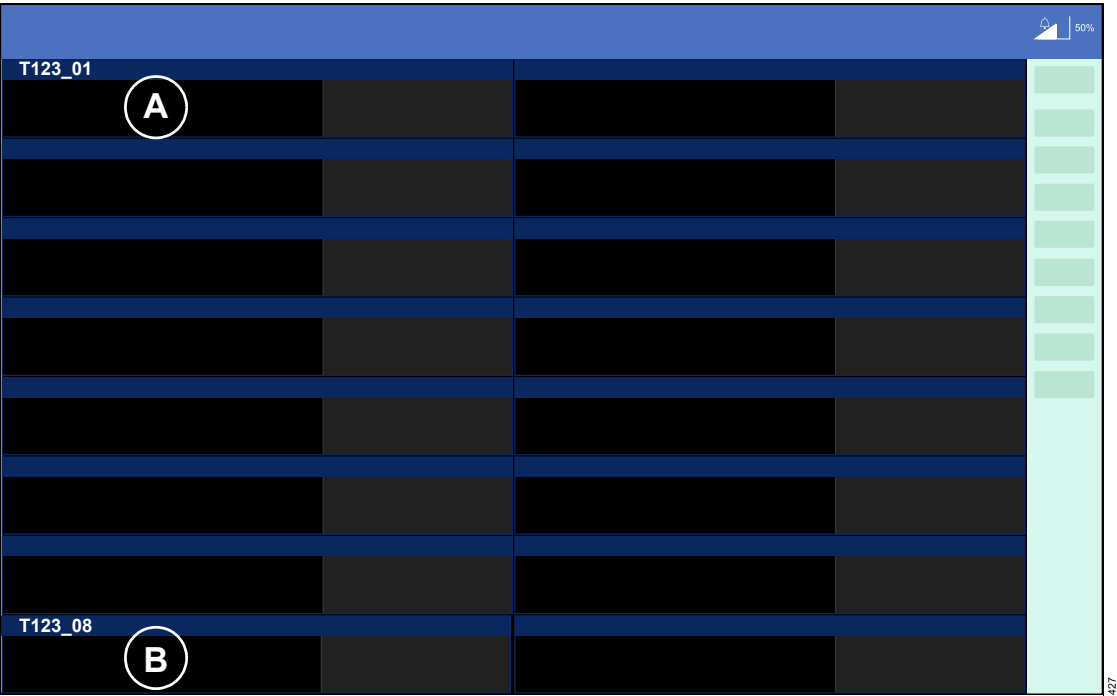
Communication management

The following table summarizes some of the special circumstances that affect communication between the ICS, the M300/M300+, and bedside monitors.

What happens if...	Behavior
the ICS goes offline (for example, due to a disconnected network cable)?	– The ICS stops displaying all patient data and sounds a one-shot alarm. – The ICS stops annunciating alarms for all patients. – The ICS displays an Offline message in the viewport of the bedside monitors. – The ICS displays a Offline message in the viewport of the M300/M300+.
the M300/M300+ loses its connection to the ICS?	– The viewport of the patient at the ICS appears blank until the ICS detects the M300/M300+ again. – The ICS displays Offline in the viewport of the patient if the connection loss persists for more than 9 seconds. – The ICS issues a one-shot alarm (an alarm that remains active until the user acknowledges it). The offline message remains in the viewport but the audio and the flashing message do not return for that patient.
an M300/M300+ detects a duplicate IP address?	The ICS briefly displays the Duplicate IP address message, and then displays the Offline banner for the device.
you discharge a patient monitored by an M300/M300+ from the ICS?	– The Discharged message appears in the viewport of the patient at the ICS. – The ICS labels any previous disclosure patient as 'inactive'. and the record is stored temporarily but does not delete that record.

Moving an M300/patient from one room (viewport) to a different room (viewport)

The following instructions describe how to move a patient from the current viewport (represented by **A** in the following illustration) to a 'Discharged' viewport (represented by **B**).



- 1 Select the BedView of the new viewport (**B**) (the viewport to which you want the patient to be moved).
- 2 Click on the 'Discharged' viewport to display the **Admit/Standby** screen.
- 3 Select the **Telemetry device ID** field, and then select the M300/M300+ you want to move from the listing that displays.
- 4 Click the **Apply** button displayed below the **Admit/Standby** screen.
- 5 Click **No** in response to the Question dialog box that appears. Selecting **Yes** will result in the patient being discharged.

The M300/M300+ and patient are moved to the selected viewport, and the original viewport will be discharged.

This sequence will take approximately 30 seconds to complete.

A new **Question** dialog displays when an M300/M300+ patient is moved to a new room (viewport). For viewports on the same ICS, the dialog contains the following buttons:

- **Cancel**
- **Move** – moves the M300/M300+ patient to the new viewport, and then discharges the patient from the original viewport.
- **Admit** – discharges the M300/M300+ patient from the original viewport and admits them as a new patient to the new viewport.

Supported symbols

The following table identifies the symbols that can appear on the ICS and the M300/M300+. For a list of fixed keys that appear on the M300/M300+, see "Keys of the M300/M300+" on page 49.

Symbol	Possible Locations	Description
	Upper-right corner on the Main screen header bar.	This symbol appears after selecting the Audio pause button on the ICS Main menu bar. The symbol also indicates that alarms are audio paused for all patients who are assigned at the ICS.
	Top-left corner of the parameter box area header bar on the ICS.	This symbol appears as a selectable button (black on a yellow background) when the patient has an active alarm that has not yet been acknowledged. For more information, see the chapter "Alarms" on page 121.
	– In the upper-right corner of the Bed-View header bar of the patient. – On the M300 header bar. – Top-left corner of the parameter box area header bar on the ICS.	This symbol appears, black on yellow background when Alarm pause is selected. A countdown timer next to the symbol indicates the remaining time before alarm monitoring resumes. For more information, see the chapter "Alarms" on page 121.
	In the upper-right corner of the patient's ICS waveform area.	This symbol button appears for approximately 5 seconds after clicking within the waveform area of a patient's Main screen viewport. Select this button to request a timed strip recording and to mark an event (for M300 only).
	In the header bar of the viewport, above the parameter box	This symbol appears when the alarm volume of a bedside monitor/M300/M300+ has been set to zero.

Symbol	Possible Locations	Description
	– In the header bar of the viewport, to the left of the bed label – In header bar of the BedView, to the left of the bed label	This symbol appears when a monitor is in wireless mode.
	– In the header bar of the viewport, to the left of the bed label – In header bar of the BedView, to the left of the bed label – In the header bar of the M300/M300+	This symbol identifies an M300/M300+ patient.
	– In the header bar of the viewport, to the left of the bed label – In header bar of the BedView, to the left of the bed label	This symbol identifies an adult patient.
	– In the header bar of the viewport, to the left of the bed label – In header bar of the BedView, to the left of the bed label	This symbol identifies a pediatric patient.
	– In the header bar of the viewport, above the parameter box – In header bar of the BedView	This symbol indicates the remaining charge of the M300/M300+ battery. When the M300 is placed on the charger (M300 only), an arrow appears above the symbol indicating that the battery is being charged. Following are additional indications of the ICS battery indicator icon for the M300/M300+: – The battery icon turns red when the battery runtime indicator shows only a single bar. – The battery icon is framed in red when the battery runtime indicator shows no bars. – The battery icon turns white when the battery runtime indicator shows more than a single bar or the device is charging. This applies only to the M300.

Electronic patient data transfer

An electronic patient data transfer allows you to move patient data across the Infinity network from one device to another using the ICS. A patient data transfer for wired and wireless monitors behaves the same. For example, you can transfer the data of an M300/M300+ at the ICS to most bedside monitors on the Infinity network. You can also transfer the data from most bedside monitors to an M300/M300+ using the ICS. In both instances, the bedside monitor and the M300/M300+ must share the same units of measure for the data transfer to work. The only exceptions are the SC9000 and Infinity M540 which do not fully support electronic patient data transfer.

A patient data transfer includes the following data:

- Trend data
- Demographic data

Only patients in standby mode and those patients within assigned monitoring units of the ICS are candidates for a data transfer.

Transfer messages describe the process or any problems during a transfer. For details on the transfer messages, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

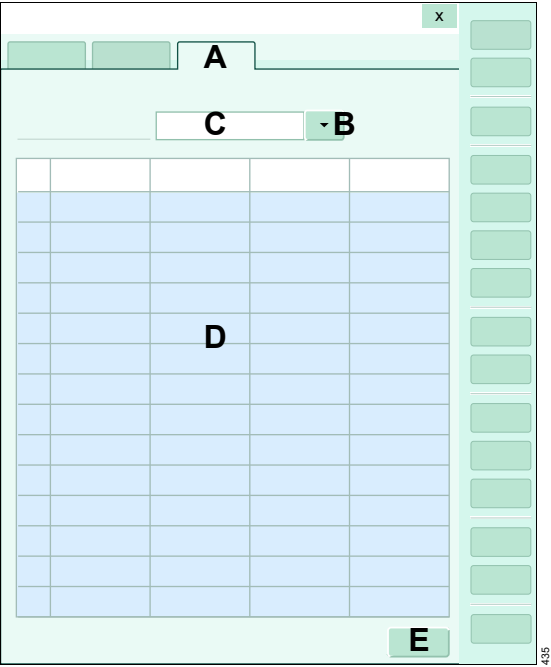
After a successful patient data transfer, the source monitor discharges the patient automatically.

If the patient data transfer is unsuccessful, the data remain at the source device. In this case, any data received at the destination device are deleted until a complete data transfer occurs.

Exiting the transfer screen where you initiated the patient data transfer cancels the procedure. The patient data remain stored at the source device.

Transferring patient data

The following diagram shows the **Transfer** page from which you initiate a data transfer.



- A** **Transfer** tab
- B** Arrow button for selecting another care unit
- C** Selected care unit label
- D** List of beds in selected care area (must be in Standby to be available for transfer)
- E** **Start transfer** button

To transfer data from a bedside monitor to an M300/M300+

In the following procedure, the letters in parentheses refer to the letters of the **Transfer** page diagram.

- 1 Put the source bedside monitor in standby mode. Only patients in standby mode are candidates for transfer.
- 2 Select the M300/M300+ parameter box at the ICS to open the BedView page.
- 3 Select the **Admit/Standby** button on the BedView menu bar.
- 4 Select the **Transfer** tab (A) to access the **Transfer** page.
- 5 Select the arrow button (B) next to the **Care unit** field to select the desired care unit in which the bedside monitor is located. A list of patients in the selected care unit appears.
- 6 Select the desired patient from the selection list (D).
- 7 Select the **Start transfer** button (E). A confirmation pop-up window appears.
- 8 Select **Yes** in the confirmation pop-up to start the data transfer. The message **Transfer completed** appears after the data have been transferred.

NOTE

If the selected patient was not placed in standby, the following message appears: **The selected bed must be in standby.**

NOTE

Trends in the database will be preserved and will be available for remote reviewing of the database from which the data originated.

CAUTION

When transferring a patient to an M300/M300+ device, the M300/M300+ always adopts the alarm limits and arrhythmia default settings of the ICS to which it is assigned when a patient is transferred from a bedside monitor to an M300/M300+.

After completing the patient transfer, always check the alarm limits and arrhythmia settings to make sure that they are appropriate for your patient.

To transfer data from an M300/M300+ to a bedside monitor

- 1 Select the M300/M300+ parameter box at the ICS whose data you wish to transfer to the bedside monitor.
- 2 Put the M300/M300+ (containing the data you want to transfer) into standby mode (see "Enabling standby mode" on page 89).
Only patients in standby mode are candidates for transfer.
- 3 Go to the destination bedside monitor and start the data transfer (refer to the instructions for use of the connected monitor).

To transfer data from an M300/M300+ to another M300/M300+

- 1 Put the M300/M300+ (containing the data you want to transfer) into standby mode (see "Enabling standby mode" on page 89). Only patients in standby mode are candidates for transfer.
- 2 Proceed to the parameter box of the M300/M300+ you want to transfer the data to.
- 3 Select the **Admit/Standby** button on the BedView menu bar.
- 4 Select the **Transfer** tab (A) to access the **Transfer** page.
- 5 Select the arrow button (B) next to the **Care unit** field to select the desired care unit in which the M300/M300+ is located. A list of patients in the selected care unit appears.
- 6 Select the desired patient from the list (D).
- 7 Select the **Start transfer** button (E).
A confirmation pop-up window appears.

CAUTION

Do not select the same M300/M300+ as the source and the destination for data transfer. This action results in discharging patient data on the M300/M300+.

ICS and M300/M300+ online help

The **Help** function enables you to display the ICS and M300/M300+ instructions for use from the main ICS screen. When active, a pdf version of the instructions for use occupies the left side of the screen.

To access online help

- Select the **Help** button from the Main screen menu bar.

To close online help

- Select the **Quit** button located in the lower-right corner of the Help window.

About the PDF reader

Selecting **Help** from the Main screen menu bar launches a PDF reader, from which you can view an online version of this IFU. The PDF reader includes several buttons and controls to assist you in navigating your way through this online document, described in the following topic.

Standby mode

You can temporarily interrupt patient monitoring by placing the monitor in standby. For M300 only, standby mode can only be enabled from the ICS.

Standby mode has the following effect:

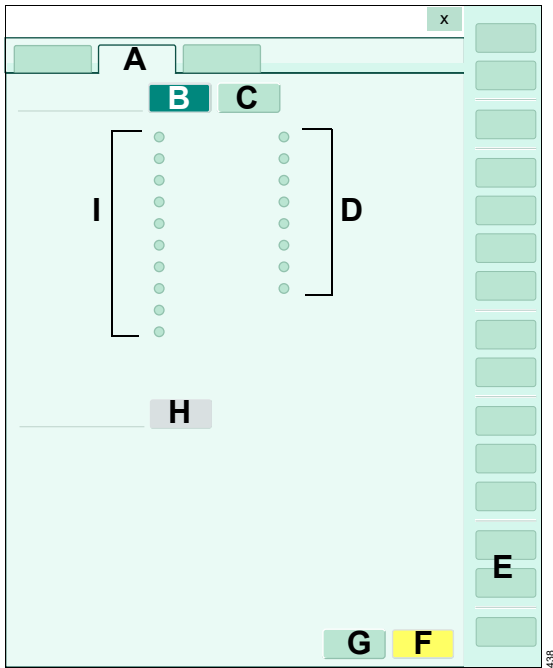
- The **Standby** banner is displayed in the waveform area of the ICS Main screen, in the BedView of the patient.

The **Standby** banner is also displayed in the bed's header bars. If you have selected a reason (M300 only) for placing the patient into standby, a corresponding label also appears. The **Standby** banner appears at the M300/M300+.

- After moving out of coverage range and then returning to coverage range while in Standby mode, the M300 remains in Standby mode.
- For M300 patients, the waveforms do not display at the ICS.
- With the exception of OFFLINE alarms, all monitoring (including audible and visual alarm signals) are suppressed at the ICS and at the monitor.
- Active alarms are considered acknowledged
- All recordings are canceled
- All BedView buttons appear unavailable for selection except for **Trends/Data**, **Admit/Standby**, **Main screen**, and **Print screen**.

Standby/ Discharge page

The following diagram shows the **Standby/ Discharge** page for placing an M300/M300+ in standby.



A **Standby/ Discharge** tab

B Standby **On** button

C Standby **Off** button

D Event duration selection list for standby mode

E **Admit/Standby** button

F **Apply** button

G **Undo** button

H Patient **Discharge** button

I Reasons for placing the patient in standby mode.

Enabling standby mode

The letters appearing in parentheses (below) refer to the diagram of the **Standby/ Discharge** page. You can only initiate standby mode for an M300/M300+ from the ICS.

To enable standby mode

- 1 Select the parameter box of the M300/M300+ patient you want to place into standby mode, or select the patient name or bed label from the Main screen viewport (if using this method, skip the next step).
- 2 Select the **Admit/Standby** button (E) on the menu bar of the BedView to display the **Admit/Standby** dialog window.
- 3 Select the **Standby/ Discharge** tab (A).
- 4 Select the **On** button (B).
- 5 Select the reason for standby from the selection list (I). Some of the available selections include the following:

- Off unit	- Procedure
- Cath lab	- Ultrasound
- X-ray	- MRI
- Surgery	- CT
- Shower	

Note, however, that this list can be edited by selecting the **Edit** button within the **Biomed > Configure central > General settings > Standby list**.

- 6 Select the duration you wish to place the patient in standby from the event duration list (D). The following selections are available:
 - **5 minutes, 10 minutes, 20 minutes, 30 minutes, 1 hour** (default), **2 hours, 3 hours**
- 7 Select the **Apply** button (F) to place the patient in standby.

Canceling standby mode

You can cancel standby mode for an M300/M300+ from the ICS and the M300/M300+.

Monitoring resumes and alarms are announced immediately for any patient coming out of standby.

To cancel standby mode at the ICS

The letters in parentheses refer to the diagram on page 88.

Option 1:

- 1 Select the parameter box of the M300/M300+ patient you wish to take out of standby. Once in BedView, the banner displays **Standby. Select here to resume monitoring.**
- 2 Select the **Admit/Standby** button (E) on the BedView menu bar to display the **Admit/Standby** dialog window.
- 3 Select the **Standby/ Discharge** tab (A).
- 4 Select the **Off** button (C).
- 5 Select the **Apply** button (F).

Option 2:

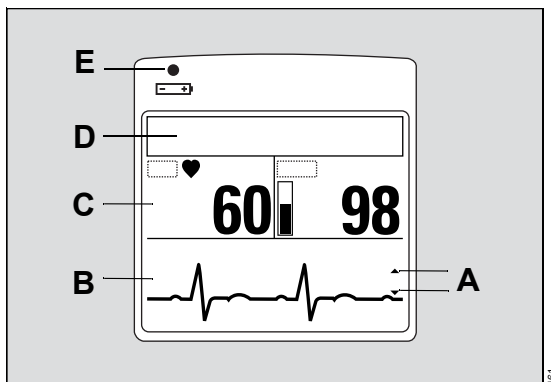
- 1 Put the patient in BedView. The banner displays **Standby. Select here to resume monitoring.**
- 2 Click anywhere in BedView to cancel **Standby** mode.

To cancel standby mode from the M300

- Click in BedView
- or
- Press the  key on the M300/M300+

M300/M300+ user interface

The following sections describe the user interface of the M300/M300+. The screen of the M300/M300+ is divided into the following main areas.

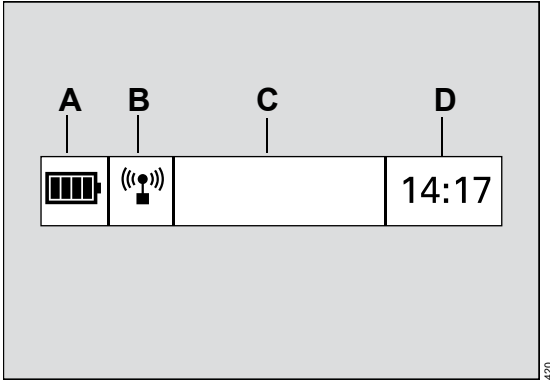


- A** Arrows on the screen indicate that you can scroll through the waveform using the arrow keys on the M300/M300+ (see "M300/M300+ keypad" on page 93)
- B** Waveform area
- C** Parameter box area (ECG only or ECG/SpO2 combination parameter box)
- D** M300/M300+ header bar (see "M300/M300+ header bar" on page 92)
- E** Battery status LED (see "Charging the M300 battery" on page 95)

You can customize the M300/M300+ setup for a monitoring session by selecting system-wide defaults such as the waveform assignment. For more information see "The Layout/ Parameters page" on page 221.

M300/M300+ header bar

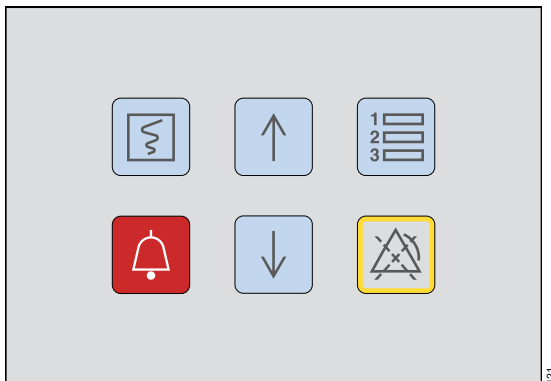
The header bar appears along the top of the M300/M300+. Unless an alarm condition is present, the header bar always appears blue. During an alarm, the message area of the header bar (H) appears in the color of the associated alarm grade. For details on the alarm signal colors, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.



- A** Battery charge symbol that shows the available battery charge when the screen is enabled. When the screen of the M300/M300+ is in power-save mode, the LED (E) indicates the battery status (see "Charging the M300 battery" on page 95).
- B** Wireless signal strength symbol. This symbol appears when the M300/M300+ is connected to a wireless access point. The appearance of the symbol varies depending on signal strength.
- C** Message area; alarm messages are preceded by the following symbol . In addition, the entire area turns red during high-priority alarm conditions and yellow during medium -priority alarm conditions.
- D** Bed label and time area.

M300/M300+ keypad

The following diagram shows the keypad of the M300/M300+ which allows you to execute numerous functions. For a detailed description of these keys, see "Keys of the M300/M300+" on page 49.



M300/M300+ waveforms

Waveform colors follow the colors selected at the ICS. For details on the waveform color, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

Waveforms are drawn from left to right and can contain the following information:

- Waveform scales which can only be setup at the ICS. For details on the waveform setup, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.
- Units of measure
- Parameter labels
- Pacer spikes
- Lead labels

This page has been left blank intentionally.

Charging the M300 battery

Overview	96
Battery status LED	96
Using the Bedside Charger	97
Using the Central Charger	99

Overview

This section describes the following basic assembly tasks:

- "Battery status LED" on page 96
- "Using the Bedside Charger" on page 97
- "Using the Central Charger" on page 99

Battery status LED

The battery LED on the M300 indicates the status of the battery charge. The following table describes the various indications of the battery status LED.

Behavior	Description
Blinking green (approximately every 5 seconds)	– Power is on. – The M300 is in use away from the charger. – The battery charge is OK.
Blinking amber (approximately every 5 seconds)	– Power is on. – The M300 is in use away from the charger – The battery charge is low.
Solid amber	Battery is being charged while the M300 is seated in the charger.
Solid green	The battery is charged while the M300 is still seated in the charger.

In addition, the M300 displays messages that the battery is low and needs to be recharged. In addition it sounds a low-priority alarm when it is time to recharge the battery.

NOTE

The M300 enters a deep-discharge state when it is stored away from either the Bedside Charger or the Central Charger for extended periods. To exit the deep-discharge state, place the M300 in either the Bedside Charger or the Central Charger for at least 30 minutes.

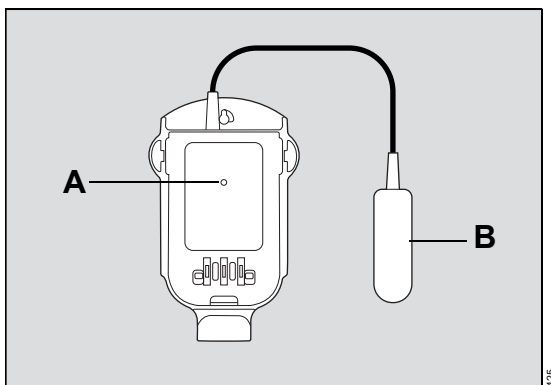
NOTE

When seating the M300 in either the Bedside Charger or the Central Charger, it can take up to 30 seconds for the battery status LED to reflect whether or not proper contact has been made, and that the unit is actually being charged.

After 30 seconds, the LED should switch to either solid amber or green. If the LED continues to blink, proper contact has *not* been made. In this case, please try to re-seat the M300 and/or clean the contacts on the back of the unit.

Using the Bedside Charger

The following illustration shows a Bedside Charger, which is used to charge an individual M300. When the green LED (A) of the Bedside Charger is illuminated, the Bedside Charger is connected to power and is ready to charge an M300.



A Power LED – lights up green when the Bedside Charger is plugged in

B Power connector/plug

Charging M300 at the bedside

CAUTION

When docked on the bedside charger, make sure that the Infinity M300 is *not* placed under bed covers and/or sheets. In addition, do not place the M300 and bedside charger inside the patient's pocket or carrying pouch for the following reasons:

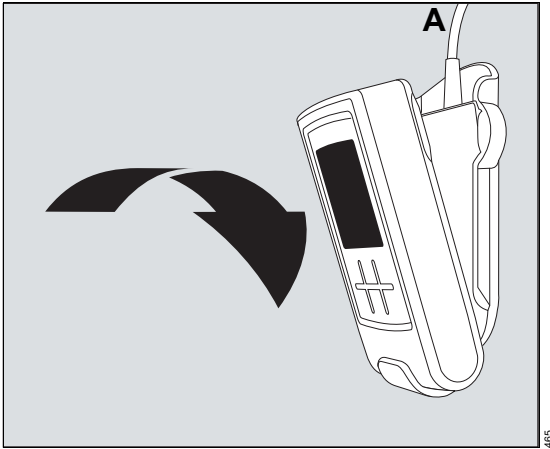
- the M300 requires air circulation to dissipate heat resulting from the charging battery
- the M300 will suspend battery charging if it detects that heat is not being dissipated due to a lack of adequate air circulation
- the M300 alarm volume can be reduced if located under bed covers or sheets. This can potentially prevent the M300 audio (including alarms or fault mitigation) from being heard.

To place the M300 into the Bedside Charger

WARNING

Place the M300 and the Bedside Charger so they do not fall on a patient thus causing injuries. Make sure that no accessory cables accidentally become entangled around the neck of a patient.

- 1 Plug the power cable (A) into a power outlet.
- 2 Place the bottom of the M300 in the Bedside Charger, as shown in the following illustration.



- 3** Press the top of the M300 toward the back of the Bedside Charger until it snaps into place.

Behavior when the M300 is docked to the Bedside Charger

- The wireless communication of the M300 is disabled, causing the wireless icon (Υ) to disappear from the M300 display
- Patients cannot be admitted to an M300 while the M300 is docked to the Bedside Charger
- The **Find Device** feature is not supported while the device is docked to the Bedside Charger.

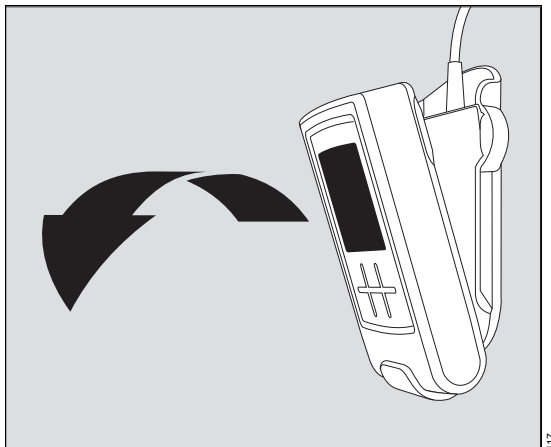
To remove the M300 from the Bedside Charger

CAUTION

Observe the following precautions when unplugging the Bedside Charger:

- To avoid damaging the wall adapter, do not pull on the cord of the Bedside Charger to unplug it.
- To avoid damaging the Bedside Charger, grasp the wall adapter firmly and pull it out straight from the wall. Before grasping the wall adapter, ensure that it is not damaged.
- To avoid damaging the Bedside Charger, ensure that it is no longer attached to the bed before attempting to move the bed.

- 1 Grab the M300 on the top and carefully pull it away from the Bedside Charger.



- 2 Lift the M300 out of the Bedside Charger.

When the M300 is removed from the Bedside Charger, the battery status LED indicator flashes once every 5 seconds. In addition, the battery symbol displays the available battery power, provided the M300 screen is not in power save mode (see "Battery status LED" on page 96).

Using the Central Charger

The Central Charger can accommodate up to ten M300 devices at one time.

CAUTION

Placing the M300 into a Central Charger will discharge the M300 and stop the monitoring of the current patient.

When an M300 is placed on the Central Charger:

- The patient is discharged from the ICS
- Patient data (locally-stored trends, demographic data, etc.) stored in the memory of the M300 is erased
- The battery recharges

WARNING

Remove the lead wire set from M300 before placing it into the Central Charger, to avoid possible electrical shock.

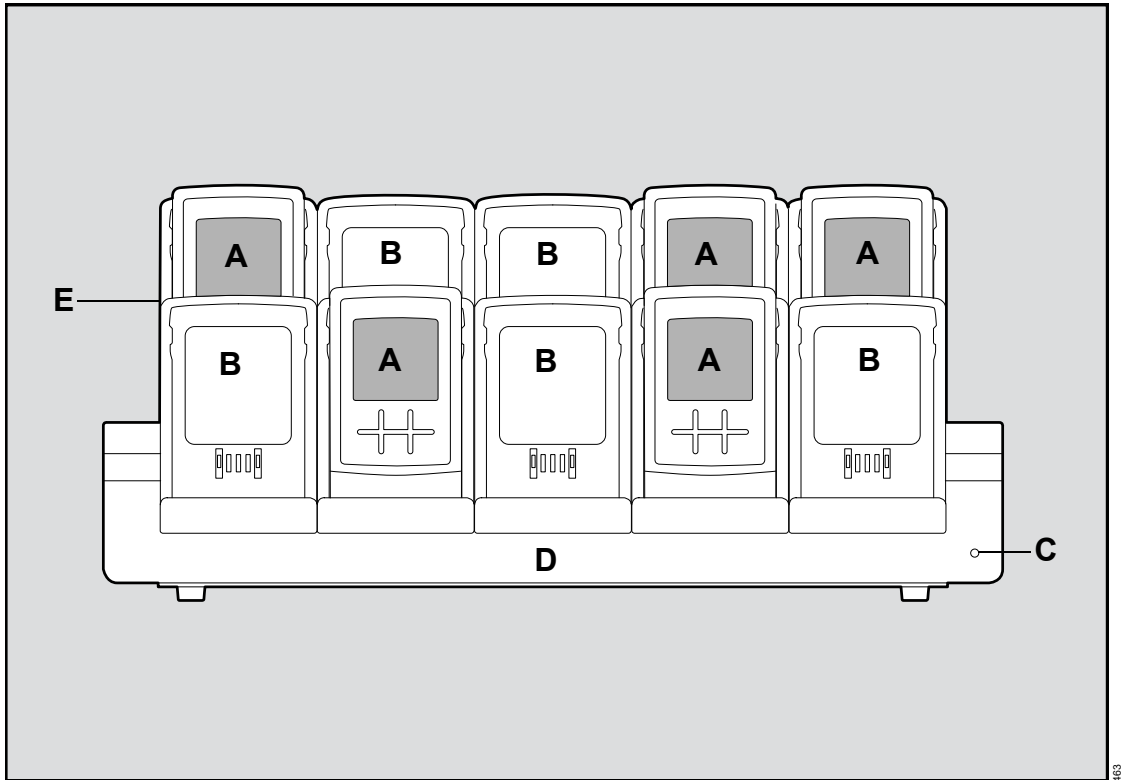
CAUTION

Do not use the Central Charger near patients as exposure to any fluids may cause damage.

To plug in the Central Charger

- 1 Plug one end of the power cable in the Central Charger connector (E).
- 2 Plug the other end of the power cable into an appropriate power outlet.

The LED (C) lights up green when the Central Charger is plugged in.



- A** M300 devices placed in the Central Charger
- B** Available charging slots on the Central Charger
- C** Power LED
- D** Central Charger base unit
- E** Connector for power cable

To place the M300 into the Central Charger

- Place the bottom of the M300 into one of the empty slots (B) and push it back until it is firmly seated.

To remove the M300 from the Central Charger

- Carefully pull on the top of the M300 and lift the device out of the Central Charger.

This page has been left blank intentionally.

Charging the M300+ swappable battery

Overview	104
Battery status LED	104
Using the Battery Charger	104

Overview

This section describes the following basic assembly tasks:

- "Battery status LED" on page 104
- "Using the Battery Charger" on page 104

Battery status LED

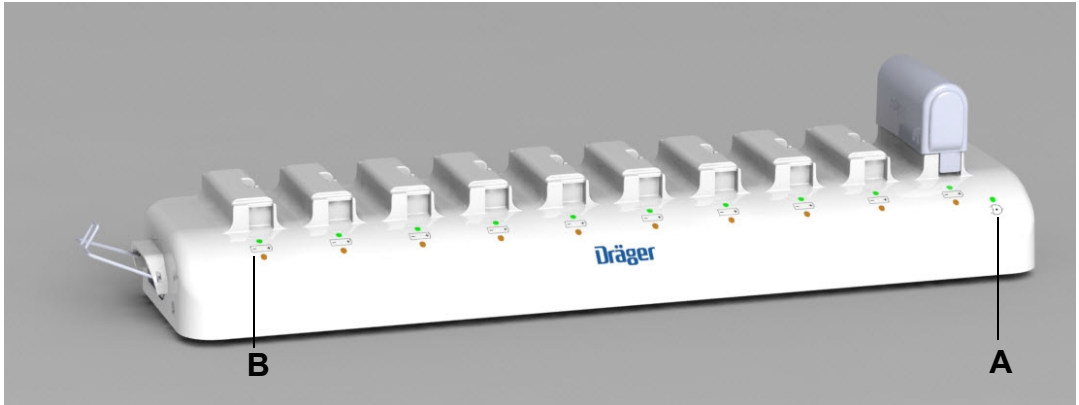
The battery LED on the M300+ indicates the status of the battery charge. The following table describes the various indications of the battery status LED.

Behavior	Description
Blinking green (approximately every 5 seconds)	– Power is on. – The M300+ is in use. – The battery charge is OK.
Blinking amber (approximately every 5 seconds)	– Power is on. – The M300+ is in use. – The battery charge is low.

In addition, the M300+ displays messages that the battery is low and needs to be recharged. In addition it sounds a low-priority alarm when it is time to recharge the battery.

Using the Battery Charger

The following illustration shows a battery charger, which is used to charge swappable batteries from the M300+. When the green LED (A) of the battery charger is illuminated, the battery charger is connected to power and is ready to charge M300+ batteries. When an M300+ battery is connected to the battery charger, the battery charging status LEDs (B) will illuminate red when a battery is charging and green when the battery is fully charged.



A Power LED – lights up green when the battery charger is plugged in

B Battery charging status LEDs

For more information on how to insert and remove swappable batteries from the battery charger, or how to insert swappable batteries into the M300+, see "Inserting the swappable battery into the battery charger" and "Removing the swappable battery from the battery charger" on page 62, and "To insert the swappable battery into the M300+" on page 268.

This page has been left blank intentionally.

Getting started

Overview of monitoring a patient	108
Turning the M300/M300+ on/off	108
Telemetry/Parameters dialog window (BedView in ICS)	109
The Layout/ Parameters page (in ICS)	109
M300/M300+ Demographics screen	111
Admitting a patient	112
Admitting a new M300/M300+ patient	113
Admitting under special circumstances	114
Admitting a patient at the ICS	114
Populating patient data over the network	115
Discharging a patient	116
Discharging an M300/M300+ patient	116
Patient categories	118
Selecting a different patient category	118

Overview of monitoring a patient

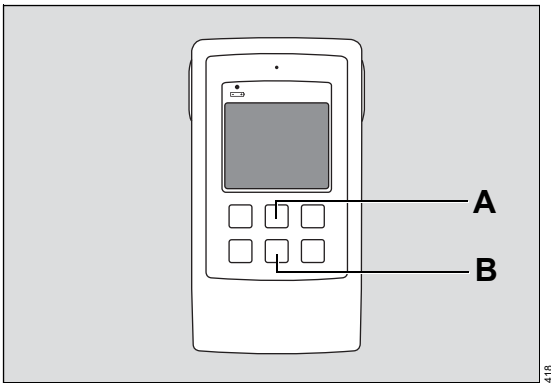
This chapter describes the steps necessary to start monitoring a patient with the M300/M300+. Specifically, this chapter describes the following procedures:

- Turning the M300/M300+ on/off
- Admitting/discharging patients

Turning the M300/M300+ on/off

To turn the M300/M300+ on

- Simultaneously press both arrow keys (A) and (B).



A startup screen displays the current software version. A tone sounds to confirm that the speaker is functional.

WARNING

When powering-up the M300/M300+, confirm that the verification audio tone is annunciated. If no verification tone sounds, do not use the device and contact your technical service personnel.

The M300/M300+ may display error messages during startup. For a partial listing of M300/M300+ messages, see "Problem solving" on page 235.

To turn the M300/M300+ off

- 1 Simultaneously press and hold both arrow keys (A) and (B) for 3 seconds.
- 2 Select the up arrow to highlight **Yes**.
- 3 Press the  button to confirm the shutdown.

NOTE

M300/M300+ device settings, including clinical data and current alarm settings, are retained for a maximum of 2 minutes after the device is powered off. After 2 minutes of no power, the patient is discharged, and factory default settings are restored.

Telemetry/Parameters dialog window (BedView in ICS)

The **Telemetry/Parameters** dialog window consists of several setup pages for configuring the M300/M300+. The Telemetry setup button in the Main screen toolbar allows you to make general system-wide default selections. The **Telemetry/ Parameters** button in BedView allows you to change the settings of a specific bed.

To access the Telemetry/Parameters pages

- 1 Select the **Telemetry/ Parameters** button on the BedView menu bar.
- 2 Select one of the following tabs to access the corresponding setup pages:
 - **Layout/ Parameters**
See "The Layout/ Parameters page (in ICS)" on page 109, including bed-specific tabs for configuring Layout, **ECG**, **SpO2**, and **ST**.
 - **Device setup**
See "The Device setup page" on page 232.

The Layout/ Parameters page (in ICS)

The **Layout/ Parameters** page is used to configure some basic M300/M300+ settings. Because it is accessed from the BedView menu bar, the settings apply only to the selected M300/M300+.

To access the Layout/ Parameters page

- 1 Select the **Telemetry/ Parameters** button on the BedView menu bar.
- 2 Select the **Layout/ Parameters** tab.

The sub-tabs that appear are the same as those that appear when accessing the **Layout/ Parameters** tab from the Main screen's menu bar (using the **Telemetry defaults** button). Although the tab contents are the same, the BedView contents apply only to the specified M300/M300+ device.

For descriptions of the tab contents, refer to the following pages corresponding to each tab:

- **Layout**
See "Layout/ Parameters > Layout page" on page 222
- **ECG**
See "Layout/ Parameters > ECG page" on page 227
- **SpO2**
See "Layout/ Parameters > SpO2 page" on page 228
- **ST**
See "Layout/ Parameters > ST page" on page 228. Note that you cannot change the following settings from the BedView page.
 - **ST units**
 - **ST event duration [s]**

M300/M300+ Demographics screen

The M300/M300+ two Demographic screens display patient demographic information. All patient demographic information is received from the ICS. Use the Up/Down arrows to jump from screen to screen.

Screen 1	
A	<i>Name</i>
B	<i>ID</i>
C	<i>Bed label</i>
D	<i>Care unit</i>
E	<i>Patient category</i>
F	<i>Adult / Pediatric</i>



Use up and down arrows to go from screen to screen.

Screen 2	
G	<i>QRS threshold</i>
H	<i>Normal/Low</i>

NOTE

To display Biomed page from page 2, press the down arrow three times.

Admitting a patient

You can admit M300/M300+ patients at the ICS for central monitoring. However, for M300/M300+ patients, the ICS is the primary display. Therefore, you cannot monitor patients with an M300/M300+ without also admitting them to the ICS.

CAUTION

The previous patient must be discharged before a new patient is admitted to make sure that the data for the new patient is correct.

During the initial setup of the ICS, certain Main screen viewports (which contain the waveforms and parameter values) are set up specifically for M300/M300+ devices. Such viewports are identified with the wireless symbol  and a pre-configured bed label. You can only admit an M300/M300+ to these viewports. All other viewports are reserved for bedside-monitor patients.

WARNING

Monitors in a care area may seem identical but may use different default alarm settings because of different profile assignments. After admitting a patient, always verify that the set alarm limits are appropriate for the patient.

NOTE

For Infinity M300/M300+, default alarm presets are available only for adult and pediatric patients.

Although demographic data are not essential for central monitoring, they are useful for patient identification. Demographic data are initially entered during the admission process. You can always view and edit the demographic data of patients at the ICS where they were originally admitted.

If remote control is enabled, you can view and edit demographic data for patients residing in the ICS monitoring units. This is possible even if the patients are not currently displayed on the main screen. The only exception is the patient category setting which cannot be changed remotely.

If a patient resides outside the monitoring units of an ICS, you can always view but not change any demographic data.

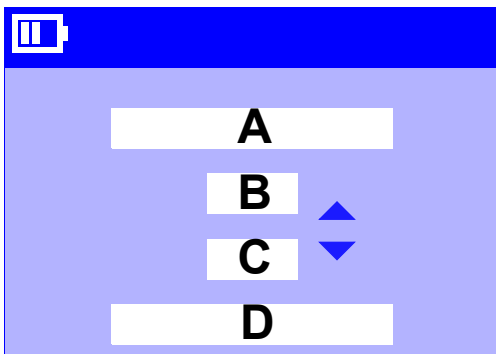
Admitting a patient to a viewport at the ICS also admits the patient to the disclosure database. For information about the disclosure database, refer to the *Instructions for use Infinity Central/Station Wide, Software VG4.0 or later*.

Admitting a new M300/M300+ patient

Whenever you turn on an M300/M300+ and previous patient data is stored on the M300/M300+, the **New patient? Yes/No** screen appears automatically.

This screen allows you to decide whether the currently-stored patient data remains or is deleted to make room for a new patient.

To admit a new patient, you must select **Yes** to erase the previous patient's data from memory. Use the Up (↑) arrow and Down (↓) arrow keys to toggle between **Yes** and **No** selections.



A - New patient?

B - Yes

C - No

D - Press  **to confirm**

If you select **No**, the M300/M300+ retains all stored patient data (patient name, trends, stored recordings) and will continue to append the new data to the stored data.

If you select **Yes**, patient data stored by the M300/M300+ is erased and the ICS alarm limits and arrhythmia default settings are applied.

In both cases, if the M300/M300+ was already admitted to the ICS, the patient continues to be displayed in the same viewport at the ICS screen.

When you select a new patient, a new Full disclosure record is created by the ICS. Since the M300/M300+ erased all patient data, the patient name on the ICS appears blank until a new name is entered for that patient (via the ICS admit screen).

Admitting under special circumstances

The following table lists certain conditions that affect a patient admission.

Circumstance	Effect on admit functions
The M300 cannot communicate with the network.	– A medium-priority alarm sounds at the ICS. – Patient admission is not possible.

Admitting a patient at the ICS

You can admit a patient in the following two ways:

- By entering the demographic data manually on the **Demographics** page.
- Over the network by pulling the data from an HL7/ADT interface (see "Populating patient data over the network" on page 115).

To admit an M300/M300+ patient manually or edit existing demographic data

In the following steps, the letters in parentheses refer to the diagram of the **Demographics** page. For information about the **Demographics** page, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

NOTE

If you leave the **Demographics** page without first selecting the **Apply** button, all changes are lost.

- 1 Select an empty viewport with an M300/M300+ label and a wireless symbol  already configured for an M300/M300+ patient.

To edit existing M300/M300+ data, select the viewport of the corresponding M300/M300+ patient.

- 2 Select the **Admit/Standby** tab on the menu bar of the BedView to display the **Admit/Standby** page.
- 3 Select the **Demographics** tab if not already selected.
- 4 Enter the name of the patient in the **Patient name** field (A).
- 5 Enter the patient ID in the **Patient ID** field (B).

NOTE

When admitting an M300/M300+ patient to the ICS, failure to enter the patient's name or ID number could result in unidentifiable strip recordings (resulting from missing bed label and care unit information in the recording header).

To make sure that strip recordings can be identified, always enter the patient ID or ID number when admitting an M300/M300+ patient at the ICS. Failure to do so results in missing bed labels and care unit information in the header of the recording.

- 6 Enter the name of the physician in the **Physician name** field (C).
- 7 Select either **Adult** or **Pediatric** in the **Patient category** field (D).

- 8 Enter the patient's birth date in the **Date of birth** field (E) – Day, Month, Year.
- 9 Enter the admit date in the **Admit date** fields (F) – Day, Month, Year.
- 10 Enter the weight of the patient in the **Weight** field (G). For M300/M300+ patients, the supported weight range is: 0.1 kg to 350 kg (1 lb to 772 lb).
- 11 Enter the height of the patient in the **Height** field (H). For M300/M300+ patients, the supported height range is: 20 cm to 240 cm (8 in to 100 in).

NOTE

For M300/M300+ patients, the system setup setting determines the units of measure (see "General settings setup page" on page 213).

- 12 Select the gender of the patient in the **Gender** field (I) – **Unknown, Male, Female**.
- 13 Select the pacemaker type in the **Type of implant** fields (J). This selection appears when the corresponding function is configured at the ICS. The possible selections are: **None, Pacer, ICD, PCD, EXT**.
- 14 Select the telemetry ID from the drop-down list of available devices in the **Telemetry device ID** field (K). The list is pre-populated during the setup of the M300/M300+.
- 15 Scroll through the list and select the ID corresponding to the M300/M300+ device you want to admit.
- 16 Select the **Apply** button to save your changes, or **Undo** to remove any changes made since the last time the **Apply** button was selected.

If you changed any existing demographic data, the updated data are now sent to the M300/M300+.

Populating patient data over the network

You can populate the **Demographics** page automatically, by retrieving the demographic data of a patient from the network. Prerequisite for this network data transfer is the Infinity Gateway with an interface to the ADT (Admit, Discharge, Transfer) Hospital Information System (HIS). Based on the patient ID, the HIS searches the database for the demographic data of the patient. After modifying demographic data at the bedside, the updated information in the database will not display until the patient is re-admitted at the ICS. If patient demographic information is changed or updated from a location *other than* the CentralStation, you must re-select the **Apply** button from the **Admit/Standby** page to update the stored information in the database.

To populate patient data via Get data

In the following steps, the letters in parentheses refer to the diagram of the **Demographics** page. For information about the **Demographics** page, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

- 1 Select a viewport that either has an M300/M300+ label or has a bedside admitted.
- 2 Select the **Admit/Standby** button from the BedView menu bar to display the **Admit/Standby** dialog window.
- 3 Select the **Demographics** tab if not already selected.

- 4 Enter the patient ID in the **Patient ID** field on the **Demographics** page (B).
- 5 Select the **Get data** button (L) in the **Demographics** page. The **Get data** button appears grayed out and is not selectable when the HIS is not available. The button is also not selectable when the ICS is disconnected from the network.

Discharging a patient

Discharging a patient discontinues patient monitoring.

M300/M300+ patients can be discharged 1) at the ICS where they were originally admitted, 2) directly from the M300/M300+, or 3) by placing the M300 into the Central Charger (M300 only).

NOTE

You cannot discharge a M300/M300+ patient remotely from another ICS.

The following occurs at the M300/M300+ when a patient is discharged:

- All parameter values are deleted.
- Demographic and locally-stored trend data are deleted at the M300/M300+.
- The **Discharged** message appears.

Discharging an M300/M300+ patient

Patient discharge occurs from the ICS as well as from the M300/M300+.

To discharge a patient from the M300/M300+ screen, do the following:

- 1 On the M300/M300+ keypad, press the **Staff alert** setting key  and the **Alarm pause** setting key  simultaneously for 3 seconds.

A confirmation screen appears asking to **Confirm discharge** of the patient or to **Cancel** and not discharge the patient.

- 2 To discharge the patient, use the up and down arrows on the keypad and select **Discharge**.
- 3 Press the **Layouts** key  to confirm that the patient was discharged.

To discharge an M300/M300+ patient from the ICS, do the following:

- 1 Select the viewport of the M300/M300+ patient you want to discharge.
- 2 Select the **Admit/Standby** button from the BedView menu bar to access the **Admit/Standby** page.
- 3 Select the **Standby/ Discharge** tab.

- 4 Select the **Discharge** button to enable a confirmation pop-up.
- 5 Select the **Discharge** button inside the pop-up to discharge the patient, or select the **Undo** button to cancel the discharge.

After discharging the patient, either A) return the M300 to a charger (see "Charging the M300 battery" on page 95) or B) return the M300+ swappable battery to the battery charger (see "Charging the M300+ swappable battery" on page 103).

CAUTION

Failure to discharge previous patient information can result in the mixing of patient archive data at ICS when admitting a new patient using the ICS or the M300/M300+.

Patient categories

The patient category setting controls alarm and arrhythmia settings, the QRS sensitivity, and so on. Whenever you admit a new patient at the ICS, the patient category matches the setting of the ICS for the M300/M300+. A corresponding symbol (see page 81) appears in the viewport header bar in ICS and in the header bar of the BedView in ICS. M300/M300+ devices support adult and pediatric patients only. For information about the viewport header bar and BedView, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

Selecting a different patient category

For M300/M300+ patients, you can change the patient category setting only at the ICS where the patient was originally admitted. You cannot change the patient category of an M300/M300+ from a remote ICS.

After changing the patient category, the default settings (for example, alarm limits, arrhythmia, QRS sensitivity setting) for that patient category are automatically enabled. An ECG relearn phase is also initiated automatically.

WARNING

A potential hazard can exist if different alarm presets are used for the same or similar equipment in any single area.

WARNING

The operator should check that the current alarm preset is appropriate prior to use on each patient.

To change the patient category for an M300/M300+

In the following steps, the letters in parentheses refer to the diagram of the ICS **Demographics** page. For information about the **Demographics** page, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

- 1 Select the parameter box of the M300/M300+ patient whose patient category you want to change.
- 2 Select the **Admit/Standby** button from the BedView menu bar.
- 3 Select the **Demographics** tab if not already selected.
- 4 Select the **Adult** or **Pediatric** button next to the **Patient category** field (D).
- 5 Select **Apply** to confirm the selection or **Undo** to leave the patient category unchanged.

After changing the patient category, the new patient category label and symbol appear in the left most field in the ICS header bar of the BedView. For information about the BedView, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

NOTE

Changing the patient category of an M300/M300+ causes the ICS database (Full disclosure, Events, and trends) to behave as if a new patient has been admitted, which creates a brand new patient record.

Although the original patient record (Full disclosure, Events, and trends) is not erased, it is changed to an archived state.

To view any of the data as it existed prior to the category change, go to the Trends/Data census screen and search for the previous record for that patient.

This page has been left blank intentionally.

Alarms

Overview of alarms	122	Alarm groups	139
Alarm priorities	123	M300/M300+ alarm ranges and defaults . . .	140
High-priority alarm conditions	123	Parameter ranges and defaults	140
Medium-priority alarm conditions	123	Arrhythmia parameter ranges and defaults . . .	141
Low-priority alarm conditions	123		
Alarm processing	123		
ICS general alarm processing	123		
M300/M300+ alarm processing	124		
Parameter box flashing rate	125		
Latching and non-latching alarm	126		
Activating or deactivating alarm validation . . .	127		
Alarm validation times for the M300	127		
Alarm signals	128		
Visual alarm indicators on the M300	128		
ICS and M300/M300+ audio alarm signals . . .	128		
M300 speaker alarm tones	129		
Adjusting the M300/M300+ alarm volume	130		
Pausing audio alarms for the M300/M300+ . . .	131		
Pausing audio alarms for the M300/M300+ from a remote network device	132		
Pausing alarms for the M300/M300+	132		
Pausing alarms for the M300/M300+ from a remote network device	133		
Alarm setup for multiple parameters	133		
Configuring alarm settings for multiple parameters	134		
Alarm setup for arrhythmia parameters	136		
Configuring arrhythmia alarm settings	137		
Auto setting all alarm limits	138		
Special conditions for alarm event recordings . . .	138		
Special conditions for alarm event storage	139		

Overview of alarms

The ICS is the primary alarm annunciator for the M300/M300+.

The ICS displays visual and audio alarms based on information received from the source device.

Although audio tone characteristics cannot be changed by the user, three distinctive alarm patterns (IEC fast, IEC slow, and Infinity) are provided from which you can select to best fit your environment. IEC fast and IEC slow provide pulse tone qualities to comply with IEC 60601-1-8:2006 + A1:2012 standard requirements for different interburst repeat times. Infinity is a unique Dräger pattern.

WARNING

The user must remain within the hearing range of the ICS acoustic alarm signal. This operator position makes it possible to quickly detect an alarm and to respond accordingly. The distance to the medical device must be appropriate for the volume of the alarm signal.

WARNING

When operating in a noisy environment, the volume of the alarm signals must be adjusted to suit. Always set the volume of the alarm signal sufficiently high.

WARNING

Any unauthorized changes to alarm configurations can decrease patient safety.

NOTE

At least once per year, check all cables, devices, and accessories for damage, ground resistance, chassis leakage currents, and all alarm functions.

Each alarm condition is assigned one of three alarm priorities: high, medium, and low. Each alarm priority has unique audible and visual alarm signals.

For information on all alarm conditions and associated alarm messages, see "Problem solving" on page 235.

The color of an alarm message corresponds to the priority of the associated alarm condition.

Alarm priorities

Every alarm condition is assigned to one of three priorities: high, medium, or low. Visual and audio alarm signals indicate the level of the alarm priority. For more information on how alarm priorities affect alarm reporting, see "Alarm signals" on page 128.

High-priority alarm conditions

All high-priority alarms are physiological alarm conditions that can be life-threatening and require immediate intervention.

An example of a high-priority alarm condition is asystole.

Medium-priority alarm conditions

Most medium-priority alarms report alarm conditions that require prompt attention but may not be life-threatening.

An example of a medium-priority alarm condition is an alarm limit violation.

Low-priority alarm conditions

All low-priority alarms alert you to technical issues that may compromise the ability of the system to monitor the patient.

An example of a low priority alarm condition is an artifact on the ECG waveform.

Alarm processing

ICS general alarm processing

Each M300/M300+ assigned to an ICS sends its visual and audio alarm signals to the ICS for display and broadcast.

If there are multiple active alarms, the ICS reports:

- in the viewport for each bedside monitor and M300/M300+, the highest priority alarm of all the active alarms for that device.
- in the BedView page for each bedside monitor and M300/M300+, all active alarms for that device.
- in the ICS Main screen, surveillance alarms display and sound.
- The ICS will always sound the tone of the highest grade active alarm.

When a parameter is alarming, the parameter box of the BedView page and the entire parameter area of the viewport of the alarming bedside monitor flashes in the color representing the alarm priority (red for high, yellow for medium, or cyan for low).

When multiple alarm conditions occur simultaneously, the parameter boxes flash for all alarming parameters. The alarm condition with the highest priority determines which audio alarm signal is generated, how the parameter box appears, and what alarm message appears in the header bar.

When multiple alarm conditions of equal priority occur simultaneously for any given bedside monitor or M300/M300+, the ICS displays and annunciates the most recent alarm condition on the ICS Main screen.

During an alarm, the ICS provides both audio and visual alarm signals for all M300/M300+ and bedside monitors in the assigned local monitoring units.

NOTE

The ICS can only control the alarms for beds in the same monitoring unit(s) as the ICS.

M300/M300+ alarm processing

The M300/M300+ provides local alarm annunciation as an activated/deactivated function, regardless of alarm priority (high, medium, or low). The user may choose to enable or disable parameter alarms on an individual basis or for all parameters together (All alarms on/off).

CAUTION

Upon startup and after a patient discharge, the M300/M300+ alarms will not be active until a numeric value has been received for the corresponding parameter.

For a description of special alarm behaviors, see "Pausing alarms for the M300/M300+ from a remote network device" on page 133.

NOTE

In the event of a power loss at the ICS, M300/M300+ alarm settings are retained by the M300/M300+ unit. When power is restored to the ICS, the M300/M300+ communicates the current alarm settings back to the ICS.

NOTE

The M300 can retain alarm settings for approximately 80 hours after the unit powers down due to depleted battery.

While the battery is attached to the M300+, alarm settings and current patient data remain intact for approximately 80 hours after the unit powers down due to a depleted battery.

CAUTION

Alarm settings for the M300 will not be retained upon removal of the internal battery.

Parameter box flashing rate

The parameter box will flash at a 50% duty cycle for high- and medium-grade priority alarms, as follows:

High-priority alarm = 1.4 to 2.8 Hz

Medium-priority alarm = 0.4 to 0.8 Hz

The parameter box for Low-priority alarms will remain solid (no flashing).

The M300/M300+ transceiver sends audio pause information to the network so the ICS can display the **"Audio paused"** status and counter.

When the monitor is in an 'All alarms paused' state, a banner displaying **"All alarms paused mm:ss"** appears in black text within a yellow background, (where mm:ss represents a countdown timer in minutes:seconds).

The priority of the alarm banners are, as follows:



All alarms paused mm:ss



Audio paused mm:ss



HR, ASY, VF off

When the HR limits and Arrhythmia are disabled, a "**⚠ HR, ASY, VF off**" banner will appear as white text on a red background.

Note that the message will rotate through any other active messages (such as alarms, or status messages).

Note that the "**⚠ HR, ASY, VF off**" message will rotate through any other active M300 messages (such as alarms or status messages).

When the HR limits are disabled and Arrhythmia is enabled, a "**⚠ HR alarms off**" banner will appear as black text on a yellow background.

Note that this banner message will also rotate through any other active M300/M300+ messages (such as alarms or status messages).

Latching and non-latching alarm

When an alarm condition no longer exists, the associated audible and visual alarms behave in the following manner:

- For **high-priority** alarms
Both audible and visual alarm signals normally continue until you acknowledge the alarm, even though the alarm condition has ceased to exist. This type of alarm is called a latching alarm.
- For **medium-priority** alarms
If the condition clears itself, the audio and visual flashing alarm signals stop. The visual alarm message continues to appear in the header bar. This type of alarm is called a non-latching alarm with a latched message.
- For **low-priority** alarms
Both audible and visual alarm signals automatically stop when the alarm condition ceases to exist without user intervention.

NOTE

Under certain conditions, the visual message will continue to display at the ICS as long as the condition exists (**Offline**, for example). This type of alarm is also a non-latching alarm, sometimes with a latched message.

See "Special conditions for alarm event recordings" on page 138, and "Special conditions for alarm event storage" on page 139.

The alarm priority of a latching alarm condition determines how the alarm signals behave after the alarm condition ceases to exist:

- A latched alarm condition of high-priority is identified by the standard audible and visual alarm signals (see "Alarm signals" on page 128).
- A non-latched alarm condition of medium-priority continues to appear in the header bar. The alarm header does not flash, and there are no audio alarm signals.

To acknowledge a cleared latched alarm condition

Select the **Bed audio pause** button in the menu bar of the BedView page when the **Bed audio pause** function is enabled at the ICS. You can also click the  icon in the viewport. For information about the **Bed audio pause** button and function, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

The latched alarm signals are cleared and all audible and visual latched alarm signals disappear.

Activating or deactivating alarm validation

When alarm validation is enabled (see "Telemetry defaults > Alarms > Device settings tab" on page 220), an alarm condition must exist for a certain period of time before audible and visual alarm signals are triggered. This feature helps to reduce the number of nuisance alarms. The factory default for Alarm Validation Delay is Off.

When alarm validation is enabled, the time between the detection and annunciation of a parameter falling outside the set alarm limits equals the time of detection plus the assigned alarm validation delay. For heart rate, adding the delay time may exceed the maximum of 10 seconds allowed by IEC 60601-2-27.

The following tables list which parameters have an alarm validation time. Parameters that do not appear in the table have no validation times and audible and visual alarm signals are triggered almost immediately.

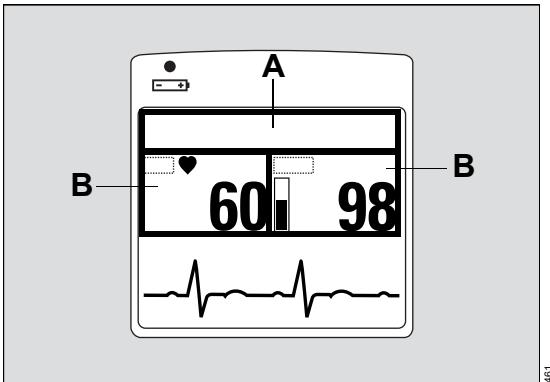
Alarm validation times for the M300

M300 Parameter	Upper alarm limit	Lower alarm limit
ECG/Heart rate (HR)	6 s	6 s
Pulse rate (PLS)	6 s	10 s
Pulse oximetry (SpO2)	6 s	10 s
ST segment analysis (ST)	60 s	60 s

Alarm signals

Visual alarm indicators on the M300

The M300/M300+ screen displays visual alarm in the message field and the parameter boxes. For information about alarm signal colors for a bedside monitor, refer to the instructions for use of the specific monitor.



A Alarm message field – The  symbol precedes alarm messages (except those defined as nuisance alarms, as described in "Activating or deactivating alarm validation" on page 127). In addition, the entire area turns red during high-priority alarm conditions and yellow during medium-priority alarm conditions.

B Alarming parameter box

ICS and M300/M300+ audio alarm signals

The ICS provides distinct audio alarm signals for each alarm priority in addition to visual alarm signals.

During a parameter alarm, the M300/M300+ also provides distinct audio alarm signals for each alarm priority in addition to visual alarm signals.

The specific characteristics of these audio alarm signals depend on the selected alarm pattern.

Available alarm patterns are:

Infinity, IEC fast (default), and IEC slow.

For information about the ICS audio alarm signals and patterns, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

Alarm volume range

Alarm priority level	Minimum alarm volume	Maximum alarm volume
High	39 – 55 dB	64 – 81 dB
Medium	42 – 52 dB	67 – 79 dB
Low	41 – 54 dB	65 – 79 dB

CAUTION

Setting the auditory alarm signal sound pressure levels lower than the ambient levels can impede operator recognition of alarm conditions.

M300 speaker alarm tones

Alarm priority	IEC fast (default)	IEC slow	Infinity
High	2.5 second tone interval	15 second tone interval	Two-tone, high-pitched, rapid tone
Medium	5 second tone interval	25 second tone interval	Two medium-pitch, short tones followed by a pause
Low	16 second tone interval	Single tone	Short, single, low-pitch tone every 10 seconds

Adjusting the M300/M300+ alarm volume

The volume of the M300/M300+ built-in speaker is adjustable. For more information on configuring the Volume Control of the M300/M300+, see page 211.

NOTE

The M300/M300+ alarm volume can be set to **Off** only while it is displayed at the ICS. If communication is interrupted between the network and the M300/M300+, the M300/M300+ continues monitoring and automatically sets its alarm volume to 100 %. Any alarms that are active at the time the M300/M300+ lost connection and all future alarms are annunciated by the M300/M300+ until communication is reestablished with the ICS.

If there is an active alarm while M300/M300+ has lost connection with the ICS, the M300/M300+ screen does not shut off despite the ICS **Screen shut-off time [min]** setting. You cannot shut off the M300/M300+ screen manually unless the alarm is paused.

To adjust the M300/M300+ alarm volume from the ICS

- 1 On the ICS, select the **Telemetry/Parameters** button in the menu bar of the BedView page.
- 2 Select the **Device setup** tab.
- 3 Select the **Setup** tab.
- 4 Select the **Alarm volume [%]** button.
- 5 Select one of the available settings.

To adjust the M300/M300+ alarm volume from the M300/M300+

- 1 On the M300/M300+, press the  key until you scroll to the **Alarm volume** screen.
- 2 Use the   buttons to increase or decrease the volume.

Pausing audio alarms for the M300/M300+

You can pause (silence) all active audio alarm signals for an individual patient at their bedside monitor and at the ICS using the **Bed audio pause** button. The **Bed audio pause** button appears in the parameter box area of the viewport or in the menu bar of the BedView page.

An audio pause of a bedside monitor at the ICS does the following:

- Pauses all active audio alarm signals for an individual patient at their bedside monitor and at the ICS. Audio pause is available only for those patients connected to a bedside monitor within the local monitoring units of the ICS whose **Bed audio pause** selection is enabled. For more information about audio pause, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.
- Stops the parameter box/area and header bar from flashing.

After the audio pause period expires, all audio alarm signals resume if the alarm condition is still valid.

NOTE

Pausing the active audio alarm signals of an individual bedside monitor does not affect the audio pause state of the other bedside monitors or any other local alarms that may be present at the ICS.

To pause all active audio alarm signals of a bedside monitor at its viewport

- In the parameter box area of the viewport of the bedside-monitor patient, select the audio pause  button.

If the viewport audio pause  button is unavailable, the **Bed audio pause** selection is disabled at the ICS, or the patient is in a remote monitoring unit, you cannot pause the alarm.

For more information about audio pause, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

- In the menu bar of the BedView page of the bedside-monitor patient, select the **Bed audio pause** button.

To pause all active audio alarm signals of a bedside monitor at its BedView page

- In the menu bar of the BedView page of the bedside-monitor patient, select the **Bed audio pause** button.

This will be displayed by the **Audio pause**  symbol with timer at the ICS viewport and in BedView. The timer indicates the remaining time of the bedside audio pause period.

Pausing audio alarms for the M300/M300+ from a remote network device

If the **Audio pause from remote ICS** setting is enabled at the local ICS (see page 220), you can pause (silence) active audio alarm signals from the following devices:

- Remote ICS
- Bedside monitors in the local monitoring units

When the **Audio pause from remote ICS** setting is disabled at the local ICS (see page 220), the BedView **Bed audio pause** button is unavailable at the remote ICS. In addition, the audio pause  button does not display in the viewport of the remote ICS Main screen during an alarm.

Pausing alarms for the M300/M300+

You can pause all visual and audio alarm signals for the M300/M300+ at the ICS with the **Alarm pause** button in the menu bar of the BedView page. The alarm pause time can be configured from 1 to 5 minutes. To configure the alarm pause time, see "Telemetry defaults > Alarms > Device settings tab" on page 220.

To temporarily pause all alarm functions of the M300 from the ICS

- Select the **Alarm pause** button in BedView.

You can pause all alarm functions at the M300 if configured to do so.

To pause all alarm functions from the M300

- 1 On the M300/M300+, press and hold the  key for 3 seconds.

A confirmation message displays on the M300 screen.

- 2 Use the   buttons to select **Yes** or **No**.

- 3 Press the  key to confirm the selection.

The **Alarm pause** message and  symbol with a countdown timer displays.

Pressing the  key again cancels the alarm pause.

NOTE

You cannot initiate an audio pause from the M300/M300+ (you can only initiate an alarm pause).

Pausing alarms for the M300/M300+ from a remote network device

You can pause all alarm functions for the M300/M300+ from other ICS in the local monitoring units if the **Control from remote ICS** setting is enabled at the local ICS.

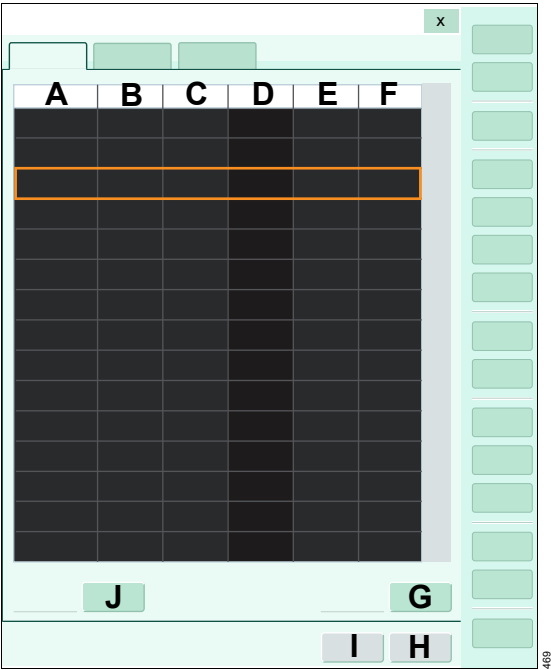
Note that, in all cases with the M300/M300+, a change in any system setup or telemetry setup from the Main screen menu bar pages will take effect only after the device is re-admitted.

When the **Control from remote ICS** setting is disabled at the local ICS, the **Alarm pause** button on the BedView menu bar is unavailable at a remote ICS.

For more information about pausing alarms, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

Alarm setup for multiple parameters

The following diagram shows the **Alarms > Limits** page for configuring alarm settings for all available parameters. The page consists of a table with setup rows for each parameter. Each setup row consists of several fields for configuring the individual alarm settings.



- A **Parameter** labels column
- B **Alarm** (on/off) column
- C **Lower** limits column
- D **Actual** (current) parameter values column
- E **Upper** limits column
- F **Archive** column
- G **Restore** button in the **Limits defaults** field– restores system default settings; only available for the M300
- H **Apply** button
- I **Undo** button
- J **Auto set** button in the **Limits** field

Configuring alarm settings for multiple parameters

In the following steps, the letters in parentheses refer to the diagram of the **Alarms > Limits** page (see "Alarm setup for multiple parameters" on page 133). For alarm ranges and defaults for the M300/M300+, see "M300/M300+ alarm ranges and defaults" on page 140.

WARNING

Setting alarm limits to extreme values may prevent certain alarm conditions from being detected and from being annunciated with audio and visual alarm signals.

To configure the alarm settings of a bedside monitor or M300/M300+

- 1 Select the **Alarms** button in the menu bar of the BedView page.
- 2 Select the **Limits** tab (if not already selected).
- 3 Select the corresponding button in the **Alarm** on/off column (B) to enable or disable alarm monitoring. A crossed-out triangle  symbol appears in the parameter box when alarm monitoring is disabled.
- 4 Select the corresponding button in the **Lower** column (C) to adjust the lower alarm limits.
- 5 Select the corresponding button in the **Upper** column (E) to adjust the upper alarm limits.
- 6 Use one of the following settings in the **Archive** column (F) to determine what happens in response to an alarm:
 - **Off** – no event is stored and no recording is generated.
 - **Store** – stores the event in the disclosure database.

NOTE

An event will not be saved unless the specific alarm is turned on AND the alarm is generated.

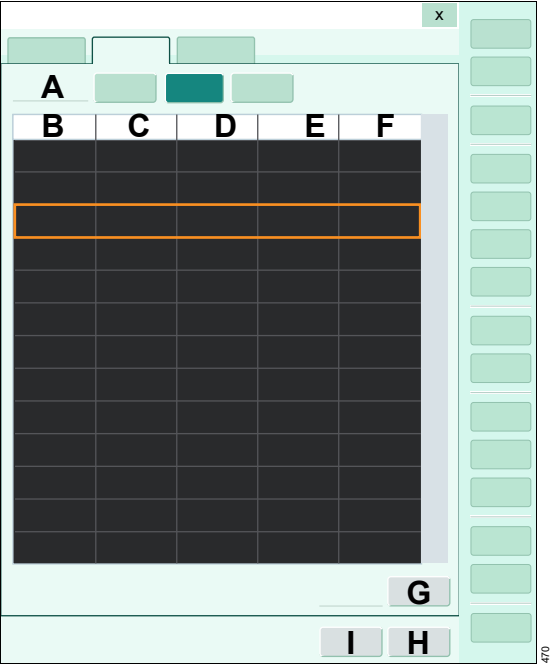
- **Record** – generates a strip recording.
 - **Store/Rec.** – generates a strip recording and stores the event in the disclosure database.
- 7 Repeat steps 3 through 6 for each parameter you want to configure.
- Or, select the **Auto set** button in the **Limits** field (J), to reset the alarm limits of all the available parameters to automatically calculated values. For more information on auto setting limits, see page 138.
- 8 Select the **Apply** button.

NOTE

When the remote control feature is disabled, only the first page of the Alarm limits page is displayed.

Alarm setup for arrhythmia parameters

The following diagram shows the **Alarms > Arrhythmia** page where you configure alarm settings for arrhythmia parameters. This page consists of a table with setup rows for each arrhythmia parameter. Each setup row consists of several fields for configuring the individual arrhythmia alarm settings.



- A** **ARR mode** buttons: *Off*, **Basic**, *Advanced* – selects the arrhythmia mode. For more information, see page 163.
- B** **Arrhythmia** column for identifying the **ARR** label
- C** **Alarm** column for selecting an alarm priority
- D** **Rate** column for setting the rate
- E** **Count** column for setting the count
- F** **Archive** column
- G** **Restore** button (in the **Limits defaults** field for M300/M300+) for restoring the system default settings for the M300.
- H** **Apply** button
- I** **Undo** button

Configuring arrhythmia alarm settings

In the following steps, the letters in parentheses refer to the diagram of the **Alarms > Arrhythmia** page (see "Alarm setup for arrhythmia parameters" on page 136).

For alarm ranges and defaults for the M300/M300+, see "M300/M300+ alarm ranges and defaults" on page 140.

To configure the arrhythmia alarm settings of a bedside monitor or M300

- 1 Select the **Alarms** button in the menu bar of the BedView page.
- 2 Select the **Arrhythmia** tab (if not already selected).
- 3 Select the desired arrhythmia mode using the **ARR mode** buttons (A).
- 4 Select the corresponding button in the **Alarm** column (C) to select the alarm priority (**High**, **Medium**, or **Low**) or to disable alarm monitoring. A crossed-out triangle  symbol appears in the arrhythmia alarms settings page when alarm monitoring is disabled. The priority for asystole (**ASY**) and ventricular fibrillation (**VF**) events cannot be changed. The alarm priority **High** is always assigned to these categories.
- 5 Select the corresponding setup button in the **Rate** column (D) to set the rate.
- 6 Select the corresponding setup button in the **Count** column (E) to set the count.
- 7 Use one of the following settings in the **Archive** column (F) to determine what happens in response to an alarm:
 - **Off** – no event is stored and no recording is generated.
 - **Store** – stores the event in the disclosure database.
 - **Record** – generates a strip recording.
 - **Store/Rec.** – generates a strip recording and stores the event in the disclosure database.
- 8 Repeat steps 4 through 7 for each parameter you want to configure.
- 9 Select the **Apply** button.

Auto setting all alarm limits

The auto set function allows you to quickly adjust alarm limits based on preset percentages. The following table lists the percentages for the M300/M300+. For other monitors, consult the instructions for use for the specific model.

WARNING

The operator should check that the current alarm limit or default is appropriate prior to use on each patient.

Parameter	Upper limit	Lower Limit
HR, PLS	125 % of current value	80 % of current value
PVC/min	Not applicable	Not applicable
SpO2	100 %	95 % of current value
ST	Current value + 2.0 mm (0.2 mV)	Current value – 2.0 mm (– 0.2 mV)

To auto set all parameters (except arrhythmia)

- 1 Select the **Alarms** button in the menu bar of the BedView page.
- 2 Select the **Limits** tab (if not already selected).
- 3 Select the **Auto set** button.

NOTE

If the **Auto set** function would force the alarm limits of a parameter outside the allowable limit range of the monitor, the alarm limits remain unchanged.

Special conditions for alarm event recordings

Event	Effect on alarm recording function...
An alarm is re-enabled (for example, when an alarm condition is valid beyond an audio pause).	A new alarm recording is not generated.
An alarm is paused during an alarm event recording or pending recording.	All alarm progress and pending recordings are printed completely.
An alarm function of a parameter is disabled.	Alarm recording is still generated, provided the alarm recording function is enabled.

Special conditions for alarm event storage

When an alarm is re-enabled (for example, when an alarm condition is valid beyond an audio pause), a new event is not stored.

Alarm groups

The alarm group feature enables you to configure several bedside monitors as members of a group. This enables the bedside monitors to display the group's highest priority active alarm at each bedside monitor within that alarm group. Although a bedside monitor can display a message from an M300/M300+, the M300/M300+ will not display messages on its own screen from other M300 devices in the same alarm group.

If multiple bedside monitors in the alarm group detect an alarm, each corresponding alarm message briefly rotates along the top of the screen on the other bedside monitors in the alarm group.

To configure an alarm group for the M300/M300+, see "Alarm group column" on page 210.

CAUTION

Care must be taken when assigning patients to alarm groups. Assigning a patient to an incorrect alarm group could result in alarms going unheard or unanswered by the intended caregiver.

NOTE

An M300/M300+ is assigned to an alarm group only while it is admitted to an ICS.

M300/M300+ alarm ranges and defaults

Parameter ranges and defaults

Parameter	Alarm limit range	Upper limit defaults	Lower limit defaults	Alarm default	Alarm archive default
HR <i>Increment: 5 bpm</i>	Upper: 25 to 300 bpm Lower: 20 to 295 bpm	120 bpm (adult) 150 bpm (pediatric)	45 bpm (adult) 50 bpm (pediatric)	On	Store/Rec.
PLS <i>Increment of 5 bpm</i>	Upper: 35 to 240 bpm Lower: 30 to 235 bpm	120 bpm (adult) 150 bpm (pediatric)	45 bpm (adult) 50 bpm (pediatric)	Off (adult) On (pediatric)	Off
PVC/min <i>Increment of 1</i>	Upper: 1 to 60 Lower: not applicable	10 (adult, pediatric)	Not applicable	Off	Off
SpO2 <i>Increment: 1 %</i>	Upper: 21 to 100 % Lower: 20 to 99 %	100 % (adult, pediatric)	90 % (adult, pediatric)	Off (adult) On (pediatric)	Off
ST <i>Increment: 0.1 mm or 0.01 mV</i>	Upper: –14.9 to +15.0 mm –1.49 to +1.50 mV Lower: –15.0 to +14.9 mm –1.50 to +1.49 mV	+2.0 mm (+0.2 mV)	–2.0 mm (–0.2 mV)	Off	Off
STVM/STCVM <i>Increment: 0.1 mm or 0.01 mV</i>	Upper: 0.1 to 45.0 mm 0.01 to 4.50 mV Lower: 0.0 to 44.9 mm 0.00 to 4.49 mV	+2.0 mm (+0.20 mV)	0.0 mm (0.0 mV)	Off	Off

Arrhythmia parameter ranges and defaults

NOTE

Items in parentheses are default values.

Parameter	Alarm grade default	Rate (default)	Count (default)	Alarm archive factory default
AIVR	Low	Adult: Not adjustable, VTach rate –1 (119) Pediatric: Not adjustable, VTach rate –1 (159)	Adult: Not adjustable (3) Pediatric: Not adjustable	Off
ARTF	Off	Adult and pediatric: Not adjustable	Adult and pediatric: Not adjustable	Off
ASY	High	Not adjustable	Not adjustable	Store/Rec.
BGM	Low	Not adjustable	Not adjustable	Off
BRADY	Adult: Off Pediatric: Medium	Adult: 30 to 105 (50) Pediatric: 30 to 105 (60) <i>Increment of 5</i>	Adult: Not adjustable (8) Pediatric: Not adjustable	Off
CPT	Low	Not adjustable	Not adjustable	Off
PAUSE	Off	Adult: 1 to 3.5 (2.5 s) Pediatric: 1 to 3.5 (2 s) <i>Increments of 0.5 s</i>	Not adjustable	Off

Parameter	Alarm grade default	Rate (default)	Count (default)	Alarm archive factory default
RUN	Medium	Not adjustable (Rate = VTach)	Not adjustable 3 to VTach count –1 (3 to 9)	Off
SVT	Medium	120 to 200 (150) <i>Increments of 10</i>	3 to 10 (3) <i>Increments of 1</i>	Off
TACH	Off	Adult: 100 to 200 (130) Pediatric: 100 to 200 (180) <i>Increments of 10</i>	5 to 15 (8) <i>Increments of 1</i>	Off
VF	High	Not adjustable	Not adjustable	Store/Rec.
VTach	High	Adult: 100 to 200 (120) Pediatric: 100 to 200 (160) <i>Increments of 10</i>	5 to 15 (10) <i>Increments of 1</i>	Store/Rec.

ECG, arrhythmia, and ST segment monitoring with M300/M300+

Overview of telemetry defaults	144	Overview of arrhythmia monitoring	158
ECG signal processing and display	144	M300/M300+ Arrhythmia processing	159
Supported parameters	145	Selecting arrhythmia leads	160
Patient preparation for ECG monitoring	145	Recommended remedies for lead-off notifications	163
ECG precautions	146	Arrhythmia modes	163
ECG display	146	Arrhythmia display	164
ECG parameter box in a viewport of the ICS Main screen	146	Arrhythmia parameter box on an ICS BedView	164
ECG parameter box in the ICS BedView	147	Accessing the Arrhythmia setup page	165
ECG parameter box on the M300/M300+	147	Arrhythmia parameter setup function	165
ECG waveform in a viewport of the ICS Main screen	147	Overview of ST monitoring	165
ECG waveform on a BedView page of the ICS	148	Connecting lead wire sets for ST monitoring	167
ECG waveform on the M300/M300+	148	Standard ST monitoring	167
ECG electrode colors	149	12-lead TruST monitoring	168
Electrode placement	150	ST display	169
Standard configuration, three electrodes (IEC/AHA)	150	ST parameter box on an ICS BedView	169
Standard configuration, five electrodes (IEC/AHA)	151	ST complex pages	169
Pacer configuration, five electrodes (IEC/AHA)	152	Viewing all ST complexes	170
Standard configuration, six electrodes (IEC/AHA)	153	Zooming in on an ST complex	172
Accessing the ECG setup page	153	ST measuring and ISO points	173
ECG parameter setup functions	154	Adjusting ST measuring and ISO points	173
Monitoring paced patients	155	ST reference	174
Pacemaker precautions	155	Saving ST reference	174
Pacemaker considerations	155	Accessing the ST setup page	174
Pacer Fusion mode	157	ST parameter setup functions	175
Device interference with pacemaker monitoring	157	Learning/relearning QRS pattern	175

Overview of telemetry defaults

This chapter describes heart rate (HR), arrhythmia (ARR), and ST monitoring for the M300/M300+. For all other bedside monitors, refer to their respective instructions for use.

The M300/M300+ calculates and displays heart rate values, identifies paced beats, reports arrhythmia conditions, and measures ST deviations.

3-, 5-, and 6-lead wire sets are available for ECG monitoring for adult and pediatric patients.

The ECG monitoring functions are configurable in the ECG setup page (see "ECG parameter setup functions" on page 154).

Before performing any monitoring functions, refer to the section "For your safety and that of your patients" on page 7.

ECG signal processing and display

The M300/M300+ calculates heart rates within a range of 15 beats to 300 beats per minute, using the R-R intervals of the last 10 seconds. This calculation excludes the two longest and two shortest R-R intervals. The M300/M300+ averages the remaining intervals and displays the result as the current heart rate in the heart rate parameter box.

During dual-channel processing, a weight is assigned to each channel depending on its level of artifact. The channel with less artifact always receives the greater weight. When a channel exceeds a certain level of artifact, it is excluded from the composite signal, and the M300/M300+ shifts to single-channel processing. If both channels experience excessive artifact, the message ECG artifact appears until at least one channel is sufficiently free of artifact.

During artifact, asterisks (* * *) replace the heart rate value. When the artifact clears, QRS processing resumes without initiating a relearning phase.

NOTE

For heart rates of 300 bpm and greater, the monitor may display **VF** and not the expected +++ as the parameter value. The M300/M300+ skips the longest and shortest R-R due to R-R calculations and then averages the heart rate.

The M300/M300+ identifies QRS complexes with amplitudes between 0.4 mV and 5.0 mV (when the waveform scale is set to 1 mV/cm or greater) or 0.2 mV and 5.0 mV (when the waveform scale is set to 0.5 mV/cm or lower), and a QRS width of 70 ms to 120 ms for adult and a QRS width of 40 ms to 120 ms for pediatric patients.

For parameter-specific error messages, see "Problem solving" on page 235.

Supported parameters

- ECG: HR (heart rate)
- Arrhythmia: ARR (ASY, VF, ARTF, VTach, RUN, AIVR, SVT, CPT, BGM, TACH, BRADY, PAUSE; see page 163 for a description of these arrhythmia modes) and PVC/min
- ST: I, II, III, aVR, aVL, aVF, V , V+, V2, V5, STVM, STCVM, dV1, dV3, dV5, dV6

Patient preparation for ECG monitoring

The following tips provide optimal ECG monitoring results but must never replace hospital-approved practices or the recommendations of the electrode manufacturer.

Follow hospital procedures for proper skin preparation. Dräger recommends Ag/AgCl disposable electrodes. Never use disposable electrodes after their expiration date and make sure that there is enough gel and that the gel has not dried out.

If QRS detection threshold is configured to **Low**, P- and T-waves with amplitudes exceeding 0.17 mV may be interpreted as QRS complexes. P- and T-waves with amplitudes exceeding 0.35 mV when QRS detection threshold is configured to **Normal**, may be interpreted as QRS complexes. The algorithm has implemented safeguards to reduce the occurrence of P- and T-wave detection as QRS complexes, however additional steps can be taken to prevent and/or troubleshoot occurrence.

- To allow detection of low heart rate conditions under these circumstances, place the lead with the highest R-wave in ECG **Channel number 1**.
- If P- and T-waves are misinterpreted, confirm that the lead with highest R-wave is in ECG **Channel number 1** and set QRS detection threshold to **Normal**.
- If P- and T-waves continue to be misinterpreted, reposition the electrodes or use a pulse oximeter to monitor the pulse rate.

To maintain a clear signal, change electrodes every 24 to 48 hours or more often when the following occurs:

- ECG signal degradation
- Excessive patient perspiration
- Skin irritation

Consider the following when selecting electrode sites:

- **Surgery** – keep electrodes as far from the surgical site as possible, while maintaining a clinically useful lead configuration.
- **Burn patients** – use sterile electrodes. Clean the equipment thoroughly and follow hospital infection control procedures.

ECG precautions

WARNING

Do not rely solely on the ECG when monitoring seizure-prone patients. Electrical artifacts of non-cardiac origin, such as seizure, may prevent detection of certain arrhythmias.

ECG display

On the ICS and M300/M300+, the ECG display consists of:

- ECG parameter box
- ECG waveforms

The ECG parameter box appears differently on the ICS when you enable arrhythmia monitoring. For information on arrhythmia mode display, see page 164.

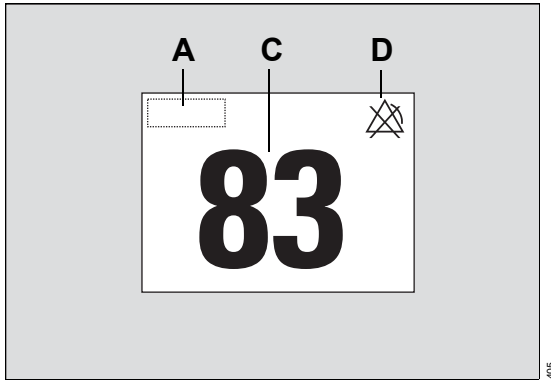
The ECG parameter box displays in the following locations:

- The viewports in the ICS Main screen
- The ICS BedView page of a patient
- On the M300/M300+

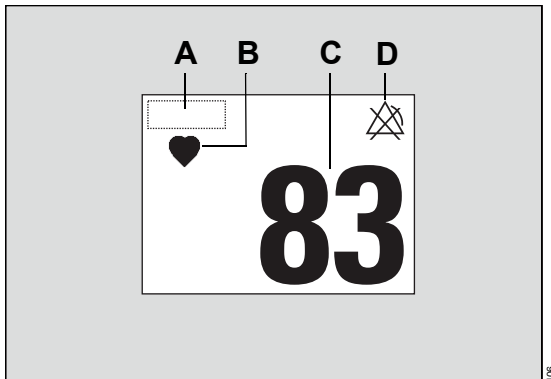
ECG parameter box in a viewport of the ICS Main screen

For information on the ECG parameter box of a viewport in the ICS Main screen, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

ECG parameter box in the ICS BedView



ECG parameter box on the M300/M300+



- A** Parameter label
- B** Heart blip that flashes with each detected pulse (if pacer detection is enabled, the symbol appears as **P♥** when a paced beat is detected)
- C** Heart rate value – during artifact, asterisks (***) replace the heart rate value
- D** Crossed triangle symbol when alarms are turned off

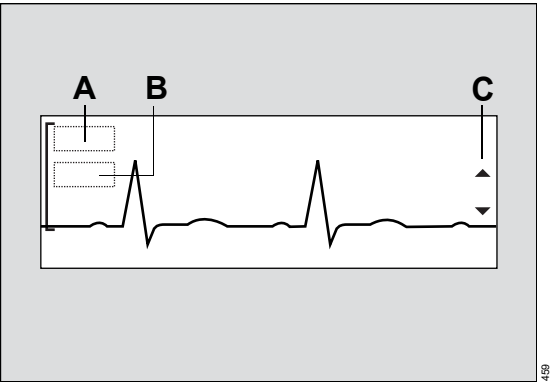
ECG waveform in a viewport of the ICS Main screen

For information on the ECG waveform of a viewport in the ICS Main screen, refer to the *Instructions for use Infinity Central/Station Wide, Software VG4.0 or later*.

ECG waveform on a BedView page of the ICS

For information on the ECG waveform on a BedView page in the ICS, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later.*

ECG waveform on the M300/M300+



A Selected waveform scale

B Lead label

C Arrows on the screen indicate that you can scroll through the different waveforms using the arrow keys on the M300/M300+ (see page 93)

If pacer detection is enabled, blue vertical pacer spikes identify paced beats. Pacer spikes are printed on strip recordings.

Lead wire set	Available ECG leads
Three electrodes	I, II, III
Five electrodes	I, II, III, aVR, aVL, aVF, V ¹⁾
Six electrodes	Standard: I, II, III, aVR, aVL, aVF, V, V+ ¹⁾ TruST 12-lead: I, II, III, aVR, aVL, aVF, dV1, V2, dV3, dV4, V5, dV6 ²⁾

1) V and V+ are chest leads

2) The letter 'd' (dV3, for example) indicates a derived lead

To select the number of leads and the lead wire set, see "ECG parameter setup functions" on page 154.

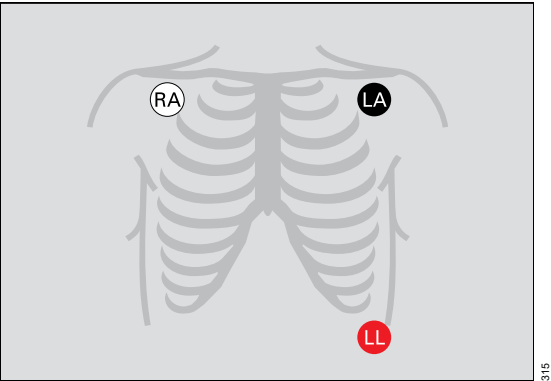
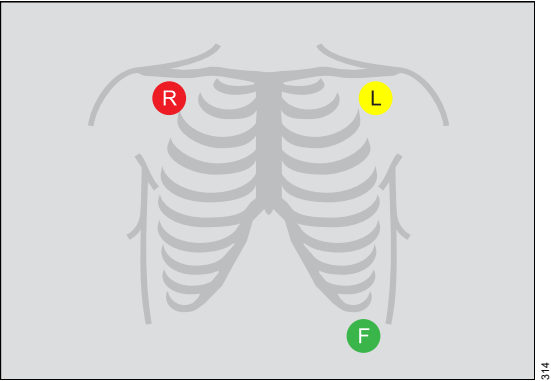
ECG electrode colors

Electrodes are labeled and color-coded according to IEC (IEC1) and AHA (IEC2).

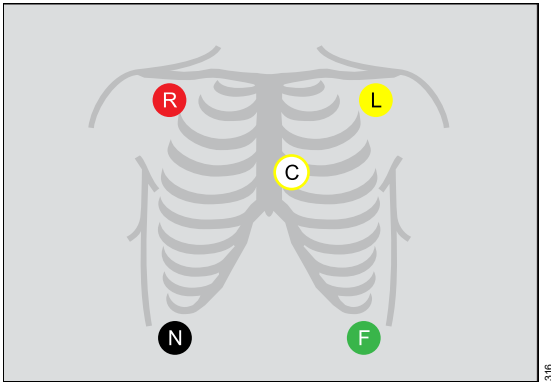
IEC		AHA/US		Electrode location
L	Yellow	LA	Black	Left arm
F	Green	LL	Red	Left leg
R	Red	(A)	White	Right arm
N	Black	(L)	Green	Right leg (neutral)
C	White	V	Brown	Moveable chest
C+	Gray and white	V+	Gray and brown	Second moveable chest

Electrode placement

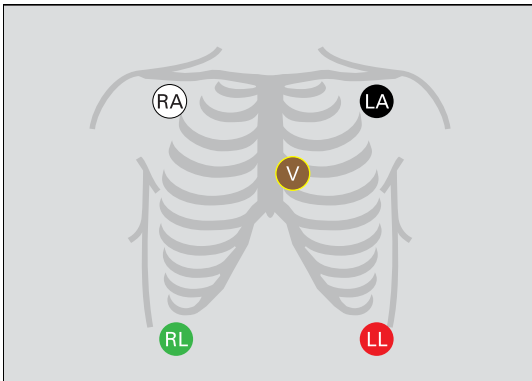
Standard configuration, three electrodes (IEC/AHA)



Standard configuration, five electrodes (IEC/AHA)

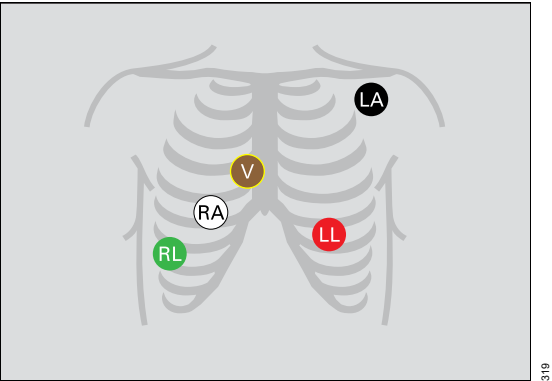
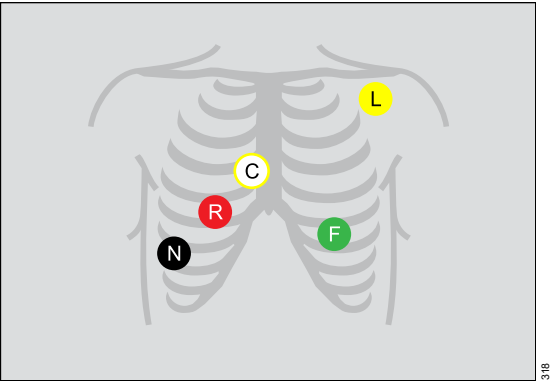


316

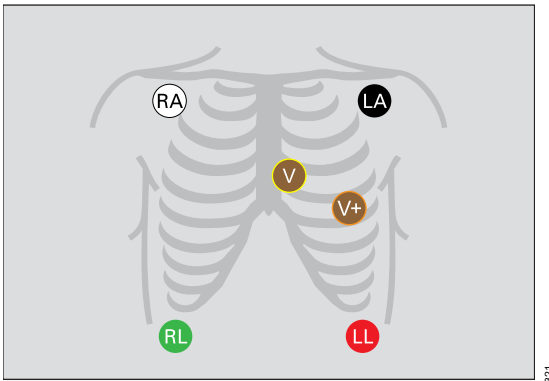
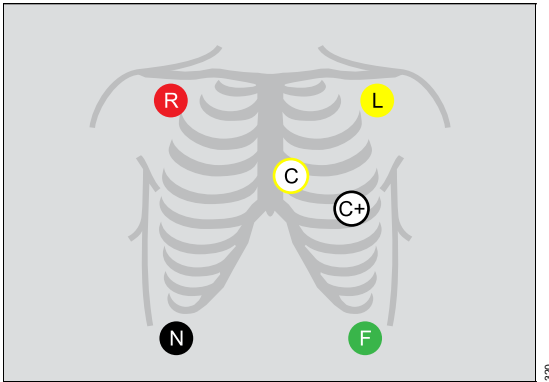


317

Pacer configuration, five electrodes (IEC/AHA)



Standard configuration, six electrodes (IEC/AHA)



Accessing the ECG setup page

The ECG setup page for a telemetry patient can only be accessed through the BedView page of the ICS.

- 1 Open the BedView page by selecting the viewpoint of the telemetry patient in the ICS Main screen.
- 2 Select the **Telemetry/ Parameters** button.
- 3 Select the **Layout/ Parameters** tab (if not already selected).
- 4 Select the **ECG** tab.

ECG parameter setup functions

All ECG parameter setup functions take place in the **ECG** setup page (see page 153).

To configure the alarm functions, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

Selection	Available settings	Description
TruST 12-lead	On, Off (default)	Enables/disables TruST monitoring (see page 168).
<i>(Selection only appears when the TruST locked option is enabled.)</i>		
Cable type	3-, 5-, and 6-lead (default) wires	Selects the lead wire set.
<i>(TruST is available only with a 6-lead wire set.)</i>		
Pacer detection	– On (default) Depending on the bedside monitor software version, the ICS will display a Pacer ON banner for both Pacer ON and Pacer Fusion pacer detection settings. Refer to the bedside monitor's display to identify which pacer detection mode is selected. – Off (the message Pacer off appears in the waveform area) – Fusion – is available only if Pacer fusion is enabled; see page 209 (the message Pacer fusion appears in the waveform area)	Determines whether pacer impulses are detected. See "Pacer Fusion mode" on page 157 for precautions before you start this mode.
Color	Red, white, yellow, green (default), light blue, blue, purple, orange	Determines the color of the waveforms, and the parameter labels and values.

Monitoring paced patients

When pacer detection is enabled, the M300/M300+ uses the following specifications to identify a pulse as a pacer pulse:

- Amplitude: ± 2 to ± 700 mV
- Width: 0.2 to 2.0 ms
- Rise/Fall times (min.): 0.1 μ s, ≤ 100 μ s
- Overshoot (min.): 0.025, ≤ 2 mV
- Recharge time constant: 4 to 100 ms

If a pacer pulse is within 250 ms by a QRS complex, the QRS is classified a paced beat. A paced beat is identified as follows:

- In the heart rate parameter box, the letter 'P' appears next to the flashing heart symbol when a pacer pulse is detected.
- On the ECG waveform, vertical spikes appear to identify pacer spikes.

When pacer detection is disabled, the message **Pacer off**, appears in the top ECG channel.

Pacemaker precautions

WARNING

Risk of pacer-induced artifacts on M300/M300+ waveform

The M300/M300+ has been tested for pacemaker pulse detection. However, it is impossible to anticipate every clinically possible waveform characteristic. For paced patients, the M300/M300+ could therefore miscount heart rates and misinterpret rate-dependent arrhythmias.

- Dräger recommends closely monitoring the heart rate of paced patients.

Pacemaker considerations

The M300/M300+ is tested in accordance with IEC 60601-2-27 201.12.1.101.13 Rejection of pacemaker pulses. All pacemaker pulses within this defined range are effectively rejected with the exception of the following:

- False low-rate alarms can result under the following conditions: Fused beats and asynchronous pacemakers, when coupling intervals are in the range of +10 ms to –90 ms
 - Presence of large pacemaker pulses 2.0 ms wide with amplitude 500 mV or greater
 - Asynchronous pacemaker pulses with overshoot
 - Asynchronous pacemaker with large amplitude pace pulses with no overshoot and at low heart rate (30 bpm)

- Paced pulses of 0.2 – 0.5ms and amplitude voltage from -2.0 – 700 mV with overshoot greater than 0.3% may result in missed valid heart beats, contributing to a lower than actual heart rate.

Dräger recommends closely monitoring paced patients.

- False high-rate alarms can result under the following conditions:

- Asynchronous pacemaker with large pace pulse tails and at low heart rate (30 bpm)
- Pace pulses above 200 - 700 mV, such as when an external pacemaker is used, may cause an electrical overshoot which can mimic a QRS complex, which may affect the accuracy of ECG beat classification.

Dräger recommends monitoring transcutaneous paced patients in accordance with your hospital's policy.

- With lower pace pulses of -2.0 - 2.0 mV an electrical overshoot can occur, and mimic a QRS complex, which may affect the accuracy of ECG beat classification.
- Large atrial pacemaker pulse followed by a large ventricular pacemaker pulse (both having identical amplitude and durations)

Dräger recommends closely monitoring paced patients.

NOTE

The displayed heart rate may be incorrect if the pacemaker pulse wanders through the ECG waveform (ineffective pacing). During the wandering pacemaker test required by IEC 60601-2-27 and ANSI/AAMI EC13, the displayed heart rate varied between 15 and 30 bpm (rather than consistently being 30 bpm).

WARNING

Make sure that pacer detection is turned OFF for patients without pacemakers. Make sure that it is ON for patients with pacemakers. Deactivating pacer detection for paced patients may result in pacemaker pulses being counted as regular QRS complexes, which could prevent an asystole alarm from being detected. Always verify that the pacer detection status is correct for the patient.

WARNING

Interference from a monitor may cause some rate-adaptive implantable pacemakers to pace at unnecessarily high rates. Be extra vigilant with patients when using these types of pacemakers.

WARNING

Always keep pacemaker patients under close surveillance and monitor their vital signs carefully.

- Do not assess the patient's condition exclusively from the heart rate values the monitor displays and the rate alarms that are generated. Heart rate meters may continue to count the pacemaker rate during cardiac arrest or some arrhythmias.
- Some pacemakers (especially external pacemakers with body surface electrodes) emit pulses with amplitudes far exceeding the 700 mV maximum amplitude specified for the M300. The M300 may incorrectly detect these large pacemaker pulses as valid QRS complexes and may fail to detect cardiac arrest.

Pacer Fusion mode

Pacer Fusion mode offers increased detection sensitivity to fused paced beats, which reduces false asystole and low heart rate alarms.

WARNING

Pay close attention to pacemaker patients being monitored in fusion mode because this mode may increase the risk of falsely counting pacemaker spikes as QRS complexes, thus failing to detect cardiac arrest.

CAUTION

Fusion mode pacer detection is not intended for use with large-signal, unipolar pacemakers. It is intended for use only with biphasic pacemakers. Observe the following:

- Select fusion mode only in situations where it becomes necessary to suppress repeated false asystole and/or false low heart rate alarms.
- Before selecting fusion mode, be certain that the patient has a biphasic pacemaker (external or implanted) and that it is accurately programmed as appropriate for that patient.
- Do not use fusion mode if you are uncertain as to what type of pacemaker is being used.

Device interference with pacemaker monitoring

WARNING

Wireless monitoring could lead to possible interference with pacemaker monitoring due to WLAN (wireless local area network).

The following devices can interfere with pacemaker monitoring:

– Impedance-derived rate response pacemakers

These pacemakers emit pulses that adjust the pacemaker rate to the respiratory rate. These pulses could be falsely interpreted as pacer pulses. For impedance-derived rate response pacemakers, modify the electrode placement until the blue spikes on the waveform disappear since they are not related to real pacer impulses.

– Infusion or roller bypass pumps

Interference from these devices can cause pacer spikes to appear on the waveform although the ECG appears normal. To determine if the pump is the cause of the artifact, turn it off, if possible. To minimize the artifact, choose the lead with the best signal or replace the electrodes. Rerouting invasive pressure tubing away from the infusion tubing can also improve the ECG signals.

– Line isolation devices

To minimize the effect of line isolation devices, which can cause temporary disturbances in the ECG signal, follow these precautions:

- Choose the lead with the best signal for ECG monitoring.
- Check the ECG electrodes; replace them, if necessary.

– Transcutaneous electrical nerve stimulators

Signals from transcutaneous electrical nerve stimulators (TENS) often resemble pacemaker signals and can be labeled as such. The M300 can reject valid QRS complexes, which follow misinterpreted TENS signals. If TENS signals continue to register as pacer spikes, disable pacer detection (see page 154).

Overview of arrhythmia monitoring

The M300/M300+ performs arrhythmia (ARR) monitoring on adult and pediatric patients. The selected arrhythmia mode controls which arrhythmia parameters are monitored (see page 163).

WARNING

When **HR alarm limits** and **ARR monitoring** are disabled, the monitor cannot report **asystole (ASY)** and **ventricular fibrillation (VF)** alarms. To enable **ASY** and **VF** alarms, always keep **HR alarm limits** enabled.

NOTE

The **HR alarms off** banner appears in the header bar of the BedView and viewport when heart rate alarm limits are disabled and arrhythmia monitoring is enabled.

The **HR,ASY,VF off** banner appears in the header bar of the BedView and viewport when heart rate alarm limits are disabled and arrhythmia monitoring is disabled.

NOTE

For all non-arrhythmia alarms, events other than Arrhythmia are saved only if the event is set to **Store** and an alarm is turned on and generated.

The arrhythmia monitoring functions are configurable in the arrhythmia setup page (see page 165).

Before performing any monitoring functions, refer to the section "For your safety and that of your patients" on page 7.

M300/M300+ Arrhythmia processing

Arrhythmias are identified using an internal detection process. This process does the following:

- Filters out ECG signal artifacts
- Detects the beat pattern
- Classifies the beat pattern
- Detects the rhythm

When arrhythmia analysis is enabled, multiple alarm conditions may occur simultaneously. Announcing all the alarm conditions would cause alarm fatigue and prevent the clinician from addressing the most serious condition. For this reason, the arrhythmia conditions are prioritized and only the highest priority alarm event shall annunciate. The priority order of the arrhythmia events is based on the default priority defined in the algorithm and the alarm grade configured by the user.

Based on this detection process, arrhythmias and other associated events are reported in the following order of severity:

- 1 **ASY** (asystole)
- 2 **VF** (ventricular fibrillation)
- 3 **VTACH** (ventricular tachycardia)
- 4 **RUN** (ventricular run)
- 5 **AIVR** (accelerated idioventricular rhythm)
- 6 **SVT** (supraventricular tachycardia)
- 7 **CPT** (ventricular couplet)
- 8 **BGM** (bigeminy)
- 9 **TACH** (tachycardia)
- 10 **Brady** (bradycardia)
- 11 **Pause** (sinus pause)
- 12 **ARR artifact**

In addition to storage as events, the two high priority alarms, **ASY** and **VF**, are also stored and displayed in the trends of the ICS.

An arrhythmia with a high grade alarm configuration has a higher priority than an arrhythmia with a medium, low or disabled alarm grade configuration. An arrhythmia with a medium grade alarm configuration has a higher priority than an arrhythmia with a low or disabled alarm grade configuration. An arrhythmia with a low grade alarm configuration has a higher priority than an arrhythmia with a disabled alarm configuration.

The priority for arrhythmia events configured with the same alarm grade follows the arrhythmia hierarchy list. When arrhythmia artifact is present (ARTF) at 100% artifact level, no arrhythmia events are recognized except for bradycardia and ventricular fibrillation. If sinus tachycardia and ventricular tachycardia are configured at the same alarm grade, a ventricular tachycardia will take priority if the rate is high enough and the beats are classified as ventricular beats.

Selecting arrhythmia leads

Appropriate lead selection is essential for accurate arrhythmia monitoring. It is ideal to assign the two best ECG leads as the arrhythmia monitoring leads. The following two options are available:

- ECG 1 (single channel option) – dedicates processing to the lead selected as the top waveform displayed.
- ECG 1 & 2 (Dual channel option) – determines the heart rate and arrhythmia based on the leads selected as top two waveforms.

To select default arrhythmia leads

- 1 Select the **Telemetry defaults** button in the ICS Main screen.
If the selection does not appear, the Telemetry option is not enabled.
- 2 Select the **Layout/ Parameters** tab (if not already selected).
- 3 Select the **Layout** tab.
- 4 Select the arrow next to **QRS/ARR processing** to choose the appropriate channel(s).

To select arrhythmia leads for an individual M300

- 1 Open the BedView page by selecting the parameter box of the telemetry patient in the ICS Main screen.
- 2 Select the **Telemetry/ Parameters** button.
- 3 Select the **Layout/ Parameters** tab (if not already selected).
- 4 Select the **Layout** tab (if not already selected).
- 5 Select the arrow next to **QRS/ARR processing** to choose the appropriate channel(s).

The following table describes the ECG lead status and notifications.

Lead status	Notification
One lead is not detected, but is not required to process the heart rate or arrhythmia.	<xx> Lead off message will be displayed on the M300/M300+ and can be viewed on the patient BedView of ICS. ¹⁾
Two leads are selected for processing such as II and V, and the secondary lead is disconnected; heart rate and arrhythmia processing is uninterrupted.	<xx> Lead off message is displayed on the M300/M300+ and ICS. ¹⁾
An insufficient number of ECG leads are connected.	ECG leads off alarm will annunciate at the M300/M300+ and ICS according to the configured priority of Low (default), Medium, or High.
– An alarm condition will be recorded if Archive is set to Record or Store/Rec.	
– An alarm condition will be stored if Archive is set to Store or Store/Rec.	
– If the alarm is disabled, a status message will be displayed.	
QRS processing leads are not detected for 10 seconds or more, or the ECG signal is not available. During this period, arrhythmia processing does not occur.	ECG leads off alarm will annunciate at the M300/M300+ and ICS according to the configured priority of Low (default), Medium, or High.
– An alarm condition will be recorded if Archive is set to Record or Store/Rec.	
– An alarm condition will be stored if Archive is set to Store or Store/Rec.	
– If the alarm is disabled, a status message will be displayed.	

1) xx represents LA, LL, RA, RL, V, V2, V+, or V5.

The following table lists the ECG lead functionality for 3-, 5-, or 6-lead ECG cable set.

ECG cable	Disconnected electrode(s)	Selected processing lead	Neutral electrode	Valid leads available for ECG processing
3	None (RA, LA, and LL are valid)	I	LL	I
		II	LA	II
		II	RA	III
	Any one or more		N/A	None
5	None	Any	RL	I, II, III, aVR, aVL, aVF, V
	RA	Any	RL	III
	LA	Any	RL	II
	LL	Any	RL	I
	V	Any	RL	I, II, III, aVR, aVL, aVF
	RL	Any	V	I, II, III, aVR, aVL, aVF
	RL, V	I	LL	I
		II	LA	II
		II	RA	III
	Any two or more of: RA, LA, and LL		N/A	None
6	None	Any	RL	I, II, III, aVR, aVL, aVF, V, V+
	RA	Any	RL	III
	LA	Any	RL	II
	LL	Any	RL	I
	V	Any	RL	I, II, III, aVR, aVL, aVF, V+
	V+	Any	RL	I, II, III, aVR, aVL, aVF, V
	RL	Any	V	I, II, III, aVR, aVL, aVF, V+
	RL, V	I	LL	I
		II	LA	II
		III	RA	III
	Any two or more of: RA, LA, and LL		N/A	None
NOTE If the user selects a lead for processing that becomes invalid, an ECG leads off condition is reported.				

Recommended remedies for lead-off notifications

- Inspect and periodically replace electrodes according to the electrode manufacturer's recommendation.
- Inspect ECG wire connections from M300/M300+ to patient electrodes.
- Inspect and replace faulty lead sets.
- If a lead wire or electrode cannot be replaced, select another lead for processing.
- Inspect M300/M300+ connector contacts for contamination, and if needed, clean contacts according to the reprocessing instructions in this IFU.

Arrhythmia modes

If arrhythmia monitoring is enabled, the selected arrhythmia mode (**Basic** or **Advanced**) determines how many events are monitored.

The following table lists which arrhythmia events are reported with each monitoring mode.

Arrhythmia monitoring off – the following events are detected if at least one ECG is displayed and the HR limits option is on:		
ASY	Asystole	4 s pass without the detection of a valid QRS complex.
VF	Ventricular fibrillation	Sine wave with fibrillation characteristics. ¹⁾
Basic arrhythmia monitoring mode – the following additional events are detected:		
VTach	Ventricular Tachycardia	N or more consecutive PVCs are detected, with a beat-to-beat rate greater than or equal to the VTach rate. ²⁾
ARTF	Artifact	More than 50 % of beats in the last minute were classified as questionable.
Advanced arrhythmia monitoring mode – the following additional events are detected:		
RUN	Ventricular RUN	At least (3 -(N-1)) consecutive PVCs are detected, with a beat-to-beat rate greater than or equal to the VTach rate. ²⁾
AIVR	Accelerated Idioventricular Rhythm	Series of 3 or more PVCs with a rate less than the VTach rate.
SVT	Supraventricular Tachycardia	N or more consecutive normal beats, with a beat-to-beat rate greater than or equal to the SVT rate. ²⁾
CPT	Ventricular Couplet	Sequence of beats with the pattern: normal, PVC, PVC, normal.
BGM	Ventricular bigeminy	Sequence of beats with the pattern: normal, PVC, normal, PVC, normal.
TACH	Tachycardia	N or more consecutive normal beats, with a beat-to-beat rate $\geq$ TACH rate. ^{2) 3)}

BRADY	Bradycardia	Eight or more consecutive normal beats, with an average rate $\leq$ bradycardia rate.
PAUSE	Pause	A sequence of two normal beats occur with an Normal-Normal interval greater than the PAUSE rate times the average N-N interval (± 100 ms).

- 1) Certain VTach have sinusoidal waveforms closely resembling VF. Because of the similarities between these waveforms, such types of VTach can be classified as VF, the more serious of the two conditions.
- 2) N is the event count set in the count column of the arrhythmia setup table.
- 3) A PVC or another abnormal beat breaks the analysis sequence and restarts analysis.

Arrhythmia display

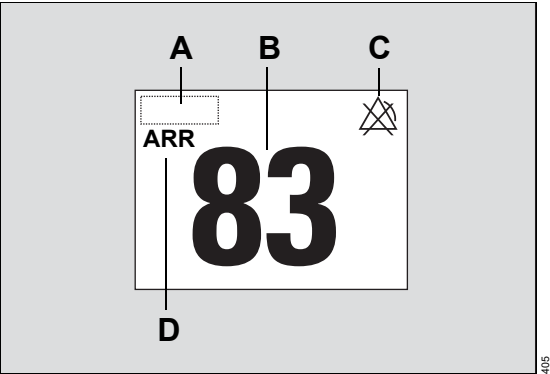
The arrhythmia parameter box displays in the following locations:

- The viewports in the ICS Main screen
- The ICS BedView page of a patient

NOTE

The M300/M300+ does not display the arrhythmia label but does show arrhythmia alarm messages. The arrhythmia label **ARR** and the alarm messages appear in the viewport of the ICS and the BedView page of the M300/M300+.

Arrhythmia parameter box on an ICS BedView



- A** Parameter label
- B** Heart rate value – during artifact, asterisks (***) replace the heart rate value
- C** Crossed triangle symbol when heart rate alarms are turned off
- D** Arrhythmia monitoring is turned on

Accessing the *Arrhythmia* setup page

The ***Arrhythmia*** setup page for a telemetry patient can only be accessed through the BedView page of the ICS.

- 1 Open the BedView page by selecting the parameter box of the telemetry patient in the ICS Main screen.
- 2 Select the ***Alarms*** button.
- 3 Select the ***Arrhythmia*** tab.

Arrhythmia parameter setup function

The arrhythmia parameter setup function takes place in the ***Arrhythmia*** page (see page 165).

To configure the alarm functions, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

Selection	Available Settings	Description
<i>ARR mode</i>	<i>Off, Basic</i> (default), <i>Advanced</i>	Selects which events are reported (see page 163 for more detail).

Overview of ST monitoring

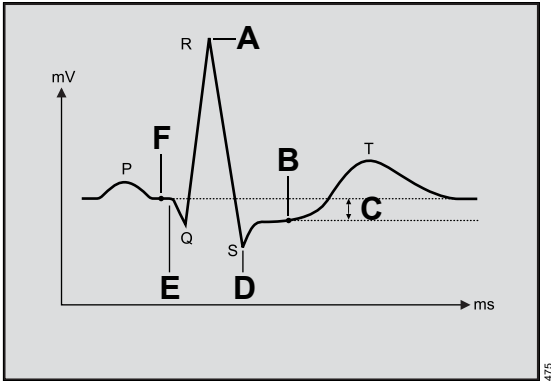
ST segment analysis examines normal ECG complexes for all available leads. The M300/M300+ learns each ST lead, combines the measurements into an average ECG complex, and derives the ST deviation. ST monitoring is available for adult and pediatric patients.

The ST deviation is defined as the displacement (in mm or mV) above or below the isoelectric line. The deviation measurement compares the ISO point to the ST measurement point.

The ST monitoring functions are configurable in the ST setup page (see page 174).

Before performing any monitoring functions, refer to the section "For your safety and that of your patients" on page 7.

The following illustration identifies the measured elements of an ECG complex.



- A** Fiducial point
- B** ST measurement point
- C** ST level
- D** QRS offset
- E** QRS onset
- F** ISO point

The ST algorithm has been tested for accuracy of the ST segment data. The significance of the ST segment changes need to be determined by a clinician.

NOTE

ST analysis is always performed using a dedicated filter which ensures diagnostic quality. ST segment of the ECG waveform may appear differently from the ST segment of the ST complex. An ECG report is not of diagnostic quality. Therefore, the ST segment of the ECG waveform on the report may appear differently from the ST segment of the ST complex. The only report of ECG diagnostic quality is a Rest ECG report.

NOTE

When monitoring in dual-lead mode, ECG signal processing uses pre-determined logic to assess signal quality and determine which lead to use for analysis. If the first lead's signal quality is poor but the second lead's signal quality is good, the algorithm puts more weight on the good lead for monitoring the patient's condition.

Connecting lead wire sets for ST monitoring

ST monitoring uses the following lead configurations for each available ST monitoring mode:

- Standard ST monitoring – uses the standard 3-, 5-, and 6-lead wire sets. For more information connecting lead wire sets, see page 150.
- 12-Lead TruST monitoring – provides 12-lead ST monitoring with a 6-lead wire set.

For more information about connecting lead wire sets, see page 150.

Standard ST monitoring

The 6-lead wire set monitors eight ECG leads, of which two are chest leads (V and V+). When TruST is enabled, 12-lead ST segment analysis is available.

To enable or disable default ST monitoring

- 1 Select the **Telemetry defaults** button ICS Main screen.
- 2 Select the **Layout/ Parameters** tab.
- 3 Select the **ST** tab.
- 4 Do one of the following:
 - To enable ST monitoring, select a lead for each desired ST lead.
 - To disable ST monitoring, select **None** for each ST lead.

For more information about available lead wire settings, see "ST parameter setup functions" on page 175.

To enable or disable ST monitoring for an individual M300/M300+

- 1 Open the BedView page by selecting the parameter box of the telemetry patient in the ICS Main screen.
- 2 Select the **Telemetry/ Parameters** button.
- 3 Select the **Layout/ Parameters** tab (if not already selected).
- 4 Select the **ST** tab.
- 5 Do one of the following by first selecting the drop-down arrow on the button located to the right of the corresponding ST lead number, and then making a selection from the available options:
 - To enable ST monitoring, select a lead for each desired ST lead.
 - To disable ST monitoring, select **None** for each ST lead.
- 6 Select **Apply** to save your changes, or **Undo** to exit without saving the changes.

For more information about available lead wire settings, see "ST parameter setup functions" on page 175.

12-lead TruST monitoring

This feature offers real-time assessment of 12-lead ST deviations, with only six electrodes, which provide eight measured ECG leads and four derived chest leads. The derived leads are identified by adding the letter 'd' before the lead label. The derived leads are dV1, dV3, dV4, and dV6.

When TruST monitoring is enabled, the V-lead defaults to V2 and the V+ lead defaults to V5. Although you can select derived leads for display, they are excluded from arrhythmia and QRS processing.

NOTE

TruST monitoring can be enabled only if a 6-lead wire set is used. Note also that no Rest-ECG report can be generated with 12-Lead TruST ECG.

To enable or disable default TruST monitoring

- 1 Select the **Telemetry defaults** button in the ICS Main screen.

If the selection does not appear, it is likely that the **Enable M300** option has not been selected. For more information, see page 213.

- 2 Select the **Layout/ Parameters** tab.

- 3 Select the **ECG** tab.

- 4 Do one of the following:

- To enable TruST monitoring, select the **On** button for **TruST 12-lead**.
- To disable TruST monitoring, select the **Off** button for **TruST 12-lead**.

To enable or disable TruST monitoring for an individual M300/M300+

- 1 Open the BedView page by selecting the parameter box of the telemetry patient in the ICS Main screen.

- 2 Select the **Telemetry/ Parameters** button.

- 3 Select the **Layout/ Parameters** tab (if not already selected).

- 4 Select the **ECG** tab.

- 5 Do one of the following:

- To enable TruST monitoring, select the **On** button for **TruST 12-lead**.
- To disable TruST monitoring, select the **Off** button for **TruST 12-lead**.

ST display

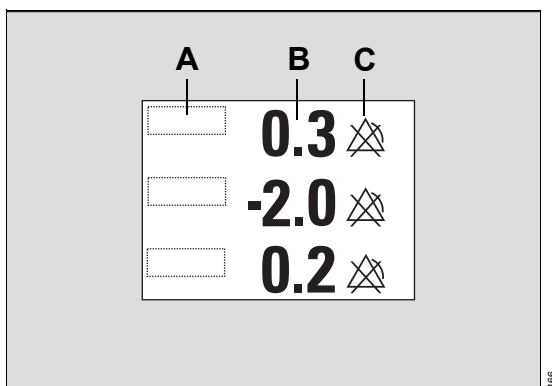
The ST parameter box displays in the following locations:

- The viewports in the ICS Main screen
- The BedView page of the patient

NOTE

The M300/M300+ does not display the ST values but does show ST alarm messages. The ST parameter box and alarm messages appear in the viewport and the BedView page of the ICS.

ST parameter box on an ICS BedView



- A** Selected ST lead labels
- B** Selected ST deviation values
- C** Crossed triangle symbol when alarms are turned off for the selected ST leads

ST complex pages

ST Complex is available only when the ST locked option is enabled. For more information, see page 228. You can view all ST complexes or zoom in on a single ST complex to view it in greater detail.

The following functions are available only for M300/M300+:

- Changing the ISO point
- Changing the ST measurement point
- Saving a reference complex

In the ST complex tab, a solid yellow vertical line marks changes in ST points (ISO or measurement).

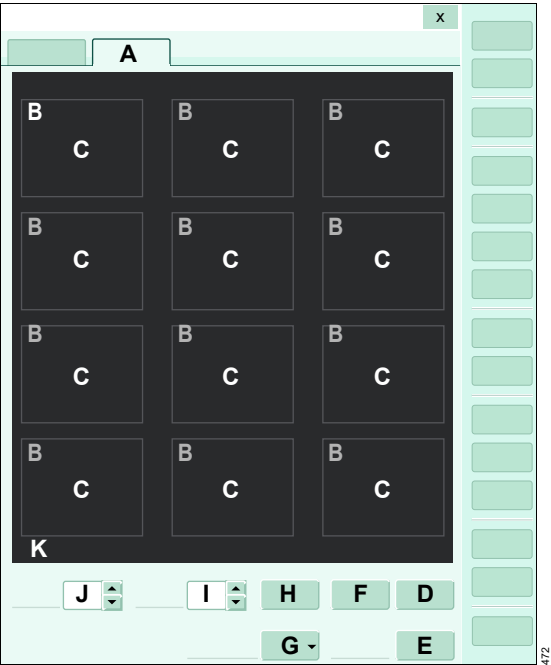
Viewing all ST complexes

The number of displayed ST complexes depends on the connected lead wire set.

To access the multiple ST complexes page

- 1 Open the BedView page by selecting the parameter box of the telemetry patient in the ICS Main screen.
- 2 Select the *ECG views* button.
- 3 Select the *ST complexes* tab.

The following diagram shows a representation of the general ST complexes page.



- A** **ST complexes** tab
- B** Waveform label (for each waveform)
- C** ST panels for each monitored ST lead (including scale, ST measurement point, ISO point, and reference point)
- D** **Save reference** button
- E** **Save reference** button (on, off)
- F** **Undo** button
- G** **Size [mV]** selection control
- H** **Set points** button
- I** ST measuring point selection controls
- J** **ISO** point adjustment controls
- K** Complex time

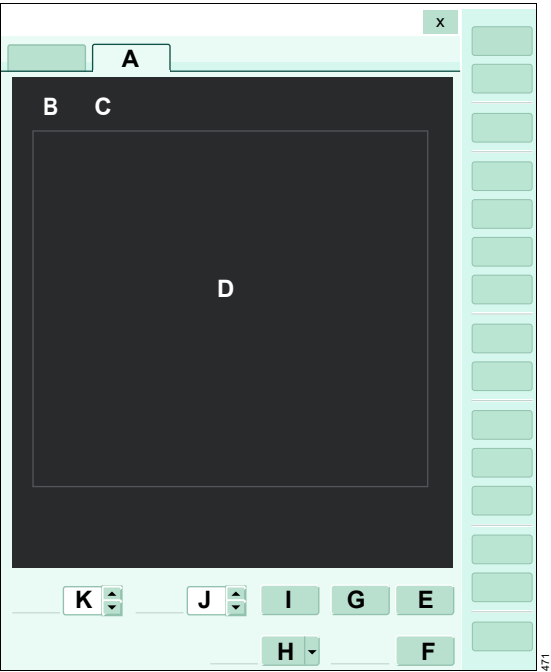
Zooming in on an ST complex

You can zoom in on a single ST complex to view it in greater detail.

To access a single ST complex

- 1 Open the BedView page by selecting the parameter box of the telemetry patient in the ICS Main screen.
- 2 Select the **ECG views** button.
- 3 Select the **ST complexes** tab.
- 4 Select the desired ST complex panel.

The following diagram shows a single ST complex when you zoom in on one ST complex.



- A** **ST complexes** tab
- B** ST label (unique for each ST lead)
- C** Scale
- D** Waveform area
- E** **Save reference** button
- F** **Reference** button (on, off)
- G** **Undo** button
- H** **Size [mV]** selection control
- I** **Set points** button
- J** ST measuring point selection controls
- K** **ISO** point adjustment controls

ST measuring and ISO points

You can change the ST measurement point and the ISO point from the single ST complex setup page. The setup buttons and controls for changing the measuring points are located on the bottom of the page. Changing the measuring point for one complex adjusts the measuring points for all ST complexes.

Adjusting ST measuring and ISO points

Whenever you adjust the ISO point and ST measurement point, the ST deviation is recomputed.

To change ST measurement points

- 1 Open the BedView page by selecting the parameter box of the telemetry patient in the ICS Main screen.
- 2 Select the **ECG views** button.
- 3 Select the **ST complexes** tab.
- 4 Select the desired ST complex panel.
- 5 Select the arrows next to the ISO value to move cursor and adjust ISO point.
- 6 Select the arrows next to the ST value to move cursor and adjust ST point.
- 7 Select the **Set points** button to accept the settings and send them to the M300. Select **X** to close the ST complex panel without saving changes.

ST reference

You can save ST reference complexes as a reference point for future ST deviation measurement comparisons. The first time you relearn ECG complexes, the current ST data are saved as a reference data. This original ST reference data is updated each time you save ST references.

Saving ST reference

You can save the ST reference from the general ST complexes page and the single ST complex page (see "ST complex pages" on page 169). Saving a reference complex in either page, saves all currently displayed ST complexes as reference complex.

To save ST reference complexes

- 1 Open the BedView page by selecting the parameter box of the telemetry patient in the ICS Main screen.
- 2 Select the **ECG views** button.
- 3 Select the **ST complexes** tab.
- 4 Select the desired ST complex panel.
- 5 Select the **Save reference** button or select **X** to close the ST complex panel.

Accessing the ST setup page

The ST setup page for a telemetry patient can only be accessed through the BedView page of the ICS.

- 1 Open the BedView page by selecting the parameter box of the telemetry patient in the ICS Main screen.
- 2 Select the **Telemetry/ Parameters** button.
- 3 Select the **Layout/ Parameters** tab (if not already selected).
- 4 Select the **ST** tab.

ST parameter setup functions

All ST parameter setup functions take place in the ST setup page (see page 174).

To configure the alarm functions, refer to the *Instructions for use Infinity Central/Station Wide, Software VG4.0 or later*.

Selection	Available settings	Description
ST lead %1 1-14	– 3-lead wire: I, II, III, None – 5-lead wire: I, II, III, aVR, aVL, aVF, V, None – 6-lead wire (TruST disabled): I, II, III, aVR, aVL, aVF, V, V+, None – 6-lead wire (TruST activated): I, II, III, aVR, aVL, aVF, dV1, V2, dV3, dV4, V5, dV6, STVM, STCVM, None	Selects an ST lead for analysis and display.
ST event duration [s]	60	Defines a period an alarm condition must persist, before alarm signals are generated. This field is read-only.

Learning/relearning QRS pattern

The M300/M300+ creates a reference complex by learning the dominant QRS pattern of a patient. The reference complex is stored and all subsequent beats and rhythms are compared against it and classified as either normal or irregular.

The M300/M300+ can only learn the QRS pattern of the leads that are selected for arrhythmia processing. If only one lead is available, the M300 only learns one lead. If no lead wire set is connected, the M300/M300+ cannot perform a learning phase. In this case, an error message is displayed.

The M300/M300+ starts a learning phase automatically when:

- The M300/M300+ comes out of standby mode
- After a M300/M300+ restarts
- Arrhythmia monitoring is turned on
- A different arrhythmia mode is selected
- Different ECG leads are selected for arrhythmia processing
- TruST monitoring is enabled
- The cable type is changed

- The patient category changes at the M300

During the learning phase, which lasts approximately 30 to 40 seconds, the message **ECG relearn** appears in the viewport header bar message area. In addition, the message **LRN** appears in the ECG parameter box.

If ST monitoring is turned on, ST deviations are also recomputed during the learning phase.

Each learning phase of a patient's QRS is entered in the clinical log.

Initiate a manual relearn when:

- Leads are reconnected or electrodes are repositioned
- Eight hours have passed since the last learning phase
- The bedside monitor displays a message indicating that it cannot learn

To start a manual ECG relearn

- 1 Open the BedView page by selecting the parameter box of the telemetry patient in the ICS Main screen.
- 2 Select the **ECG relearn** button.

SpO₂ and pulse rate monitoring with Masimo and M300/M300+

Overview of SpO₂ monitoring with Masimo	178
Supported parameters	178
SpO₂ precautions	179
Starting SpO₂ monitoring on a patient	180
Connecting the SpO₂ cable to the M300/M300+	181
Patient preparation for SpO₂ monitoring	181
Applying the sensor	182
Turning SpO₂ monitoring on/off	183
SpO₂ display	183
SpO ₂ parameter box in the ICS BedView	184
SpO ₂ parameter box on an M300	184
Accessing the SpO₂ page	185
SpO₂ parameter setup functions	185

Overview of SpO₂ monitoring with Masimo

This chapter describes SpO₂ monitoring for the ICS with M300/M300+ devices configured for use with Masimo sensors. For all other bedside monitors, refer to their respective instructions for use.

SpO₂ monitoring is only possible when the SpO₂ license option is enabled at the ICS, an SpO₂ license is available, and **SpO₂ monitoring** is set to **On**.

NOTE

The ICS displays a message when all SpO₂ licenses have been allocated.

The M300/M300+ measures the percentage of functional hemoglobin saturated with oxygen (SpO₂) and derives a pulse rate (PLS) continuously.

A sensor, applied to the patient, measures the absorption levels of red and infrared light. The SpO₂ algorithm uses the difference between the two measurements to calculate the SpO₂. Because light absorption varies with blood volume and blood volume varies with pulse rate, the SpO₂ algorithm can also derive a pulse value.

The SpO₂ values and waveforms display on the ICS and the M300/M300+ (pulse values display only at the ICS).

SpO₂ measurements are for adult and pediatric patients.

NOTE

Information about wavelength range may be useful during photodynamic therapy. For details, refer to "Technical specifications" on page 277.

The SpO₂ monitoring functions are configurable in the parameter-specific dialog window (see "SpO₂ parameter setup functions" on page 185).

Before performing any monitoring functions, refer to the section "For your safety and that of your patients" on page 7.

For parameter-specific error messages, see the chapter "Problem solving" on page 235.

Supported parameters

- Saturation (SpO₂)
- Pulse rate (PLS)

SpO₂ precautions

Interfering Substances: Carboxyhemoglobin may erroneously increase measurement values. The level of increase is approximately equal to the amount of carboxyhemoglobin present. Dyes, or any substance containing dyes that change arterial pigmentation, may cause erroneous measurement values.

NOTE

You can configure the alarm priority for the SpO₂ sensor off alarm condition. Available volume settings are **Low** (default), **Medium**, and **High**.

See "Alarm priorities" on page 123 for additional information.

In the event that the SpO₂ sensor becomes disconnected, a 'sensor unplugged' alarm is annunciated. The user may acknowledge the alarm condition to clear the alarm.

WARNING

When the M300/M300+ is configured for Masimo sensors, use only Masimo- and Dräger-specified sensors. Other sensors may not provide adequate protection against defibrillation and may put the patient at risk.

WARNING

A pulse oximeter should be considered an early warning device. If a trend towards patient hypoxemia is observed, blood samples should be analyzed by laboratory instruments to completely understand the condition of the patient.

CAUTION

Do not immerse the sensor or patient cable in any liquid. Moisture may present a safety risk.

NOTE

A pulse oximeter can be used during defibrillation, but the readings may be inaccurate for up to 20 seconds.

NOTE

Purchase of the M300/M300+ confers no express or implied license under any Masimo patent to use the M300/M300+ with any oximetry sensor that is not manufactured or licensed by Masimo.

For a list of approved sensors, see the chapter "List of accessories" on page 297.

NOTE

Do not use a functional tester to assess the accuracy of a pulse oximeter probe or a pulse oximeter monitor. Since pulse oximeter measurements are statistically distributed, only about two-thirds of those measurements can be expected to fall within $\pm A_{rms}$ of a CO-Oximeter's measured value.

NOTE

A functional tester can be used to measure the total error of a pulse oximeter monitor-probe system if a particular calibration curve has been independently demonstrated to be accurate for that system. The functional tester can then measure how accurately a particular pulse oximeter is in reproducing the calibration curve.

NOTE

The M300/M300+ serial port cannot be accessed during SpO₂ monitoring.

NOTE

Ambient light can interfere with pulse oximetry measurements if the sensor is not properly attached, causing erratic measurement or missing values. Observe proper sensor placement and cover the sensor with opaque material if interference due to ambient light is suspected.

NOTE

To reduce artifacts, make sure the SpO₂ sensor is properly attached to the patient, the patient is not moving, and all cables are properly connected.

Starting SpO₂ monitoring on a patient

- 1 Admit the patient (see "Admitting a patient at the ICS" on page 114).
- 2 Turn SpO₂ monitoring on, if not already on by default (see "Turning SpO₂ monitoring on/off" on page 183).
- 3 Connect the SpO₂ cable to the M300/M300+ (see "Connecting the SpO₂ cable to the M300/M300+" on page 181).
- 4 Prepare the patient and connect the SpO₂ sensor to the patient (see "Patient preparation for SpO₂ monitoring" on page 181).
- 5 Check the M300/M300+ **Demographics** screen to ensure that you are monitoring the correct patient.
- 6 Set the alarm limits at the ICS (see "M300/M300+ alarm ranges and defaults" on page 140).

Connecting the SpO₂ cable to the M300/M300+

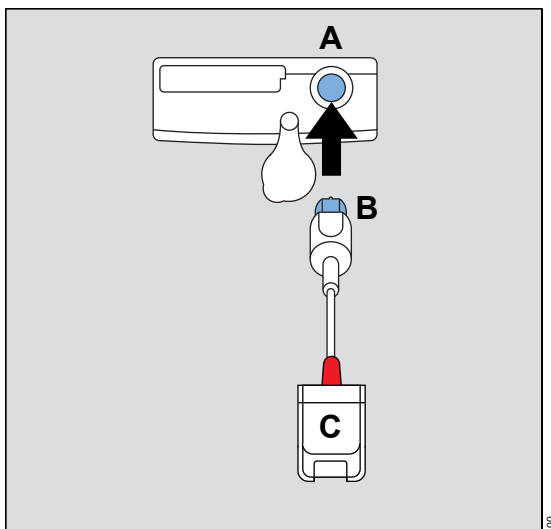
The SpO₂ cable connects directly to the M300/M300+.

To connect the SpO₂ cable to the M300/M300+

- 1 Attach the blue connector of the intermediate cable (B) to the blue SpO₂ connector (A) of the M300/M300+.
- 2 Attach the appropriate sensor to the end of the intermediate cable (C).

To apply the sensor to the patient, see "Applying the sensor" on page 182.

For a list of sensors, see page 278.



Patient preparation for SpO₂ monitoring

The following tips provide optimal SpO₂ monitoring results but should never replace hospital-approved practices or sensor manufacturer's recommendations.

The accuracy of SpO₂ monitoring depends largely on the strength and quality of the SpO₂ signal.

If a finger is used as a monitoring site, remove any nail polish. Cut the finger nails of the patient, if necessary.

The signal may vary due to the following conditions:

- Placement of a sensor that is too tight

- Patient experiences hypotension, severe vasoconstriction, severe anemia, or hypothermia
- Arterial occlusion proximal to the sensor
- Patient is in cardiac arrest or is in shock
- Bright light causing erratic measurement or missing values. Cover the sensor with opaque material if it is likely to be exposed to direct bright light.
- Significant levels of dysfunctional hemoglobins (HbCO or MetHb)
- Intravascular dyes such as indocyanine green or methylene blue
- Excessive patient movement
- Venous pulsations
- Placement of a sensor on an extremity with a blood pressure cuff, arterial catheter, or intravascular line

Applying the sensor

If you are using a reusable sensor, make sure that it is clean before applying it to the patient.

Follow the recommendations of the manufacturer.

WARNING

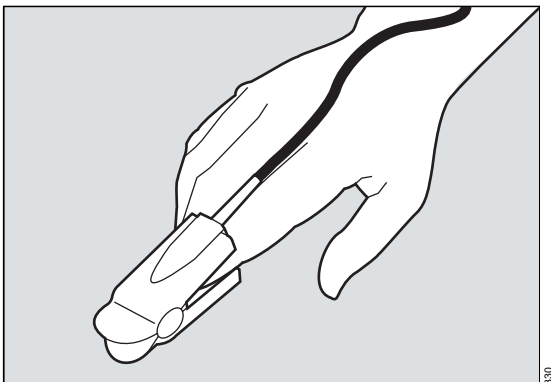
Inspect the application site every two to three hours to ensure skin quality and correct optical alignment. If the skin quality changes, move the sensor to another site. Change the application site at least every four hours.

NOTE

Read the instructions provided with the sensor for optimal application techniques and for safety information. Never use damaged sensors.

To apply the sensor

- 1 Select the size and type of sensor that is best suited for your patient.
- 2 Position the sensor correctly and attach it to your patient.



- 3 Connect the sensor to the SpO₂ cable (see page 181).

Turning SpO₂ monitoring on/off

- 1 Access the **SpO₂** setup page at the ICS, (see "Accessing the SpO₂ page" on page 185).
- 2 Select **On** for **SpO₂ monitoring**.
- 3 Optional: Select **On** for **Bar graph** to display a pulse bar in the SpO₂ parameter box on the M300/M300+ (the pulse bar does not display on the ICS).
- 4 Select **Color** to change the display color of the SpO₂ waveforms and the parameter labels and values.
- 5 Select **Apply** to save the changes or **Undo** to keep the previous settings.

NOTE

When **SpO₂ monitoring** is turned **Off**, the values in the **SpO₂** parameter boxes in the ICS BedView window and in the viewports of the ICS Main screen appear blank.

SpO₂ display

On the ICS and M300/M300+, the SpO₂ display consists of:

- SpO₂ parameter box
- SpO₂ pulse plethysmogram waveform

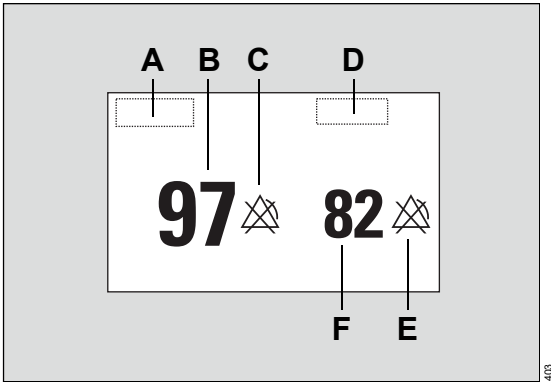
NOTE

The pulse plethysmogram waveform is directly proportional to the pulse amplitude strength.

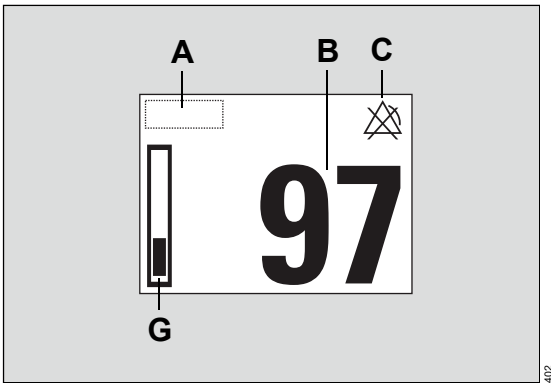
The SpO₂ parameter box displays in the following locations:

- The viewports on the ICS main screen
- The BedView screen of a patient on the ICS
- On the M300/M300+

SpO₂ parameter box in the ICS BedView



SpO₂ parameter box on an M300



- A** SpO₂ label
- B** SpO₂ saturation value
- C** Crossed triangle symbol when the SpO₂ alarm is turned off.
- D** PLS label
- E** Crossed triangle symbol when the pulse alarm is turned off.
- F** PLS value
- G** Pulse bar graph – can be turned on/off, see "Bar graph" on page 185.

Accessing the SpO₂ page

- 1 Open the BedView screen by selecting the viewport of the telemetry patient on the ICS main screen.
- 2 Select the **Telemetry/ Parameters** button.
- 3 Select the **Layout/ Parameters** tab (if not already selected).
- 4 Select the **SpO₂** tab.

SpO₂ parameter setup functions

All SpO₂ parameter setup functions take place in the ICS SpO₂ setup page (see "Accessing the SpO₂ page" on page 185).

To configure the alarm functions, see "M300/M300+ alarm ranges and defaults" on page 140.

Selection	Available settings	Description
SpO₂ monitoring	On, Off (default)	Turns SpO ₂ monitoring on or off.
Bar graph	On (default), Off	Displays a bar graph pulsating at pulse rate with the amplitude being proportional to the pulse strength. Displays only on the M300/M300+ not the ICS.
Color	Red, white (default), yellow, green, light blue, blue, purple, orange	Determines the color of the waveforms and the parameter labels and values.

This page has been left blank intentionally.

SpO₂ and pulse rate monitoring with Nellcor and M300/M300+

Overview of SpO₂ monitoring with Nellcor . . .	188
Supported parameters	188
SpO₂ precautions	189
Starting SpO₂ monitoring on a patient	190
Connecting the SpO₂ cable to the M300/M300+	191
Patient preparation for SpO₂ monitoring . . .	192
Applying the sensor	192
Turning SpO₂ monitoring on/off	193
SpO₂ display	194
SpO ₂ parameter box on an ICS BedView	194
SpO ₂ parameter box on an M300/M300+	195
Accessing the SpO₂ setup page	196
SpO₂ parameter setup functions	196

Overview of SpO₂ monitoring with Nellcor

This chapter describes SpO₂ monitoring for the ICS with M300/M300+ devices configured for use with Nellcor sensors. For all other bedside monitors, refer to their respective instructions for use.

SpO₂ monitoring is only possible when the SpO₂ license option is enabled at the ICS, an SpO₂ license is available, and **SpO₂ monitoring** is set to **On**.

NOTE

The ICS displays a message when all SpO₂ licenses have been allocated.

The M300/M300+ measures the percentage of functional hemoglobin saturated with oxygen (SpO₂) and derives a pulse rate (PLS) continuously.

A sensor, applied to the patient, measures the absorption levels of red and infrared light. The SpO₂ algorithm uses the difference between the two measurements to calculate the SpO₂. Because light absorption varies with blood volume and blood volume varies with pulse rate, the SpO₂ algorithm can also derive a pulse value.

The SpO₂ values and waveforms display on the ICS and the M300/M300+ (pulse values display only at the ICS).

SpO₂ measurements are for adult and pediatric patients.

NOTE

Information about wavelength range may be useful during photodynamic therapy. For details, refer to "Technical specifications" on page 277.

The SpO₂ monitoring functions are configurable in the SpO₂ setup page (see "SpO₂ parameter setup functions" on page 196).

Before performing any monitoring functions, refer to the section "For your safety and that of your patients" on page 7.

For parameter-specific error messages, see the chapter "Problem solving" on page 235.

Supported parameters

- Saturation (SpO₂)
- Pulse rate (PLS)

SpO₂ precautions

Interfering Substances: Carboxyhemoglobin may erroneously increase measurement values. The level of increase is approximately equal to the amount of carboxyhemoglobin present. Dyes, or any substance containing dyes that change arterial pigmentation, may cause erroneous measurement values.

NOTE

You can configure the alarm priority for the SpO₂ sensor off alarm condition. Available volume settings are **Low** (default), **Medium**, and **High**.

See "Alarm priorities" on page 123 for additional information.

In the event that the SpO₂ sensor becomes disconnected, a 'sensor unplugged' alarm is annunciated. The user may acknowledge the alarm condition to clear the alarm.

WARNING

When the M300/M300+ is configured for Nellcor sensors, use only Nellcor- and Dräger-specified sensors. Other sensors may not provide adequate protection against defibrillation and may put the patient at risk.

WARNING

A pulse oximeter should be considered an early warning device. If a trend towards patient hypoxemia is observed, blood samples should be analyzed by laboratory instruments to completely understand the condition of the patient.

CAUTION

Do not immerse the sensor or patient cable in any liquid. Moisture may present a safety risk.

NOTE

A pulse oximeter can be used during defibrillation, but the readings may be inaccurate for up to 20 seconds.

NOTE

Purchase of the M300/M300+ confers no express or implied license under any Nellcor patent to use the M300/M300+ with any oximetry sensor that is not manufactured or licensed by Nellcor.

For a list of approved sensors, see the chapter "List of accessories" on page 297.

NOTE

Do not use a functional tester to assess the accuracy of a pulse oximeter probe or a pulse oximeter monitor. Since pulse oximeter measurements are statistically distributed, only about two-thirds of those measurements can be expected to fall within $\pm A_{rms}$ of a CO-Oximeter's measured value.

NOTE

A functional tester can be used to measure the total error of a pulse oximeter monitor-probe system if a particular calibration curve has been independently demonstrated to be accurate for that system. The functional tester can then measure how accurately a particular pulse oximeter is in reproducing the calibration curve.

NOTE

The M300/M300+ serial port cannot be accessed during SpO₂ monitoring.

NOTE

Ambient light can interfere with pulse oximetry measurements if the sensor is not properly attached, causing erratic measurement or missing values. Observe proper sensor placement and cover the sensor with opaque material if interference due to ambient light is suspected.

NOTE

To reduce artifacts, make sure the SpO₂ sensor is properly attached to the patient, the patient is not moving, and all cables are properly connected.

Starting SpO₂ monitoring on a patient

- 1 Admit the patient (see "Admitting a patient at the ICS" on page 114).
- 2 Turn SpO₂ monitoring on, if not already on by default (see "Turning SpO₂ monitoring on/off" on page 193).
- 3 Connect the SpO₂ cable to the M300/M300+ (see "Connecting the SpO₂ cable to the M300/M300+" on page 191).
- 4 Prepare the patient and connect the SpO₂ sensor to the patient (see "Patient preparation for SpO₂ monitoring" on page 192).
- 5 Check the M300/M300+ **Demographics** screen to ensure that you are monitoring the correct patient.
- 6 Set the alarm limits at the ICS (see "M300/M300+ alarm ranges and defaults" on page 140).

Connecting the SpO₂ cable to the M300/M300+

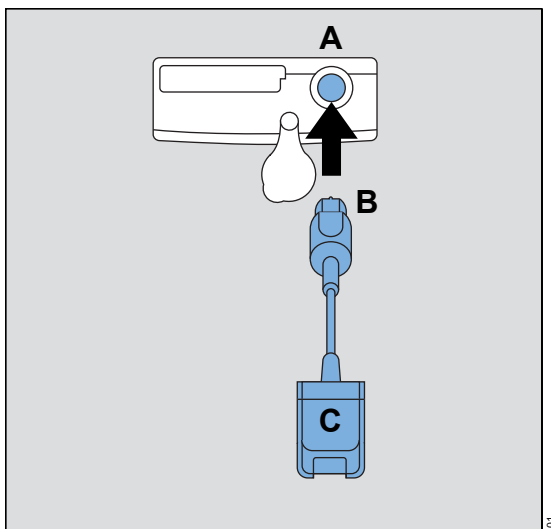
The SpO₂ cable connects directly to the M300/M300+.

To connect the SpO₂ cable to the M300/M300+

- 1 Attach the blue connector of the intermediate cable (B) to the blue SpO₂ connector (A) of the M300/M300+.
- 2 Attach the appropriate sensor to the end of the intermediate cable (C).

To apply the sensor to the patient, see "Applying the sensor" on page 192.

For a list of sensors, see page 278.



Patient preparation for SpO₂ monitoring

The following tips provide optimal SpO₂ monitoring results but should never replace hospital-approved practices or sensor manufacturer's recommendations.

The accuracy of SpO₂ monitoring depends largely on the strength and quality of the SpO₂ signal.

If a finger is used as a monitoring site, remove any nail polish. Cut the finger nails of the patient, if necessary.

The signal may vary due to the following conditions:

- Placement of a sensor that is too tight
- Patient experiences hypotension, severe vasoconstriction, severe anemia, or hypothermia
- Arterial occlusion proximal to the sensor
- Patient is in cardiac arrest or is in shock
- Bright light causing erratic measurement or missing values. Cover the sensor with opaque material if it is likely to be exposed to direct bright light.
- Significant levels of dysfunctional hemoglobins (HbCO or MetHb)
- Intravascular dyes such as indocyanine green or methylene blue
- Excessive patient movement
- Venous pulsations
- Placement of a sensor on an extremity with a blood pressure cuff, arterial catheter, or intravascular line

Applying the sensor

If you are using a reusable sensor, make sure that it is clean before applying it to the patient.

Follow the recommendations of the manufacturer.

WARNING

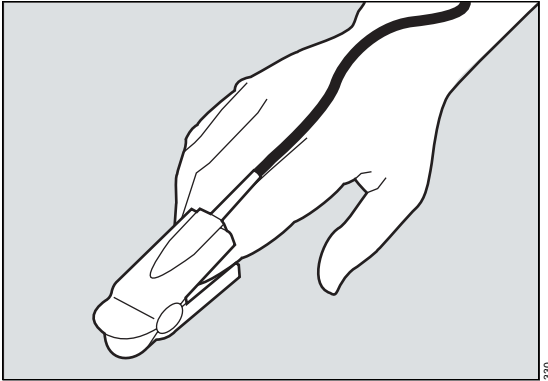
Inspect the application site every two to three hours to ensure skin quality and correct optical alignment. If the skin quality changes, move the sensor to another site. Change the application site at least every four hours.

NOTE

Read the instructions provided with the sensor for optimal application techniques and for safety information. Never use damaged sensors.

To apply the sensor

- 1 Select the size and type of sensor that is best suited for your patient. Follow the recommendations of the manufacturer.
- 2 Position the sensor correctly and attach it to your patient.



- 3 Connect the sensor to the SpO₂ cable (see page 191).

Turning SpO₂ monitoring on/off

- 1 In ICS, access the SpO₂ setup page (see "Accessing the SpO₂ setup page" on page 196).
- 2 Select **On** for **SpO₂ monitoring**.
- 3 Optional: Select **On** for **Bar graph** to display a pulse bar in the SpO₂ parameter box on the M300/M300+ (the pulse bar does not display on the ICS).
- 4 Select **Color** to change the display color of the SpO₂ waveforms and the parameter labels and values.
- 5 Select **Apply** to save the changes or **Undo** to keep the previous settings.

NOTE

When **SpO₂ monitoring** is turned **Off**, the values in the **SpO₂** parameter boxes in the ICS BedView window and in the viewports of the ICS main screen appear blank.

SpO₂ display

On the ICS and M300/M300+, the SpO₂ display consists of:

- SpO₂ parameter box
- SpO₂ pulse plethysmogram waveform

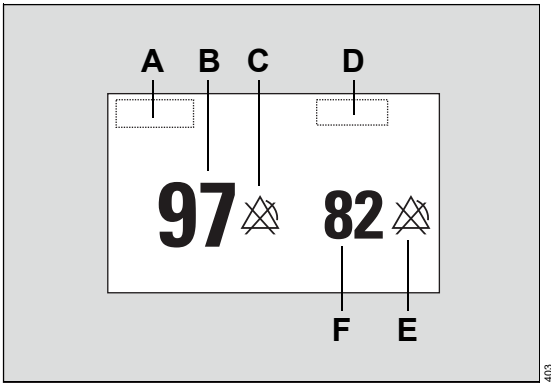
NOTE

The pulse plethysmogram waveform is directly proportional to the pulse amplitude strength.

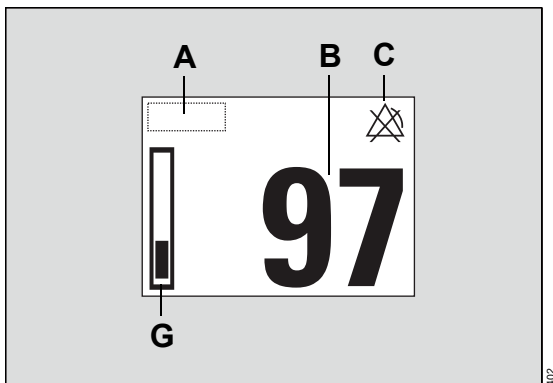
The SpO₂ parameter box displays in the following locations:

- The viewports on the ICS Main screen
- The BedView screen of a patient on the ICS
- On the M300

SpO₂ parameter box on an ICS BedView



SpO₂ parameter box on an M300/M300+



- A** SpO₂ label
- B** SpO₂ saturation value
- C** Crossed triangle symbol when the SpO₂ alarm is turned off.
- D** PLS label
- E** Crossed triangle symbol when the pulse alarm is turned off.
- F** PLS value
- G** Pulse bar graph – can be turned on/off, see "Bar graph" on page 196.

Accessing the SpO₂ setup page

- 1 Open the BedView screen by selecting the viewport of the telemetry patient on the ICS Main screen.
- 2 Select the **Telemetry/ Parameters** button.
- 3 Select the **Layout/ Parameters** tab (if not already selected).
- 4 Select the **SpO₂** tab.

SpO₂ parameter setup functions

All SpO₂ parameter setup functions take place in the ICS SpO₂ setup page (see "Accessing the SpO₂ setup page" on page 196).

To configure the alarm functions, see page "M300/M300+ alarm ranges and defaults" on page 140.

Selection	Available settings	Description
SpO₂ monitoring	On , Off (default)	Turns SpO ₂ monitoring on or off.
Bar graph	On (default), Off	Displays a bar graph pulsating at pulse rate with the amplitude being proportional to the pulse strength. Displays only on the M300/M300+ not the ICS.
Color	Red, white (default), yellow, green, light blue, blue, purple, orange	Determines the color of the waveforms and the parameter labels and values.

Recordings/reports

Overview	198
Recorder	199
Recorder setup	199
Initiating manual recordings	200
Processing of strip recordings	200
Requesting a remote recording	200
Setting up a recording	200
Manual (timed) recordings	201
Canceling a recording	205
Actions that affect recordings	206
M300/M300+ offline recordings	206

Overview

The ICS offers a real-time record of its monitoring results on recorders. You can also request various reports and screens to be printed on a configured laser printer.

The content of the reports and recordings depend on the configured settings, which can be customized within the **Recorders/ Reports** setup pages. For information about the recordings and reports settings, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

WARNING

If you require a diagnostic quality recording you must use a Rest ECG report. Using any recording other than Rest ECG report may lead to misdiagnosis. For information about the Rest ECG report, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

The Rest ECG report is unavailable on the M300.

NOTE

The recorders should always be installed and configured as part of the M300/M300+ system.

NOTE

All telemetry ECG recordings and reports are filtered at a bandwidth of 0.5 Hz to 40 Hz.

When requesting a recording at the ICS for telemetry patients, recordings are printed at the recorder assigned to the local ICS.

If an assigned recorder is unavailable at the time of a recording request, the request (or recorded data) is stored and executed as soon as the recorder becomes available.

You can also print a variety of reports on a laser printer.

Status messages in the Main screen status area indicate when a request is accepted, canceled, or rejected.

NOTE

If no recorders are assigned to an M300/M300+, then recordings will not be stored.

NOTE

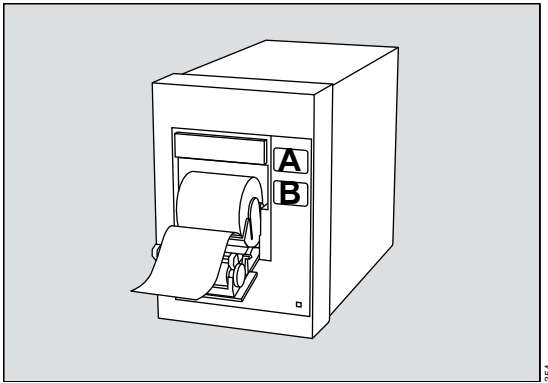
A maximum of 4 recorders can be installed when used in a Monitoring Unit which includes one or more M300/M300+ devices.

For information about printing recordings and reports, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

Recorder

Manual and alarm recordings are printed on recorders via the network.

Recorder setup



A **Stop** button

B **mm/s** button

The recorders have two buttons:

- The **Stop** button stops a recording in progress.
- The **mm/s** button on the recorder's front panel (**Alternate Speed** on older recorders) enables you to change the recording speed while a recording is in progress. The recorder stops briefly and then re-starts automatically at the preconfigured alternate recording speed.

NOTE

Pressing the mm/s button has no effect on recordings involving the M300/M300+ (M300/M300+ recordings are always at 25 mm/s).

The recorder "Alternate speed" feature is not supported for M300/M300+ monitors.

Replacing the recorder paper

- 1 Open the paper door and remove the empty paper roll and any paper remaining in the printing mechanism.
- 2 Place a new paper roll (with printed side facing up) into the spool holder. Unroll a few inches of paper from the bottom.
- 3 Align the paper roll with the paper guides and then close the door. If not aligned properly, the paper may jam.
- 4 Generate a manual recording to verify that the recorder is connected properly and the paper is loaded correctly.

Initiating manual recordings

Recordings	Required steps
Manual recording (from the Main screen)	For an individual patient: – Select the Main screen viewport to display a button which, when selected, will print the recording. If the patient is discharged or in Standby mode, you cannot request a manual recording.
	For all patients admitted to the Main screen: – Press the keyboard F11 key.
Manual recording (from BedView)	Select the Record button.

NOTE

If the ICS is operating in Dual Display mode, recordings are printed only for the patients of the screen in which the mouse pointer is located at the time of the request.

Processing of strip recordings

You can initiate a manual recording at the ICS. The request is handled by the bedside device.

Requesting a remote recording

Other ICS devices within the same monitoring unit can request recordings of local patients. These requests use the recording attributes of the remote device.

Setting up a recording

For general recording setup attributes, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*. For telemetry-specific recording setup information, see "Device setup > Setup page" on page 234.

Manual (timed) recordings

Manual recordings are strip recordings of a specified duration. These recordings contain delay data originating before the recording is initiated and real-time data acquired after the recording started.

NOTE

If the patient was monitored for less time than the specified delay, the amount of delay data is adjusted accordingly. If no delay data is available at the recording request time, that part of the printed waveform is blank.

Manual recordings consist of up to two displayed waveforms. Pressure waveforms are recorded in either Standard or Pressure Overlap mode, depending on their configuration at the bedside monitor (see the instructions for use for the specific bedside monitor).

Manual vs. automatic recordings

Manual (timed) recordings are either requested manually or generated automatically when a parameter or arrhythmia event occurs whose recording function is enabled. For detailed information on how to enable/disable an event's/parameter's automatic recording function, see "Configuring alarm settings for multiple parameters" on page 134, and "Configuring default arrhythmia alarm settings" on page 219.

An alarm recording is the same as one manually requested except that it has a different recording type in the header.

Telemetry recordings

All telemetry recordings ignore manual Main screen settings and use the following fixed settings.

- Duration: 20 seconds
- Delay: 10 seconds
- Speed: 25 mm/s

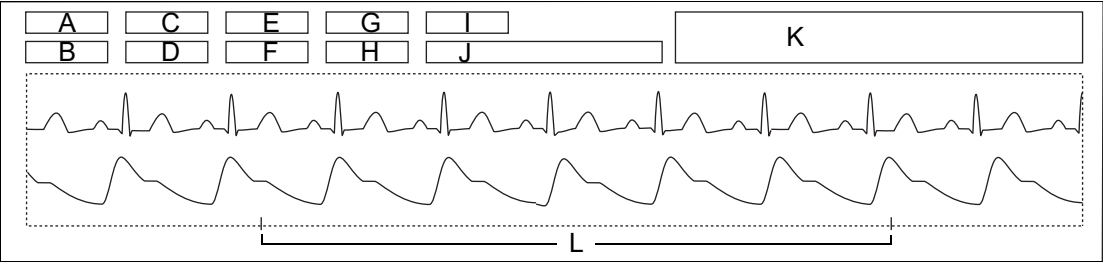
Header information

The header of a manual recording contains the following information:

- Parameter values at the time the recording starts printing
- Patient name and ID number
- Date and time

The following diagram shows a representation of a typical manual recording:

Manual (timed) recording with header



- A** Patient name
- B** Patient ID
- C** Bed label
- D** Care unit
- E** Date
- F** Time
- G** Selected delay time
- H** Selected recording speed
- I** Recording type
- J** Diagnostic code
- K** Parameter labels and units of measure
- L** 3-second interval markers

Diagnostic code

Digit	Description	Possible values	Definition
1	Lead processed for VF and pacer pulse detection	X 1 2 3 S T U V + a b c d e f A B C D E F	None I II III aVR aVL aVF V V+ V1 V2 V3 V4 V5 V6 dV1 dV2 dV3 dV4 dV5 dV6
2	ECG filter	M D E	Monitor Off ESU
3	Pacer detection	C c H	On - Artifact Rejection <Medium> Off - Artifact Rejection <Medium> Fusion - Artifact Rejection <Medium>
4	QRS/arrhythmia processing	2 1	ECG1 & ECG2 ECG1

Digit	Description	Possible values	Definition
5	Patient category/ QRS classification	<Space> 1 2 B n	Adult, neither lead completed learning Adult, ECG1 lead completed learning Adult, ECG2 lead completed learning Adult, ECG1&2 lead completed learning Neonate
6	Leads available for processing	0 1 2 3	No valid lead to process ECG1 is valid to process ECG2 is valid to process ECG1 & ECG2 are valid to process
7	VTach count	5-F	Value = VTach count (where A-F corresponds to 10-15)
8	VTach rate	0-A	Value = (VTach rate - 100)/10 (where A corresponds to 10)
9	SVT count	3-A	Value = SVT count (where A corresponds to 10)
10	SVT rate	0-A	Value = (SVT rate - 100)/10 (where A corresponds to 10)
11	TACH count	5-F	Value = TACH count (where A-F corresponds to 10-15)
12	TACH rate	0-A	Value = (TACH rate - 100)/10 (where A corresponds to 10)
13	BRADY rate	0-F	Value = (BRADY rate - 30)/5 (where A-F corresponds to 10-15)
14	PAUS rate	0-5	Value = (PAUS rate - 1.0)/0.5 (where A-F corresponds to 10-15)
15	HR source	E P S	ECG is heart rate source ART is heart rate source SpO2 is heart rate source
16	RESP mode	O M A <Space>	RESP monitoring off Manual Automatic N/A

Digit	Description	Possible values	Definition
17	RESP size	1-K <Space>	Value = (RESP size)/5 (where A-K corresponds to 10-20) N/A
18, 19	Minutes since breath detector initialization	00-99 <Space>	Number of minutes that have elapsed since the breath detector was initialized (where 99 corresponds to ≥ 99 minutes) N/A
20	Not used	<Space>	N/A
21	Monitor model	V	M300
22-26	Software version	xxxxx (ASCII)	First five characters of base software (for example, VA1-1)

Canceling a recording

Recording type	To cancel in Main screen:	To cancel in BedView:	To cancel at the recorder:
Manual (timed) recording	Select the patient's record symbol () to deselect it	Select the record Symbol to deselect it	Press the STOP key
Alarm recording	Not possible	Not possible	Press the STOP key
Arrhythmia event recording	Not possible	Not possible	Press the STOP key

Actions that affect recordings

Action	Effect on pending recordings	Effect on recordings in progress
Patient Discharge	Pending recordings are discarded	Recording is canceled
Edit patient's demographic data	No effect	No effect
Patient monitoring put in Standby mode	No effect	Recording is canceled
Configuration change of Main screen resulting in removal of a patient	Patient's pending recordings are canceled	Recording is canceled
Change in scale settings or parameter order (parameters might become available/unavailable due to re-stored/missing signals)	No effect	Recordings will continue but waveform and parameter data for any removed parameter appear as blanks. Added parameters are <i>not</i> included on a recording currently in progress.
Recorder assignment change	No effect. Additional recordings are printed on the new recorder.	No effect on recordings.
Network time/date change	No effect on active or pending recordings. All new recordings in progress reflect the new date/time.	Recordings reflect the change immediately (as will all future manual recordings).
Recorder becomes unavailable, runs out of paper, or jams	No effect	Recording is not lost, but routed to another assigned recorder, or stored for printing when the recorder becomes available.
Remote device requesting a recording of a local patient goes offline	Deletes all recordings associated with this device	Recording is canceled
Patient disconnect for transport	Cancels all pending recordings for that bed	Recording is canceled

M300/M300+ offline recordings

While the M300/M300+ is offline or the recorder is not available, the last five recordings (automatic or manual) are stored on the M300/M300+ when the **Store** setting is applied. When the connection is restored, those recordings are sent to the recorder.

System configuration

Overview	208
The Biomed page	208
Biomed > Configure telemetry page	208
Telemetry setup defaults	212
Telemetry default setup (System setup)	212
Telemetry setup (for each M300/M300+ device)	212
The General settings page	213
General settings setup page	213
The Alarms page (telemetry)	215
Alarms > Limits page	215
Changing alarm limits settings	217
Alarms > Arrhythmia page	218
Telemetry defaults > Alarms > Device settings tab	220
Configuring the alarm settings of the patient	221
The Layout/ Parameters page	221
Layout/ Parameters > Layout page	222
Layout/ Parameters > ECG page	227
Layout/ Parameters > SpO2 page	228
Layout/ Parameters > ST page	228
The Find device page	232
The Device setup page	232
Device setup > Status page	233
Device setup > Setup page	234

Overview

This chapter describes the System setup screens, which consist of several setup pages for configuring the ICS and the M300/M300+ telemetry functions. Some of these setup pages are password protected and are only accessible to authorized personnel. For more information about configuring the ICS, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

The *Biomed* page

The ***Biomed*** page allows you to perform a number of system administrator-related tasks, including configuring the ICS and telemetry, accessing the system console, viewing logs, and showing devices, to name a few. The Biomed page includes a number of sub-tabs to organize the information.

The Biomed page is password protected and is only accessible to authorized personnel.

To access the *Biomed* page

- 1 Select the ***System setup*** button on the menu bar.
- 2 Select the ***Biomed*** tab.
- 3 Enter the password and select ***Apply***.
- 4 Select from the available tabs.

Biomed > *Configure telemetry* page

The ***Configure telemetry*** tab includes the following sub-tabs, described in the following table:

- ***General settings***
- ***Telemetry devices***
- ***Telemetry bed labels***
- ***Telemetry settings***

CAUTION

The ***ECG notch filter [Hz]*** setting can affect ECG waveform artifacts. If there are monitoring performance concerns, contact the hospital's biomedical department, DrägerService, or specialized service personnel.

Biomed > Configure telemetry > General settings tab		
Selection	Settings	Description
ECG notch filter [Hz]	50, 60 (default)	Assigns the M300/M300+ ECG notch filter setting.
French NFC mode	Off (default), On	Sets the French regulation mode for M300/M300+ devices admitted to this ICS.
Pacer fusion	Enabled, Disabled (default)	Determines whether Pacer fusion appears as one of the selectable options (in addition to On and Off) for the Pacer detection setting in both the ICS Telemetry defaults and the per-patient ECG screen in BedView. For information about Pacer fusion mode and any associated WARNINGS or CAUTIONS, see page 157.
WARNING Special surveillance is necessary for patients with pacemakers who are monitored with pacer detection set to Pacer fusion mode because more pacer spikes may register as integral QRS complexes.		

Biomed > Configure telemetry > Telemetry devices tab		
Selection	Settings	Description
Device ID	User input	Enables installation personnel to define the M300/M300+ ID# (3-digit maximum) for each M300/M300+ IP address to be used at that ICS.
IP address	User input	Enables installation personnel to define the IP address for each M300/M300+ to be used at that ICS. IMPORTANT: When setting-up the M300/M300+ ID IP address, the 4th octet of each address must be unique. For example: 191.2.20.163 191.2.1.164

Biomed > Configure telemetry > Telemetry devices tab		
Selection	Settings	Description
Add device	User input	Enables the installation personnel to add a new M300/M300+ device by selecting this button and entering the appropriate information. The Telemetry devices table can accept a maximum of 255 rows.
Remove device	User input	Enables installation personnel to remove an existing M300/M300+ device by selecting the appropriate row and selecting this button.

Biomed > Configure telemetry > Telemetry bed labels tab		
Selection	Settings	Description
Bed label column	User input	Defines the available telemetry bed labels that can be used on this ICS. This list will be used as the source for the Assign bed setting. For information about the Assign bed setting, refer to the <i>Instructions for use Infinity CentralStation Wide, Software VG4.0 or later</i>. Up to 32 bed labels can be entered to identify ICS Main screen patient windows. A bed label can be a maximum of seven characters in length.
Alarm group column	User input	Assigns an alarm group to each ICS bed label. An alarm group is assigned to the M300/M300+ only upon admission. The Alarm group field initially appears as 0 and can accept numbers 0 through 255.

Biomed > Configure telemetry > Telemetry settings tab		
Selection	Settings	Description
Alarm pause	Enabled (default), Disabled , Per patient	Enables installation personnel to activate or deactivate the Alarm pause key for all M300/M300+ devices admitted to the ICS permanently. The Per patient option allows you to activate or deactivate this key for each individual patient after the patient is admitted. If the Per patient option is selected, the ICS enables the Alarm pause key as the default upon an M300/M300+ admission.
Volume control	Enabled (default), Disabled , Per patient	Enables installation personnel to activate or deactivate the display of the M300 volume screen for all M300/M300+ devices admitted to the ICS permanently. The Per patient option allows you to activate or deactivate this key for each individual patient after the patient is admitted. If the Per patient option is selected, the ICS sets the Volume setting as the default upon an M300/M300+ admission.
Alarm volume [%]	Off (default), 10, 20, 30, 40, 50, 60, 70, 80, 90, 100	Enables the installation personnel to set the alarm volume default for all M300/M300+ devices admitted to the ICS.
Screen shut-off time [min]	1 (default), 2, 3, 4, 5	Determines the amount of time it would take the M300/M300+ display to shut off automatically after the last key was pressed.
Staff alert	Enabled (default), Disabled , Per patient	Enables the installation personnel to enable or disable the Staff Alert key for all M300/M300+ devices admitted to the ICS permanently. The Per patient option allows you to enable or disable this key for each individual patient after the patient is admitted.
Record	Disabled , Record (default), Store , Store/Rec. , Per patient	Enables the installation personnel to deactivate or define the functionality of the Record key for all M300/M300+ devices admitted to the ICS. The Per patient option allows you to activate or deactivate this key for each individual patient after the patient is admitted. If the Per patient option is selected, the ICS sets the Record key setting to Store as the default upon a M300/M300+ admission.

Telemetry setup defaults

The **Telemetry defaults** window consists of several setup pages for configuring the M300/M300+ telemetry system defaults. Some of these setup pages can be password protected and are only accessible to authorized personnel.

Telemetry setup is available only when the Telemetry Locked option is enabled.

Most setup pages consist of selections for configuring individual features. In the following sections, these setup pages are presented as tables which list each menu selection, the available settings, and a description. Some setup pages are more complex and are described in more detail.

The **Telemetry defaults** button from the Main screen is used to configure general M300/M300+ settings, and the **Telemetry/ Parameters** button in BedView is used to change the settings for a specific bed.

Telemetry default setup (System setup)

From the Main screen

The **Telemetry defaults** window includes tabs containing the following setup pages:

- **General settings** (see page 213)
- **Alarms** (see page 215)
- **Layout/ Parameters** (see page 221)
- **Find device** (see page 232).

Telemetry setup (for each M300/M300+ device)

From the BedView

A **Telemetry/ Parameters** button provides access to bed-specific setup pages, including:

- **Layout/ Parameters** (see page 222)
including bed-specific tabs for configuring Layout, **ECG**, **SpO2**, and **ST**
- **Device setup** (see page 232).

The General settings page

The **Telemetry defaults > General settings** page is used to configure general M300/M300+-related system default settings.

To access the Telemetry > General settings page

- 1 Select the **Telemetry defaults** button from the Main menu bar.
- 2 Select the **General settings** tab (if not already selected).

General settings setup page

The following table lists the available settings of the **General settings** setup page.

The M300/M300+-related pages described in the following tables are available only when the **Enable M300** option has been enabled during system installation. Note that your selected purchase options will also affect what displays on your system.

Except for the **Find device** page, a clinical password is required to access the following screens. The clinical password can be deactivated in **System setup > Biomed > Configure central > Passwords**.

For more information about the **General settings** page, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

Selection	Settings	Description
Patient category	Pediatric, Adult (default)	Determines the default patient category for M300/M300+ devices.
Weight	kg (default), lb	Determines the unit of measurement for patient weight for M300/M300+ devices.
Height	cm (default), in	Determines the unit of measurement for patient height for M300/M300+ devices.

Selection	Settings	Description
Control from remote ICS	Enabled (default), Disabled	Allows you to activate or deactivate functions from other remote ICS devices within the same monitoring unit. When set to Enabled, all M300/M300+ telemetry devices can be controlled by remote network devices. When set to Disabled, remote access is deactivated and those functions appear unavailable for selection in their respective applications. Note: When Remote control is set to Disabled, only the first page of the Alarm limits screen is displayed.

The **Alarms** page (telemetry)

The **Telemetry defaults > Alarms** page enables you to configure system default settings relating to alarm annunciation, and change the alarm limits and arrhythmia settings for all M300/M300+ devices admitted to that ICS.

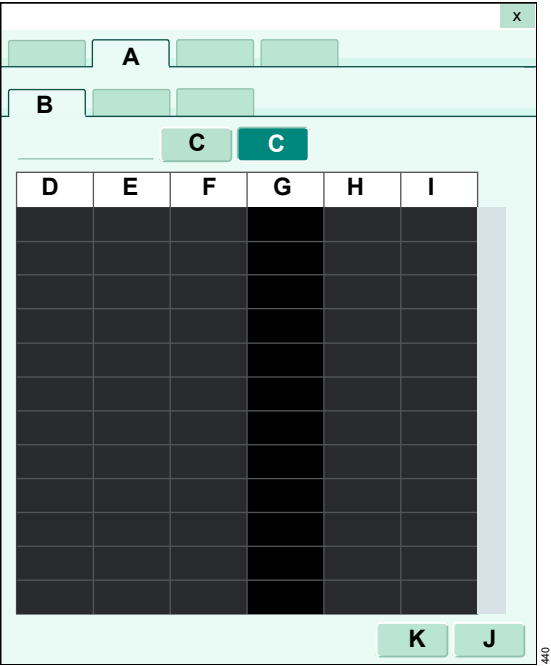
To access the alarm setup for telemetry

- 1 Select the **Telemetry defaults** button on the Main menu bar.
- 2 Select the **Alarms** tab.
- 3 Select one of the following tabs to access the corresponding setup page:
 - **Limits**
 - **Arrhythmia**
 - **Device settings**

Alarms > Limits page

The following diagram shows an example of the **Limits** tab contents from the **Alarms** page, where alarm settings for all available parameters can be configured.

The page consists of a table with setup rows for each parameter. Each setup row consists of several fields used to configure the individual alarm settings. Selecting a field causes the corresponding row to appear highlighted.



- A **Alarms** tab
- B **Limits** tab
- C **Patient category** buttons (Pediatric, Adult)
- D **Parameter** labels column
- E **Alarm** on/off column
- F **Lower** limits column
- G **Actual** parameter values
- H **Upper** limits column
- I **Archive** column
- J **Apply** button
- K **Undo** button

Changing alarm limits settings

In the following steps, the letters in parentheses refer to the preceding diagram of the **Limits** page. For related information, refer to page 140.

WARNING

Setting alarm limits to extreme values may prevent certain alarm conditions from being detected and from being annunciated with audible and visual alarm signals.

To configure the default alarm settings

- 1 Select the **Limits** tab (if not already selected).
- 2 Select a **Patient category** (C).
Repeat the following steps for each parameter, as necessary. Use the vertical scroll bar along the right side of the table to display additional rows at the table bottom.
- 3 Select the corresponding field in the **Alarm** column (E) to activate or deactivate alarm monitoring. A crossed-out triangle appears in the parameter box when alarm monitoring is deactivated.
- 4 Use the corresponding field controls in the **Lower** column (F) to adjust the lower alarm limits.
- 5 Use the corresponding field controls in the **Upper** column (H) to adjust the upper alarm limits.
- 6 Select one of the following settings in the **Archive** column (I) to determine what happens in response to an alarm:
 - **Off** – no event is stored and no recording is generated
 - **Record** – generates a manual recording
 - **Store** – stores the event for later review
 - **Store/Rec.** – generates a manual recording and stores the event.
- 7 Select **Apply** to save any changes, or **Undo** to revert to the previous settings without saving.

Alarms > Arrhythmia page

The following diagram shows an example of the **Arrhythmia** tab contents from the **Alarms** page, where you configure default alarm settings for available arrhythmia parameters.

As with the previous **Limits** page, this setup page consists of a table with setup rows for each arrhythmia parameter. Each setup row consists of several fields to configure the individual arrhythmia alarm settings. Selecting a field causes the corresponding row to appear highlighted.

The screenshot shows a Tetris game interface. The top status bar has a green background with a white 'x' in the top right corner. The top row of the board has a green background with a white 'A' in the center. The second row has a green background with a white 'B' in the center. The third row has a green background with a white 'C' in the center. The fourth row has a green background with a white 'D' in the center. The fifth row has a green background with a white 'D' in the center. The sixth row has a green background with a white 'E' in the center. The seventh row has a green background with a white 'F' in the center. The eighth row has a green background with a white 'G' in the center. The ninth row has a green background with a white 'H' in the center. The tenth row has a green background with a white 'I' in the center. The bottom row has a green background with a white 'K' in the center. The board is mostly empty, with a few blocks placed in the top rows.

- A** **Alarms** tab
- B** **Arrhythmia** tab
- C** **Patient category** buttons (Pediatric, Adult)
- D** **ARR mode** buttons (Off, Basic, Advanced)
- E** **Arrhythmia** column for identifying the arrhythmia label
- F** **Alarm** column for selecting an alarm priority
- G** **Rate** column for setting the rate
- H** **Count** column for setting the count
- I** **Archive** column
- J** **Apply** button
- K** **Undo** button

Configuring default arrhythmia alarm settings

In addition to arrhythmia alarm settings, this setup page also enables you to select the patient category and arrhythmia mode (see page 163).

In the following steps, the letters in parentheses refer to the diagram of the **Limits > ARR** setup page. Alarm ranges and defaults are listed beginning on page 140.

To change arrhythmia alarm settings

- 1** Select the **Telemetry defaults** button on the Main menu bar.
- 2** Select the **Alarms** tab.
- 3** Select the **Arrhythmia** tab.
- 4** Select the desired **Patient category** (C) and **ARR mode** option (D).
- 5** Select the corresponding setup field in the **Alarm** column (F) to assign the alarm priority. A crossed-out triangle appears when alarm monitoring is deactivated.

Asystole (**ASY**) and ventricular fibrillation (**VF**) events are always assigned a high alarm priority. These priorities cannot be changed.
- 6** Select the corresponding setup field in the **Rate** column (G) to set the rate, if applicable.
- 7** Select the corresponding setup button in the **Count** column (H) to set the count, if applicable.

8 Use one of the following settings in the **Archive** column (I) to determine what happens in response to an alarm:

- **Off** – no event is stored and no recording is generated.
- **Record** – generates a manual recording.
- **Store** – stores the event for later review.
- **Store/Rec.** – generates a manual recording and stores the event.

9 Select **Apply** to save any changes, or **Undo** to revert to the previous settings without saving.

Telemetry defaults > Alarms > Device settings tab

The following table lists the available settings from the **Device settings** tab within the **Alarms** page. Your selection takes effect immediately.

To access the **Alarms** page, refer to the *Instructions for use Infinity CentralStation Wide, Software VG4.0 or later*.

Selection	Settings	Description
Alarm volume [%]	Off (default), 10, 20, 30, 40, 50, 60, 70, 80, 90, 100	From the ICS, the user is able to change the alarm volume for the speaker embedded in this M300/M300+.
Minimum selectable alarm volume if offline [%]	10, 20, 30, 40, 50 (default), 60, 70, 80, 90, 100	Determines the minimum volume, as well as the settings/range available to a user when an M300/M300+ is offline.
Alarm pause time [min]	1, 2 (default), 3, 4, 5	Determines the duration of the Alarm pause time [min] setting. When selected, all alarm functions are temporarily suppressed for the selected time. The alarm function is automatically activated when the alarm pause timer expires.
Alarm validation	On (default), Off	When this function is enabled, alarm conditions are verified for a specified time before triggering audible and visual alarm signals (see page 127). This feature is used to reduce nuisance alarms.
Audio pause from remote ICS	Enabled (default), Disabled	Determines whether alarms can be audio paused for telemetry patients from other bed-side monitors or CentralStations in its monitoring unit. When disabled, the Audio pause button appears unavailable for selection.
SpO2 sensor off alarm	Low (default), Medium, High	Determines the alarm priority for this alarm condition.

Selection	Settings	Description
ECG leads off alarm	Low (default), Medium , High	Determines the alarm priority for this alarm condition.
Critical battery alarm	Medium (default), High	Determines the alarm priority for this alarm condition.
Restore alarm factory defaults	Restore	Restores alarm limits and arrhythmia settings to factory defaults for all patient categories.

Configuring the alarm settings of the patient

The following settings can be accessed from the BedView **Alarms > Device settings** page:

- For patient monitors:
 - Volume for external device alarm
- For M300/M300+ telemetry:
 - Volume for M300/M300+ speaker alarm
 - Selectable for M300/M300+ VGn only:
 - Priority for SpO2 sensor off alarm
 - Priority for ECG leads off alarm
 - Priority for critical battery alarm

The **Layout/ Parameters** page

The Telemetry setup **Layout/ Parameters** pages allow you to set the default order and layout of waveforms and parameters of the BedView screen for telemetry patients. **SpO2**, **PLS**, and **ST** only appear as selections when their corresponding license/locked option is enabled.

The BedView for telemetry patients accommodates a maximum of eight channels, where each channel is composed of a waveform and a parameter box.

For each channel, parameter, scale, and waveform can be configured.

SpO2+PLS, and **PLS** are only available as a parameter setting when SpO2 monitoring is set to **On**.

To access the **Layout/ Parameters** page

- 1 Select the **Telemetry defaults** button on the Main menu bar.
- 2 Select the **Layout/ Parameters** tab and then select one of the following tabs:
 - **Layout** (see page 222)
 - **ECG** (see page 227)

- **SpO2** (see page 228)
- **ST** (see page 228)

Layout/ Parameters > Layout page

The **Layout** page enables you to configure the default parameters, scales, and waveforms for each channel that will display in BedView for telemetry patients. In addition, you can set the QRS/arrhythmia processing lead setting and identify which ECG lead are used for arrhythmia processing.

The following table displays the user-configurable parameters, waveforms, and scales that are displayed in BedView.

SpO2, **PLS**, and **ST** appear as possible selections only when their corresponding license/locked option is enabled. In addition, **SpO2+PLS** is available as a parameter (and PLS as a waveform setting) only when SpO2 monitoring is set to **On**.

Selection	Settings	Description
		Channel setup
Parameter column	HR, ARR, ST, SpO2+PLS, None	Enables you to make parameter selections by selecting the corresponding channel column. SpO2+PLS is available as a parameter setting only when SpO2 monitoring is set to On .
Gain/Scale column	For all ECG waveforms: 0.25, 0.5, 1 (default), 2, 4, 8 mV/cm The M300/M300+ uses an AAMI-compliant regular QRS threshold when you select a scale of 1, 2, 4, or 8 mV/cm. If you select a scale of 0.25 or 0.5 mV/cm, the M300/M300+ lowers the detection threshold, and the AAMI requirement is not met.	Enables you to select the gain and scale of the ECG waveform.
		ECG QRS processing settings
		mV/cm Detection threshold
		8≥ 0.4 mV
		4≥ 0.4 mV
		2≥ 0.4 mV
1≥ 0.4 mV		
0.5≥ 0.2 mV		
0.25≥ 0.2 mV		
	For the SpO2/PLS waveform: 10 %, 20 %, 30 %, 40 % (default), 50 %, 60 %, 70 %, 80 %, 90 %, 100 %	

Selection	Settings	Description
Waveform column	– 3-wires - <i>I, II, III</i> – 5-wires - <i>I, II, III, aVR, aVL, aVF, V</i> – 6-wires - <i>I, II, III, aVR, aVL, aVF, V, V+</i> – <i>SpO2 - PLS</i>	Enables you to click in the channel's Waveform column to make a selection. PLS is available as a waveform setting only when SpO2 monitoring is set to On.
		ECG Monitoring Setup
QRS/ARR processing	– Channel 1 – Channel 1 + Channel 2 (default)	Enables you to select leads for ECG and arrhythmia monitoring. The Channel 1 + Channel 2 option is unavailable when the ECG cable type is set to three wires.
WARNING High amplitude P- and T-waves of long duration may register as integral QRS complexes. To ensure that the system accurately detects low heart rate in these cases, select the lead with the highest R-wave (relative to the T- and/or P-wave) for ECG1. If the system continues to misinterpret P- or T-waves, reposition the electrodes or use other modalities to monitor the patient.		

ICS Telemetry defaults screen

To set the **Adult QRS threshold** or **Pediatric QRS threshold**, navigate to the Telemetry defaults screen and select the **Layout/ Parameters** tab, then the **Layout** tab.



A	Reduced Main screen showing vital signs in real time
B	Main menu bar
C	Telemetry Layout Tab page
D	QRS/ARR processing
E	QRS/ARR processing channels
F	Adult QRS threshold
G	Normal
H	Low
I	Pediatric QRS threshold
J	Normal
K	Low

QRS Threshold

Depending on the software versions running on the ICS and the M300/M300+ devices, the procedure you follow to set the QRS threshold on the M300/M300+ will differ:

- If ICS is VG2.1.1 or later, and the M300/M300+ is VG2.4 or later, you set the QRS threshold by a menu selection, either **Normal** or **Low**
- If ICS is VG2.1 or earlier, or the M300 is VG2.3 or earlier, the QRS threshold is linked to the ECG gain and the QRS threshold buttons are grayed out. The following relationships apply:
 - Setting the gain to 1, 2, 4, or 8 mV/cm, automatically sets the QRS threshold to **Normal**.
 - Setting the gain to 0.5 or 0.25 mV/cm, automatically sets the QRS threshold to **Low**.

NOTE

Patient admitted on M300/M300+ VG2.4 or later:

Changes to QRS/ARR processing leads and gain settings do not change QRS threshold settings.

Patient admitted on M300 VG2.3 and earlier:

- Changes to QRS/ARR processing leads and gain settings will alter the QRS threshold settings between **Normal** and **Low**.
- When selecting one or two QRS/ARR processing leads, a gain setting of < 1mv on either lead, sets the ICS QRS threshold to **Low**.
- When selecting one or two QRS/ARR processing leads, a gain setting of > 1mv on all leads, sets the ICS QRS threshold to **Normal**.

To set the QRS Threshold using ICS VG2.1.1 and M300/M300+ VG2.4 or later

From the Main ICS screen:

- 1 Click **System setup** on the ICS.
- 2 Click **Layouts**.
- 3 Click one of the following:
 - **Normal** to detect QRS complexes of normal amplitude.
 - **Low** to detect QRS complexes of low amplitude.

To set the QRS Threshold using earlier ICS and M300 versions

For ICS 2.1 or earlier, or M300 VG2.3 or earlier, from the Main ICS screen:

- 1 Click **System setup** on the ICS.
- 2 Click **Layouts**.
- 3 Click the drop-down arrow of the appropriate **Gain/Scale** channel.
- 4 Select the appropriate Gain value:
 - Select a value of 1,2,4 or 8 mV/cm to set the QRS threshold to **Normal**.
 - Select a value of 0.5 or 0.25 mV/cm to set the QRS threshold to **Low**.

ANSI/AAMI/ IEC 60601- 2-27:2011

QRS detection amplitude

QRS detection amplitude: 0.5 to 5.0 mVp-v RTI

QRS threshold detection duration:

Adult: 70 to 120 ms

Pediatric: 40 to 120 ms

Configuring the QRS threshold to **Low** may extend the QRS detection amplitude to as low as 0.17 mVp-v RTI.

WARNING

Risk of inaccurate HR value. If the QRS setting is set to *Low* in the presence of HR artifact, the associated HR value may be inaccurate.

To avoid an inaccurate HR value, it is recommended to set the QRS threshold setting to *Normal*.

ECG QRS processing settings

Gain/Scale column	mV/cm	Detection threshold
For all ECG waveforms: 0.25, 0.5, 1 (default), 2, 4, 8 mV/cm The M300/M300+ uses an AAMI-compliant regular QRS threshold when you select a scale of 1, 2, 4, or 8 mV/cm. If you select a scale of 0.25 or 0.5 mV/cm, the M300/M300+ lowers the detection threshold, and the AAMI requirement is not met.	8	≥0.35 mV
	4	≥0.35 mV
	2	≥0.35 mV
	1	≥0.35 mV
	0.5	≥0.17 mV
	0.25	≥0.17 mV

Layout/ Parameters > ECG page

The ECG page enables you to define the system-wide default ECG patient monitoring settings shown in the following table.

Selection	Settings	Description
TruST 12-lead	On, Off (default)	Enable/disable TruST monitoring of the M300 (see "12-lead TruST monitoring" on page 168). Precordial (chest) leads are fixed as V2 and V5. This setting appears only when Cable type setting is 6 wire and the TruST locked option is enabled (it will not be displayed when the ECG cable type is set to 3 or 5 wires).
Cable type	3, 5, 6 (default)	Select the ECG cable type.
Pacer detection	On (default), Off, Fusion	Set the pacer detection function. When On is selected, pacer spikes display on a patient's waveform whenever a pacemaker pulse is detected. The Fusion option is available only if the Pacer fusion setting (described on page 209) is set to Enabled.
Color	Red, White, Yellow, Green (default), Light Blue, Blue, Purple, Orange	Select the colored box and then make the appropriate color selection for ECG waveforms and parameter box values, units of measure, and labels.

Layout/ Parameters > SpO2 page

The SpO2 page enables you to define default system-wide SpO2 monitoring settings, and to adjust the settings displayed in the following table.

Selection	Settings	Description
SpO2 monitoring	On, Off (default)	Enable or disable SpO2 monitoring. SpO2 Monitoring can be enabled for local telemetry patients only. This option appears unavailable for selection when SpO2 is unavailable.
Bar graph	On (default), Off	When set to On , the M300/M300+ displays a pulse bar in its SpO2 parameter box. The bar graph is not displayed in the ICS parameter box.
Color	Red, White (default), Yellow, Green, Light Blue, Blue, Purple, Orange	Select the colored box and then make the appropriate color selection for SpO2 waveforms and parameter box values, units of measure, and labels.

Layout/ Parameters > ST page

The **ST** tab is inaccessible until the ST locked option is enabled. For additional information, contact your technical personnel of your hospital.

The ST setup page is where you can customize ST monitoring and define system-wide default settings for the ST parameter boxes. In addition, the ST page enables you to set up the ST units of measure and ST measurement point.

ST alarm limits default settings must be configured in **Telemetry defaults > Alarms > Limits** tab (see page 215). For additional information, see "Pausing alarms for the M300/M300+ from a remote network device" on page 133.

Following admission, ST parameter order can be changed on each patient-specific BedView ST setup page.

The following table displays the available selections within the ST system default setup page.

For additional information about ST monitoring, see page 165.

ST setup screen selections: 3-Wire		
Selection	Settings	Description
ST lead %1 ¹⁾ ¹⁾ Note: %1 is a placeholder for available ST lead 1.	I (default), II, III, None	Sets ECG lead vector for ST lead 1 parameter box
ST units	mm (default), mV	Sets units for ST measurements
ST event duration [s]	60	Determines how long an ST event must remain outside the set ST alarm limit before an alarm sounds. This field is read-only.
ST measurement point [ms]	60, 80 (default)	Determines whether the ST measuring point is 60 or 80 ms after QRS offset

ST setup screen selections: 5-Wire		
Selection	Settings	Description
ST lead %1 ¹⁾ ¹⁾ Note: %1 is a placeholder for available ST leads 1 - 7.	<u>Available selections:</u> I, II, III, aVR, aVL, aVF, V, None <u>ST lead defaults:</u> ST lead 1: I ST lead 2: II ST lead 3: III ST lead 4: aVR ST lead 5: aVL ST lead 6: aVF ST lead 7: V	Sets ECG lead vector for ST lead 1 - 7 parameter box
ST units	mm (default), mV	Sets units for ST measurements
ST event duration [s]	60	Determines how long an ST event must remain outside the set ST alarm limit before an alarm sounds. This field is read-only.
ST measurement point [ms]	60, 80 (default)	Determines whether the ST measuring point is 60 or 80 ms after QRS offset

ST setup screen selections: 6-Wire, TruST OFF		
Selection	Settings	Description
ST lead %1 ¹⁾ ¹⁾ Note: %1 is a placeholder for available ST leads 1 - 8.	<u>Available selections:</u> <i>I, II, III, aVR, aVL, aVF, V, V+, None</i> <u>ST lead defaults:</u> ST lead 1: <i>I</i> ST lead 2: <i>II</i> ST lead 3: <i>III</i> ST lead 4: <i>aVR</i> ST lead 5: <i>aVL</i> ST lead 6: <i>aVF</i> ST lead 7: <i>V</i> ST lead 8: <i>V+</i>	Sets ECG lead vector for ST lead 1 - 8 parameter box
ST units	<i>mm</i> (default), <i>mV</i>	Sets units for ST measurements
ST event duration [s]	60	Determines how long an ST event must remain outside the set ST alarm limit before an alarm sounds. This field is read-only.
ST measurement point [ms]	60, 80 (default)	Determines whether the ST measuring point is 60 or 80 ms after QRS offset

ST setup screen selections: 6-Wire, TruST ON		
Selection	Settings	Description
ST lead %1 ¹⁾ ¹⁾ Note: %1 is a placeholder for available ST leads 1 - 14.	<u>Available selections:</u> <i>I, II, III, aVR, aVL, aVF, V, V+, None</i> <u>ST lead defaults:</u> ST lead 1: <i>I</i> ST lead 2: <i>II</i> ST lead 3: <i>III</i> ST lead 4: <i>aVR</i> ST lead 5: <i>aVL</i> ST lead 6: <i>aVF</i> ST lead 7: <i>dV1</i> ST lead 8: <i>V2</i> ST lead 9: <i>dV3</i> ST lead 10: <i>dV4</i> ST lead 11: <i>V5</i> ST lead 12: <i>dV6</i> ST lead 13: <i>STVM</i> ST lead 14: <i>STCVM</i>	Sets ECG lead vector for ST lead 1 - 14 parameter box
ST units	<i>mm</i> (default), <i>mV</i>	Sets units for ST measurements
ST event duration [s]	60	Determines how long an ST event must remain outside the set ST alarm limit before an alarm sounds. This field is read-only.
ST measurement point [ms]	60, 80 (default)	Determines whether the ST measuring point is 60 or 80 ms after QRS offset

The *Find device* page

The **Telemetry defaults > Find device** page is used to help locate a specific misplaced M300/M300+. This is achieved by causing it to sound a series of five alternating tones (assuming the M300/M300+ device is on, has a sufficiently charged battery, and is within the wireless coverage area).

This functionality is limited to M300/M300+ devices that are not admitted in the ICS Main screen.

To find a misplaced M300

- 1 Select the **Telemetry defaults** button on the Main menu bar.
- 2 Select the **Find device** tab.
- 3 Select the number corresponding to the misplaced device.
- 4 Select the **Find** button to cause the corresponding device to emit a series of five alternating tones.

The *Device setup* page

The **Telemetry/ Parameters > Device setup** page is used to view the status of, or configure the settings for a specific M300/M300+ device. Because it is accessed from the BedView menu bar, the settings apply only to the selected M300/M300+.

To access the *Device setup* pages

- 1 Select the **Telemetry/ Parameters** button on the BedView menu bar.
- 2 Select the **Device setup** tab.
- 3 Select one of the following tabs to access the corresponding setup page:
 - **Status** (see page 233)
 - **Setup** (see page 234)

Device setup > Status page

The **Status** page is for checking the device ID# of the M300/M300+, remaining battery life, signal level, ECG electrode status. This page also allows you to see if the M300/M300+ is connected to the bedside charger.

Selection	Description
Device ID	The ID number assigned to that M300 device in the Telemetry devices table.
Battery charge [%]	The remaining battery life displayed as a percentage, as reported by the M300/M300+ device.
Signal [dBm]	The RSSI (received signal strength indicator), as reported by the M300/M300+ device.
ECG electrode status	Green = Electrode is connected to patient Red = Lead off - the electrode is not connected to patient 3 wires cable type: RA, LA, LL 5 wires cable type: RA, RL, LA, LL, V 6 wires cable type (TruST Off): RA, RL, LA, LL, V, V+ 6 wires cable type (TruST On): RA, RL, LA, LL, V2, V5

Device setup > Setup page

After admitting a patient, you can configure several settings for a specific M300/M300+ device. These settings include the **Alarm pause** key, **Volume control** screen, **Alarm volume [%]**, **Staff alert** key, and **Record** key.

These settings are based on the default telemetry settings entered from the ICS main screen. For related information, see "Telemetry setup defaults" on page 212.

The system-wide telemetry settings defaults (see page 211) determine whether the following settings are available for selection.

Selection	Settings	Description
Alarm pause	Enabled (default), Disabled	This setting is available only when the corresponding ICS telemetry default setting is set to 'Per patient'. Otherwise, the setting is grayed-out and appears unavailable for selection.
Volume control	Enabled (default), Disabled	This setting is available only when the corresponding ICS telemetry default setting is set to 'Per patient'. Otherwise, the setting is grayed-out and appears unavailable for selection.
Alarm volume [%]	Off (default), 10, 20, 30, 40, 50, 60, 70, 80, 90, 100	Upon admission, the corresponding ICS telemetry default setting is the default setting.
Staff alert	Enabled, Disabled (default)	This setting is available only when the corresponding ICS telemetry default setting is set to 'Per patient'. Otherwise, the setting is grayed-out and appears unavailable for selection.
Archive	Off, Record, Store/Rec., Store (default)	This setting is available only when the corresponding ICS telemetry default setting is set to 'Per patient'. Otherwise, the setting is grayed-out and appears unavailable for selection.

Problem solving

Overview of problem solving	236
M300/M300+ – arrhythmia alarm messages	237
M300/M300+ – ECG alarm messages	238
M300/M300+ – ST alarm messages	240
M300/M300+ – SpO ₂ alarm messages	242
M300/M300+ messages	244

Overview of problem solving

Multiple alarm messages cycle in the alarm message field of the header bar.

For example, if two faults are detected simultaneously, the more urgent of the two is displayed.

The exclamation marks in the following tables indicate the priority level of the alarm messages (see page 123 for definitions). The exclamation marks are not in the actual alarm messages.

- Warning = !!! Message of high-priority
- Caution = !! Message of medium-priority
- Advisory = ! Message of low-priority

NOTE

Some alarm messages in these instructions for use represent features that can be configured for different alarm priorities. Depending on the configured alarm priority, these messages can be identified as high-priority (!!!), medium-priority (!!) or low-priority (!).

If no priority level is assigned, the message is informational and no action is required.

In the following table, messages are listed in alphabetical order. This table identifies possible alarm causes and provides corrective action. The various causes and remedies should be worked through in the order listed until the problem has been resolved.

This chapter only contains messages that pertain to the M300. For all other device-specific messages, refer to the instructions for use of the connected device.

M300/M300+ – arrhythmia alarm messages

The following table lists arrhythmia alarm messages that may display on the M300/M300+.

Priority	Message	Problem	Solution
!!!	ASY	The indicated arrhythmia was detected.	– Check the patient and treat if necessary. – Some messages only appear when the full arrhythmia option is installed and activated.
!!!	VF		
!!!	VTach ¹		
!!	AIVR ¹		
!!	RUN ¹		
!!	SVT ¹		
!	BGM ¹		
!	CPT ¹		
Off	ARR artifact ¹		
Off	BRADY ¹		
Off	PAUSE ¹		
Off	TACH ¹		
None	ARR cannot learn (lead x) ²	After 100 beats, the M300/M300+ cannot determine the dominant normal complex on any lead selected for QRS processing.	– Check the electrode preparation. – Reapply electrodes if necessary.
None	ARR relearning	The M300/M300+ is learning the patient's QRS complex to establish a reference template.	Informational message (no action required).
!!	PVC/min > (alarm limit)	PVC value is above the upper alarm limit.	– Check the patient and treat if necessary. – Reapply electrodes if necessary.
¹ These arrhythmia events can have one of three alarm priorities assigned (high, medium, or low) or is turned off. The priority listed in this table is the default. For these arrhythmia events, you can deactivate alarms. ² x represents an arrhythmia lead.			

M300/M300+ – ECG alarm messages

The following table lists ECG alarm messages that may display on the M300/M300+.

Priority	Message	Problem	Solution
!	ECG artifact¹	– Patient movement (shivering, tremors) – Bad electrode contact – Excessive signal noise interference from auxiliary equipment	– Check the electrodes and reapply if necessary. – Make sure that the patient's skin is properly prepped. – Isolate the patient from auxiliary equipment, if possible.
! !! !!!	ECG leads off¹	Lead-off condition detected due to: – Broken cable(s) – Disconnected ECG lead wires – Loose lead wire(s) – Wrong lead selected – Dried out electrode gel	– Replace defective cable(s). – Reapply gel on reusable electrodes. – Replace dried electrodes with fresh ones with good gel. – Select another ECG lead for processing. – If monitoring augmented leads, verify that the number of selected leads in the ECG setup page is correct. – Check cable(s) and connection(s) – Replace cable(s) if necessary
!!	HR > (alarm limit) HR < (alarm limit)	The parameter value is above/below the set upper /lower alarm limits.	– Check the patient and treat if necessary. – Change the alarm limits.
¹ In the parameter box the parameter value is replaced by ***			

Priority	Message	Problem	Solution
!!	<i>HR out of range high</i> ²	The parameter value is above the measurement range of the monitor.	Check the patient and treat if necessary.
None	<i><xx> Lead off</i> ³ <i>LL lead off</i> <i>LA lead off</i> <i>RA lead off</i> <i>RL lead off</i> <i>ECG leads off</i> <i>V lead off</i> <i>V+ lead off</i> <i>V2 lead off</i> <i>V5 lead off</i>	The indicated electrode is no longer attached to the patient.	Reattach the electrode to the patient.
² In the parameter box the parameter value is replaced by +++ ³ xx represents LA, LL, RA, RL, V, V2, V+, or V5			

M300/M300+ – ST alarm messages

The following table lists ST alarm messages that may display on the M300/M300+.

Priority	Message	Problem	Solution
!!	<i>Cannot analyze ST</i>	The algorithm cannot determine ST values due to artifact, the absence of normal beats, or invalid leads.	– Perform a relearn (see page 175). – Check electrodes; reapply if necessary. – Make sure the patient's skin is properly prepared. – Isolate the patient from auxiliary equipment if possible. – Inspect and replace defective cable(s) and wire(s). – Reapply gel on reusable electrode(s). – Reapply the electrode(s). Make sure the patient's skin is properly prepared. – If a lead or electrode cannot be replaced, select another ST lead for processing.

Priority	Message	Problem	Solution
None	<i>ST relearning</i>	ST relearn is in progress.	Informational message (no action required).
!	<i>STx¹ Lead off</i>	Lead-off condition detected due to: – Broken cable(s) – Disconnected ECG lead wires – Loose lead wire(s) – Wrong lead selected – Dried out electrode gel – Cable disconnected from bedside monitor	– Replace defective cable(s). – Reapply gel on reusable electrodes or replace dried disposable electrodes. – Select another ECG lead for processing. – If monitoring augmented leads, verify that the number of selected leads is correct (see page 228). – Check cable(s) and connection(s). – Replace cable(s) if necessary.
!!	<i>STx¹ out of range high²</i> <i>STx¹ out of range low³</i>	The parameter value is above/below the measurement range of the monitor.	– Check the patient and treat if necessary. – Check the placement of electrodes and change their position if necessary.
¹ x represents the actual ST lead. ² In the parameter box the parameter value is replaced by +++ ³ In the parameter box the parameter value is replaced by - - -			

M300/M300+ – SpO₂ alarm messages

The following table lists SpO₂ alarm messages that may display on the M300/M300+.

Priority	Message	Problem	Solution
!!	<i>PLS out of range high</i> ¹ <i>PLS out of range low</i> ²	The parameter value is above/below the measurement range of the monitor.	– Check the patient and treat if necessary. – Change the alarm limits.
!!	<i>PLS unplugged</i>	The sensor is unplugged from the trunk cable.	– Reconnect the sensor
!	<i>Replace SpO₂ sensor</i>	The SpO ₂ sensor needs to be replaced.	– Replace sensor.
!	<i>SpO₂ artifact</i>	Persistent artifact (if noise amplitude is indistinguishable from signal for > 20 sec.)	– Ensure that sensor is properly attached to patient and not moving. – Reposition the sensor or use a different measurement site.
!	<i>SpO₂ H/W failure</i> ³	There is a hardware failure with the SpO ₂ sensor cable.	– Check for defective cable. – Power cycle the M300/M300+ to clear the message. – Contact Dräger Technical support.
None	<i>SpO₂ searching</i>	The sensor is searching for valid pulses to compute a measurement value.	Verify proper sensor application.
!	<i>SpO₂ sensor failure</i> ³	There is a hardware failure with the SpO ₂ sensor.	– Make sure the SpO₂ sensor is properly attached to the patient and all cables are properly connected. – Replace sensor.

Priority	Message	Problem	Solution
!	<i>unplugged</i>	SpO2 sensor is unplugged from the intermediate cable. Or intermediate cable is unplugged from M300/M300+ transceiver.	– Ensure that the sensor is securely connected to intermediate cable and intermediate cable is securely connected to M300/M300+ transceiver.
! !! !!!	<i>SpO2 sensor off</i>	Nothing has been detected between the sensor's light source and detector for 5 seconds.	– Ensure sensor is properly connected to patient's finger
!	<i>SpO2 light blocked</i>	Insufficient light is reaching the sensor's light detector for a valid measurement.	– Ensure that light detector side of the sensor is not blocked and only patient finger is placed between light source and detector.
!	<i>SpO2 no measurement</i>	30 seconds have elapsed since a valid measurement was computed and no other technical condition exists.	– Ensure that sensor is properly attached to patient and not moving. Reposition the sensor or use a different measurement site.
!	<i>SpO2 weak signal</i>	Pulsations are not of sufficient amplitude to compute a valid measurement	– Reposition the sensor or use a different measurement site.
!	<i>SpO2 Non-Masimo sensor</i>	Nellcor sensor used with monitor SW configured for Masimo sensor	– Ensure that Masimo sensor is plugged into M300/M300+ transceiver.
!	<i>SpO2 Non-Nellcor sensor</i>	Masimo sensor used with monitor SW configured for Nellcor sensor	– Ensure that Nellcor sensor is plugged into M300/M300+ transceiver.
!	<i>SpO2 regulation error</i>	Input from the sensor can not be maintained at proper levels for a valid measurement to take place	– Ensure that sensor is properly attached to patient and not moving.
¹ In the parameter box, the parameter value is replaced by +++ ² In the parameter box, the parameter value is replaced by - - - ³ In the parameter box, the parameter value is replaced by ***			

M300/M300+ messages

The following table lists various messages that may display on the M300/M300+.

Priority	Message	Description	Action
None	 All alarms paused	The alarm function of the M300/M300+ device is temporarily disabled. The message is followed by minutes and seconds which represent a count-down timer.	Informational message, no action required.
None	 Audio paused	The audible alarm signal for the M300/M300+ device is silenced for 2 minutes. The message clears after the alarm silence period times out. The message is followed by minutes and seconds which represent a count-down timer.	Informational message, no action required.
None	Default patient settings restored	User settings were restored to factory defaults.	Informational message, no action required.
None	Discharged	The patient is discharged (see page 116).	Informational message, no action required.
None	High temperature reset	Reset due to the internal temperature exceeding the acceptable limit.	Informational message, no action required.
None	HR alarms off	Alarms related to the heart rate parameter are disabled.	Informational message, no action required.
None	HR,ASY,VF off¹	– Arrhythmia monitoring is disabled. – HR alarms are disabled – The ASY/VF alarms feature is set to Follow HR (not supported by the M300/M300+).	Informational message, no action required.
!	Low battery	The M300/M300+ battery charge is low, with approximately 30 minutes of run-time remaining.	Recharge battery.

Priority	Message	Description	Action
None	Low battery reset	An error was detected with the battery.	Informational message, no action required.
! (M300) !! (ICS)	Offline	The M300/M300+ cannot communicate with the ICS. The M300/M300+ device is out of range of its wireless coverage area.	– Check the patient. – Ensure that the patient is not out of the designated coverage area.
None	Patient data erased (followed by an error code)	Trend data or at least one stored event was erased.	Informational message, no action required.
! !!	Recharge battery	The M300/M300+ battery charge is very low, with approximately 15 minutes of runtime remaining.	Recharge battery or contact your technical personnel to replace the M300 battery.
None	Software reset, see Error Log	Reset due to a software error.	Informational message, no action required.
None	Software watchdog reset	Reset due to software error.	Informational message, no action required.
!!	Staff alert	M300/M300+ Staff alert key was pressed.	– Check the patient. – This message requires acknowledgment using the Alarm pause button from the ICS, the Bed audio pause button, or the viewport icon.
None	Standby ²	The monitor is in standby mode.	Informational message, no action required.
	Audio paused by remote	This message appears temporarily after pausing the audible alarm tone.	Informational message, no action required.
	Remote limit change	This message appears temporarily when parameter alarm limits are modified at the ICS.	Informational message, no action required.
¹ During an alarm, the alarm message and the banner will be displayed alternately for the duration of the alarm.			
² When a M300/M300+ patient is put into Standby mode, the patient name, lead labels, and scales will continue to display. A selectable Standby label also displays. For more information, refer to the <i>Instructions for use Infinity CentralStation Wide, Software VG4.0 or later</i> .			

This page has been left blank intentionally.

Maintenance

Overview 248

Definition of maintenance concepts 249

Inspection 250

Safety checks - Infinity M300/M300+ 250

Perform annual safety checks 250

Preventive maintenance 251

Overview

This chapter describes the maintenance measures required to maintain the proper functioning of the medical device. Maintenance measures must be performed by the responsible personnel.

WARNING

Risk of infection

Users and service personnel can become infected with pathogenic germs. Disinfect and clean the device or the device parts before any maintenance measures and also before returning the medical device for repair.

WARNING

Risk of electric shock

Current-carrying components are located under the cover.

- Do not remove the cover.
- Maintenance measures must be performed by the responsible personnel. Dräger recommends DrägerService or specialized service personnel to perform these measures.

WARNING

If the device is mechanically damaged, or if it is not working properly, do not use it. Contact your hospital's technical personnel.

WARNING

The M300 and ICS must be inspected and serviced annually. A record must be kept on this preventive maintenance. We recommend obtaining a service contract with DrägerService or specialized service personnel through your vendor. For repairs, we recommend that you contact DrägerService or specialized service personnel.

WARNING

To avoid electric shock, inspect all cables and accessories before each use.

Never use cables or accessories that appear cracked, worn, or damaged in any way. Doing so may compromise performance or put the patient at risk.

CAUTION

When servicing devices from Dräger, always use replacement parts that are qualified to Dräger standards. Dräger cannot warrant or endorse the safe performance of third-party replacement parts for use with the devices.

CAUTION

If you spill liquid on the equipment or accessories, or immerse these components in liquid, allow them to dry completely for at least 24 hours to 48 hours. Contact your hospital's technical personnel to test that any such component is fully operational before putting it back in clinical use, except in the case of the M300/M300+ itself; it may be put back into service after being allowed to dry completely without a check by technical personnel if the immersion did not exceed 1 meter in depth or extend in time for more than 30 minutes.

NOTE

Before Dräger devices are decommissioned, the device data should be sanitized by performing factory default reset or removing and destroying the hard drive.

Definition of maintenance concepts

Concept	Definition
Maintenance	All measures (inspection, preventive maintenance, repair) intended to maintain and restore the functional condition of a medical device.
Inspection	Measures intended to determine and assess the actual state of a medical device.
Preventive maintenance	Recurrent specified measures intended to maintain the functional condition of a medical device.
Repair	Measures intended to restore the functional condition of a medical device after a device malfunction.

Inspection

Perform inspections at regular intervals and observe the following specifications.

M300/M300+:

Checks	Interval	Personnel responsible
Inspection/safety checks	Every 1 year	Expert

NOTE

In addition to periodic inspections, the Infinity M300 battery should be replaced every 12 months by your technical Service personnel (M300 only).

Safety checks - Infinity M300/M300+

Safety checks are no substitute for preventative maintenance measures (including preventive replacement of wear parts) as identified by the manufacturer.

WARNING

Risk of medical device failure

If safety checks are not performed on a regular basis, the proper operation of the medical device can be compromised.

Perform annual safety checks

- 1 Check accompanying documents:
 - Instructions for Use are available
- 2 Perform a functional test of the following features according to the Instructions for Use:
 - Power On/Off
 - Admit and Discharge from ICS
 - Discharge directly from M300/M300+
 - Discharge, by docking into Central Charger (M300 only)
 - Charging indicator LEDs
 - ECG waveform and HR
 - ECG Lead off detection

- SpO2/Pulse (if option is enabled)
 - Visual and audio alarms
 - Keypad (all 6 keys)
- 3 Check that the device combination is in good condition:
 - All labels are complete and legible
 - There is no visible damage
 - 4 Use the instructions for use to check that all components and accessories needed to use the product are available.
 - 5 Check the electrical safety requirements according to IEC 62353.

Preventive maintenance

WARNING

Risk of faulty components

Device failure is possible due to wear or material fatigue of the components. To maintain proper operation of all components, this device must undergo inspection and preventive maintenance at specified intervals.

WARNING

Risk of electric shock

Before performing any maintenance work, disconnect all electrical connectors from the power supply.

The following table shows the preventive maintenance intervals:

Component	Interval	Measure	Personnel responsible
M300	Every 12 months	Replace battery	Service personnel

NOTE

Technical Service personnel should examine and replace batteries after 12 months of service.

CAUTION

It is a good practice to recharge batteries immediately after discharging a patient. In addition, do not store low or dead batteries. Doing so could potentially result in loss of data.

This page has been left blank intentionally.

Reprocessing

Safety Information	254	After reprocessing	268
Information on reprocessing	254	Assembling and attaching device-specific components	268
Classification for reprocessing	254	To insert the swappable battery into the M300+	268
Classification of medical devices	254	Preparation before next use of device	270
Classification of device-specific components	255	Checking the operational readiness	270
Before reprocessing	256		
Observe before disassembly	256		
Patient-specific accessories and consumables	257		
Device-specific components	258		
Validated reprocessing procedures	259		
Overview of the reprocessing procedures of the components	259		
Cleaning	260		
Surface disinfection	260		
Supplementary information	261		
Other agents and reprocessing procedures	261		
Disinfectants	261		
Reprocessing of patient-specific accessories	264		
Categorization of accessories	264		
Reprocessing of the categories ECG monolead, SpO2 intermediate cable and SpO2 sensor	264		
Cleaning	265		
Surface disinfection	265		
Reprocessing of the category Pouch	266		
Storage and transport	266		
Other agents and reprocessing procedures	266		

Safety Information

WARNING

Risk due to inappropriately reprocessed products

Reusable products must be reprocessed, otherwise there is an increased risk of infection.

- Follow the infection prevention policies and reprocessing regulations of the healthcare facility.
- Follow national infection prevention policies and reprocessing regulations.
- Use validated procedures for reprocessing.
- Reprocess reusable products after every use.
- Follow the manufacturer's instructions for cleaning agents, disinfectants, and reprocessing devices.

CAUTION

Risk due to faulty products

- Signs of wear, e.g., cracks, deformation, discoloration, or peeling, may occur with reprocessed products.
- Check the products for signs of wear and replace them if necessary.

Information on reprocessing

Follow the national infection prevention policies and reprocessing regulations.

Follow the infection prevention policies and reprocessing regulations of the health-care facility (e.g., concerning the reprocessing cycles).

Classification for reprocessing

Classification of medical devices

The classification depends on the intended use of the medical device. The risk of infection transmission through the application of the product to the patient without proper reprocessing is the basis of the Spaulding classification.

Classification	Explanation
Non-critical	Components that come only into contact with skin that is intact
Semi-critical	Components that carry breathing gas or come into contact with mucous membranes or pathologically altered skin
Critical	Components that penetrate skin or mucous membranes or come into contact with blood

Classification of device-specific components

The following classification is a recommendation from Dräger.

Non-critical

Device Components:

- M300/M300+ Telemetry Device
- M300+ Battery
- M300+ Battery Retainer

Chargers:

- M300 Central Charger
- M300 Bedside Charger
- M300+ Battery Charger

Semi-critical

- None

Critical

- None

Before reprocessing

Observe before disassembly

WARNING

A risk of an electric shock might occur due to penetrating liquid. Follow the instructions below to disconnect power before reprocessing.

1 Turn off the M300/M300+ Telemetry Device:

- a. Simultaneously press and hold both arrow keys.
- b. Select the up arrow to highlight **Yes**.
- c. Press the **Menu** button and confirm the shutdown.

2 Unplug the M300 Bedside and Central Charger (excluding M300+):

- a. If docked, remove the M300 telemetry device.
- b. Disconnect the power plug.

3 Unplug the M300+ Battery Charger (excluding M300):

- a. Remove all batteries from the charger.
- b. Disconnect the power plug.

Patient-specific accessories and consumables

The patient-specific accessories and consumables must be removed from the device and, if necessary, disassembled.

Reusable products:

- If the reusable product has its own instructions for use, perform reprocessing in accordance with the separate instructions for use. Further information can be found in the list of accessories.
- If no separate instructions for use are available for the reusable product, perform reprocessing in accordance with the instructions in this IFU (see "Reprocessing of patient-specific accessories" on page 264).

Disposable products:

- Dispose of the disposable products.

WARNING

Disposable accessories (such as disposable electrodes) are for single-use only. Do not reuse disposable accessories.

Removing the accessories

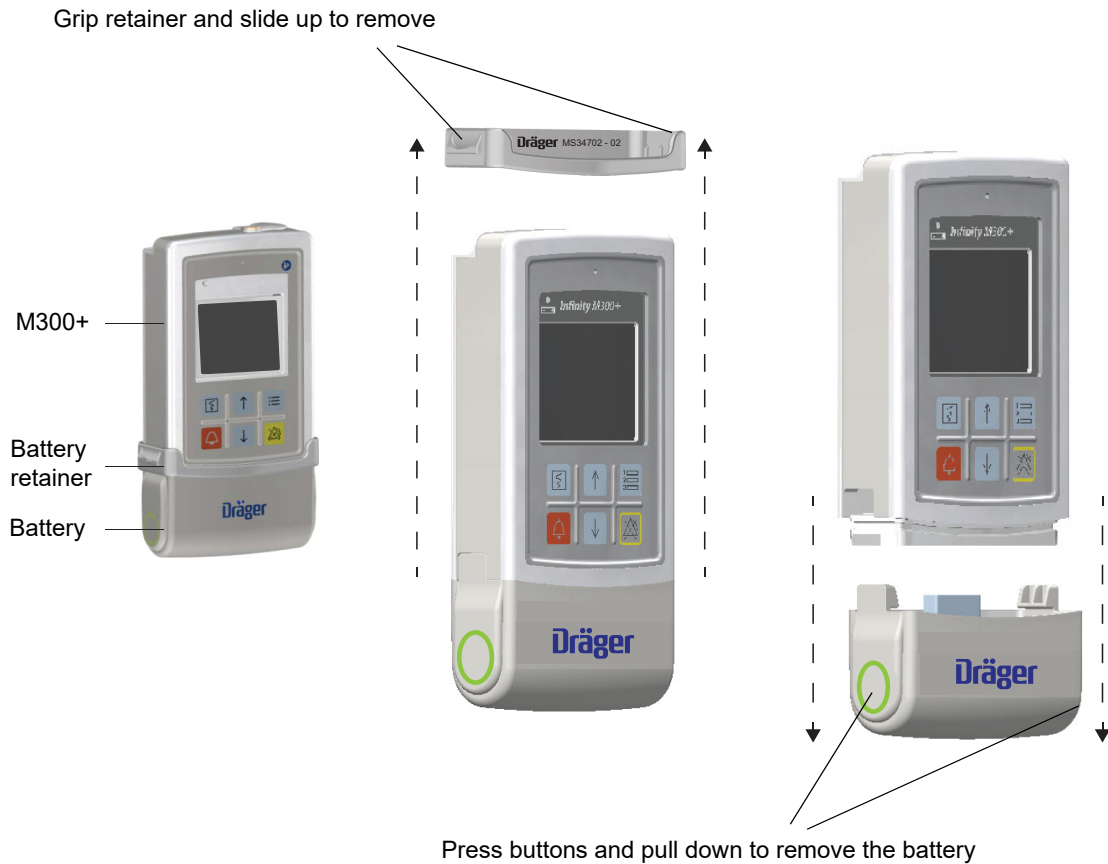
- ECG lead wire
- SpO2 intermediate cable
- Pouch M300/M300+ components

Device-specific components

The device-specific components must be removed from the device.

To remove the swappable battery and battery retainer from the M300+ (excluding M300)

- 1 Grip the sides of battery retainer and slide up to remove the retainer.
- 2 Press the two buttons on each side of the swappable battery.
- 3 Pull down to remove the battery.



Validated reprocessing procedures

Overview of the reprocessing procedures of the components

Components	Surface disinfection with cleaning	Manual cleaning followed by disinfection by immersion	Machine cleaning with thermal disinfection	Steam sterilization	Description of the procedure
M300/M300+ telemetry device	Yes	N/A	N/A	N/A	See "Surface disinfection with cleaning" on page 259.
M300+ Battery	Yes	N/A	N/A	N/A	
M300+ Battery Retainer	Yes	N/A	N/A	N/A	
Charger(s)	Yes	N/A	N/A	N/A	

Surface disinfection with cleaning

Components:

- M300/M300+ Telemetry Device
- M300+ Battery
- M300+ Battery Retainer
- Charger(s)

Surface disinfectant	Manufacturer	Concentration	Contact time
Dismozon plus	BODE Chemie	1.6 %	15 min
Oxycide	Ecolab USA	2.3 %	5 min

Prerequisites:

- The surface disinfectant has been prepared in accordance with the manufacturer's instructions.
- The manufacturer's instructions, e.g., regarding shelf life or application conditions, are observed.
- An uncontaminated, lint-free cloth soaked in surface disinfectant is used for the cleaning surface disinfection.

WARNING

Risk of electric shock and device malfunction.

Penetrating liquid may cause the following:

- Damage to the device
- Electric shock
- Device malfunctions

Ensure that no liquid penetrates the device. Always refer to the accompanying documents for the accessories.

WARNING

Do not immerse or rinse the device and its peripherals. If you spill liquid on the device (including the battery or accessories), or accidentally immerse it in liquid, allow contacts to thoroughly dry.

CAUTION

Do not use excessive pressure when cleaning the charging contacts. Excessive pressure can damage the contacts.

CAUTION

Do not steam autoclave, gas sterilize, or immerse the components in liquid or cleaning solutions. Do not subject the components to intense vacuum.

WARNING

Risk of cross contamination:

Perform every step of the instructions below for each of the components:

- M300/M300+ Telemetry Device
- M300+ Battery
- M300+ Battery Retainer
- Charger(s)

Failure to do so can lead to infection.

Cleaning

- 1 Wipe off obvious soiling with a disposable cloth soaked in surface disinfectant.
- 2 Dispose of the cloth.
- 3 Wipe all surfaces with a new disposable cloth soaked in surface disinfectant. After that, there must no longer be any soiling visible.

Surface disinfection

- 4 Take a new disposable cloth soaked in surface disinfectant. Wipe cleaned surfaces again until all surfaces to be disinfected are visibly wet.
- 5 Wait 15 minutes for the surface disinfectant contact time.
- 6 At the end of the contact time, moisten a new, uncontaminated and lint-free cloth with water (at least drinking water quality).

- 7 Wipe all surfaces until no remains of the surface disinfectant, such as foam residues or streaks, are visible.
- 8 Wait until the surfaces are dry.
- 9 Check the surfaces for visible damage and, if necessary, replace the product.

Supplementary information

Cleaning inside surface of battery retainer and device connectors and ports.

A brush/wipe dampened in water (at least drinking water quality) can be used, in case debris needs to be removed on the contacts and connector ports. Allow the product to dry.

Storage and transport

After reprocessing, there are no special requirements for the storage and transport of the product. However, the following must be observed:

- Store dry and free of dust.
- Avoid recontamination and damage during transport.

All other information in the instructions for use regarding storage and transport continues to apply. In addition, the requirements that prevent contamination or damage to the product must be met. These include, for example, dry and dust-free storage and avoiding damage during transport to the operating location.

Other agents and reprocessing procedures

Disinfectants

Use nationally approved disinfectants suitable for the respective reprocessing procedure and field of application.

Surface disinfectants

Follow the manufacturer's instructions for surface disinfectants.

The following surface disinfectants were compatible with the material at the time of testing:

Class of active ingredient	Surface disinfectant	Manufacturer	Listing
Chlorine-releasing agents	Clorox Professional Disinfecting Bleach Cleaner	Clorox Professional Products Company	EPA ¹⁾
	Dispatch Hospital Cleaner Disinfectant Towels with Bleach		
	Actichlor plus	Ecolab	–
	Chlor-Clean Tablets	helix Solution	–
	Chloricide +	Sky Chemicals	–
	Chlorine Disinfectant Wipes	Medipal	–
	Lierkang type II disinfection effervescent tablet	Lircon	–
	JIANZHISU disinfection effervescent tablets	JIANZHISU	–
Oxygen-releasing agents	Descogen Liquid	Antiseptica	CE
	Descogen Liquid r.f.u.		
	Oxygenon Liquid		
	Oxygenon r.f.u.		
	Dismozon plus	BODE Chemie	CE
	Oxycide	Ecolab US	EPA
	Perform	Schülke +	CE
	SteriMax Wipes	Aseptix (Ecolab)	CE
	Incidin OxyWipe	Ecolab	CE
	Incidin OxyWipe XL		
	Rubysta	Kyorin (Japan)	–
	Rely+On Virkon	LANXESS Corporation	EPA
	Perisept 62	Triple S	EPA
	Accel PREvention RTU	Diversey	DIN ²⁾
	Accel PREvention Wipes		
	Oxivir Excel Wipes	Diversey	ARTG ³⁾

Class of active ingredient	Surface disinfectant	Manufacturer	Listing
Quaternary ammonium compounds	acryl-des	Schülke +	CE
	mikrozid alcohol free liquid		
	mikrozid alcohol free wipes		
	mikrozid sensitive liquid		
	mikrozid sensitive wipes		
	Cleanisept Wipes "Maxi"	Dr. Schumacher	CE
	Surfa'Safe Premium	Laboratoires ANIOS	CE
	WIP'ANIOS EXCEL		
	Tuffie 5	Vernacare	–
	Medizar Hospital Grade Surface Disinfectant Wipes	Ainsworth Medical	–
	Premier Disinfectant Wipes	Reynard	–

- 1) United States Environmental Protection Agency
- 2) Drug Identification Number
- 3) Australian Register of Therapeutic Goods (classified as class IIb)

Dräger states that oxygen-releasing agents and chlorine-releasing agents may cause color change in some materials. Color change does not indicate that the product is not functioning correctly.

Other surface disinfectants are used at one's own risk.

Dräger makes no statement about the effectiveness or the current approval status of these products.

Reprocessing of patient-specific accessories

Categorization of accessories

Category	Classification	Part number	Description of the procedure
ECG monolead	Non-Critical	MS14555 MS14556 MS14559 MS14560 MS14683 MS14682	See "Surface disinfection with cleaning" on page 264.
SpO2 intermediate cable	Non-Critical	MS18683 MS17330	
SpO2 sensor	Non-Critical	MS13235	
Pouch M300+ waterproof 10 pcs	Non-Critical	MS33867	See "Reprocessing of the category Pouch" on page 266
Pouch M300 waterproof new tag	Non-Critical	MS32401	

Reprocessing of the categories ECG monolead, SpO2 intermediate cable and SpO2 sensor

Surface disinfection with cleaning

Surface disinfectant	Manufacturer	Concentration	Contact time
Dismozon plus	BODE Chemie	1.6 %	15 min
Oxycide	Ecolab USA	2.3 %	5 min

Prerequisites:

- The surface disinfectant has been prepared in accordance with the manufacturer's instructions.
- The manufacturer's instructions, e.g., regarding shelf life or application conditions, are observed.
- An uncontaminated, lint-free cloth soaked in surface disinfectant is used for the cleaning surface disinfection.

WARNING

Risk due to penetrating liquid.

WARNING

Risk of electric shock and device malfunction.

Penetrating liquid may cause the following:

- **Damage to the device**
- **Electric shock**
- **Device malfunctions**

Ensure that no liquid penetrates the device.

CAUTION

To avoid damaging the device, do not use sharp tools or abrasives. Never immerse electrical connectors in water or other liquids.

CAUTION

Do not autoclave accessories.

CAUTION

Do not use excessive pressure or flex patient cables unnecessarily when cleaning. Excessive pressure can damage the patient cables.

Cleaning

- 1 Wipe off obvious soiling with a disposable cloth soaked in surface disinfectant.
- 2 Dispose of the cloth.
- 3 Wipe all surfaces with a new disposable cloth soaked in surface disinfectant. After that, there must no longer be any soiling visible.

Surface disinfection

- 4 Take a new disposable cloth soaked in surface disinfectant. Wipe cleaned surfaces again until all surfaces to be disinfected are visibly wet.
- 5 Wait 15 minutes for the surface disinfectant contact time.
- 6 At the end of the contact time, moisten a new, uncontaminated and lint-free cloth with water (at least drinking water quality).
- 7 Wipe all surfaces until no remains of the surface disinfectant, such as foam residues or streaks, are visible.
- 8 Wait until the surfaces are dry.
- 9 Check the surfaces for visible damage and, if necessary, replace the product.

Reprocessing of the category Pouch

The non-disposable transmitter pouch can be cleaned using mild soap and water on a damp cloth. Air dry. Laundering and solvents are not recommended.

Storage and transport

After reprocessing, there are no special requirements for the storage and transport of the product. However, the following must be observed:

- Store dry and free of dust.
- Avoid recontamination and damage during transport.

All further information on storage and transport included in the accompanying documents must be observed.

Other agents and reprocessing procedures

Disinfectants

Use nationally approved disinfectants suitable for the respective reprocessing procedure and field of application.

Surface disinfectants

Follow the manufacturer's instructions for surface disinfectants.

The following surface disinfectants were compatible with the material at the time of testing:

Class of active ingredient	Surface disinfectant	Manufacturer	Listing
Chlorine-releasing agents	Clorox Professional Disinfecting Bleach Cleaner	Clorox Professional Products Company	EPA ¹⁾
	Dispatch Hospital Cleaner Disinfectant Towels with Bleach		
	Actichlor plus	Ecolab	–
	Chlor-Clean Tablets	helix Solution	–
	Chloricide +	Sky Chemicals	–
	Chlorine Disinfectant Wipes	Medipal	–
	Lierkang type II disinfection effervescent tablet	Lircon	–
	JIANZHISU disinfection effervescent tablets	JIANZHISU	–

Class of active ingredient	Surface disinfectant	Manufacturer	Listing
Oxygen-releasing agents	Descogen Liquid	Antiseptica	CE
	Descogen Liquid r.f.u.		
	Oxygenon Liquid		
	Oxygenon r.f.u.		
	Dismozon plus	BODE Chemie	CE
	Oxycide	Ecolab US	EPA
	Perform	Schülke +	CE
	SteriMax Wipes	Aseptix (Ecolab)	CE
	Incidin OxyWipe	Ecolab	CE
	Incidin OxyWipe XL		
	Rubysta	Kyorin (Japan)	–
	Rely+On Virkon	LANXESS Corporation	EPA
	Perisept 62	Triple S	EPA
	Accel PREvention RTU	Diversey	DIN ²⁾
	Accel PREvention Wipes		
	Oxivir Excel Wipes	Diversey	ARTG ³⁾
Quaternary ammonium compounds	acryl-des	Schülke +	CE
	mikrozid alcohol free liquid		
	mikrozid alcohol free wipes		
	mikrozid sensitive liquid		
	mikrozid sensitive wipes		
	Cleanisept Wipes "Maxi"	Dr. Schumacher	CE
	Surfa'Safe Premium	Laboratoires ANIOS	CE
	WIP'ANIOS EXCEL		
	Tuffie 5	Vernacare	–
	Medizar Hospital Grade Surface Disinfectant Wipes	Ainsworth Medical	–
	Premier Disinfectant Wipes	Reynard	–

1) United States Environmental Protection Agency

2) Drug Identification Number

3) Australian Register of Therapeutic Goods (classified as class IIb)

Dräger states that oxygen-releasing agents and chlorine-releasing agents may cause color change in some materials. Color change does not indicate that the product is not functioning correctly.

Other surface disinfectants are used at one's own risk.

Dräger makes no statement about the effectiveness or the current approval status of these products.

After reprocessing

Assembling and attaching device-specific components

Prerequisite:

- All components have been reprocessed and are dry.

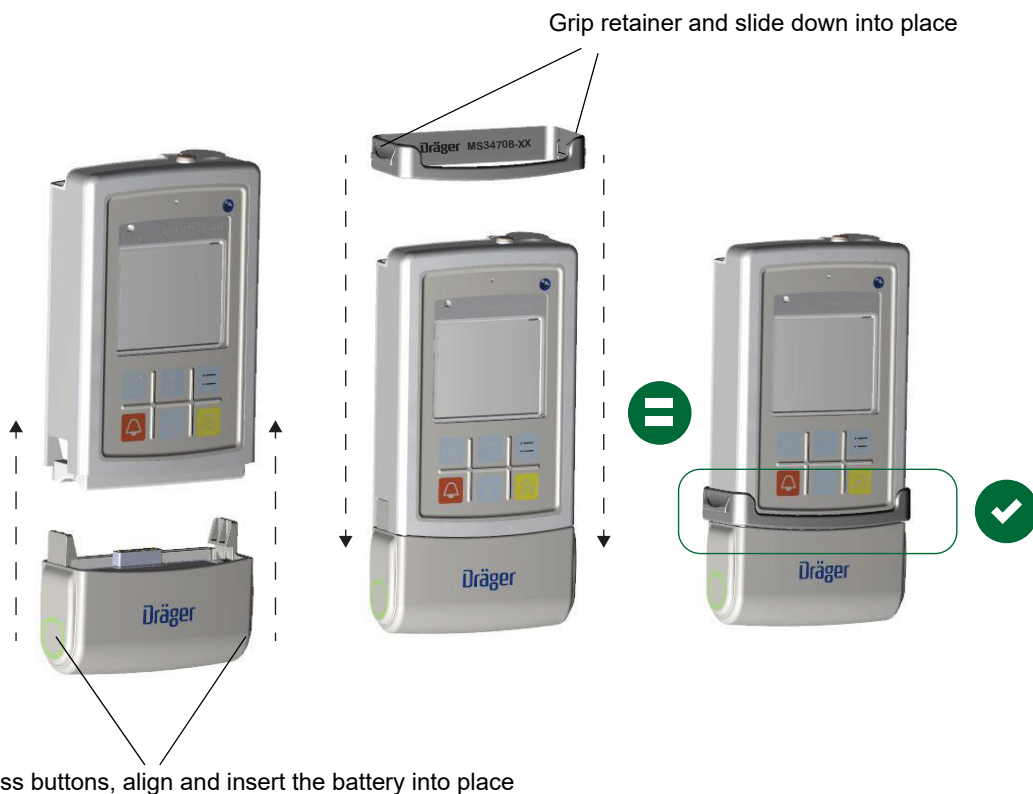
Assembling the M300+ battery retainer and M300+ battery

To insert the swappable battery into the M300+

- 1** Press the buttons on the swappable battery.
- 2** Align and insert the battery into place.
- 3** Slide the battery retainer down over the M300+ into place above the battery.

NOTE

Make sure the swappable battery correctly aligns with the M300+ before securing into place.

**CAUTION**

When inserting the swappable battery, carefully align the battery with the bottom of the monitor and press firmly from the bottom of the battery to avoid pinching fingers when the battery snaps into place. Ensure any objects or potential obstructions are clear before attaching the battery.

Preparation before next use of device

Assembling and fitting patient-specific accessories and consumables

Assemble the ECG lead wire and SpO2 intermediate cable

Checking the operational readiness

Prerequisite:

- The device has been assembled and prepared so that it is ready for operation.

Check the operational readiness (see "Getting started" on page 107).

Disposal

Disposal of the medical device 272

**M300, Bedside Charger, and Central
Charger; and M300+, swappable battery,
and battery charger 272**

Disposal of the medical device

When disposing of the medical device:

- Consult the relevant waste disposal company for appropriate disposal.
- Observe the applicable laws and regulations.

For countries subject to the EU Directive 2002/96/EC

This device is subject to EU Directive 2002/96/EC (WEEE). In order to comply with its registration according to this directive, this device may not be disposed of at municipal collection points for waste electrical and electronic equipment. Dräger has authorized a company to collect and dispose of this device.

To initiate collection or for further information, visit Dräger on the Internet at www.draeger.com and select your country. Use the Search function with the keyword “WEEE” to find the relevant information. If access to Dräger's web site is not possible, contact the local Dräger organization.

M300, Bedside Charger, and Central Charger; and M300+, swappable battery, and battery charger

All materials must be disposed of or recycled properly and in accordance with local regulations.

IFU CONTENT TO COMPLY WITH IEC 60601-1:2005 and with IEC 60601-1:2012 CLAUSE 14.13

Dräger provides patient monitoring, therapy, and IT products that may exchange information electronically with each other in the clinical environment, as well as other non-Dräger devices, over information technology networks (IT networks). Each data interface is an IT network in terms of the relevant communications standard (e.g. printer interface, USB interface, etc.).

Transmission of patient and device data across the IT Network enables patient data and equipment data to be monitored, stored, transferred, printed, or shared through the use of direct wired, as well as wireless technologies, facilitating the following operations:

- Waveform and Parameter Data Display
- Alarm Notification
- Network Recordings and printing
- Remote Control (e.g. Alarm Management)
- Remote BedView
- Patient Archive Data Review (Trends, Events, Charting Information)
- Equipment setting and patient data transfer
- Service access (device and component status data; log file access)

Connecting Dräger devices to a shared IT network with other devices, or subsequent changes to the shared IT network, can lead to previously unidentified risks for patients, operators, and third parties. These risks must be identified, analyzed, evaluated, and controlled before placing the medical device into the IT network.

Subsequent changes to the IT network can include, among other things:

- IT network configuration changes
- Adding or removing additional devices to/from the IT network
- Upgrading and/or updating network equipment connected to the IT network

Hospital personnel (e.g. Biomed, Network Engineering) should read the accompanying documents of the Dräger equipment carefully before connecting the device to an IT network. Additionally, attention should be given to the network interface description and network-relevant alarms. Installation personnel should also refer to IEC 80001-1 for guidance before connecting the Dräger equipment to IT-networks.

The following summary provides additional disclosure on the connection of Dräger medical devices to IT Networks:

- The most commonly-required configuration of the LAN-based IT-Network incorporating Dräger medical devices is a star topology that connects monitoring units and groups of monitoring units (“care units”) via layered network switches and the segmentation from other IT-Network traffic via separately designated Virtual LANs. Required device interface configurations are described in the respective product Instructions for Use documentation.

- The specifications of the LAN connection for Dräger medical devices to the IT-Network are outlined in the IEEE 802.3 wired and IEEE 802.11(b, g, n) wireless Ethernet standards. Port settings for layer 2 and layer 3 switches are defined on a product-specific basis. These settings are available from your DrägerService or specialized service personnel. Dräger provides products for initial set-up with pre-loaded IP addresses.
- The LAN-based IT-Network uses TCP/IP communication protocols. It must be capable of supporting either unicast (static or dynamic addressing requiring ARP or RARP), as well as multicast and broadcast transmissions. It needs to allow the use of the Internet Group Management Protocol (IGMP version 2). Dräger medical devices send out data packets on the IT Network. Dräger products like CentralStation monitors, Gateways, or other bedside monitors, which are configured to receive these data packets, use the Internet Management Protocol to join or leave an IP Multicast group. An example of this data flow is bedside devices sending out their patient data using IP multicasting. A CentralStation monitor can join into each multicast channel to capture and display bedside patient data information.
- Dräger devices may also require that the IT-network provides support for three dedicated, independent virtual local area network (VLAN) connections for bedside medical devices, mobile monitoring devices, and for access to the Health Delivery Organization (HDO) clinical network. Additional information can be obtained from your DrägerService or specialized service personnel.
- Besides direct network connections, other possible communication interfaces include:
 - Serial data connections, conforming to EIA RS-232 (CCITT V.24/V.28) for Medibus-based products, paging interfaces, and connections to 3rd party medical devices.
 - IEEE 1073 conformant interfaces (Medical Information Bus) for connections to 3rd party medical devices (IEEE 1073.3.2 or 1073.3.1 and 1073.4.1).
 - Serial data connections, conforming to USB 2.0, for human interface devices (mouse, keyboards, mass storage devices such as flash disks, CD drives, etc.).
- **Security** for Dräger wireless products is implemented using the Advanced Encryption Standard (AES) WPA2, with pre-shared key administration at the time of installation. Security for selected Dräger clinical IT products includes SSL and additional capabilities defined in the Medical Device Disclosure for Medical Device Security (MDS2) form.
- There are potential hazardous situations that can result from the failure of the IT-Networks to provide the characteristics required to meet the purpose of the medical device connection to the IT Network. Dräger products will attempt to detect and mitigate these potentially hazardous situations. Related to this medical device, these situations may include:
 - Untimely delivery of data (alarm annunciation/parameter values exchange/etc.), depending on a “reliable distributed alarm system or not”
 - Data not sent or sent to the wrong device
 - Missing data
 - Patient data intercepted/corrupted
 - Incorrect time stamp on data
 - Alarms not detectable in time due to unsafe distributed alarm system or alarm present at network interruption
 - Alarm pause/audio pause reset due to network interruption

- Data privacy lost due to missing firewall/virus protection
- Wrong equipment settings/wrong or no alarms due to missing firewall/virus protection

This page has been left blank intentionally.

Technical specifications

Site of operation	278
Infinity M300 Bedside Charger (MS29558) . .	284
Infinity M300 Central Charger (MS25699) . .	285
Infinity M300+	285
Infinity M300+ battery charging station	290
M300/M300+ Performance data	291
Electromagnetic compatibility (EMC)	292
Recommended separation distances from wireless communication devices	296
Operating characteristics	296

Site of operation

NOTE

The specifications displayed within this chapter are subject to change without notice.

The site of operation of all equipment must meet environmental requirements as specified in this section.

For related information, refer to "General safety information" on page 13.

The Infinity CentralStation and Infinity M300 are not intended for home care use or the following hospital environments:

- Hyperbaric chambers,
- CT areas,
- Environments containing MRI equipment.

WARNING

Any changes or modifications to the device hardware or software have exclusively to be done by service technicians authorized by Dräger. Any unauthorized change can decrease patient safety, could void the user's authority to operate the equipment, and will void the warranty.

NOTE

The Infinity M300 and its approved accessories do not contain natural rubber latex.

Infinity M300	
Physical specifications	
Size, H x W x D	142.2 x 78.7 x 30.5 mm (5.6 x 3.1 x 1.2 in)
Weight	295 g (10.5 oz) with battery
Cooling	Convection
Connections	ECG, communication port for SpO2, or programming cable, charger (bedside or central)
Environmental requirements	
Atmospheric pressure	Operating: 64.7 to 106 kPa Storage: 50 to 106 kPa
Temperature	Operating: 0 to 40 °C (32 to 104 °F) Storage: –20 to +60 °C (–4 to +140 °F)
Humidity (non-condensing)	Operating: 10 to 95 % Storage: 5 to 95 %
Protection against ingress of water	IPX 7, temporary immersion
Electrical characteristics	
Power source	Rechargeable 3.6 V lithium ion battery, available from Dräger
Protection class	Internally powered

Infinity M300	
Mode of operation	Continuous
Battery operating time	ECG only: 22 to 26 hrs ECG + continuous SpO2: 18 to 20 hrs Operation time varies according to use of display, alarms, and wireless environment (roaming). NOTE The battery runtime of the M300 may be reduced by characteristics of the wireless environment such as signal quality, power levels, power-save mode, etc. The battery operating life can also gradually diminish over time.
Battery recharging time	Using Bedside Charger, approximately: ECG only: 0 to 100 % = 12 to 14 hrs ECG + continuous SpO2: 0 to 100 % = 15 to 17 hrs Using Central Charger, approximately: 0 to 100 % = 4 hrs
User interface	
Controls	Six function keys: alarm pause, view screen, staff alert, record/mark event, up/down scroll
Alarm grades	Low, medium, high
Display	
Size/viewing area	6 cm (2.36 in) diagonal LCD
Resolution	220 x 176 pixels
Communications	
Network	IEEE 802.1 a/b/g/n
Radio power output	30 mW maximum
ECG	
Available leads	3-wire: I, II, or III 5-wire: I, II, III, aVL, aVR, aVF, V 6-wire: I, II, III, aVL, aVR, aVF, V, V+ 6-wire with Infinity TruST 12-lead: I, II, III, aVL, aVR, aVF, dV1, V2, dV3, dV4, V5, dV6
Leads analyzed	Any two user-selected ECG leads (simultaneously), or any one user-selected ECG lead
Heart rate measurement range	15 to 300 bpm
Accuracy	±2 bpm or ±1 %, whichever is greater
Display update period	2 seconds nominal

Infinity M300													
QRS detection	Amplitude: 0.4 to 5.0 mV [0.2 to 5.0 mV when waveform scale set to 0.5 mV/cm or lower] Duration: 40 to 120 ms												
Heart rate level alarm adjustment range	20 to 300 bpm												
Monitoring frequency response	0.5 to 40 Hz: ± 3 dB												
Sweep speed	25 mm/s ± 10 %												
Detected events/rhythms	Asystole, Ventricular Fibrillation, Ventricular Tachycardia, Bradycardia, Ventricular Run, Accelerated Idioventricular Rhythm, Supraventricular Tachycardia, Ventricular Couplet, Ventricular Bigeminy, Tachycardia, Pause, Artifact, PVC/min												
Time to alarm for the two ventricular tachycardia waveforms per 60601-2-27 with amplitude normal, one half and twice the indicated value are:	<table> <tr> <td>B1 aami4a</td><td>3 - 3.5 seconds</td></tr> <tr> <td>B1 aami4a_h</td><td>2 - 2.5 seconds</td></tr> <tr> <td>B1 aami4a_d</td><td>4 - 5 seconds</td></tr> <tr> <td>B1 aami4b</td><td>2 - 2.5 seconds</td></tr> <tr> <td>B1 aami4B_h</td><td>2.5 - 3 seconds</td></tr> <tr> <td>B1 aami4b_d</td><td>2 - 2.5 seconds</td></tr> </table>	B1 aami4a	3 - 3.5 seconds	B1 aami4a_h	2 - 2.5 seconds	B1 aami4a_d	4 - 5 seconds	B1 aami4b	2 - 2.5 seconds	B1 aami4B_h	2.5 - 3 seconds	B1 aami4b_d	2 - 2.5 seconds
B1 aami4a	3 - 3.5 seconds												
B1 aami4a_h	2 - 2.5 seconds												
B1 aami4a_d	4 - 5 seconds												
B1 aami4b	2 - 2.5 seconds												
B1 aami4B_h	2.5 - 3 seconds												
B1 aami4b_d	2 - 2.5 seconds												
Degree of protection against electrical shock	Type CF												
Defibrillation protection	In accordance per IEC 60601-2-27												
Electrosurgery and cautery	Not intended for use during ESU procedures												

Infinity M300	
Pacer detection	Leads I and (II or III)
Amplitude	± 2 to ± 700 mV
Width (dp)	0.1 to 2.0 ms
NOTE The Infinity M300 device contains a magnet which generates an extremely low static magnetic field of approximately 2 gauss at 12.7 mm (0.5 in) distance. Refer to the manufacturer's instructions for use of any third party medical devices in the patient vicinity for compatibility.	
ST segment analysis	
Leads analyzed	3-wire: I, II, or III 5-wire: I, II, III, aVL, aVR, aVF, V 6-wire: I, II, III, aVL, aVR, aVF, V, V+ 6-wire with Infinity TruST 12-lead: I, II, III, aVL, aVR, aVF, dV1, V2, dV3, dV4, V5, dV6
ISO point	-28 ms
ST measurement points	Default: +80 ms
ST complex	Length: 900 ms (250 samples) Frequency response: 0.05 to 40 Hz
Update interval	15 s
ST measurement and alarm limit ranges	-15.0 to +15.0 mm, -1.5 to +1.5 mV
ST measurement resolution	0.1 mm (0.01 mV)
Pulse oximetry (optional)	
Parameter display	Percentage of functional hemoglobin saturated with oxygen - Saturation (%SpO ₂), pulse rate
Measurement method	Absorption-spectrophotometry
Measurement and display range	SpO ₂ : 1 to 100 % Pulse rate: 30 to 250 bpm
Calibration range	70 to 100 %
Display update period	2 seconds nominal
Maximum hold from previous update	30 seconds (in the event of artifact or other error)
Data averaging	$\geq 90\%$ of change within 30 seconds @ 60 bpm

Infinity M300	
Accuracy	SpO2: 0 to 69 % not specified 70 to 100 % sensor-specific as follows: <u>Masimo LNOP Sensors</u> SpO2 accuracy^{1, 2, 3, 4}: LNOP adt, LNOP Pdt, LNOP neo, LNOP DCI, LNOP TC-I, LNOP DCIP, LNOP YI ±3 % Pulse rate accuracy: ±3 bpm or ±3 %, whichever is greater Low perfusion accuracy, SpO2: Not specified Low perfusion accuracy, pulse rate: ±3 bpm or ±3 %, whichever is greater <u>Masimo LNCS Sensors</u> SpO2 accuracy^{1, 2, 3, 4}: LNCS DCI, LNCS DCIP, LNCS Adtx, LNCS Pdt, LNCS Enf Not specified Pulse rate accuracy: ±3 bpm or ±3 %, whichever is greater Low perfusion accuracy, SpO2: ±2 % Low perfusion accuracy, pulse rate: ±3 bpm or ±3 %, whichever is greater <u>Nellcor Sensors</u> SpO2 accuracy^{1, 2, 3, 4}: OxiMAX MAX-A, OxiMAX MAX-AL, OxiMAX MAX-P, DS100A ±3 % <u>Dräger Sensors</u> SpO2 accuracy^{1, 2, 3, 4}: MS16444 disposable foam pedi, MS16445 disposable foam ad, MS16449 disposable vinyl ad, MS16448 disposable vinyl pedi, MS13235 reusable sensor ±2 %

Infinity M300	
NOTE ¹ Since pulse oximeter measurements are statistically distributed, only about two-thirds of those measurements can be expected to fall within $\pm 1 A_{rms}$ of the value measured by a co-oximeter. ² These accuracies have been validated using blood samples obtained from healthy adult volunteers during induced hypoxia studies in the range of 70 to 100% SpO ₂ against a laboratory co-oximeter and ECG monitor. ³ SpO ₂ accuracies are expressed as $\pm "X" \%$ between indicated saturation levels. This variation of the SpO ₂ measurement equals $\pm 1 A_{rms}$ of the value measured by a co-oximeter. ⁴ The pulse rate accuracy has been validated on healthy adult volunteers during induced hypoxia studies in the range of 70 to 100 % SpO ₂ against a laboratory co-oximeter and ECG monitor. This variation equals $\pm 1 A_{rms}$ of the pulse rate value measured by the ECG monitor.	
Nominal wavelength:	Nellcor: Red: 660 nm IR: 910 nm Masimo: Red: 660 nm IR: 905 nm
SpO ₂ alarm range	20 to 100 %
Pulse rate alarm range	30 to 240 bpm
Power	Nellcor: Red: 3 mW (maximum) IR: 4 mW (maximum) Masimo: Red: 0.9 mW (maximum) IR: 0.9 mW (maximum) LED drive is current limited by hardware mechanisms
Standards/compliance	
	IEC 60601-1 IEC 60601-1-2 IEC 60601-1-6 IEC 60601-1-8 IEC 60601-2-27 IEC 60601-2-49 IEC 62366-1:2015 IEC 80601-2-61 ANSI/AAMI EC13 ISO 10993-1

Infinity M300 Bedside Charger (MS29558)

Infinity M300 Bedside Charger	
Physical specifications	
Size, H x W x D	45.7 x 162.5 x 99.1 mm (1.8 x 6.4 x 3.9 in)
Weight	375 g (13.2 oz) to 447 g (15.8 oz) depending on plug style
Cooling	Convection
Connections	One (1) Infinity M300
Electrical specifications	
Input voltage	92 to 264 VAC, 50/60 Hz (±5 %)
Protection class	Class 1
Mode of operation	Continuous
Environmental requirements	
Temperature	Operating: 0 to 40 °C (32 to 104 °F) Storage: -20 to +60 °C (-4 to +140 °F)
Humidity (non condensing)	Operating: 10 to 95 % Storage: 5 to 95 %
Atmospheric pressure	Operating: 64.7 to 106 kPa Storage: 50 to 106 kPa
Protection against ingress of water (cradle only)	IPX4, splashing water
Standards/compliance	
Standards	IEC 60601-1 and IEC 60601-1-2

Infinity M300 Central Charger (MS25699)

Infinity M300 Central Charger	
Physical specifications	
Size, H x W x D	230 x 525 x 190 mm (9.0 x 20.7 x 7.5 in)
Weight	6.8 kg (15 lb)
Cooling	Convection
Connections	Up to ten (10) Infinity M300 devices
Electrical specifications	
Input Voltage	100 to 240 VAC
Input frequency (Hz)	50/60 Hz
Protection Class	Class 1
Mode of Operation	Continuous
Environmental requirements	
Atmospheric Pressure	Operating: 64.7 to 106 kPa Storage: 50 to 106 kPa
Temperature	Operating: 0 to + 35 °C (32 to 95 °F) Storage: –20 to +60 °C (–4 to +140 °F)
Humidity (non-condensing)	Operating: 10 to 95 % Storage: 10 to 95 %
Protection against ingress of water	IPX1 (dripping) per IEC 60529
Standards/compliance	
Standards	UL 60601-1, IEC 60601-1, and IEC 60601-1-2

Infinity M300+

Infinity M300+ specifications	
Physical specifications	
Size, H x W x D with battery attached	157.5 mm x 81.1 mm x 30.6 mm (6.2 in x 3.19 in x 1.2 in)
Weight	310 g +/- 5 g (10.93 oz)
Cooling	Convection
Connections	ECG, communication port for SpO2, programming cable

Infinity M300+ specifications	
Environmental requirements	
Atmospheric pressure	Operating: 64.7 to 106 kPa Storage: 50 to 106 kPa
Temperature	Operating: 0 to 40 °C (32 to 104 °F) Storage: –20 to +60 °C (–4 to +140 °F)
Humidity (non-condensing)	Operating: 10 to 85% Storage: 10 to 85 %
Protection against ingress of water	IPX ratings: – Main unit with battery attached is IPX4, protected against splashing water. – Main unit without battery attached is IPX7, protected against temporary immersion. – Swappable battery alone, unattached, is IPX4, protected against splashing water.
Electrical characteristics	
Power source	Rechargeable 3.6 V lithium-ion swappable battery, available from Dräger
Protection class	Internally powered
Mode of operation	Continuous
Estimated battery operating time	ECG only: 22 h ECG and continuous SpO2: 18 h Duration of operation varies according to use of display, alarms, and wireless environment (roaming). NOTE The duration of the battery charge for the M300+ may be reduced by characteristics of the wireless environment such as signal quality, power levels, power-save mode, etc. The battery operating life can also gradually diminish over time.
User interface	
Controls	Six function keys: Alarm pause, view screen, staff alert, record/mark event, up/down scroll
Display	
Size/viewing area	5.5 cm (2.17 in) diagonal LCD
Resolution	220 x 176 pixels
Communications	
Wireless Network	IEEE 802.11 a/b/g/n wireless Ethernet standards (2.4 – 5GHz)
Radio power output	30 mW (2.4 GHz) / 25 mW (5 GHz)

Infinity M300+ specifications	
ECG	
Available leads	3-wire lead set: I, II, or III 5-wire lead set: I, II, III, aVL, aVR, aVF, V 6-wire lead set: I, II, III, aVL, aVR, aVF, V, V+ 6-wire lead set with Infinity TruST: I, II, III, aVL, aVR, aVF, dV1, V2, dV3, dV4, V5, dV6
Leads analyzed	Any one or two user-selected ECG leads (simultaneously)
Heart rate measurement range	15 to 300 bpm
Accuracy	±2 bpm or ±1 %, whichever is greater
Display update period	2 seconds nominal
Heart rate alarm setting range	20 to 300 bpm
Monitoring frequency response	0.5 to 40 Hz: ±3 dB
Sweep speed	25 mm/s ±10 %
Detected arrhythmia events/rhythms	asystole, ventricular fibrillation, ventricular tachycardia, ventricular run, accelerated idioventricular rhythm, supraventricular tachycardia, ventricular couplet, bigeminy, tachycardia, bradycardia, sinus pause, ARR artifact PVC/min
Time to alarm for the two ventricular tachycardia waveforms per 60601-2-27 with amplitude normal, one half and twice the indicated value are:	B1 aami4a 3 - 3.5 seconds B1 aami4a_h 2 - 2.5 seconds B1 aami4a_d 4 - 5 seconds B1 aami4b 2 - 2.5 seconds B1 aami4B_h 2.5 - 3 seconds B1 aami4b_d 2 - 2.5 seconds
Degree of protection against electrical shock	Type CF
Defibrillation protection	In accordance with IEC 60601-2-27
Electrosurgery and cautery	Not intended for use during ESU procedures

Infinity M300+ specifications	
Pacer detection	Leads I and (II or III)
Amplitude	± 2 to ± 700 mV
Width (dp)	0.1 to 2.0 ms
ST segment analysis	
Leads analyzed	3-wire lead set: I, II, or III 5-wire lead set: I, II, III, aVL, aVR, aVF, V 6-wire lead set: I, II, III, aVL, aVR, aVF, V, V+ 6-wire lead set with Infinity TruST: I, II, III, aVL, aVR, aVF, dV1, V2, dV3, dV4, V5, dV6
Isoelectric point	Default: -28 ms (before J-point)
ST measurement point	Default: $+80$ ms (after J-point)
ST complex	Length: 900 ms (250 samples) Frequency response: 0.05 to 40 Hz
Update interval	15 s
ST measurement and alarm limit ranges	-15.0 to $+15.0$ mm, -1.5 to $+1.5$ mV
ST measurement resolution	0.1 mm (0.01 mV)
ST measurement accuracy	± 0.5 mm (0.05 mV) or 15% RTI (with respect to input) whichever is greater for all leads, excluding STVM and STCVM
Pulse oximetry (optional)	
Parameter display	Pulse oximetry oxygen saturation percentage (SpO ₂), pulse rate
Measurement method	Absorption-spectrophotometry
Measurement and display range	SpO ₂ : 1 to 100 % Pulse rate: 30 to 250 bpm
Calibration range	70 to 100 %
Display update period	2 seconds nominal
Maximum hold from previous update	30 seconds (in the event of artifact or other error)
Data averaging	$\geq 90\%$ of change within 30 seconds @ 60 bpm

Infinity M300+ specifications	
Accuracy	SpO2: 0 to 69 % not specified 70 to 100 % sensor-specific as follows: <u>Masimo LNCS Sensors</u> SpO2 accuracy^{1, 2, 3, 4}: LNCS DCI, LNCS DCIP, LNCS Adtx, LNCS Pdtx Pulse rate accuracy: Not specified ±3 bpm or ±3 %, whichever is greater Low perfusion accuracy, SpO2: ±2 % Low perfusion accuracy, pulse rate: ±3 bpm or ±3 %, whichever is greater <u>Masimo RD SET Sensors</u> SpO2 accuracy^{1, 2, 3, 4}: RD SET Adt, RD SET Pdt, Pulse rate accuracy: ±2 % ±3 bpm or ±3 %, whichever is greater Low perfusion accuracy, SpO2: ±2 % Low perfusion accuracy, pulse rate: ±3 bpm or ±3 %, whichever is greater <u>Nellcor Sensors</u> SpO2 accuracy^{1, 2, 3, 4}: OxiMAX MAX-A, OxiMAX MAX-AL, OxiMAX MAX-P, DS100A ±3 % <u>Dräger Sensors</u> SpO2 accuracy^{1, 2, 3, 4}: MS16444 disposable foam pedi, MS16445 disposable foam ad, MS16449 disposable vinyl ad, MS16448 disposable vinyl pedi, MS13235 reusable sensor ±2 %

Infinity M300+ specifications

NOTE

¹ Since SpO2 measurements are statistically distributed, only about two-thirds of those measurements can be expected to fall within $\pm 1 A_{rms}$ of the value measured by a CO-oximeter.

² These accuracies have been validated using blood samples obtained from healthy adult volunteers during induced hypoxia studies in the range of 70 to 100% SpO2 against a laboratory CO-oximeter and ECG monitor.

³ SpO2 accuracies are expressed as $\pm "X" \%$ between indicated saturation levels. This variation of the SpO2 measurement equals $\pm 1 A_{rms}$ of the value measured by a CO-oximeter.

⁴ The pulse rate accuracy has been validated on healthy adult volunteers during induced hypoxia studies in the range of 70 to 100 % SpO2 against a laboratory CO-oximeter and ECG monitor. This variation equals $\pm 1 A_{rms}$ of the pulse rate value measured by the ECG monitor.

Nominal wavelength:	Nellcor: Red: 660 nm IR: 910 nm Masimo: Red: 660 nm IR: 905 nm
SpO2 alarm range	20 to 100 %
Pulse rate alarm range	30 to 240 bpm
Power	Nellcor: Red: 3 mW (maximum) IR: 4 mW (maximum) Masimo: Red: 0.9 mW (maximum) IR: 0.9 mW (maximum) LED drive is current limited by hardware mechanisms

Standards/compliance

IEC 60601-1
IEC 60601-1-2
IEC 60601-1-6
IEC 60601-1-8
IEC 60601-2-27
IEC 60601-2-49
IEC 62366-1:2015
IEC 80601-2-61
ANSI/AAMI EC13
ISO 10993-1

Infinity M300+ battery charging station

Infinity M300+ battery charging station specifications

Physical specifications	
Size, H x W x D	101.6 x 508 x 114.3 mm (4 x 20 x 4.5 in)
Weight, with 0 batteries	1.46 Kg (3.25 lb)
Weight, with 10 batteries	2.46 Kg (5.4 lb)
Cooling	Convection

Infinity M300+ battery charging station specifications	
Electrical specifications	
Input Voltage	100 V to 240 V AC
	CAUTION: Use a surge protector with all electrical hookups.
Input frequency (Hz)	50 Hz to 60 Hz AC inputs
Protection Class	Class 1
Mode of Operation	Continuous
Swappable battery recharging time	0 to 100 % within approximately 4 h
Environmental requirements	
Atmospheric pressure	Operating: 65 to 106 kPa Storage: 50 to 106 kPa
Temperature	Operating: 0 to 40 °C (32 to 104 °F) Storage: -20 to +60 °C (-4 to +140 °F)
Humidity (non-condensing)	Operating: 10 to 95 % Storage: 10 to 95 %
Protection against ingress of water	IPX1 (dripping) per IEC 60529

M300/M300+ Performance data

The following disclosures related to algorithm performance using certain waveforms are added or updated to the monitoring specifications:

M300/M300+ ECG/Arrhythmia/ST Supplemental information	
Time to alarm for tachycardia	Ventricular tachycardia 1 mVpp, 206 bpm Gain 0.5, range 3.0 to 3.5 seconds, average 3.3 seconds Gain 1.0, range 2.9 to 3.3 seconds, average 3.2 seconds Gain 2.0, range 2.8 to 3.5 seconds, average 3.0 seconds
	Ventricular tachycardia 2 mVpp, 195 bpm Gain 0.5, range 2.2 to 4.0 seconds, average 3.0 seconds Gain 1.0, range 1.9 to 2.5 seconds, average 2.3 seconds Gain 2.0, range 2.0 to 2.9 seconds, average 2.5 seconds
Tall T wave rejection capability	1.20 mV T wave amplitude
Heart rate averaging method	Heart rate is normally based on the average R-R interval calculated over the last 10 seconds.

M300/M300+ ECG/Arrhythmia/ST Supplemental information	
Response time of heart rate meter to change in heart rate	HR change from 80 to 120 bpm: Range: < 13 seconds HR change from 80 to 40 bpm: Range: < 13 seconds
Heart rate meter accuracy and response to irregular rhythm	Ventricular bigeminy: 80 bpm Slow alternating ventricular bigeminy: 60 bpm Rapid alternating ventricular bigeminy: 120 bpm Bidirectional systoles: 90 bpm
Accuracy of input signal	Methods A, B, C, and D from IEC 60601-2-27 were used to establish overall system error and frequency response.
Lead-off sensing applied current	Lead-off sensing applied current < 0.1 µ ampere

M300/M300+ User Interface	
Time from alarm condition to representation	System alarm delay: < 1/s

Electromagnetic compatibility (EMC)

The Infinity M300/M300+ has been designed and tested for compliance with current regulatory standards as to its capacity to limit electromagnetic emissions (EMI), and also as to its ability to block the effects of EMI from external sources. The Infinity M300 is designed to comply with the EMI/EMC standard, IEC 60601-1-2.

The separation distances are written regarding the Infinity M300/M300+. The numbers provided will not guarantee faultless operation. This information may not be applicable to other medical electrical equipment, and older equipment may be particularly susceptible to interference.

Reducing EMI

To reduce possible problems caused by electromagnetic interference, Dräger recommends the following:

- Use only Dräger-approved, accessories, otherwise the correct functioning of the device may be compromised. Contact your local Dräger representative for a list of approved accessories.
- Ensure that other products used in areas where patient monitoring and/or life-support products are used comply to accepted emissions standards (CISPR 11).
- To avoid interfering with device operation, do not operate devices (monitors, MPods, MCables, and accessories) close to equipment that emits microwave or other high-frequency emissions.

- Strictly limit access to portable radio-frequency sources, e.g., cellular phones, and radio transmitters. Be aware that portable phones may periodically transmit even when in *Standby* mode.
- Maintain good cable management. Try not to route cable over electrical equipment. Do not intertwine cables.
- Be sure that all electrical maintenance is performed by trained personnel.

General notes

Medical electrical equipment needs special precautions regarding electromagnetic compatibility (EMC) and needs to be installed and put into service according to the EMC information provided in this manual.

Cables and accessories not specified within the instructions for use are not authorized. Using other cables and/or accessories may adversely impact safety, performance and electromagnetic compatibility (increased emission and decreased immunity).

The equipment should not be used next to or stacked with other equipment; if adjacent or stacked use is inevitable, the equipment should be observed to verify normal operation in the configuration in which it will be used.

When using wireless networking, be aware that the system operates at the 2.4 to 2.4835 GHz ISM band. Other equipment, even if compliant with CISPR emission requirements, could interfere with reception of wireless data. When selecting new wireless systems (e.g. cell phones, pager systems, cordless phones, Bluetooth, etc.) for use in installations where wireless networking is used, care should always be used to insure that operating frequencies are compatible. For example, selecting cordless phones that operate at 2.4 GHz will likely cause difficulty with the phones and networking components.

NOTE

Detailed radio frequency characteristics: 2.4 to 2.4835 GHz ISM band, IEEE 802.11b/g compatible, limited to 100 mW. Applicable to both access points and client adapters. See the documentation that accompanies the wireless products for further details.

Low-level signals such as ECG are potentially susceptible to interference from electromagnetic energy. While the equipment meets the testing described below, it is not a guarantee of perfect operation, the 'quieter' the electrical environment the better. In general, increasing the distance between electrical devices decreases the likelihood of interference.

NOTE

The Infinity CentralStation and Infinity M300/M300+ are intended for use in the electromagnetic environments specified below. The user of this equipment should assure that is used in an environment meeting these specifications.

WARNING

Risk due to electrostatic discharge

Malfunctions that endanger the patient may occur if no protective measures against electrostatic discharge are employed in the following situations:

- When touching the pins of connectors that carry the ESD warning symbol.
- When establishing connections with these connectors.

To prevent malfunctions, observe the following measures and train the relevant personnel:

- Observe the ESD protective measures. Such measures may include wearing antistatic clothing and shoes, touching a potential equalization pin before and while making the connection, or using electrically insulating and antistatic gloves.
- Observe the requirements for the electromagnetic environment. Observe the following section: “Electromagnetic emissions“(page 294).

WARNING

Risk due to electromagnetic disturbance

Wireless communication devices (e.g., cellular phones) and medical electrical equipment (e.g., defibrillators, electrosurgical devices) emit electromagnetic radiation. When such devices are operated too close to this device or its cables, the functional integrity of this device may be compromised by electromagnetic disturbances. As a result, the patient could be put at risk.

Maintain a distance of at least 30 cm (12 in) between this device and wireless communication devices, to ensure that the essential performance of this device is fulfilled.

Maintain an adequate distance between this device and other medical electrical equipment.

Electromagnetic emissions		
Emissions	Compliance according to...	Electromagnetic environment
RF emissions (CISPR 11) Infinity CentralStation and Infinity M300/M300+	Group 1 Class A	The Infinity M300/M300+ must emit electromagnetic energy to perform its intended function. Nearby electronic equipment may be affected.

Electromagnetic immunity	
Immunity against...	Test level and required electromagnetic environment
Electrostatic discharge (ESD) (IEC 61000-4-2)	Contact discharge: ±8 kV
	Air discharge: ±15 kV

Electromagnetic immunity	
Immunity against...	Test level and required electromagnetic environment
Fast transient electrical disturbances (bursts) (IEC 61000-4-4)	Power cable: ± 2 kV
	Longer signal input lines/output lines: ± 1 kV
Impulse voltages (surges) (IEC 61000-4-5)	Common mode: ± 2 kV
	Voltage, external conductor – external conductor: ± 1 kV
	Voltage, external conductor – protective ground conductor: ± 2 kV
Magnetic fields at mains frequency 50/60 Hz (IEC 61000-4-8)	30 A/m
Voltage dips (IEC 61000-4-11)	0% U_T ; 0.5 cycle At 0°, 45°, 90°, 135°, 180°, 225°, 270°, and 315° 0% U_T ; 1 cycle and 70% U_T ; 25/30 cycles Single phase: at 0°
Voltage interruptions (IEC 61000-4-11)	0% U_T ; 250/300 cycle
Radiated high-frequency disturbances (IEC 61000-4-3)	80 MHz to 2.7 GHz: 3 V/m
Conducted high-frequency disturbances (IEC 61000-4-6)	150 kHz to 80 MHz: 3 Vrms, ISM bands: 6 Vrms
Electromagnetic fields in the vicinity of wireless communication devices	Various frequencies from 385 MHz to 5785 MHz: 9 V/m to 28 V/m, with various pulse modulations
Proximity to magnetic fields (IEC 61000-4-39)	Test frequency: 30 kHz Modulation: CW Immunity Test Level (A/m): 8 Test frequency: 134,2 kHz Modulation: Pulse modulation, 2,1 kHz Immunity Test Level (A/m): 65 Test frequency: 13,56 MHz Modulation: Pulse modulation, 50 kHz Immunity Test Level (A/m): 7,5

Infinity M300/M300+ Radio emissions statement

NOTE

This device was developed and produced in a manner that the emission limits for RF (Radio Frequency Energy), defined by the FCC (Federal Communication Commission), by RSS (Radio Standards Specification) and by ETSI, IEC 60601-1-2, will not be exceeded. These limits are part of international safety standards and defined by international committees.

NOTE

The Infinity M300 and M300+ complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

NOTE

The emissions characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required), this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.

Recommended separation distances from wireless communication devices

To ensure that the functional integrity of this device is maintained, there must be a separation distance of at least 30 cm (12 in) between this device and wireless communication devices.

NOTE

Avoid exposure to known sources of EMI (electromagnetic interference) with medical devices such as magnetic resonance imaging MRI systems, diathermy, lithotripsy, electrocautery, RFID (Radio Frequency Identification), and electromagnetic security systems such as metal detectors. Note that the presence of RFID devices may not be obvious.

Operating characteristics

Classification

Classification Medical Device Europe

Class IIb

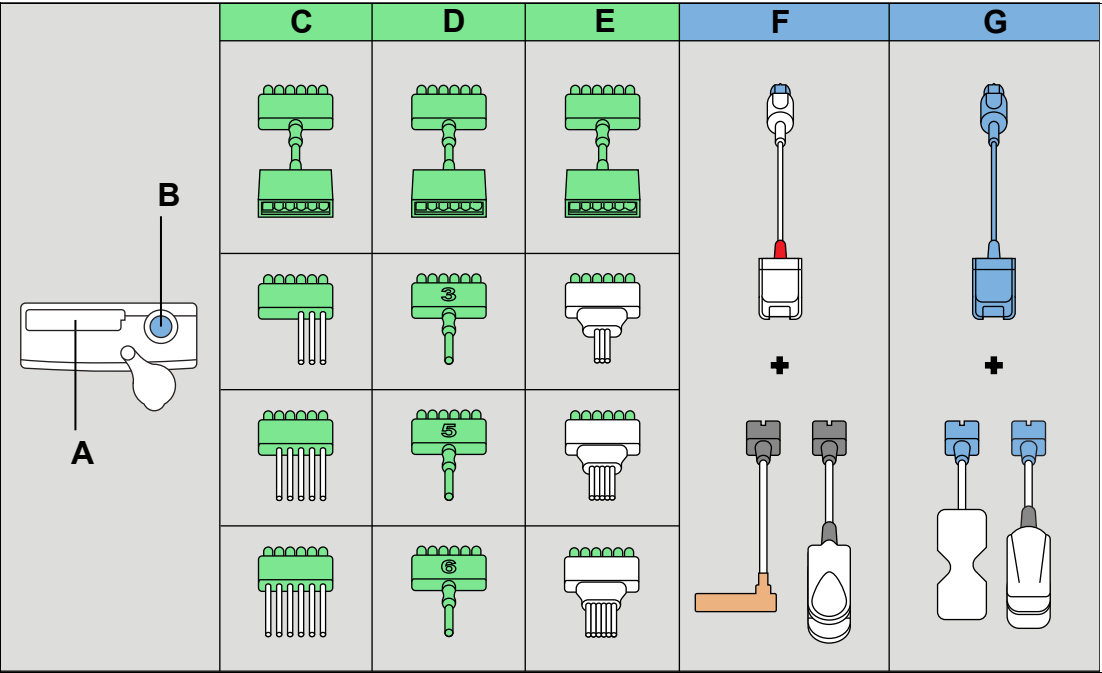
List of accessories

M300/M300+ accessories overview	298
Accessories	298
General M300/M300+ accessories	299
System components	299
ECG monitoring – reusable leadsets	301
ECG monitoring – single-patient use leadsets	303
ECG monitoring – MonoLead	305
ECG monitoring – Telemetry	307
ECG-leads Telemetry	308
Telemetry cables with single-pin connector	308
Pulse Oximetry (SpO2) monitoring with Masimo	309
Masimo SpO2 cables	310
Masimo LNCS disposable sensors	310
Masimo LNCS reusable sensors	310
Pulse Oximetry (SpO2) monitoring with Nellcor	311
Nellcor SpO2 cables	312
Nellcor disposable sensors	312
Nellcor reusable sensors	312
Dräger disposable sensors	312
Dräger reusable sensors	312
M300/M300+ accessories overview	313
Pulse Oximetry (SpO2) monitoring with Masimo (for M300/M300+)	313

M300/M300+ accessories overview

The following diagram is an overview of the accessories available for the M300/M300+.

Accessories



- A ECG connector
- B SpO2 connector
- C ECG - Grabber and Telemetry lead wire sets
- D ECG - Monolead
- E ECG - Single-patient use
- F Masimo SpO2
- G Nellcor SpO2

This chapter lists the accessories available for the ICS with M300/M300+ configuration.

The chapter is divided into the following sections:

- “General M300/M300+ accessories” on page 299

- “ECG monitoring – reusable leadsets” on page 301
- “ECG monitoring – single-patient use leadsets” on page 303
- “ECG monitoring – MonoLead” on page 305
- “ECG monitoring – Telemetry” on page 307
- “Pulse Oximetry (SpO2) monitoring with Masimo” on page 309
- “Pulse Oximetry (SpO2) monitoring with Nellcor” on page 311

Each parameter section has its own diagram depicting the parameter-specific accessories. Letters in the diagrams correspond to the letters in the tables that list the descriptions and the part numbers of the accessories. Because some accessories are too numerous to list in the diagram, they do not have a letter associated with them.

Part numbers are subject to change without prior notice. Use only Dräger-approved accessories, otherwise the proper functioning of the ICS may be compromised. Contact your Dräger representative for the most up to date part numbers.

This chapter only contains accessories for the ICS and the M300/M300+. For information about accessories for bedside monitors, refer to the instructions for use of the specific bedside monitor.

General M300/M300+ accessories

The following table lists the system components, power cables, system cables, and keyboards for the ICS with M300/M300+ configuration.

System components

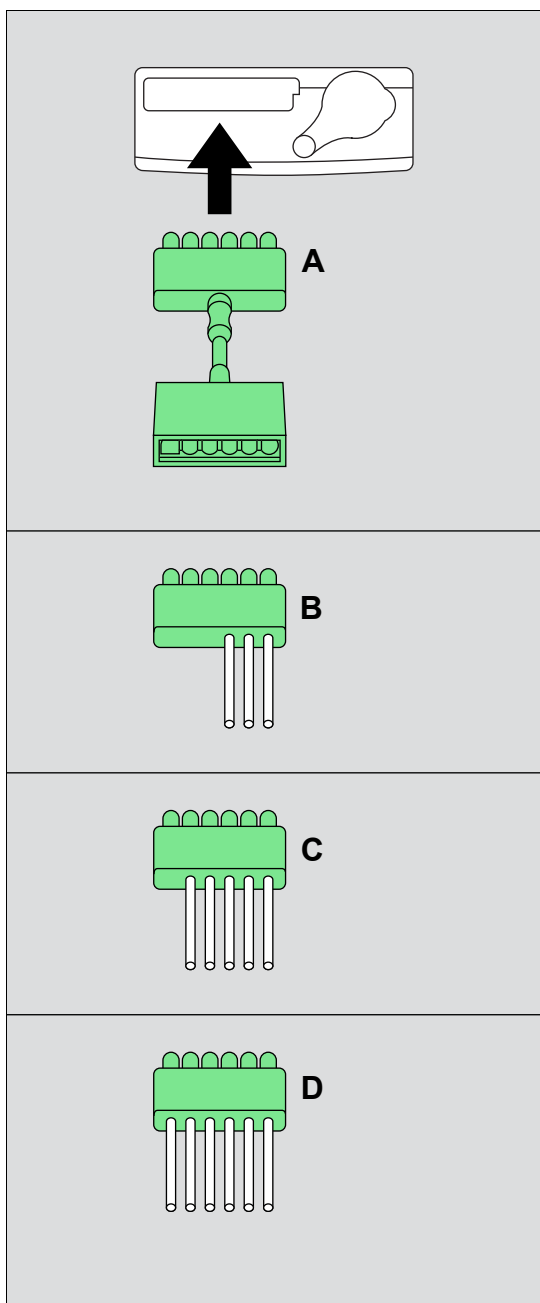
The following parts are components of the ICS with M300/M300+ configuration. They are not available for purchase individually. Contact your Dräger representative for additional information.

Part	Part No.
Bedside Charger (M300 only)	MS29558
Central Charger (M300 only)	MS25699
Infinity CentralStation CPU	MS26800
Infinity M300	MS25755
Tele Transm Pouch Disp. 100 pcs	MS22905
Pouch M300 Waterproof New Tag (M300 only)	MS32401
Shp Exc M300	MS26076
Ship Unit M300+	MS33648
E/M ASY M300+ Battery(M300+ only)	MS33308
Shp OEM INF M300+ Battery Charger (M300+ only)	MS33198

List of accessories

Part	Part No.
Shp Exc M300+	MS33659
Pouch M300+ disposable 100 pcs	MS34194
Pouch M300+ Waterproof New Tag (M300+ only)	MS33867
Battery Retainer (package of 10) (M300+ only)	MS34708

ECG monitoring – reusable leadsets



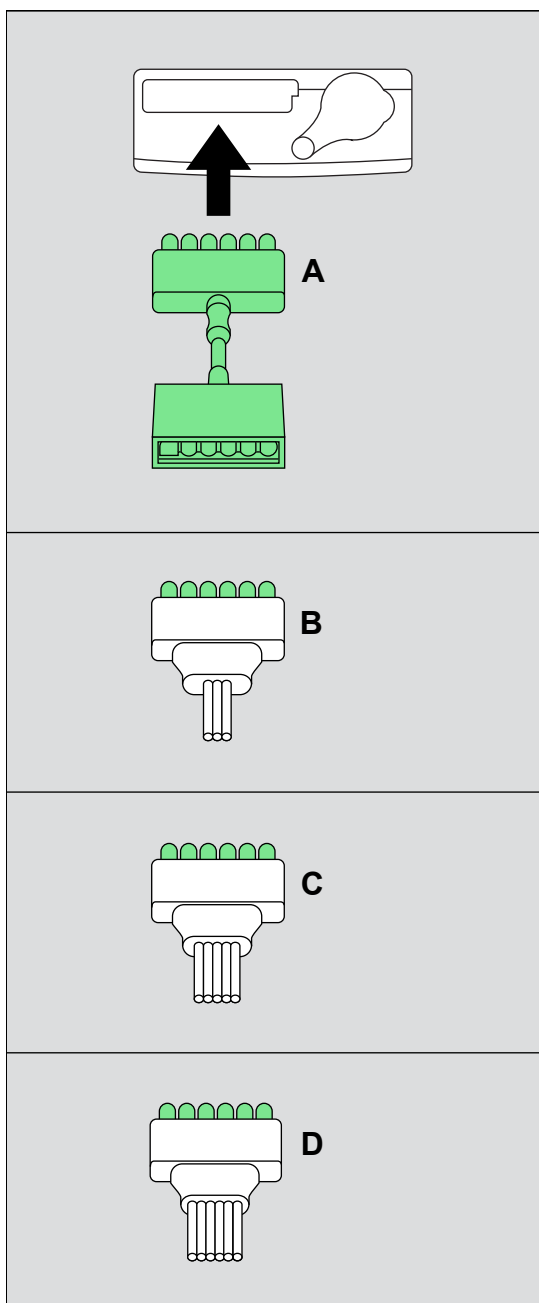
ECG accessories

	Part	Part No.
A	ECG extension cable 3/5/6, 2 m (6.5 ft)	MS16256
	ECG extension cable 6-lead, 2 m (6.5 ft)	MP05115

Reusable leadsets

	Part	Part No.
B	ECG grabber 3-lead, IEC1 (Europe), 1 m (3.3 ft)	MP03401
	ECG grabber 3-lead, IEC2 (AHA/US), 1 m (3.3 ft)	MP03402
C	ECG grabber 5-lead, IEC1 (Europe), 1 m (3.3 ft)	MP03403
	ECG grabber 5-lead, IEC2 (AHA/US), 1 m (3.3 ft)	MP03404
D	ECG grabber 6-lead, IEC1 (Europe), 1 m (3.3 ft)	MP03405
	ECG grabber 6-lead, IEC2 (AHA/US), 1 m (3.3 ft)	MP03406

ECG monitoring – single-patient use leadsets



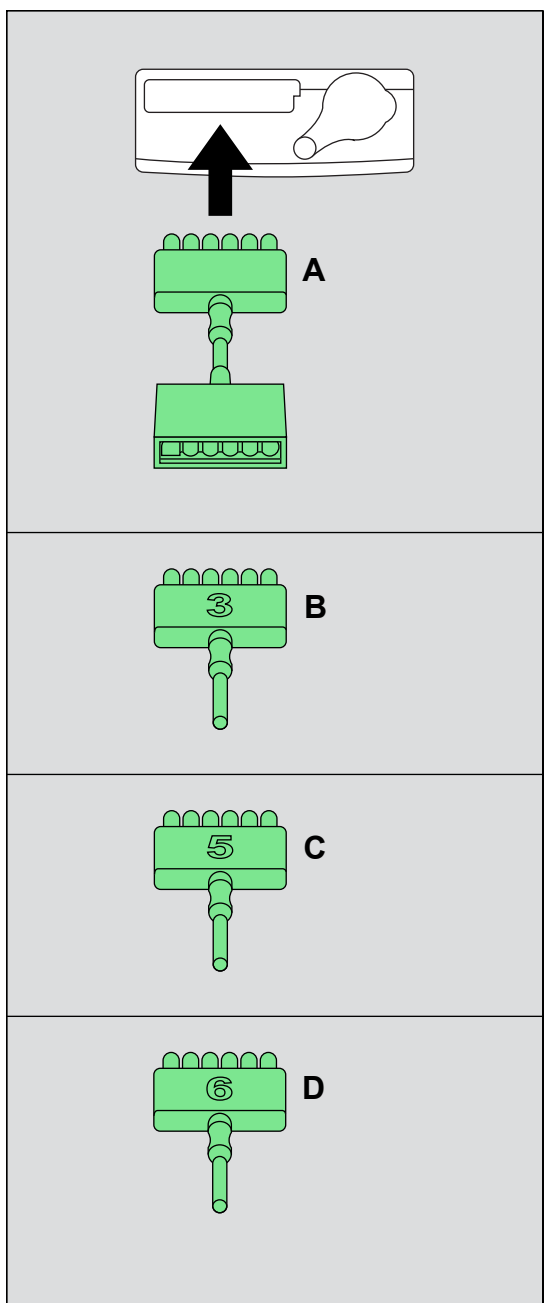
ECG accessories

	Part	Part No.
A	ECG extension cable 3/5/6, 2 m (6.5 ft)	MS16256

Single-patient use leadsets

	Part	Part No.
B	ECG grabber 3-lead, IEC1 (Europe), 1 m (3.3 ft)	MP00875
	ECG grabber, 3-lead, IEC2 (AHA/US), 1 m (3.3 ft)	MP00877
C	ECG grabber, 5-lead, IEC1 (Europe), 1 m / 1.5 m (3.3 ft / 4.9 ft)	MP00879
	ECG grabber, 5-lead, IEC2 (AHA/US), 1 m / 1.5 m (3.3 ft / 4.9 ft)	MP00881
D	ECG grabber, 6-lead, IEC1 (Europe), 1 m / 1.5 m (3.3 ft / 4.9 ft)	MP03122
	ECG grabber, 6-lead, IEC2 (AHA/US), 1 m / 1.5 m (3.3 ft / 4.9 ft)	MP03123

ECG monitoring – MonoLead



412

ECG accessories

	Part	Part No.
A	ECG extension cable 3/5/6, 2 m (6.5 ft)	MS16256
	ECG extension cable 6-lead, 2 m (6.5 ft)	MP05115

MonoLeads 1st generation

	Part	Part No.
B	ECG MonoLead 3-lead, IEC1 (Europe), 2 m (6.5 ft)	MS14555
	ECG MonoLead 3-lead, IEC2 (AHA/US), 2 m (6.5 ft)	MS14556
	ECG MonoLead 3-lead, IEC1 (Europe), 4.1 m (13.5 ft) ¹⁾	MS28561
	ECG MonoLead 3-lead, IEC2 (AHA/US), 4.1 m (13.5 ft) ¹⁾	MS28557
C	ECG MonoLead 5-lead, IEC1 (Europe), 2.5 m (8.2 ft)	MS14559
	ECG MonoLead 5-lead, IEC2 (AHA/US), 2.5 m (8.2 ft)	MS14560
	ECG MonoLead 5-lead, IEC1 (Europe), 5.3 m (17.4 ft) ¹⁾	MS28559
	ECG MonoLead 5-lead, IEC2 (AHA/US), 5.3 m (17.4 ft) ¹⁾	MS28558
D	ECG MonoLead 6-lead, IEC1 (Europe), 3 m (10 ft)	MS14683
	ECG MonoLead 6-lead, IEC2 (AHA/US), 3 m (10 ft)	MS14682
	ECG MonoLead 6-lead, IEC1 (Europe), 5.7 m (18.7 ft) ¹⁾	MS17185
	ECG MonoLead 6-lead, IEC2 (AHA/US), 5.7 m (18.7 ft) ¹⁾	MS28560

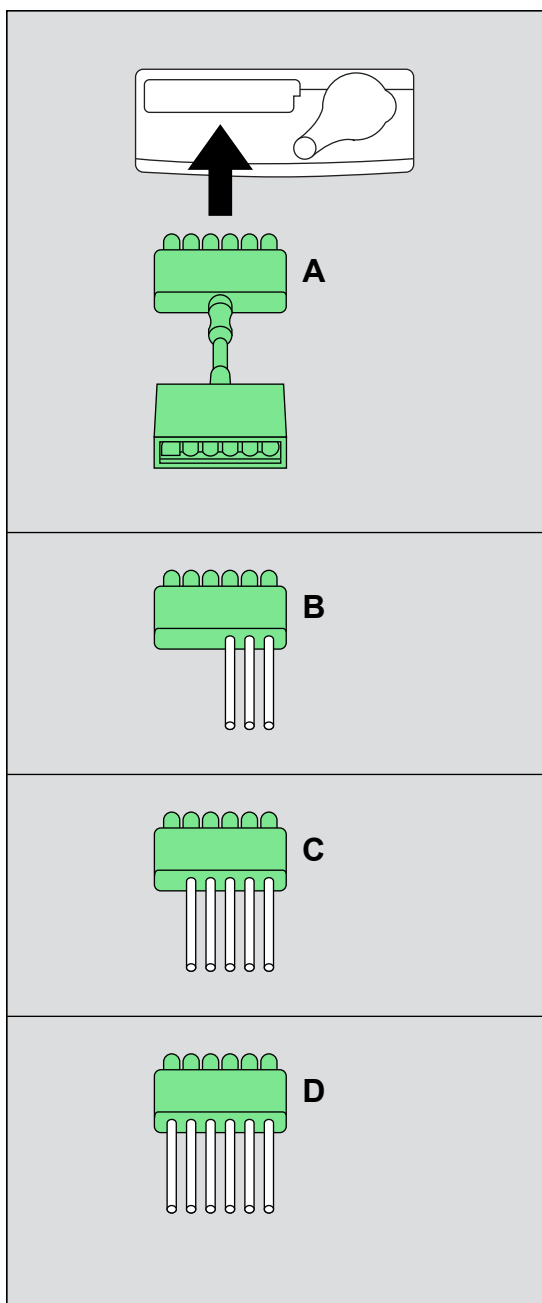
¹⁾ The indicated accessories must *not* be used in combination with the extension cable MS16256.

MonoLeads 2nd generation

	Part	Part No.
B	ECG MonoLead 3-lead, IEC1 (Europe), 2 m (6.5 ft)	MP05120
	ECG MonoLead 3-lead, IEC2 (AHA/US), 2 m (6.5 ft)	MP05121
	ECG MonoLead 3-lead, IEC1 (Europe), 4.1 m (13.5 ft) ¹⁾	MP05130
	ECG MonoLead 3-lead, IEC2 (AHA/US), 4.1 m (13.5 ft) ¹⁾	MP05131
C	ECG MonoLead 5-lead, IEC1 (Europe), 2.5 m (8.2 ft)	MP05122
	ECG MonoLead 5-lead, IEC2 (AHA/US), 2.5 m (8.2 ft)	MP05123
	ECG MonoLead 5-lead, IEC1 (Europe), 5.3 m (17.4 ft) ¹⁾	MP05132
	ECG MonoLead 5-lead, IEC2 (AHA/US), 5.3 m (17.4 ft) ¹⁾	MP05133
D	ECG MonoLead 6-lead, IEC1 (Europe), 3 m (10 ft)	MP05124
	ECG MonoLead 6-lead, IEC2 (AHA/US), 3 m (10 ft)	MP05125
	ECG MonoLead 6-lead, IEC1 (Europe), 5.7 m (18.7 ft) ¹⁾	MP05134
	ECG MonoLead 6-lead, IEC2 (AHA/US), 5.7 m (18.7 ft) ¹⁾	MP05135

¹⁾ The indicated accessories must *not* be used in combination with the extension cables MS16256 and MP05115.

ECG monitoring – Telemetry



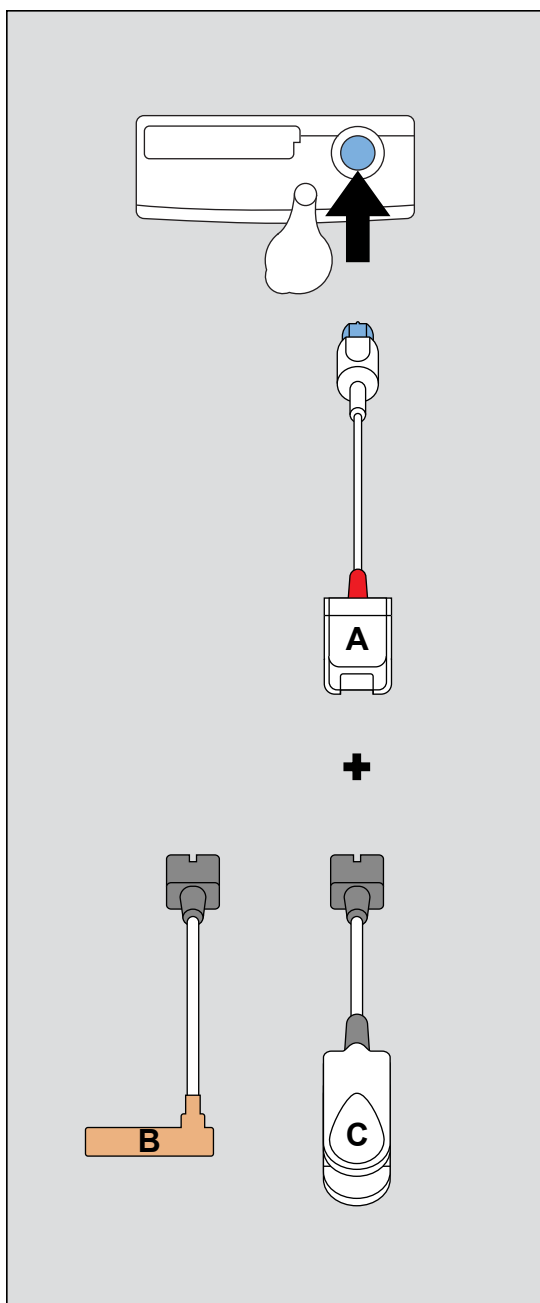
ECG-leads Telemetry

	Part	Part No.
A	ECG extension cable 3/5/6, 2 m (6.5 ft)	MS16256
	ECG extension cable, 6-lead, 2 m (6.5 ft)	MP05115

Telemetry cables with single-pin connector

Part	Part No.
ECG cable, 3-lead TruST tele., single-pin, EURO, 70 cm	MP03421
ECG cable, 3-lead TruST tele., single-pin, AHA, 70 cm	MP03422
ECG cable, 5-lead TruST tele., single-pin, EURO, 70 cm	MP03423
ECG cable, 5-lead TruST tele., single-pin, AHA, 70 cm	MP03424
ECG cable, 6-lead TruST tele., single-pin, EURO, 70 cm	MP03425
ECG cable, 6-lead TruST tele., single-pin, AHA, 70 cm	MP03426

Pulse Oximetry (SpO₂) monitoring with Masimo



Masimo SpO₂ cables

	Part	Part No.
A	Masimo intermediate cable, LNCS 1.2 m (3.9 ft)	MS24303
	Masimo intermediate cable, LNCS 3 m (9.8 ft)	MS17522

The following tables list the compatible sensors available for purchase from Dräger.

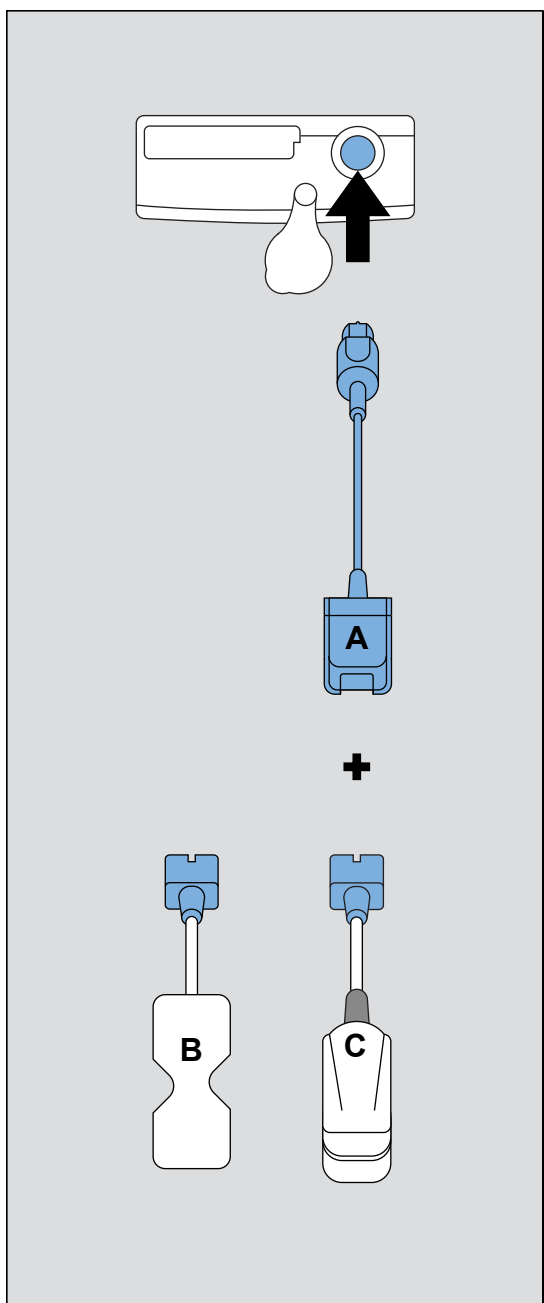
Masimo LNCS disposable sensors

	Part	Part No.
B	Adtx, adult, 20 pieces	MP00790
	Pdtx, pediatric, 20 pieces	MP00793

Masimo LNCS reusable sensors

	Part	Part No.
C	DCI, adult, finger	MP00796
	DCIP, pediatric, finger	MP00795
	SpO ₂ sensor Masimo LNCS-TC-I Ear, reusable, pediatric/adult	MP00788
	SpO ₂ sensor Masimo LNCS-TF-I, reusable, pediatric/adult	MP00799

Pulse Oximetry (SpO₂) monitoring with Nellcor



Nellcor SpO₂ cables

	Part	Part No.
A	Intermediate cable, 1.2 m (3.9 ft)	MS18683
	Intermediate cable, 3 m (9.8 ft)	MS17330

Nellcor disposable sensors

The following tables list the compatible sensors available for purchase from Dräger.

	Part	Part No.
B	OxiMax MaxA, 46 cm (18 in) cable, 24 pieces	MX50065
	OxiMax MaxAL, 91 cm (36 in) cable, 24 pieces	MX50071
	OxiMax MaxP, pediatric, 24 pieces	MX50066

Nellcor reusable sensors

	Part	Part No.
C	Durasensor DS100A, adult, finger	7262764

Dräger disposable sensors

	Part	Part No.
B	Dräger SpO ₂ sensor, pediatric, foam	MS16444
	Dräger SpO ₂ sensor, adult, foam	MS16445
	Dräger SpO ₂ sensor, pediatric, vinyl	MS16448
	SpO ₂ adhesive sensor Dräger, vinyl, disposable, adult, 24 pieces.	MS16449

Dräger reusable sensors

	Part	Part No.
C	Dräger SpO ₂ finger sensor, adult	MS13235

M300/M300+ accessories overview

Pulse Oximetry (SpO₂) monitoring with Masimo (for M300/M300+)

The following components are for both M300 and M300+. Contact your Dräger representative for additional information.

NOTE

- For Masimo sensors, there are unique part numbers for Global, USA, and Japanese location references.
- Always refer to the Directions for Use accompanying the Masimo patient accessories.
- LNCS intermediate cables are designed to last approximately 17,000 hours while actively monitoring SpO₂ (for example 4 years if monitoring occurs 12 hours a day). This duration is monitored by a chip inside the cable.

LNCS Adhesive SpO₂ Sensors

Global Part Number	USA Part Number	Japanese Part Number	Description
MP00790	MP03011	MP03089	Masimo SpO ₂ -Sen.LNCS Amtx.Bx20
MP00793	MP03012	MP03090	Masimo SpO ₂ -Sen.LNCS Pmtx.Bx20

LNCS Reusable SpO₂ Sensors

Global Part Number	USA Part Number	Japanese Part Number	Description
MP00796	MP03019	MP03097	Masimo SpO ₂ -Sensor LNCS DC-I
MP00795	MP03020	MP03098	Masimo SpO ₂ -Sensor LNCS DC-IP
MP00789	MP03023	MP03102	SpO ₂ Masimo Sen LNCS-YI Multi
MP02993	MP03024	MP03103	SpO ₂ Masimo Sen LNCS DBI Adult NOTE: Masimo does not make any claims regarding motion for this sensor.

NOTE

To use Masimo RD-SET sensors, an additional intermediate cable is required.

Masimo RD-SET SpO2 Sensors

Global Part Number	USA Part Number	Japanese Part Number	Description
MS33726	MS33745	MS33764	Masimo SpO ₂ RD-SET Adt
MS33727	MS33746	MS33765	Masimo SpO ₂ RD-SET Pdt
MS33740	MS33759	MS33778	Masimo SpO ₂ -Sen RD-SET DC-I
MS33741	MS33760	MS33779	Masimo SpO ₂ -Sen RD-SET DCIP
3718728	3718727	3718726	Masimo SpO ₂ RD-SET DB-I

Masimo RD-SET Adapters

Global Part Number	USA Part Number	Japanese Part Number	Description
MS33731	MS33750	MS33769	RD to LNOP adapter
MS33732	MS33751	MS33770	RD to LNCS adapter
MS33734	MS33753	MS33772	RD to M-LNCs adapter

RD SET intermediate cables

PN	Description
MS34436	SpO ₂ intermediate cable Masimo RD-SET, 1.2 m
MS34437	SpO ₂ intermediate cable Masimo RD-SET, 3 m

Index

A

Abbreviations	68
Accessing setup page	
ARR	165
ECG	153
SpO2	185, 196
ST	174
Acknowledging a latched alarm	126
Adding an M300	210
Adjusting volume	
M300	130
Admitting a patient	114
Over the network	115
To the MultiView WorkStation	114
Alarm archive, configuring	220
Alarm pause	
For M300	132
From a remote network device	133
Alarm pause system setting	
Configuring	211
Alarm validation	
About	127
List of parameters	127
Alarms	
Acoustic alarm signals, ICS	128
Acoustic alarm signals, M300	128
Arrhythmia parameter setup	136
Auto setting limits, M300	138
ICS	122
Latching	126
Limit defaults	140
Limit ranges	140
M300	122
Multiple parameter setup	133
Non-latching	126
Pattern, ICS	128
Priority	123
Processing, ICS	123
Processing, M300	123
Setting up groups	139
Visual alarm indicators, M300	128

ARR

Accessing setup page	165
Available settings	165
Configuring default settings	219
Defaults and ranges	141
Display, ICS	164
Modes	163
Selecting leads	160
Arrhythmia alarm messages	237
Arrow keys, M300	49
Artifact, reducing	157
Audio pause	
BedView	131
From a remote network device	132
Auto setting alarm limits	138

B

Back panel, M300	50
Bar graph (SpO2), on/off	228
Battery	
Remaining battery life	233
Status LED	47
Bedside charger for M300	51
BedView	
Alarm Pause for M300	132
Audio pause	131
Buttons	
Alarm pause, For M300	132

C

Cable type, selecting	227
Cause/remedy messages	236
Central charger	
Technical specifications	62, 285
Central charger, M300	53, 61
Clinical users	6
Colors, selecting	228
Communicating with the network	77
Configuring arrhythmia defaults	219
Connections	
SpO2 (Masimo)	181
SpO2 (Nellcor)	191
ST lead wire sets	167

Cybersecurity

Best practices	23
Cybersecurity attack	26
Error message	29
Legacy mode	20, 28
Multicast network traffic	24
Network compatibility of devices	32
Packet storm	20
Passwords	25
PSK	20
Secure mode	20, 28
Security credential expiration	31
Terminology	20

D

Data transfer	83
From M300 to M300	86
From M300 to monitor	85
From monitor to M300	85
Defaults	
Alarm defaults	217
Alarms	140
Arrhythmia	141
Parameter layout	221
Telemetry setup	212
waveform channels	222
Defibrillator precautions	17
Device description	
ICS	72
Device interference	16
Device locator function	232
Device precautions	16
Device setup	232
Device setup functions	234
Devices	
Adding	210
Removing	210
Diagnostic code (recordings)	203
Discharging a patient	116
Display	
Connectors	45
Disposal of devices	272
Docking a monitor	72

E**ECG**

Accessing setup page	153
Available settings	154
Display, ICS	146
Display, M300	146
Electrode colors	149
Electrode placement	150
Infusion pumps	157
Line isolation devices	157
Monitoring paced patients	155
Pacemaker precautions	155
Pacer detection on/off	154
Patient preparation	145
Roller bypass pumps	157
Signal processing	144
Signal quality	157
Standard lead format, selecting	165
Supported parameters	145
TENS signals	158
Transient signals	157
Electric shock danger	12
Electrical safety	12
Electrode colors	149
Electrode placement	150
Electromagnetic compatibility	292
ESD warning symbol	64

F

Find device function	232
Fixed keys, M300	49
Fusion mode	157

G

Gain/scale (telemetry), selecting	222

H**Hardware**

Unauthorized changes	8

I**ICS**

Acoustic alarm signal	128
Alarm sounds	128
Alarms	122
Basic components of	44
Infinity network communication	77
Infusion pumps, artifact	157

Intended use	40
IPX1 symbol	63

L

Latching alarms	126
Layout, configuring	222
Lead-wire sets, connecting	167
Learning QRS pattern	175
Local ICS, description	72
Local M300, description	72
Local monitoring unit, description	72

M

M300	
Adding devices	210
Alarms	122
Arrow keys	49
Back panel	50
Battery status	47
Bedside charger	51
Central charger	53, 61
Definition of	72
Fixed keys	49
Power key	49
Record button, configuring	211
Staff alert key	49
Turning the M300 on/off	108
M300 technical specifications	278
Masimo SET MCable, connecting	181, 191
Messages	
Arrhythmia	237
ECG alarms	238
SpO2 alarms	242
ST alarms	240

N

Network	
Communication	77
precautions	11
Non-latching alarms	126

O

Operating concept	71
ICS	72

P

Pacemaker	
Detection on/off	154, 227
Fusion mode	157
Infusion pumps	157
Roller bypass pumps	157
TENS	158
Pacemaker precautions	155
Pacer detection on/off	154
Parameter layout defaults	221
Patient category	
Selecting	118
Types	118
Patient discharge	116
Patient preparation	
SpO2 (Masimo)	181
SpO2 (Nellcor)	192
Patient safety	7, 13
Power key, M300	49
Precautions	
Device	16
SpO2 (Masimo)	179
SpO2 (Nellcor)	189
Priority, alarms	123
Problem solving	236

R

Record button M300, configuring	211
Recordings	
Diagnostic code	203
Manual request	200
Manual vs. automatic	201
Timed recordings	201
Relearning QRS pattern	175
Remote ICS	
Definition of	72
Description of	78
Remote M300, description	72
Remote monitoring unit, definition of	72
Repairs	9
Reprocessing personnel	6
Restrictions of use	16
Roller bypass pumps	157

S

Safe disposal	272

Safety		ST	
accessories	9	12-lead ST monitoring	167
connecting other equipment	12	12-Lead TruST monitoring	168
Defibrillator precautions	17	6-lead ST monitoring	167
defibrillator precautions	17	Accessing setup page	174
Maintenance	9	Adjusting ISO points	173
networking	11	Adjusting measurement points	173
patient safety	13	Available settings	175
Site of operation	16	Complex pages	169
Screen layout		Complex pages, viewing a single one	172
Configuring	222	Complex pages, viewing all	170
Screen shut-off feature	211	Connecting lead wire sets	167
Service personnel	6	Display, ICS	169
Shut off timer setting	76	ISO point	173
Signal strength (RF output)	233	Measurement point	173
Site of operation	16	Reference	174
Site of operation, precautions	16	Standard monitoring	167
Six-lead ST monitoring	167	ST alarm messages	240
Speaker volume, configuring	211	Staff alert key, M300	49
Special conditions		Staff alert on/off	211
Alarm event storage	139	Standby mode	87
Special conditions for alarm event recording	138	Symbols, device	63
SpO2		System setup	
Accessing setup page	185, 196	ECG settings	227
Available settings	185, 196	SpO2 settings	228
Bar graph (Masimo)	185	ST3-lead settings	229
Bar graph (Nellcor)	196	ST5-lead settings	229
Connecting the cable, Masimo	181	STscreen, 6-lead settings (TruST OFF)	230
Connecting the cable, Nellcor	191	System setup for alarm pause feature	211
Display, ICS	183, 194	System setup STscreen, 6-wire (TruST ON)	231
Display, M300	183, 194		
Monitoring a patient, Masimo	180	T	
Monitoring a patient, Nellcor	190	TACH = Tachycardia	
Patient preparation (Masimo)	181	Technical data	
Patient preparation (Nellcor)	192	Central charger	62, 285
Precautions (Masimo)	179	M300	278
Precautions (Nellcor)	189	Technical specifications	277
Supported parameters	178, 188	Telemetry setup defaults	212
SpO2 alarm messages (M300)	242	Telemetry setup defaults (BedView)	232
SpO2 monitoring on/off	228	layout/parameters	109
SpO2 waveform color (telemetry), selecting	228	TENS signals	158
		Timed recording, manual recording request	200
		Timed recordings, about	201
		Trademarks	4
		Transfer, see Data transfer	
		Transferring patient data	81
		Troubleshooting	236
		TruST 12 lead monitoring on/off	227
		Turning on the CentralStation	109
		Turning on the M300	108, 109
		Twelve-lead ST monitoring	167

U

Users 6

V

Validating alarm conditions 127

Volume control of device 211

W

Waveform channel, setting up (Telemetry) ...222

This page has been left blank intentionally.

These instructions for use apply only to
Infinity® M300 and M300+ Series VG3.0/VG3.0.1
with the Serial No.:

If no Serial No. has been filled in by Dräger, these
Instructions for Use are provided for general
information only and are not intended for use with
any specific machine or unit.



The radio equipment in the Infinity M300 patient
monitor complies with the Radio Equipment
Directive (2014/53/EU). A copy of the
Declaration of Conformity is available at the
following Internet address:
www.draeger.com/doc-radio

Manufacturer:



Draeger Medical Systems, Inc.

3135 Quarry Road
Telford, PA 18969-1042
U.S.A.



(215) 721-5400
(800) 4DRAGER
(800 437-2437)

FAX

(215) 723-5935



<http://www.draeger.com>



Drägerwerk AG & Co. KGaA

Moislinger Allee 53 – 55
23542 Lübeck
Germany



+49 451 8 82-0

FAX

+49 451 8 82-20 80



<http://www.draeger.com>

3717027 – RI 03 en

© **Drägerwerk AG & Co. KGaA**

Edition: 3 – 2024-08

(Edition: 1 – 2022-10)



Dräger reserves the right to make modifications
to the equipment without prior notice.