Volumetric Infusion Pumps
Service Manual

ARGUS 717 V
ARGUS 718 V

en

Firmware from 5.09

MADE SWISS

CE 0123

CODAN

14.544_D_SM_en_A71XV_5.09

Front

1. Indicator for mains operation (Battery recharge)
2. Status light
3. Drop light
4. LC display
5. Soft keys
6. Door handle
7. Drop detector
8. General alarm
9. Drop detector holder
10. pressure sensor ‹Upstream›
11. pressure sensor ‹Downstream›
12. Automatic ‹free-flow› block
13. Air bubble detector

Rear

14. Power connection
15. DC connection & interface for a medical PC
16. Nurse call
17. Optional interfaces: RS-232 galvanic isolated; Ethernet
18. Drop detector connection
19. Handle

READ CAREFULLY BEFORE USE

KEEP FOR FUTURE REFERENCE

This manual contains the latest data available and is subject to changes in accordance with technical improvements.
It is intended for the exclusive use by authorized persons who have been trained in maintenance and repair of devices by CODAN ARGUS AG. The service manual is meant to be used together with the user manual. The information in this document is relevant to the service personnel (as defined in IEC60601-1:2005+Amd1:2012, see Section „1.1. Important Terms and Definition") servicing the device. Other operators (e.g. nurses, doctors, etc.) handling the device are not obliged to know the content of this document.

1.1 Important Terms and Definition

Service Personnel
Individual or entity accountable for installing, assembling, maintaining and repairing the device.

For numbers in decimal notation, a point is used for the separator.

When ARGUS 71x V is used, both kinds of infusion pumps are meant - ARGUS 717 V and ARGUS 718 V.

CODAN *ARGUSservice*
This is a PC-Windows based service software for the configuration and maintenance of ARGUS 71x V.

Meaning of signal words in this document:

⚠ DANGER
The signal word DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

⚠ WARNING
The signal word WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

⚠ CAUTION
The signal word CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

Notice
The signal word NOTICE serves to advise the user of additional important information. There is no correlation with safety-relevant risks.

1.2 Intended use

The volumetric pumps ARGUS 717 V and ARGUS 718 V are purposed to deliver fluids and medications through any clinically accepted route of administration connected to a patient in a predefined way.
The devices are intended for infusion therapies including but not limited to:

- Drugs such as cytostatic agents, anesthetics, etc.
- Blood and blood components
- Total Parenteral Nutrition (TPN)
- Lipids
- Colloids and crystalloids

The volumetric pumps ARGUS 717 V and ARGUS 718 V are designed to be safe for continuous operation (24 hours per day) during expected life-time under the assumption that it is operated and serviced as specified in the instructions for use. The device shall be operated by trained medical professionals, under the continuous supervision of qualified healthcare professionals that have been properly instructed and trained in the use of the volumetric pump.
The system is intended for use on human adults, juveniles, infants and neonates.

Contra-indication

The ARGUS 717 V and ARGUS 718 V are not designed and approved:

- for home use.
- for ambulance or helicopter use.
- in a hyperbaric chamber.
- in a MRI environment.
- with non-calibrated IV-sets.
- for use by unqualified, untrained staff.

For further information please contact the official distributor or the manufacturer's Customer Service Department.

1.3 Safety Notification

⚠ WARNING

- Configuration changes with the CODAN *ARGUSservice* utility, as well as repairs and manipulations requiring the opening of the ARGUS 71x V may only be performed by authorized and trained personnel. Otherwise, patient or user safety is not guaranteed. CODAN ARGUS AG shall not assume any responsibility for any manipulations which have been carried out on the ARGUS 71x V by a non-authorized person.
- To completely isolate the ARGUS 71x V from mains power, it has to be unplugged.
- The Safety Standard Check (SSC) has to be performed at least every 24 months or after 10'000 hours of operation. The SSC has to be performed in accordance with Section „11. Safety Standard Check (SSC)".
- Modifications outside of this service manual are not allowed.
- The pumps should not be used adjacent to or stacked with other equipment.

In case of repair, send the device together with the filled out repair order form to the local distributor. See Section „12. Repair Order Form". Further information is available at:

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The latest ARGUS 71x V firmware version and CODAN *ARGUSservice* software are available under www.codanargus.com/Login section. First-time users are required to register in order to enter the Login area of the website.

Besides the regular SSC, no additional maintenance is necessary. The device does not contain wearing parts.

1.4 Essential Performance Testing

The essential performance of the ARGUS 71x V can be tested for functionality as follows:

- Alarming - during start-up, check to ensure that the status LED shortly lights up red and a short beep is emitted.
- Nurse Call - ensure that the nurse call configuration parameter is enabled (see Sections „3.9. Parameter Control“ and „5.5.1. Configuration Parameters“). Then connect the ARGUS 71x V to a nurse call system, insert an infusion set and initiate an alarm on the pump. The nurse call system should indicate an alarm. If access to a nurse call system is not possible, then follow the above steps and listen for the clicking sound of the relay switch from within the ARGUS 71x V which indicates the activation of the nurse call.

These tests are to be performed as part of the Safety Standard Check (SSC) (see Sections „1.3. Safety Notification“ and „11. Safety Standard Check (SSC)“).

1.5 Accessories

The accessories available are listed in the catalogue „Spare parts &Accessories“. See www.codanargus.com/Downloads.

⚠ WARNING

The ARGUS 71x V may only be used with spare parts and accessories recommended by CODAN ARGUS AG. The functional safety of the device is not guaranteed if non approved materials or spare parts are used. The safety of the patient may be endangered.

1.6 System Overview

The ARGUS 71x V can be used in different combinations of systems with CODAN ARGUS docking stations and pumps. For charging, a docking station ARGUS 60 P, ARGUS 100 P, ARGUS 300 P, ARGUS 500 P and ARGUS 600 P can be used.

For systems with the ability to communicate (e.g. PDMS) the ARGUS 71x V support the ARGUS*protocol*. So they are compatible to docking stations ARGUS 60 P, ARGUS 100 M, ARGUS 300 M, ARGUS 500 M, ARGUS 600 M and infusion pumps ARGUS 606 S, ARGUS 600 S and ARGUS 707 V and ARGUS 708 V.

It is possible to connect the pump to a staff alert system (nurse call system). This can be done directly over the nurse call connection on the rear side of the pump (see Section "Overview" enumeration 16.) or over a docking station which is able to forward the alarm over the interface connection (see Section "Overview" enumeration 15.)

To configure, the pump can be connected to a medical PC. Typical connection is over a serial cable to the edge board interface on the rear side of the pump (see 14. in Section "Overview"). It's also possible to establish a connection over LAN (see 17. in Section "Overview"). For this an ethernet interface board is necessary.

For use with a barcode scanner a bluetooth interface board is necessary (depends of the main board version).

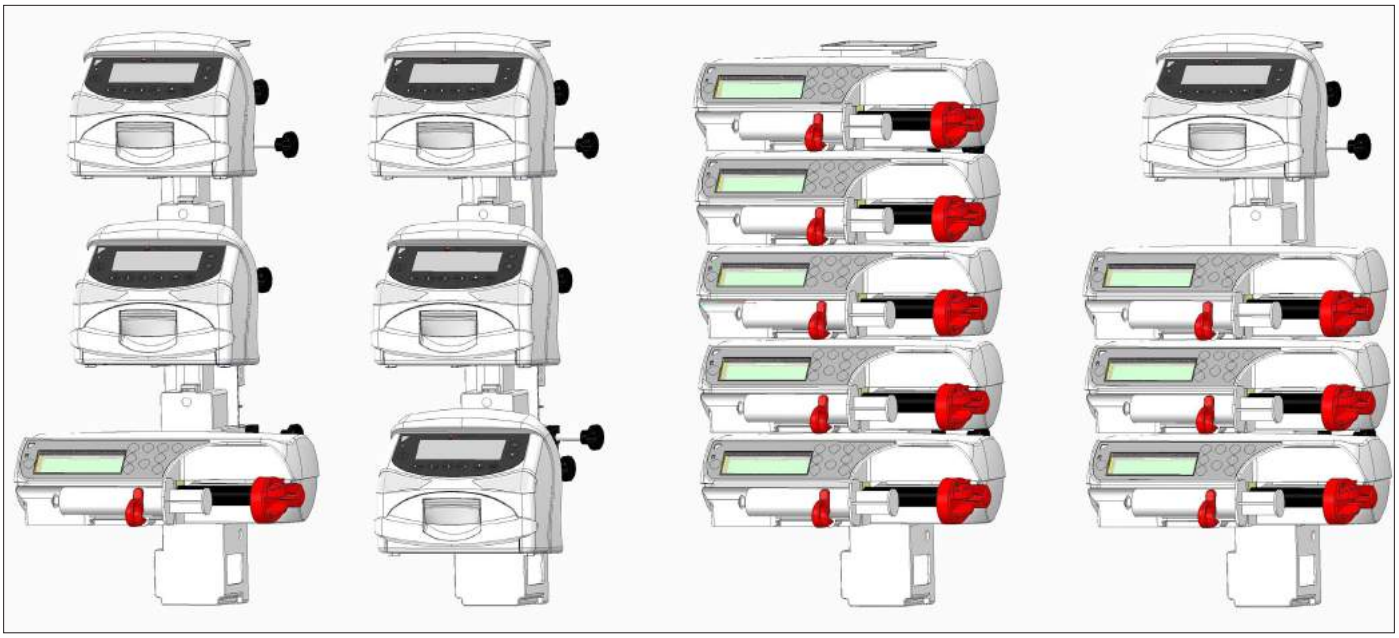


Figure 1: Pump combinations

2.1 Symbols used on the pump

These symbols are attached to the rear of the device on the type plate or directly on the pump housing. They give important information on the general use of the device.

CODAN ARGUS 717V — Device name

230V ~50–60Hz — Power voltage / power frequency

12VA — Power from the mains

IP22 — Drop-protected in a horizontal position up to ± 15° inclination
Protection against solid foreign objects of ≥ 12.5mm Ø

REF — Reference number

Manufacturing date

SN — Serial number

Fuse type

Battery type

Device contains recyclable materials.
Disposal according to WEEE 2002/96/EC and country-specific regulations.

Protection level type CF
(level of protection against electric shock)

Protection class 2
Dual insulation

Note: please refer to the accompanying documentation!

CE 0123 — Meets the requirements of MDD 93/42/EEC

Manufacturer

Specification of flow direction and recommended temperature range for infusion solutions

Holder for drop detector

The designated terminal is reserved exclusively for the drop detector!

Nurse call: additional, immediate alarm system. Can be connected to the hospital's internal nurse call system

Option: Communications interface for connection capability to LAN or serial interface. Contact CODAN ARGUS AG for further information.

2.2 Key functions

ON/OFF KEY
Switch the device on or off

⚠ WARNING
When turning off, all previous parameters of a therapy will be set to zero.

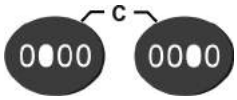
The pump cannot be switched off while an infusion is running. This can be deactivated in the configuration. A switch-off delay can also be configured.

START/STOP and ENTER KEY
- Start or stop infusion
- Activate main or submenu (Select function)
- Confirm input or selection (Enter function)

An activation delay can be configured.

NUMERIC KEYS
These keys are used to enter rate, volume or time. The keys correspond to the numbers of the display (starting from the right). The value of the corresponding number is increased by one unit by repeatedly pressing one of these keys.

CLEAR FUNCTION
Press both keys at the same time to set the value inputs to zero



MENU KEY
Call up basic menu
Mute alarm

2.3 Softkey functions

The function of the soft keys is controlled by the program and changes depending on the operating status

SELECTION KEY
Select submenu

EXIT KEY
Exit menu or submenu

In order to configure the ARGUS 71x V, PC utility CODAN *ARGUSservice* has to be used. Please verify that you are in possession of the latest CODAN *ARGUSservice* version. For ARGUS 71x V firmware 5.06, the minimum compatible version of CODAN *ARGUSservice* is 5.06. This utility is a Microsoft Windows based PC software offering various configuration and maintenance functions. The communication to the PC is via Serial RS232. For the connection between ARGUS 71x V and PC the appropriate interface cable (USB: REF: 601 496; DSUB9: REF 601 555) is needed.

The following sections describe the functionality of CODAN *ARGUSservice* and how it is to be used. These include:

- View, change and save the current device configuration
- Perform a firmware upgrade/downgrade
- View and save the device history
- Set the service interval
- Set the device time
- Set or change the device access pin
- Change the device serial number
- Create a device report file to send back to CODAN ARGUS AG
- Confirm and reset a technical error on the device

Switch the device off after usage with CODAN *ARGUSservice* is completed. Changes to the configuration will not take effect until the device is rebooted.

⚠ WARNING

The ARGUS 71x V must not be connected to a patient while being serviced with CODAN *ARGUSservice*.

In order to use the ARGUS 71x V with CODAN *ARGUSservice* make sure that

1. The ARGUS 71x V is connected to mains power.
2. The interface cable is connected to the ARGUS 71x V serial interface and your PC.
3. The pump is not inserted in a docking station.

3.1 Compatibility

Use the table below to determine the proper CODAN *ARGUSservice* version for your device, depending on the firmware version of the device.

It is recommended that CODAN *ARGUSservice* is used with Microsoft Windows 7 (32bit or 64 bit).

Device Generation Type	Device Model		Firmware Version of Device	Minimum Compatible CODAN ARGUS*service* Version
First generation devices	Syringe pumps	ARGUS 600 S ARGUS 606 S	4.xx	V4
	Volumetric pumps	ARGUS 707 V ARGUS 708 V		
	Docking stations	ARGUS 60 M ARGUS 100 M		
New generation devices	Volumetric pumps	ARGUS 717 V, ARGUS 718 V	5.04	5.04
			5.05	5.05
			5.06	5.06
	Docking stations	ARGUS 300 M, ARGUS 500 M, ARGUS 600 M	5.04	5.06

The ideal display size setting in Windows is smaller 100% (default). This can be set under:
Start -> Control Panel -> Appearance and Personalization -> Adjust screen resolution (http://windows.microsoft.com/en-us/windows7/Make-the-text-on-your-screen-larger-or-smaller?v=t).
If another display setting is used, some of the buttons might not appear correctly or not at all.

3.2 Installation

The newest version of CODAN *ARGUSservice* can be downloaded from the CODAN ARGUS AG website (www.codanargus.com/Login) On the website, go to the Login page and either register or enter your user name and password to gain access to the Login section. (Figure 2)

Figure 2: CODAN ARGUS*service* setup icon

To install the CODAN *ARGUSservice* software, just double click the installation binary (Figure 2).

Once the installation starts, continue to follow the on-screen instructions.
When asked to select the components for installation, there is the possibility to install only the components for the CODAN *ARGUSservice* utility. The installation of the service tool for first generation devices (see Section „3.1. Compatibility“) is optional (Figure 3).
The option to install the driver for the USB interface cable is also given. If the driver is already installed, this does not have to be selected again.

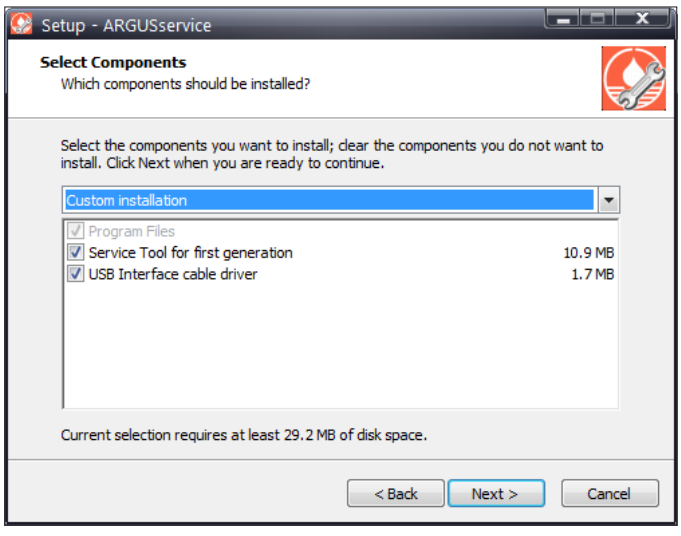


Figure 3: Installation type selection

Notice

Sometimes the driver for USB interface cable does not install, even if selected. If this should be the case, then manually install the driver after the installation of CODAN *ARGUSservice* is complete. This can be done by going to the ARGUS folder in the Windows start menu and selecting “Installation interface cable driver” (Figure 3).

3.3 Starting CODAN *ARGUSservice*

After the installation, CODAN *ARGUSservice* can be started using either the desktop short-cut or quick launch icon, depending on the installation options chosen (Figure 4).

When started, a window appears where you may select the appropriate CODAN *ARGUSservice* version to start (Figure 4). The selection depends on the generation of the device which is to be serviced (see table in Section „3.1. Compatibility“).

Figure 4: left: Desktop short-cut; right: Start menu short-cut

Figure 5: CODAN ARGUS*service* selection at start-up

3.4 Login

After selecting new generation devices, a login window will appear (Figure 6).

Login with the following credentials:
User: Administrator
Pin: 1220

The above given pin is defined as the default pin code. The pin can be changed by the administrator. After logging in successfully, the Configuration Tools page appears.

Notice
It is possible to configure each device with a separate PIN. That means, if you login, only devices with the same login data are accessible. For connection to devices with different login data, it is necessary to login on each device individually.

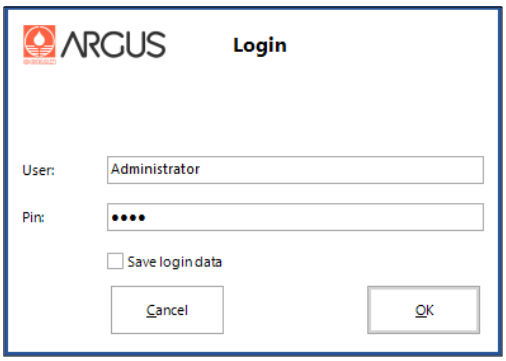


Figure 6: CODAN ARGUS*service* login

3.5 Configuration Tools

The Configuration Tools page shows the various controls (utilities) that are available (Figure 7). To enter a control, just click on the control. Before being able to use the functions within a control, a connection needs to be established to at least one device. (The following enumeration refers to the numbered items in Figure 7.)

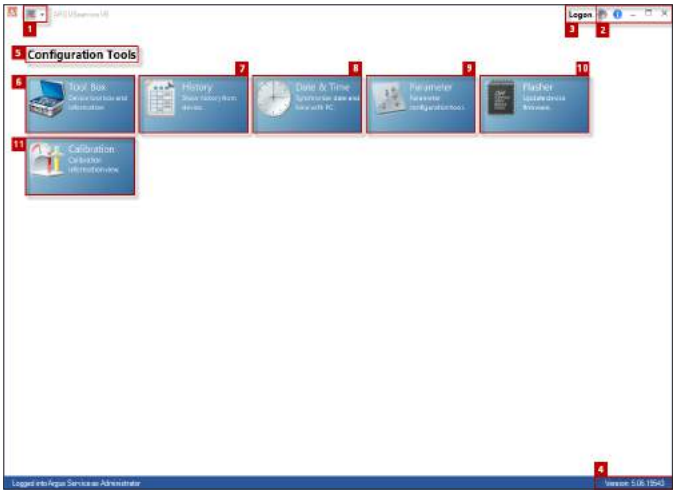


Figure 7: CODAN ARGUS*service* Configuration Tools page

1. Set background colour of application.
2. Application configuration, application information, minimize, maximize, close.
3. Login: Possibility to access the login window (see Section „3.4. Login“and change the login settings.
4. Current version of CODAN ARGUS*service*.
5. Title of current page.
6. Tool Box control: services such as medication library download, change pin, set configuration and calibration (see Section „3.6. Tool Box Control“).
7. History control: View and save the device history (see Section „3.7. History Control“).
8. Date & Times control: Set date and time on the device (see Section „3.8. Date & Time Control“).
9. Parameter control: View, change and save device configuration (see Section „3.9. Parameter Control“).
10. Flasher control: Upgrade and downgrade the device firmware (see Section „3.10. Flasher Control“).
11. Calibration Control: calibrate the device (see Section „3.11. Calibration Control“).

3.6 Tool Box Control

The Tool Box control (Figure 8) provides various functionalities to change the settings on a device. (The following enumeration refers to the numbered items in Figure 8.)

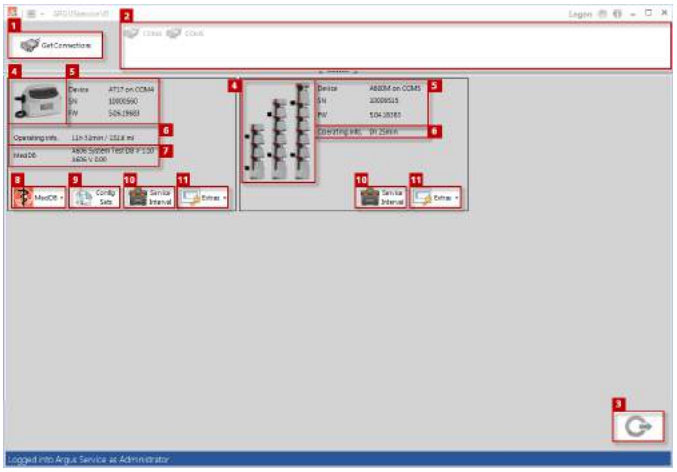


Figure 8: CODAN ARGUS*service* Tool Box control page

1. Get Connections: manages the connections to the attached devices (see Section „3.12. Get Connections“)
2. The connection overview panel shows the device connections that are selected.
3. Exit button: Click on this button to exit current screen.
4. Illustration of the attached device.
5. Device information: This includes device type, the COM port number to which the device is attached and the serial number and firmware version on the device.
6. Device operating information: For the ARGUS 71x V this is total operating hours and infused volume.
7. Downloaded medication database information.
8. Medication database utility: see Section „3.6.2. CODAN ARGUSmedDB Medication Library“.
9. Configuration utility for infusion sets: see Section „3.6.3. Configuration of infusion sets“.
10. Service interval utility: This utility sets the criteria for the next safety standard check (see Section „3.6.1. Service Interval“).
11. Extra tools: see Section „3.6.4. Extras“.

3.6.1 Service Interval

Use the Service Interval utility to set the date for the next safety standard check (SSC). The reminder can be set to appear after a certain number of calendar months (recommended 24) and/or after a certain number of operational hours (recommended 10'000). If both criteria are set, the reminder will appear after whichever expires first. If both criteria are set to 0, the reminder is disabled. When clicking on Set Reminder, the "Last SSC" date is set to the current date.

To open service interval utility, click on the Service Interval button and the screen shown in Figure 8 will appear. (The following enumeration refers to the numbered items in Figure 9).

1. Current: Shows the date of when the last SSC was performed and when the next SSC (if months is enabled) will be due. On a new device where no SSC has yet been performed, both dates will be n/a.
2. Service interval in calendar months: This is the number of calendar months after which the reminder to perform a safety standard check will appear. If set to 0, this criteria is disabled.
3. Service interval in operational hours: This is the number operational hours after which the reminder to perform a safety standard check will appear. If set to 0, this criteria is disabled.
4. Next SSC: This is the date for the next SSC.
5. Set Reminder: This sets the criteria for the next SSC. The above mentioned interval will be downloaded to the device. After clicking on Set Reminder, wait until the download is complete.
6. Exit button: Click on this button to exit the SSC screen.

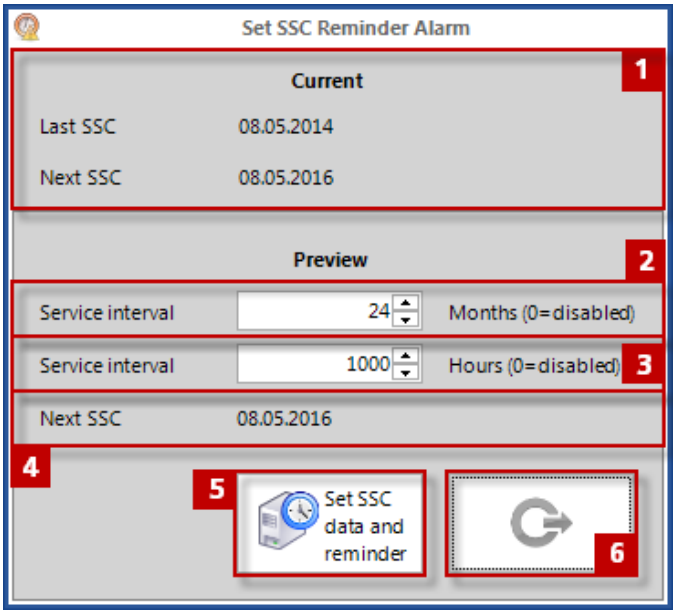


Figure 9: CODAN ARGUS*service* SSC reminder

Notice

The expiration of the specified service interval time will be indicated by

- Docking station: a short beep once an hour and the alternate green-orange blinking of the Status LED.
- ARGUS 71x V: a notification after the start-up animation.

This continues until the SSC is performed and a new reminder is set.

3.6.2 CODAN ARGUS*medDB* Medication Library

If a medication library is available, it can be download on device or deleted using the MedDB utility. Please contact your local distributor or the manufacturer.

3.6.2.1 Download Medication Library

A new medication library can be downloaded to the device. It is not necessary to delete any previous CODAN ARGUS*med*DB version.

Figure 10: Downloading MedDB

1. Ensure that a connection to the desired device exists and that the device is connected to mains power and will remain so during the entire flashing process.
2. Click on the MedDB button and then on Download MedDB.
3. In the window that appears, select the medication library file and click on open.
4. During the flashing process of the medication library, please do not disconnect the device.
5. The download process is completed when the pop-up window "Writing MedDB to Device Finish" appears.

3.6.2.2 Delete Medication Library

This function deletes the medication library on the device.

1. Press on the MedDB button and select Delete MedDB.
2. Follow the on-screen instructions.
3. During the deleting process of the medication library, please do not disconnect the device.
4. The deleting process is completed when the pop-up window "Erasing MedDB Finish" appears.

3.6.3 Configuration of infusion sets

1. Available Sets: List of available infusion sets can be loaded from firmware (see 7.). Up to 4 infusion sets can be dragged and dropped from "Available Sets" to "Sets on device"
2. Infusion set recommended by CODAN ARGUS AG
3. Sets on Device: A list of max. 4 infusion sets which are configured on the pump.
4. The check mark indicates which set is selected for modifying the parameters (see 6.).
5. The red M symbol indicates that the set has been modified or added.
6. Parameter: List of parameters of selected infusion set.
7. Load Set's from File: The newest firmware file contains the latest infusion set list
8. Restore Set Configuration: This button resets the modified but not downloaded parameters and infusion sets (see 6.) in "Sets on Device" (see 3.).
9. Download Set Configuration to Device: The button downloads the set configuration onto the device.
10. Go back to Tool Box screen.
11. Recycle bin: It is possible to remove infusion sets from Sets on Device. Move the infusion set to the recycle bin with drag and drop.

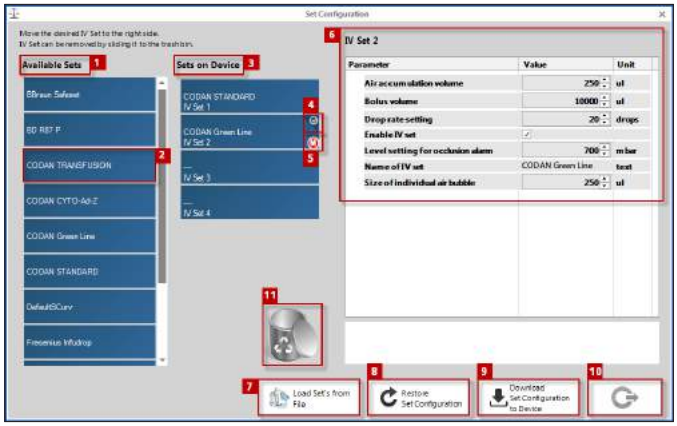


Figure 11: Cofiguration of IV-Sets page

3.6.4 Extras

Under Extras (Figure 12), there are additional utilities.

3.6.4.1 Reset Configuration

To reset to the customer configuration, click on Reset Configuration (Figure 12).

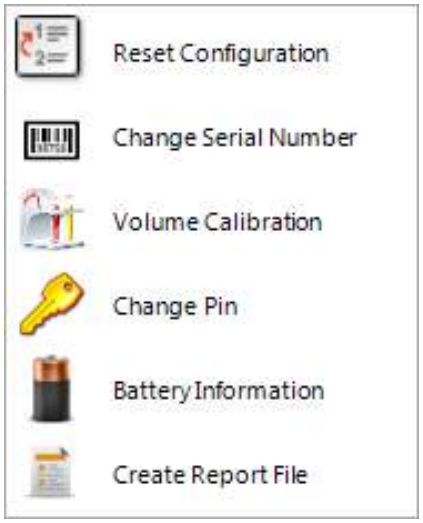


Figure 12: Tool Box control extras for ARGUS 71x V

3.6.4.2 Change Serial Number

Changing the serial number of a device is needed after a change of the mainboard. For this procedure use the Change Serial Number utility. (The following enumeration refers to the numbered items in Figure 13).

1. The current serial number on the device is already listed (in normal case 0).
2. Enter the new serial number e.g. 10000560.
3. A code is generated e.g. 0-3-10000560. Contact CODAN ARGUS AG with the generated code to receive a permission key.
4. Enter the received permission key.
5. Click on Program Serial Number.
6. Exit button: Click on this button to exit current screen without changing the serial number.

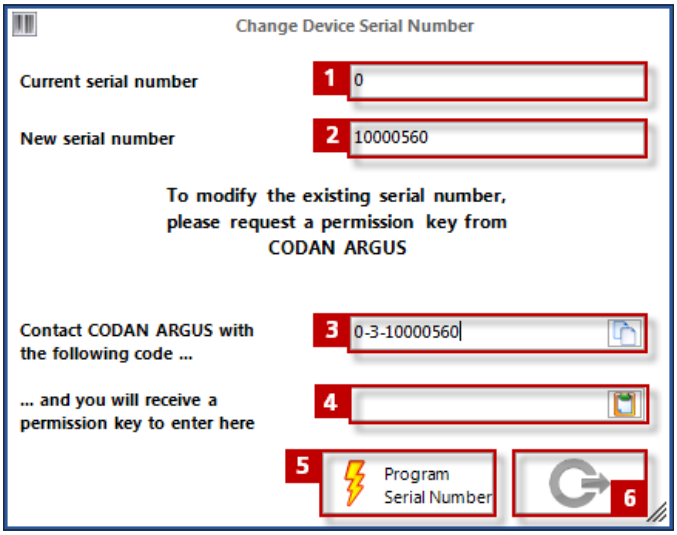


Figure 13: Change device serial number

3.6.4.3 Volume Calibration

Use the Volume Calibration utility to set the pump's specific correction factors. The calibration can either be performed based on a rate measurement or a volume measurement. The calibration is specific to an infusion set type. This is an alternative method to perform the calibration on the pump directly.

1. Calibration type: Click here to switch between volume and rate calibration.
2. The IV Set panel provides calibration information about the set.
3. Name of the infusion set.
4. Check mark: Only visible if selected.
5. Valid calibration range.
6. Current calibration value and new calibration value.
7. Target: the desired target value of the calibration measurement. Volume calibration is in ml, rate calibration is in ml/h.
8. Actual: the actual measured value. Volume calibration is in ml or g, rate calibration is in ml/h.
9. Deviation: The percentage deviation between desired target value and actual measured value is calculated by CODAN *ARGUSservice*: Formula: % deviation = (actual-target)/ actual×100
10. Reset correction for selected set.
11. Download correction value to pump.
12. Apply correction value to select infusion set.

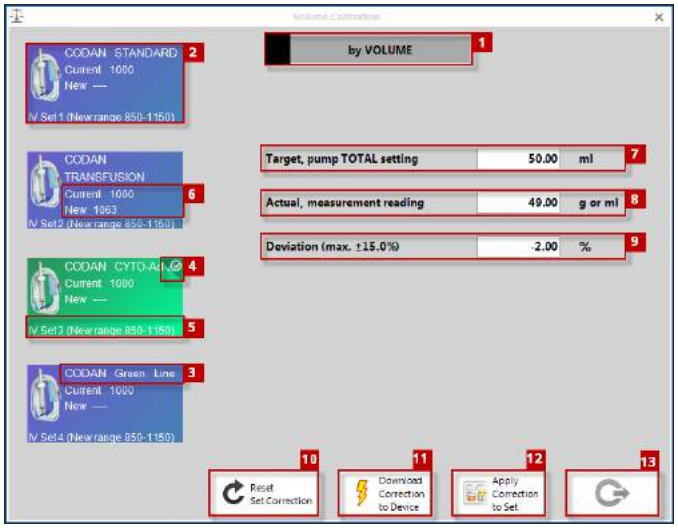


Figure 14: Volume calibration page

3.6.4.4 Calibration

Use a balance with a minimum resolution of 0,1g.

1. Switch the pump on. The pump must be in the regular infusion mode.
2. Insert the infusion set and close the front door.
3. Verify that the inserted infusion set corresponds with the name being displayed on the pump.
4. Open roller clamp.
5. Purge the infusion set.
6. Set the balance to zero by pressing TARA.
7. Start the infusion at a rate of 250 ml/h and a VTBI of 30 ml. The calibration time is therefore approximately 7 minutes.
8. Wait for the alarm "END INFUSION".
9. The resulting weight is needed for setting the correction factor in the toolbox of the CODAN *ARGUSservice* utility.
10. Change to the configuration mode of the pump.
11. Select the desired calibration type, either Volume or Rate.
12. Enter 30ml as target and the measured value as actual value.
13. The deviation is automatically calculated. It may not be greater than +/- 15%.
14. Select the infusion set for which the calibration is being performed.
15. Click on Apply Correction to Set.
16. Click on Download Correction to Device.

3.6.4.5 Change PIN

Use the Change PIN utility (Figure 15) to change the pin for a user. Currently, only the pin for the user Administrator can be changed (see Section „3.4. Login"). To open the utility, click on Change PIN in Figure 12. (The following enumeration refers to the numbered items in Figure 15, as well as being sequences of the steps to follow in order to change the device PIN).

1. From the drop-down list under User, select the user for which the pin is to be changed.
2. Under Old pin enter the current pin for the selected user.
3. Show PIN: Enabling this check-box, makes the pins visible.
4. Enter a new PIN. The PIN has to be exactly 4 digits long.
5. Enter the new PIN again to confirm it.
6. Confirm the change with OK. OK button will be enabled if both poins match.
7. Or press cancel to exit the window without changing the PIN.

If the information was entered correctly, a confirmation pop-up window will appear (Figure 16), otherwise, an error message is shown on the top (Figure 17).

Notice

In the current releases of CODAN ARGUS*service* (Version 5.06 and older) there is a bug which does not allow the proper firmware upgrade of a device when the Administrator PIN is not the default value (1220).

To recover a lost PIN send the report file (see Section „3.6.4.7. Create Report File") to CODAN ARGUS AG. Then the PIN will be sent to you.

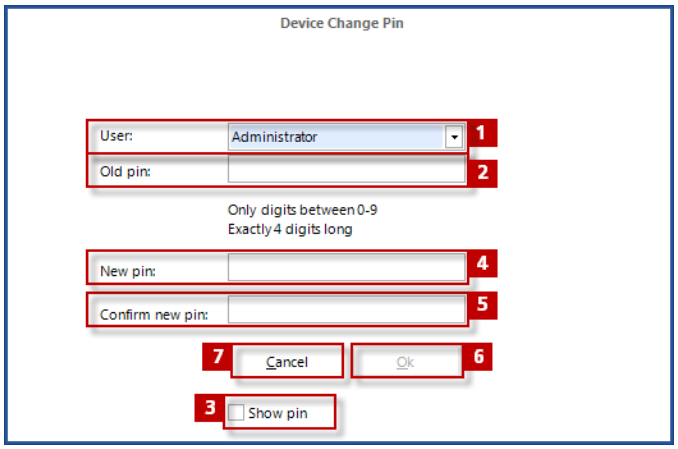


Figure 15: Change device login PIN

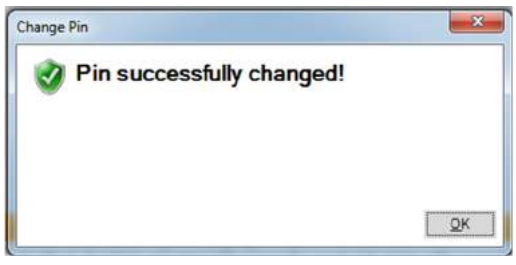


Figure 16: Successful PIN change

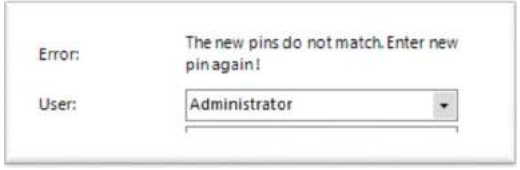


Figure 17: Invalid PIN error message

3.6.4.6 Battery Information

The Battery Information shows the battery charge state.

Main Power States	Device is connected to a power supply (mains, external DC supply or docking)
charge cond	Charge battery using conditional charging current (deeply discharged battery)
charge normal	Charge battery using normal charging current
charge trickle	Charge battery using trickle charging current (full battery)
charge overtemp	Stop charging if battery is overheated (and let it cool down)

Battery Power States	Device is running on battery power
discharge normal	Discharge battery (battery charge state above pre-alarm level)
discharge low	Discharge battery (battery charge state below pre-alarm level, but not empty)
discharge empty	Discharge battery (battery is empty)

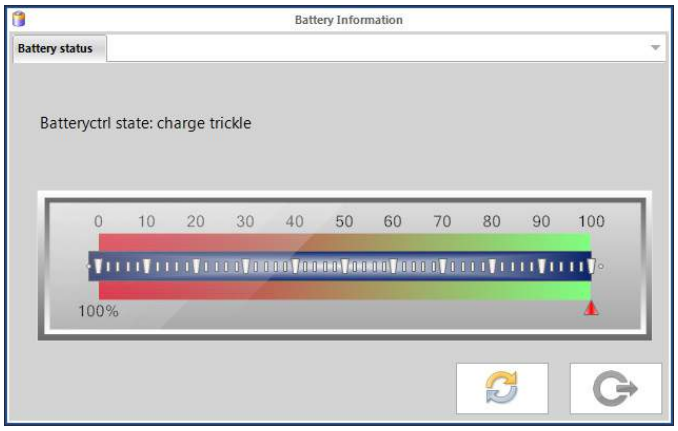


Figure 18: Battery charge state

3.6.4.7 Create Report File

Use the Create Report File utility (Figure 12) to generate a complete report of the device which can be sent to CODAN ARGUS AG. The report contains the current setting of all device parameters and states, as well as the device history. In case of an error or problem with the device, this report file is helpful in analysing the issue.

After a complete download of all device parameters (this may last several minutes) (Figure 20), a window will appear to enter a file name for the report (Figure 19). Save the report with a desired file name and then send it to CODAN ARGUS AG with a problem description to be analysed.

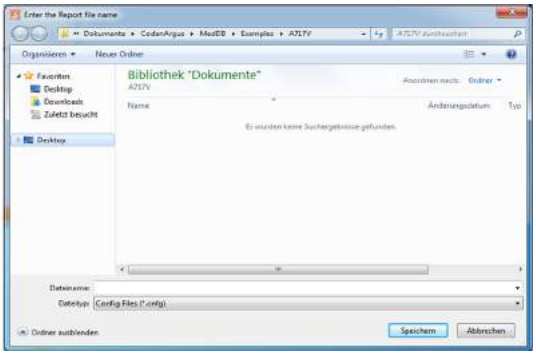


Figure 19: Enter file name for saving report file

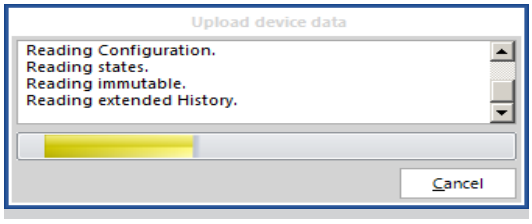


Figure 20: Progress window when creating report file

3.7 History Control

Use the History Control (Figure 21) to access the device history. The history stores up to the last 1000 events. In case of a total loss of power, the data in the history is saved. It is also possible to:

- Read the history continuously, while the device is operating (however without a connection to a patient).
- Save the device history to a file, as well as a PDF.
- View history files that have been saved previously.

(The following enumeration refers to the numbered items in Figure 21).

1. Get Connections: It manages the connections to the attached devices (see Section „3.12. Get Connections“).
2. Connection overview: The overview shows the selected devices from the Get Connections control. The COM port with the blue background illustrates the device with the currently displayed history.
3. Exit button: Click on this button to exit the History Control.
4. The history list: The newest events are listed on top.
5. Read history continuously: When checked, the history will be read continuously from the device and the history list will be updated with the newest events.
6. Description: Optionally add a description here before saving the history.
7. Reload History: Update the history list.
8. Save History: Save history to a file. Do not forget to add a description.
9. Open History-File: Open a history file, that has previously been saved, to be viewed.
10. Create PDF-File: Save the history file as a PDF, which can then be printed or be viewed without the use of CODAN ARGUS*service*.
11. Device information of currently active connection.

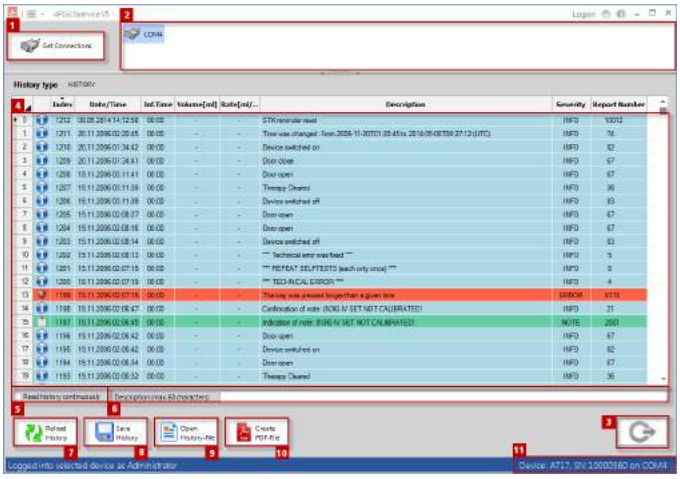


Figure 21: CODAN ARGUS*service* History Control

3.8 Date & Time Control

Use the Date & Time Control (Figure 22) to set the date and time on one or more devices. The date and time on the selected devices will be set to the system time of the PC. (The following enumeration refers to the numbered items in Figure 22).

1. Get Connections: It manages the connections to the attached devices (see Section „3.12. Get Connections“).
2. COM port number of connected and selected devices.
3. Exit button: Click on this button to exit the Date & Time Control.
4. COM port of device.
5. Synchronize device: This button sets the date and time on the device according to the date and time values shown in 6 of Figure 22.
6. Current date and time on device.
7. Synchronize all devices: This button sets the date and time on all selected devices according to the date and time values shown in 6 of Figure 22.
8. The date and time value that will be set on the device(s). The date and time on the selected devices will be set to the system time of the PC.

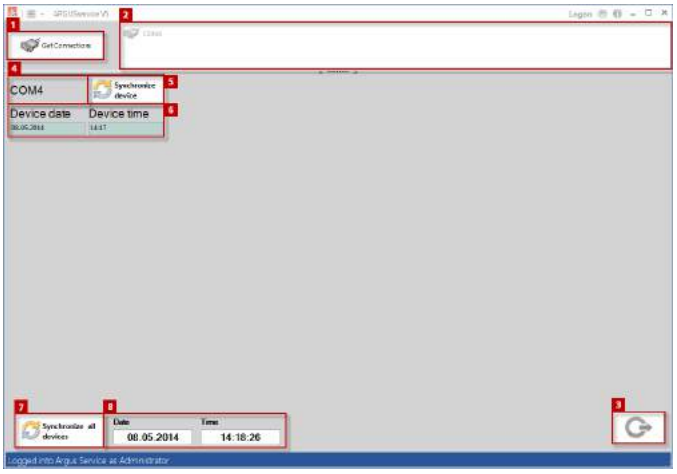


Figure 22: CODAN ARGUS*service* Date & Time Control

3.6.8.1 How to set Date and Time

The following steps are to be carried out to set the date and time:

1. Use the Get Connections control to select the desired device(s).
2. Ensure that the correct date and time is shown in 6 of Figure 22. It is essential that the time zone, time and date on the PC is set correctly to the location where the device will be used.
3. To program only one individual device, click on "Synchronize device". To program all selected devices, click on "Synchronize all devices".

3.9 Parameter Control

Use the Parameter Control (Figure 23) to view, change, and save the parameter settings on a selected device.

The parameters are listed in a parameter tree according to their associated category. For each parameter the following are visible: name, value, unit and a description. (The following enumeration refers to the numbered items in Figure 23).

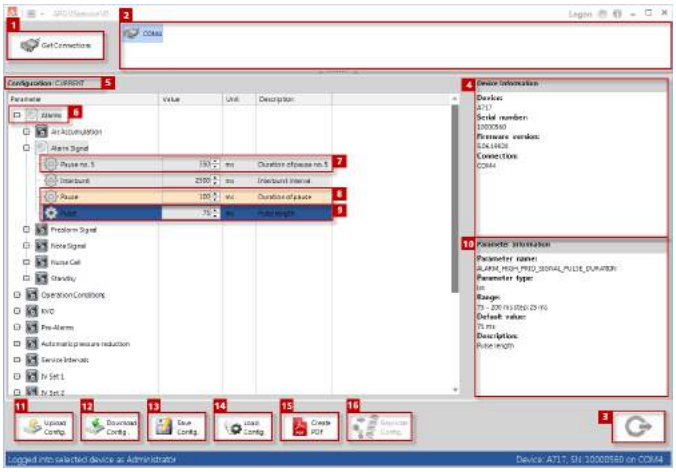


Figure 23: CODAN ARGUS*service* Parameter Control

1. Get Connections: It manages the connections to the attached devices (see Section „3.12. Get Connections").
2. Connection overview: The connection overview consists of all currently available devices, which were selected in the Get Connections control. The COM port with the blue boundary shows the connection to the device with the currently displayed configuration.
3. Exit button: Click on this button to exit the Parameter Control.
4. Device Information: Information about the device associated with the configuration currently being shown.
5. Configuration type: the configuration that is currently displayed.
6. Parameter tree: To view the parameters of a category, click on the "+" sign next to the category.
7. Parameter with default settings. The background colour is light grey.
8. Parameter with non-default values. The background colour is light orange.
9. Parameter that is currently selected for editing. The selected parameter is highlighted.
10. Parameter Information: A complete meta-information about the selected parameter.
11. Upload Configuration: Upload the current parameter configuration from the device.
12. Download Configuration: Download the parameter configuration to the device.
13. Save Configuration: Save the parameter configuration to a file. The configuration can be saved to be loaded at a later point in time.
14. Load Configuration: Load a parameter configuration from a file. The configuration can then be changed and/or be downloaded to a device.
15. Create PDF: Create a PDF version of the current parameter configuration.
16. Replicate Configuration: Allows the configuration of one device to be downloaded to other connected devices.

3.9.1 How to change a device parameter configuration

The following instruction steps show how a configuration is uploaded from a device. It explains also how to edit and download the configuration to the device again.

1. In the "Device Connection" click on the device, which is to be configured.
2. Click on "Upload Configuration".
3. Wait for the configuration to be uploaded. The complete configuration can be seen in the parameter tree.
4. Select the desired parameter to change and edit the value. The "Parameter Information" provides the range and increment step size for the value.
5. After all desired parameters are modified, click on "Download Configuration" to program the device with the new parameter values. Only parameter values that have been changed are downloaded.

Notice

After downloading the configuration successfully with CODAN ARGUS*service*, switch off the device to save the changed parameters.

3.9.2 How to store a device configuration in a file

It is possible to save the configuration of a device to a file. This file can be used to configure other device (of the same type) (see Section „3.9.3. How to replicate a pre-saved device configuration").

1. Click on the target device in the "Connection Overview" for which the configuration is to be saved.
2. Click on "Upload Configuration".
3. Wait for configuration to upload completely.
4. Click "Save Configuration".
5. Enter a file-name and select the location.
6. Click "Save".

3.9.3 How to replicate a pre-saved device configuration

After saving a device configuration to a file, it is possible to download this file to another device (of the same type) at a later point in time.

1. Create a configuration file according to Section „3.9.2. How to store a device configuration in a file".
2. Click on the target device in the "Connection Overview" for which the configuration is to be downloaded.
3. Click on "Load Configuration".
4. Select the pre-saved configuration file.
5. Click on "Download Configuration".
6. Wait for the download to complete.

3.10 Flasher Control

The Flasher Control (Figure 24) permits flashing of a new firmware file to a device. It is possible to upgrade or downgrade a firmware. (The following enumeration refers to the numbered items in Figure 24).

1. Get Connections: It manages the connections to the attached devices (see Section „3.12. Get Connections“).
2. COM port number of connected and selected devices.
3. Exit button: Click on this button to exit the Flasher Control.
4. Hex-File(s): The firmware file selected for the flashing process.
5. Device Information: Information about a connected device, including COM port, firmware version that is currently running on the device, and new firmware version that has been selected for the upgrade.
6. Progress bar of the flashing process.
7. Start flashing: This button starts the upgrade if a valid firmware file is selected.
8. Open FW File: select the firmware file for flashing.
9. Clear Memory: clear the selected firmware file.
10. Flash all: Can flash the firmware file on all devices together at the same time.

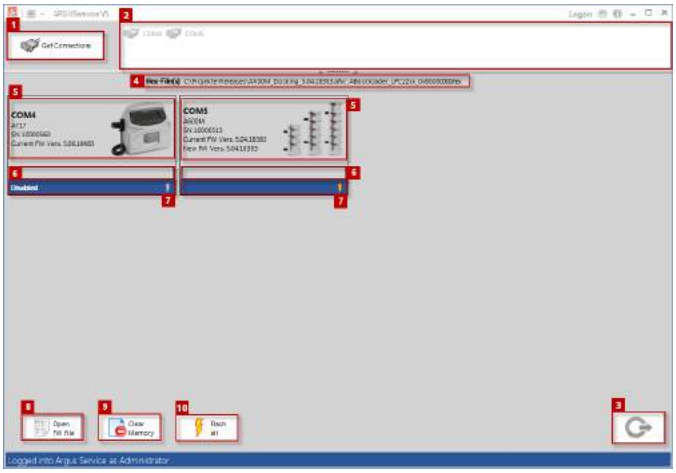


Figure 24: CODAN ARGUS*service* Flasher Control

⚠ WARNING

Do not make any software updates as long as the device is in use and/or connected to a patient!

⚠ CAUTION

A standard safety check (SSC) has to be performed after every firmware update!

Notice

- In the current release of CODAN ARGUS*service* (Version 5.06 and earlier), there is a bug which does not allow the proper firmware upgrade of a device when the Administrator pin is not the default value. Therefore, before starting the flash procedure, ensure the Administrator pin on the device which is to be updated is the default value (default value is 1220).
- Before flashing, ensure that the device is connected to mains power.
- During the flashing process, do not remove the serial port connection or the connection to mains power.
- An interrupted or cancelled flash procedure might make a restart of the device impossible. It is therefore forbidden to manually switch off or reboot the ARGUS 71x V during a flash procedure.
- The current firmware version of the device is shown by getting connection from CODAN ARGUS*service* to the device.

3.10.1 How to Flash

Steps to flash:

1. Ensure that a connection to the desired device exists and the device is listed in the Flasher tool. Also ensure that the device is connected to mains power and will remain so during the entire flashing process.
2. Click "Open FW File".
3. Select the desired firmware file and confirm with open.
4. Confirm any pop-up windows that might appear.
5. Check the correct name and path for the selected firmware file listed in "Hex-File(s)".
6. In the device status window of each individual device, the current firmware version and the new firmware version (after flashing) are listed. Verify these.
7. Start the flashing process by clicking on "Start flashing" (7 in Figure 24) or "Flash All".
8. Select language (Figure 25)
9. The flashing process consists of the states shown in Figure 26.
10. During the flashing process, the device will reboot. The flashing process is not complete yet.
11. After flashing is completed, the status bar for the device will indicate "Flashing finish". The device will be in the configuration mode again.
12. Check in configuration mode if proper firmware version was flashed.

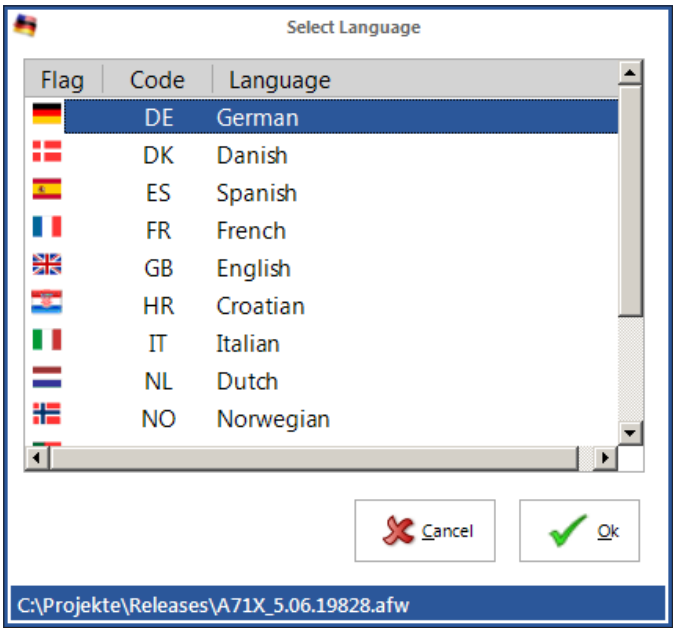


Figure 25: Select Language

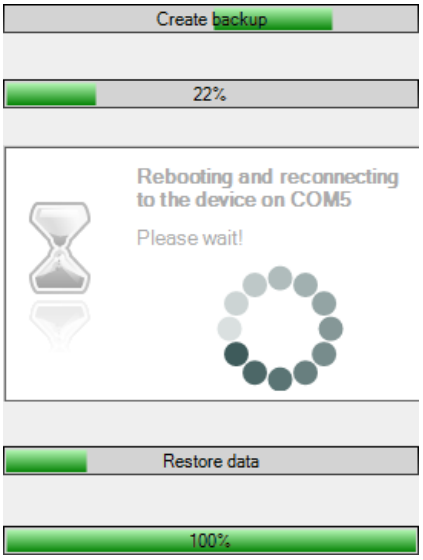


Figure 26: CODAN ARGUS*service* device flashing process

3.11 Calibration Control

The calibration control displays the calibrated values with ranges and information from each infusion set.

1. Get Connections: It manages the connections to the attached devices (see Section „3.12. Get Connections“)
2. COM port number of connected and selected devices.
3. Set 1: Number of selected infusion set
4. Pressure Calibration: Contains calibrated values (see 3. Until 7.), date of last pressure calibration and if calibration was successful.
5. CAL_SET_1_DOWNSTREAM_SENSITIVITY: Downstream pressure sensitivity (0 – 3300 mV/bar)
6. CAL_SET_1_DOWNSTREAM_POTI_GAIN: Digital potentiometer position (0 - 127) for gain calibration of downstream pressure sensor.
7. CAL_SET_1_DOWNSTREAM_POTI_OFFSET: Digital potentiometer position (0 - 127) for offset calibration of downstream pressure sensor.
8. CAL_SET_1_UPSTREAM_POTI_GAIN: Digital potentiometer position (0 - 127) for gain calibration of upstream pressure sensor.
9. CAL_SET_1_UPSTREAM_POTI_OFFSET: Digital potentiometer position (0 - 127) for offset calibration of upstream pressure sensor.
10. Volume Calibration: Contains correction factor (see 9.) and if calibration was successful.
11. CAL_SET_1_RATE_CALIBRATION_CORRECTION: Correction factor (800 - 1200) for volume calibration.
12. Set selection: Selection of desired infusion sets.
13. Create PDF-File: Save the calibration as a PDF, which can then be printed or be viewed without the use of CODAN ARGUS*service*.
14. Exit button: Click on this button to exit the Calibration Control.

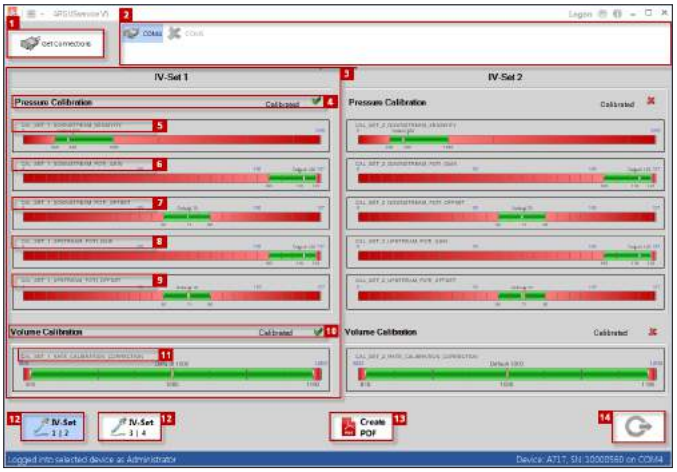


Figure 27: Calibration Control

3.12 Get Connections

The Get Connections control (Figure 28) is used to manage the connections to the attached devices. It is accessed by opening one of the controls in the Configuration Tools and then by clicking on Get Connections. Only COM (Serial) port connections are supported currently. The connection can either be made through a physical or a virtual COM port. (The following enumeration refers to the numbered items in Figure 28).

The overview shows all available COM ports on the system.
Status panel: For each COM port, there is a status panel (see Section „3.12.1. Status Panel“).

1. COM port list.
2. No device on COM port.
3. Connected device on COM port.
4. Connected and selected device on COM port.
5. Search & select all devices: This functionality goes through all COM ports and determines if a known device is attached. If so, a connection is established to the device and the device is selected.
6. Disconnect selected: This button terminates the connection to all selected devices.
7. Disconnect all: This button terminates the connection of all attached devices.
8. Exit button: Click on this button to exit the current control and return to the previous control.

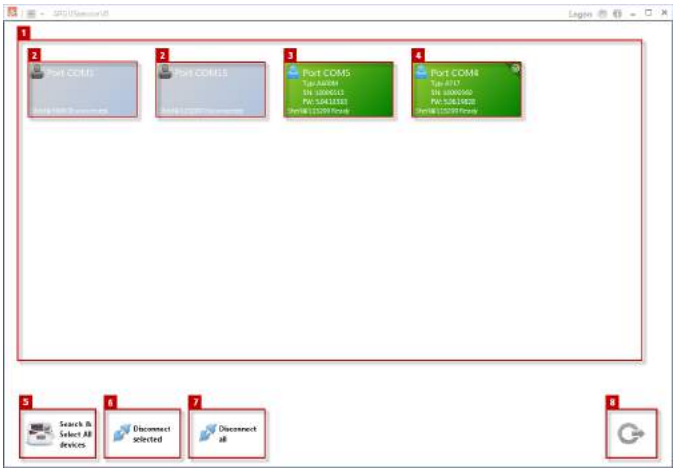


Figure 28: CODAN ARGUS*service* Get Connections page

Notice
If a device with a valid connection is switched off manually and switched on again, the connection to this device needs to be re-established in the Get Connections control. A manual reconnection needs to be performed for the specific device.

3.12.1 Status Panel

The status panel (Figure 29) provides the following information (The following enumeration refers to the numbered items in Figure 29):

1. Device login state:
   If the device login state is blue, login was successful.
   If the device login state is grey, login failed.
2. Identification of COM port.
3. The check-mark symbol indicates a selected connection.
4. Device information of connected device: type, serial number, firmware version.
5. Status and baud rate of connection.

Figure 29: Device connection status panel

Additionally, the colour of the panel reflects the state of the connection:

Grey: Disconnected	Dark red: Technical error on device or an error with COM port
Light green: Changing state, either connecting or disconnecting	Pink: Unknown state
Dark Green: Connected	

Notice
In order to be able to use a device with CODAN ARGUS*service*, there needs to be a connection to the device AND the connection needs to be selected (3 in Figure 29).
It is possible to be disconnected with an error. In this case the colour of the panel will be red, but the status (5 in Figure 29) will indicate disconnected.

3.12.2 Connecting / Disconnecting

It is possible to connect or disconnect all attached devices at once or individually.

Connect / disconnect to all devices:

1. Click "Search & Select All Devices" to connect to and select all attached devices
2. Click "Disconnect All" to disconnect all devices at once

Connect to an individual device:

1. Left click on the status panel of respective device (Figure 30).

Reconnect / disconnect to an individual device:

1. Right click on the status panel of respective device (Figure 30).
2. From the drop down list, select the desired action, either "Disconnect" or "Reconnect".

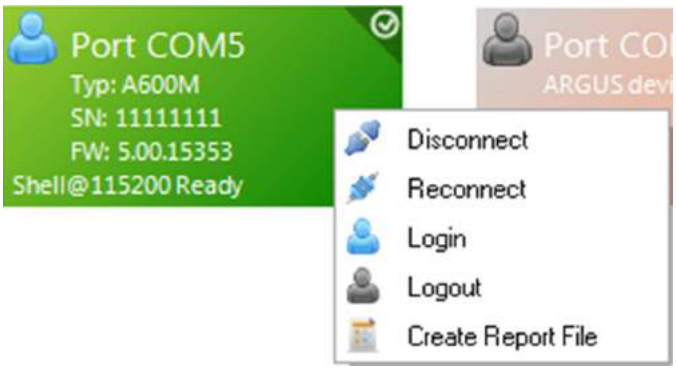


Figure 30: Right click options of device status panel

3.12.3 Clearing a Technical Error

If a device has a technical error, the error can be cleared by using CODAN ARGUS*service*:

1. Make sure the device was turned on and off at least once since the technical error occurred.
2. Connect to device.
3. Right click on the panel of the device (Figure 31).
4. Select "Reset Techerror".
5. Wait for the technical error to be cleared and a report file to be created (Figure 32). Enter a file name for the report file. It can take several minutes to gather the information to create the report file.
6. Send this report file together with a problem description to your local CODAN ARGUS representative or directly to CODAN ARGUS AG.

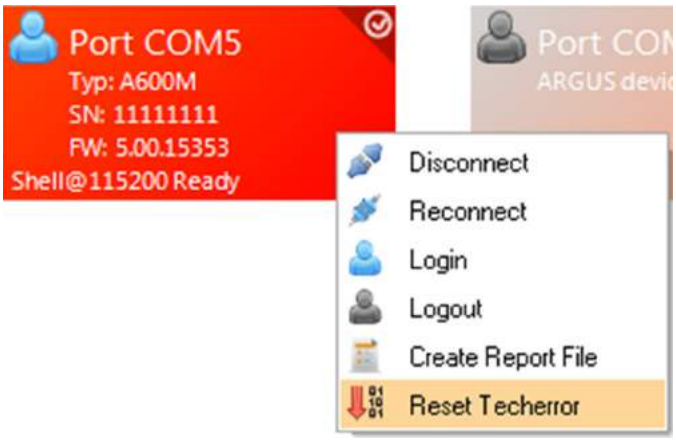


Figure 31: Resolving a technical error

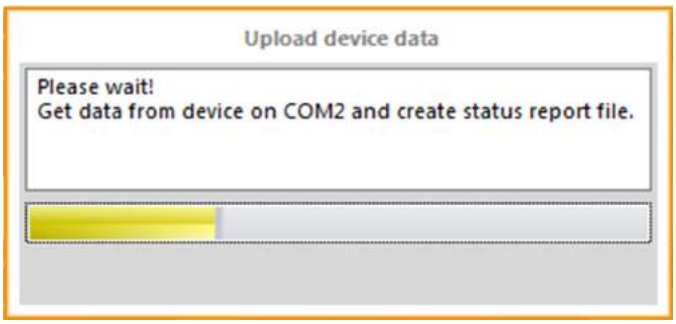


Figure 32: Creating report file after technical error

The device has one RS232 serial interface and one Ethernet interface to connect to external systems. Over both interfaces, an external system can communicate with the device and the inserted pumps using the ARGUS*protocol*.

Using the ARGUS*protocol*, the status and current run-time information from the devices can be requested. For more detailed information on this feature, please contact your local distributor or CODAN ARGUS AG.

⚠ WARNING

Connect to ARGUS 71x V only to external (non CODAN ARGUS) devices which comply with IEC60950-1:2005.

5.1 Maintenance Mode

Entering the Maintenance Mode:

1. Keep the 2nd numeric key depressed and press the ON/OFF key in order to get access to the configuration mode.
2. Enter the Administrator PIN to log in. The Administrator PIN is set to 1220 by default but it can be changed with the CODAN *ARGUSservice* utility, see Section „3.6.4.5. Change PIN". The PIN code shall prevent unauthorized use.
3. The pump settings menu is shown after login.
4. Use the EXIT Soft Key to leave a menu or sub-menu to get to PUMP SETTINGS.

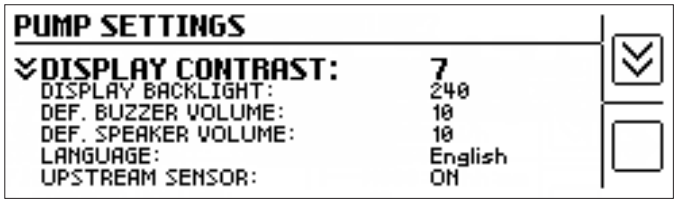
Menu Overview:

This overview describes all available menus and their sequence of availability.

The Menu key guides the user through all available menus. Press the Menu key until the desired menu is displayed.

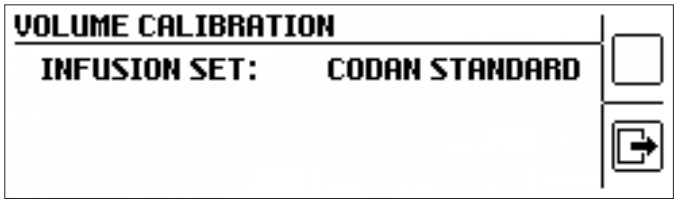
Pump Settings

In the Pump Settings Menu some configuration parameters can be set permanently and directly without using CODAN *ARGUSservice*.



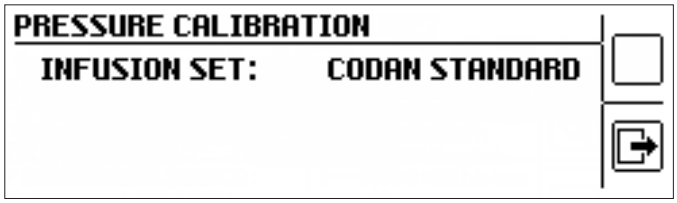
Volume Calibration

This menu is a part of the set calibration and guides the service technician through the volume calibration process (see Section „5.1.2. Volume Calibration").



Pressure Calibration

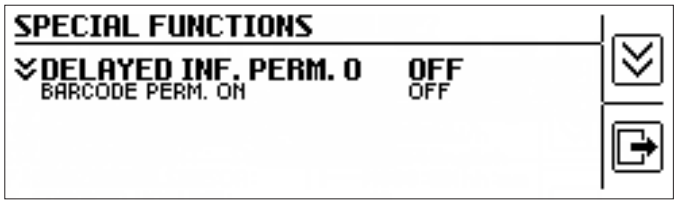
This menu is a part of the set calibration and guides the service technician through the pressure calibration process (see Section „5.1.3. Pressure Calibration").



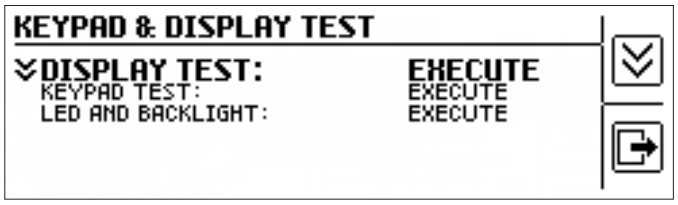
Special Functions

Permanent selection of one special function. Just one special function is possible at the same time. This menu is also accessible in normal mode. If one of the functions is activated in the maintenance mode, then the user is not able to change this settings in normal mode.

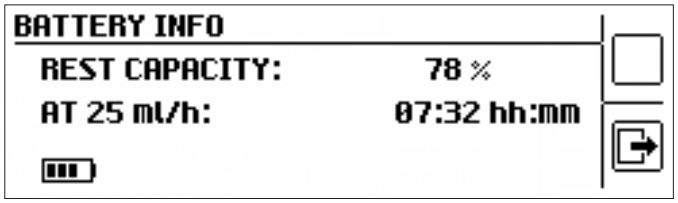
- Delayed infusion
- Barcode mode



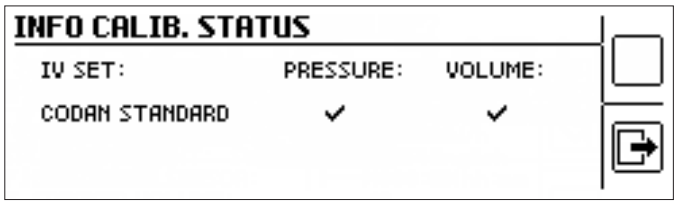
Keypad & Display Test
This menu is split into 3 user interface tests. Each of these tests guides the service technician through the process (see Section „5.1.4. Keypad & Display Test“).



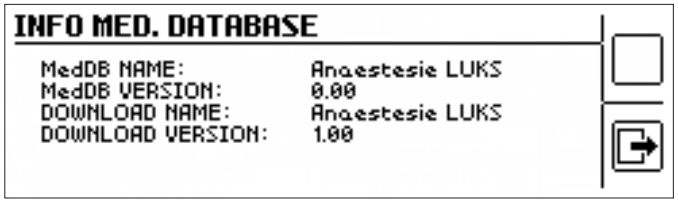
Battery Info
Information about the remaining battery capacity in % and in hours/minutes. If the specified times are no longer achieved, the Technical Service Department can replace the batteries.



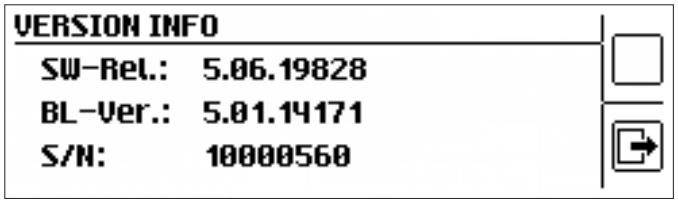
Info Calibration Status
This menu shows the calibration status of the configured sets. A tick means: calibration done, x means: not calibrated. Infusion sets must be pressure and volume calibrated in order to be used.
Column 1: Infusion set
Column 2: Pressure calibration status
Column 3: Volume calibration status



Info Medication Database
The medication library downloaded to the device can be identified.

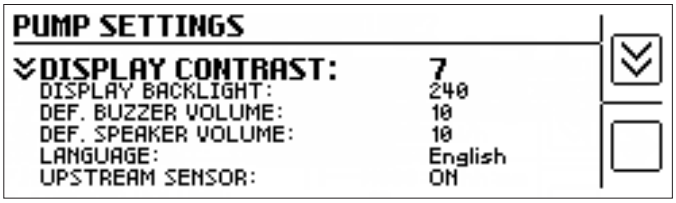


Version Info
Column 1: Firmware Release with Version and Revision
Column 2: Bootloader Release with Version and Revision
Column 3: Serial number of the device



5.1.1 Pump Settings

The following pump settings are adjustable:



Setting	Default Value	Range/Unit	Description
DISPLAY CONTRAST	7	1 – 15	Display contrast
DISPLAY BACKLIGHT	240	0 – 255	Display backlight brightness
DEF. BUZZER VOLUME	10	1 – 10	Buzzer loudness. The volume cannot be turned off!
DEF. SPEAKER VOLUME	10	1 – 10	Speaker loudness. The volume cannot be turned off!
LANGUAGE	English	English or 2nd Language	Language selection of English or a secondary language for user interface in normal mode.
UPSTREAM SENSOR	ON	ON/OFF	UPSTREAM OFF: The deactivation of the upstream sensor makes the use of a drop detector compulsory! UPSTREAM ON: The pump may be used with (recommended) or without drop detector.

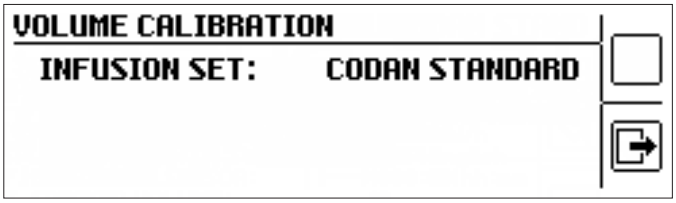
Notice

The buzzer and speaker volume may also be changed temporarily during normal infusion. See user manual "14.2.1. Changing the volume of the audible signal (buzzer and speakers".

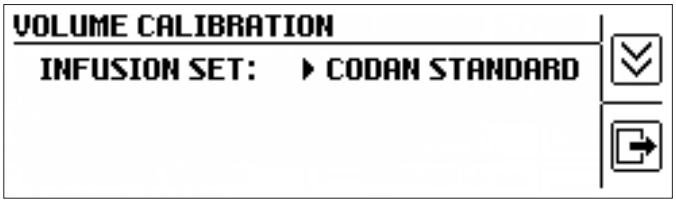
5.1.2 Volume Calibration

Enter the configuration mode and go to the menu "Volume Calibration":

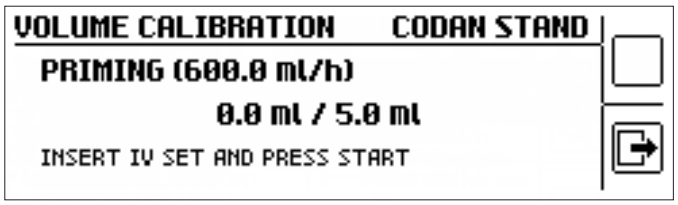
1. Press Start.



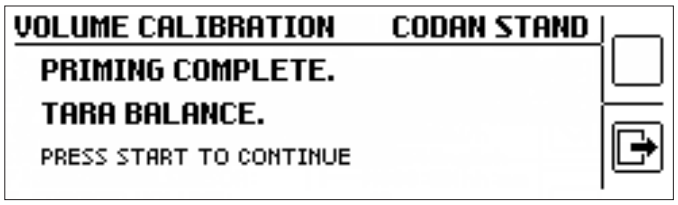
2. Select the infusion set and press Start.



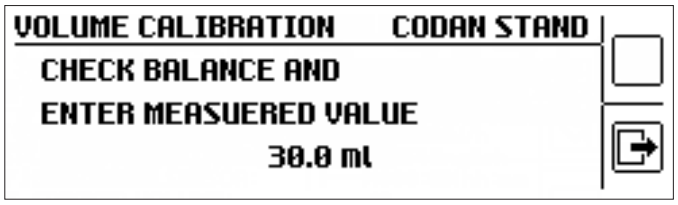
3. Insert the infusion set and press Start. The infusion starts and the volume increases to 5.0 ml.



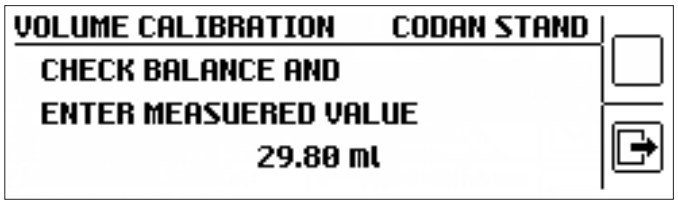
4. Set the balance to zero by pressing "TARA" and press Start. The infusion starts and the volume increases to 30.0 ml.



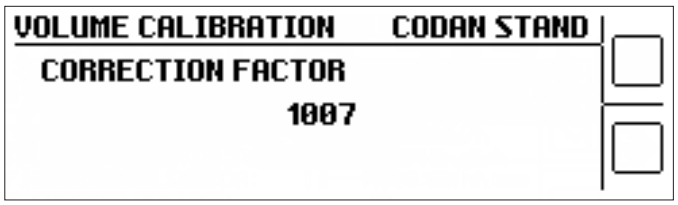
5. Check the result of the balance.



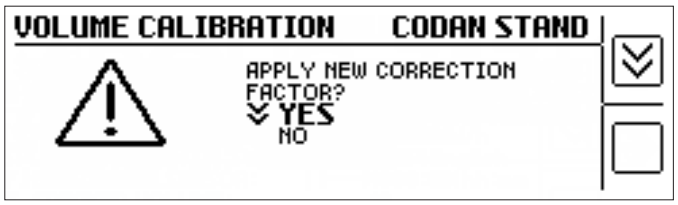
6. Enter now the value of the balance (e.g. 29.80g) and press Start.



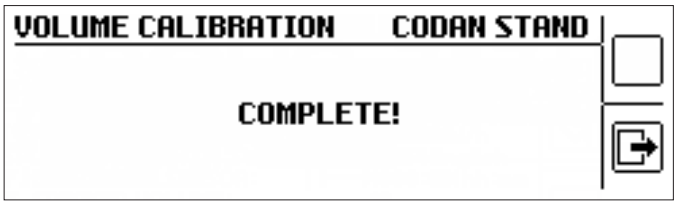
7. Press Start to store the correction factor.



8. YES: Press Start and continue with step 9.
NO: Press Start and repeat from step 1.



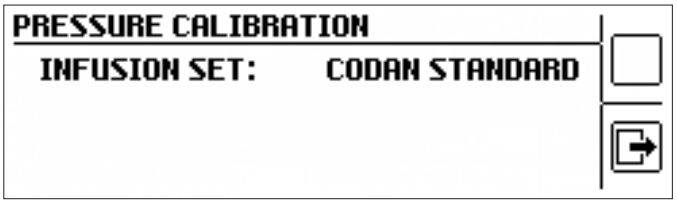
9. Use the EXIT key to go back to "Pump Settings".



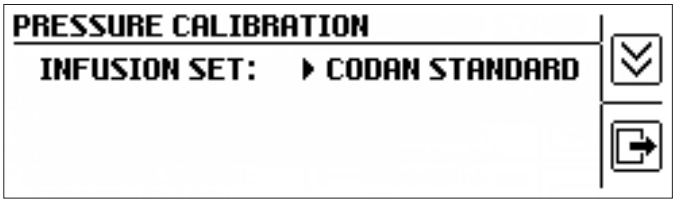
5.1.3 Pressure Calibration

Start pump in configuration mode and go to the menu "Pressure Calibration":

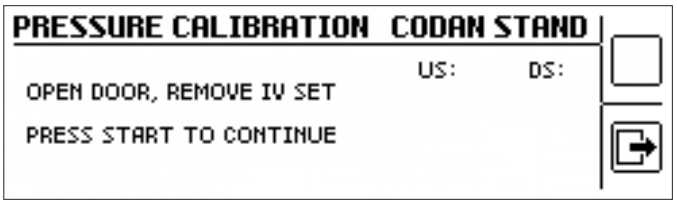
1. Press Start



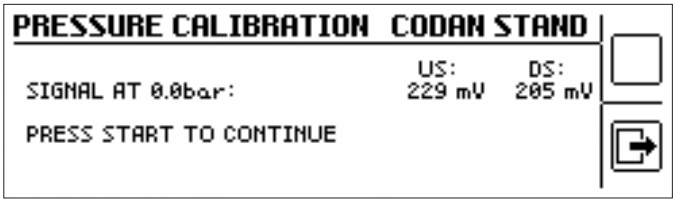
2. Select the infusion set and press Start.



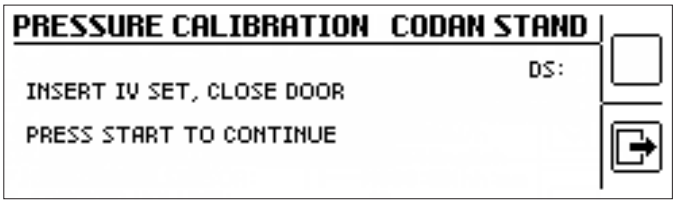
3. Open the door, remove the infusion set and press Start.



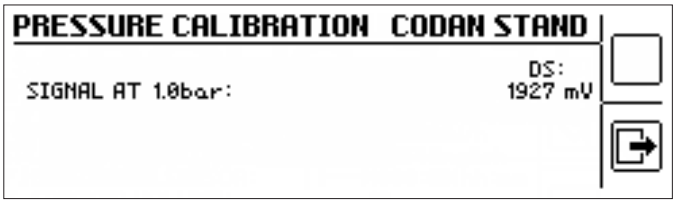
4. The signals at 0 bar for up- and downstream sensor are displayed. Press Start.



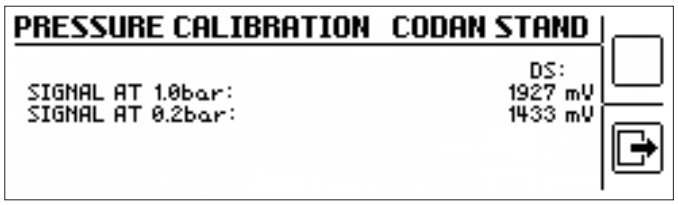
5. Insert the infusion set, close door, open the 3-way stop cock and press Start.



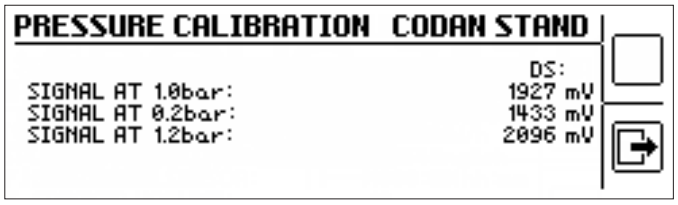
6. Close the 3-way stop cock. Press Start as soon as the manometer reaches 1.0 bar.



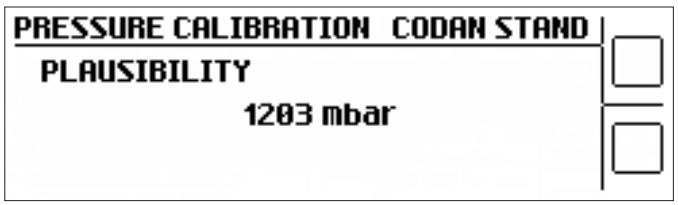
7. Open the 3-way stop cock and release the pressure. Close the 3-way stop cock again and press Start as soon as the manometer reaches 0.2 bar.



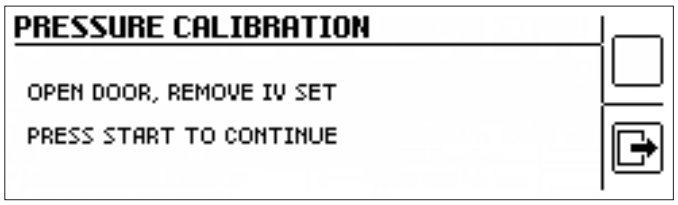
8. Press Start as soon as the manometer reaches 1.2 bar
The plausibility screen is displayed.



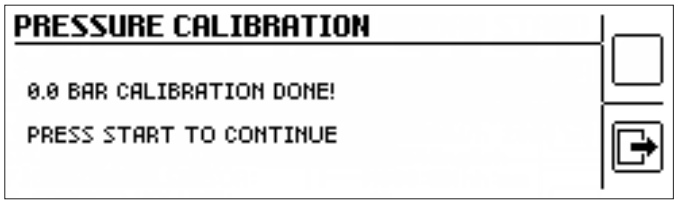
9. Compare the value of plausibility check with the value of the manometer (±100 mbar) and press Start.



10. Remove the infusion set and press Start.

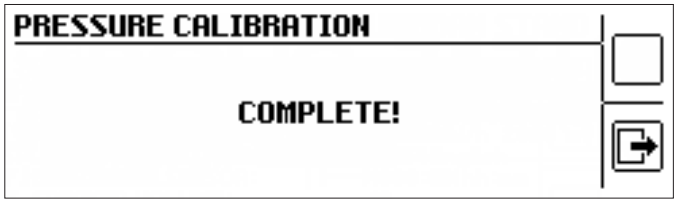


11. The 0.0 bar calibration done screen is displayed and press Start.



12. Confirm calibration with Start.

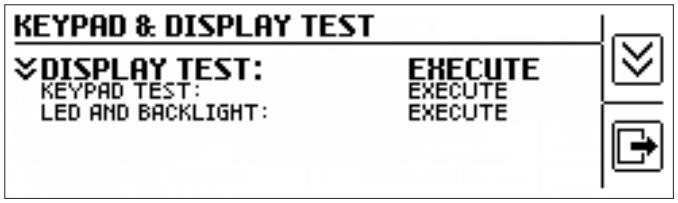
13. Press the EXIT Key.



5.1.4 Keypad & Display Test

This menu is designed for the intuitive performance of a safety standard check (SSC). The aim of this test is to verify the correct operation of the user interface including keypad and display.

Select all tests one by one and follow the instructions shown on the display.



DISPLAY TEST	This test detects possible defective pixels. The check contains of two steps. The correct function of the display is confirmed by a black display at the end of this test.
KEYPAD TEST	This test verifies the correct function of all keys except the ON/OFF Key. This one is automatically checked at every switching on and off of the pump. The test is successfully completed when every key was pressed once and when the check-mark is displayed.
LED AND BACKLIGHT	This test verifies all light media. The test is successfully completed if all light media have shone as indicated on the display.

5.2 Set Calibration

The set calibration consists of volume and pressure calibration and is necessary after configuration of a new infusion set.

The volumetric infusion pumps ARGUS 71x V contain two pressure sensors. The upstream sensor on the side of the medication container (left input) and the downstream sensor on the patient's side (right output). The pressure calibration can be performed directly on the pump (see Section „5.1.3. Pressure Calibration"). After each pressure calibration a control measurement is recommended (see Section „11.3. Pressure Control Measurement").

For pressure calibration and control measurement the following equipment is needed:

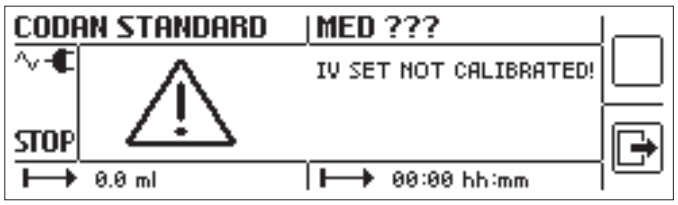
- a manometer with a scaling of 0.1 bar
- a 3-way stop cock and a clamping shears
- the chosen infusion set

For the volume calibration, there are two ways to calibrate. It is possible to either enter the correction factor directly on the device (see Section „5.1.2. Volume Calibration") or to use the CODAN *ARGUSservice* PC utility tool (see Section „3.6.4.3. Volume Calibration"). After each volume calibration a control measurement is recommended (see Section „11.2. Volume Control Measurement").

For volume calibration and control measurement the following equipment is needed:

- a scale with a minimum resolution of 0.1g
- the chosen infusion set

This notification in normal mode reminds the user to calibrate the infusion set:



Notice

- The ARGUS 71x V can be used with a maximum of 4 different infusion sets.
- Before an infusion set can be calibrated on the pump, it must be configured by CODAN *ARGUSservice* utility. The parameter "Enable infusion set" must be checked in order to perform a calibration of the infusion set. See Section „3.6.3. Configuration of infusion sets".

⚠WARNING

- Unless otherwise specified by the customer, the ARGUS 71x V will be calibrated by the manufacturer with the CODAN standard set. Other infusion sets have to be calibrated separately.
- Only infusion sets being validated and approved by CODAN ARGUS AG shall be used. For an up-to-date list please contact CODAN ARGUS AG.
- After configuration of a new infusion set, pressure and volume calibration are mandatory.
- A pressure calibration is necessary when a pressure sensor or the main board was replaced before.
- If the pressure control measurement is not accurate, a pressure calibration is recommended.

5.3 Technical Errors

A technical error is specified on the display via a numerical code (example: «18082»). The second line contains information such as firmware version, module number, module revision and line number. This message is accompanied by a periodic audible signal, a permanent red status light and a flashing alarm light. In case of a technical error, the device needs to be analysed by the technical service. The failure status will be stored in the history log. Information about this technical error can be found with the history tool of CODAN *ARGUSservice*. For further assistance generate the report file and contact CODAN ARGUS AG.

Procedure in the event of a technical error message

- Press On/Off key, to mute the audible signal.
- Press On/Off key, to switch off the pump.
- The pump must be disconnected from the patient immediately
- and replaced with a substitute device.

Pass the defective pump to the Technical Service Department.

Procedure in emergencies, when interruption of the therapy poses a risk to the patient

- Press On/Off key, to mute the audible signal.
- Press On/Off key, to switch off the pump.
- Press On/Off key again, the pump is now in normal mode again, until a new technical error occurs.

5.4 Coin Cell Battery

The lithium ion coin cell battery (Type: CR2032, REF: 601 603) is used to store the states and history of the device. When the battery is replaced, this information is lost. It is recommended that the information is saved using CODAN *ARGUSservice* before the battery is replaced. For step-by-step instructions on how to replace coin cell, see Section „6.8.6. Replacement of the Coin Cell".

During normal usage, the button cell battery will last over 10 years. However, if the ARGUS 71x V is not used for an extended periods of time while being disconnected from mains power, the battery may be empty within a shorter time span.

⚠ WARNING

Repairs shall only be performed by trained specialists who are authorized in maintenance and repair of the ARGUS 71x V by CODAN ARGUS AG. Repairs shall only be performed with original spare parts which must not be modified without prior authorization from CODAN ARGUS AG. Not following these instructions can compromise patient safety.

5.5 Configuration Mode

Entering the Configuration Mode:

Keep the 2nd numeric key depressed and press the ON/OFF key in order to get access to the configuration mode.

The configuration contains various device-specific settings. These settings make it possible to customize the functionality of the ARGUS 71x V. There are two sets of this configuration:

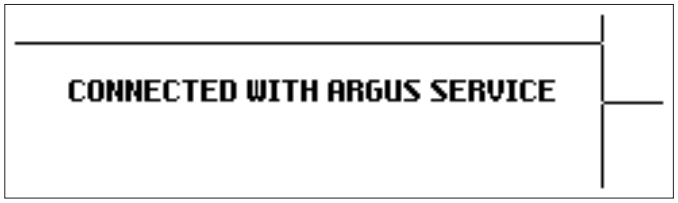
Current Configuration:	The active device configuration.
Customer Configuration:	The default configuration that can be customized by order. The Order and Configuration Form is available at CODAN ARGUS AG. The customer configuration can be restored with CODAN *ARGUSservice*.

Changes made in configuration mode are stored permanently into current configuration.

⚠ WARNING

- Changes in the configuration mode (with the CODAN *ARGUSservice* PC utility tool), preventive maintenance measurements or repair constitute a modification of the device and may only be carried out by authorized persons. Otherwise, patient safety cannot be guaranteed.
- After each change of a configuration, a function check has to be performed.
- Reducing the volume also affects the volume of the audible alarm.

An active connection is displayed on the screen.



5.5.1 Configuration Parameters

This section contains an overview of all relevant settings accessible with the parameter tool of CODAN *ARGUSservice* (see Section „3.9. Parameter Control“).

Alarm	Setting	Default Value	Range/Unit	Description
Air Accumulation	Detection	True	False/True	Detection of accumulated air bubbles
	Duration	32	8 - 64 min	Time window for detected air accumulation. Volume of air accumulation (see infusion set configurations).
Alarm Signal	Pause no. 5	350	350 -1300 ms	Duration of pause no. 5 (See Figure 34).
	Interburst	2500	2500 - 15000 ms	Interburst interval (See Figure 34).
	Pause	50	50 - 125 ms	Duration of pause (See Figure 34).
	Pulse	75	75 - 200 ms	Pulse length (See Figure 34).
Pre-alarm Signal	Interburst	15000	15000 - 30000 ms	Alarm low priority interburst interval (See Figure 35).
	Pause	125	125 - 250 ms	Duration of pause (See Figure 35).
	Pulse	125	125 - 250 ms	Pulse length (See Figure 35).
Note Signal	Pause	750	500 - 2000 ms	Duration of pause (See Figure 36).
	Pulse	750	500 - 2000 ms	Pulse length (See Figure 36).
Nurse Call	Function	False	False/True	Allows alarm transmissions
	Pause width	2	0 - 3600 s	Pause width
	Pulse width	1	0 - 3600 s	Pulse width
Standby	Duration	2	1 - 60 min	Time-out for unused device until alarm release
	One-time Standby alarm	False	False/True	Alarm release only before the first start of infusion

Figure 33: Auditory Signal for an Alarm

Auditory Signal for an Alarm:
A: Pulse length
B: Duration of pause
C: Duration of 3rd and 8th pause (calculated: A + 2B)
D: Duration of pause no.5
E: Interburst interval

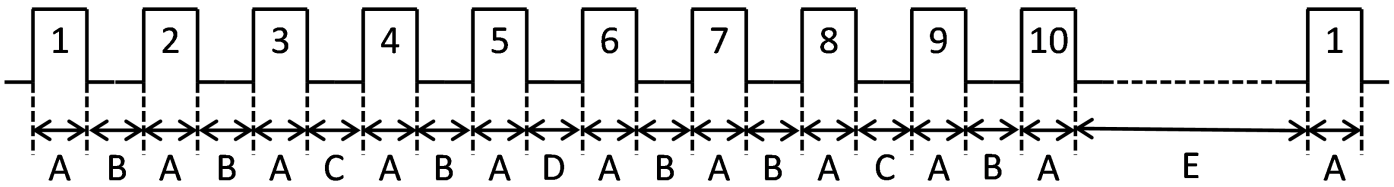


Figure 34: Auditory Signal for an Alarm

Auditory Signal for a Pre-Alarm:
A: Pulse length
B: Duration of pause
C: Alarm low priority interburst interval

Figure 35: Auditory Signal for Pre-Alarm

Auditory Signal for a Note:
A: Pulse length
B: Duration of pause

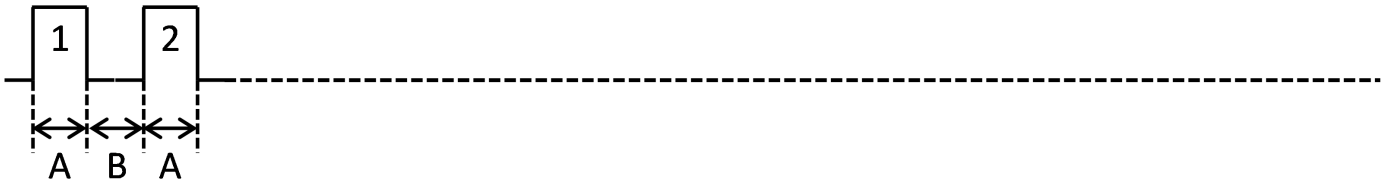


Figure 36: Auditory Signal for a Note

Operation Conditions	Setting	Default Value	Range/Unit	Description
Buzzer	Volume setting	10	1 - 10	Buzzer loudness
	Sound at start of infusion	True	False/True	Buzzer signal release at start of infusion
General	Automatic bolus function	False	False/True	Option in addition to the manual bolus
	Fluid balancing	False	False/True	Reset of the infused volume while VTBI remains unaffected
	infusion set menu	True	False/True	Selection and confirmation of an infusion set brand
	Drug selection required	False	False/True	User is forced to select a drug before infusion start (drug library must be available)
	Rate modification in Stop Mode	False	False/True	User is forced to stop infusion before a rate change
	Set duration exceeded time	0	0 - 1000 h	Notification time if infusion set is inserted too long (0 = disabled).
	OFF key delayed	3	0 - 3 s	Adjustments of the response time
	OFF key in Stop Mode only	True	False/True	Device must be in Stop Mode to be switched off
	STOP key delayed	0	0 - 3000 ms	Adjustments of the response time
	Fallback time to infusion rate	15	5 - 120 sec	Time to fall back within main screen
	Transport Mode reminder	15	1 - 60 min	Interval time for recurrence of reminders (Transport Mode must be enabled)
Speaker	Volume setting	10	1 - 10 volume	Speaker alarm loudness
Delayed Infusion	Blue Leds	False	False/True	Blue leds are enabled for indicating delayed infusion mode
Barcode Mode	Patient barcode required	False	False/True	Patient barcode required
	Staff barcode required	False	False/True	Staff barcode required
	Staff barcode required for rate change	False	False/True	Staff barcode required for rate change (Parameter 'Staff barcode required' must also be enabled, otherwise no action)

⚠ WARNING

When setting the volume of the buzzer or speaker, ensure that the loudness is higher than the ambient noise level, otherwise the operator might not recognize the occurrence of an alarm condition. This could lead to a delayed reaction to an alarm condition.

KVO	Setting	Default Value	Range/Unit	Description
General	KVO after VTBI was reached	False	False/True	KVO is active when VTBI (Volume to be infused) was reached
	KVO at stop	True	False/True	KVO is active whenever an infusion is stopped (alarm conditions excluded)
	Setting for high infusion rates	3000	100 - 10000 µl/h	KVO rate for infusion rates above 40 ml/h
	Setting for low infusion rates	100	100 - 5000 µl/h	KVO rate for infusion rates up to 40 ml/h

Pre-Alarms	Setting	Default Value	Range/Unit	Description
General	Clear-time for low battery	2	1 - 240 min	Time until pre-alarm is repeated after its last clearance
	Clear-time Near End of Infusion	2	1 - 240 min	Time until pre-alarm is repeated after its last clearance
	Near End of Infusion	False	False/True	Announcement that the VTBI will be reached soon
	Time for Near End of Infusion	10	1 - 240 min	Time of the pre-alarm release

Automatic pressure reduction	Setting	Default Value	Range/Unit	Description
General	Automatic pressure reduction at downstream	True	False/True	Automatic activation of pressure reduction through occlusion

Service Intervals	Setting	Default Value	Range/Unit	Description
General	Interval setting in months	0	0 - 24 months	Time period up to the reminder SAFETY CHECK IS DUE
	Interval setting in hours of operation	0	0 - 10000 hrs	Time period up to the reminder SAFETY CHECK IS DUE

Infusion set 1-4	Setting	Default Value	Range/Unit	Description
General	Size of individual air bubble	250	50 - 1000 µl	Air bubble size at which an air alarm is released
	Air accumulation volume	250	100 - 2000 µl	Volume of accumulated air bubbles at which an air alarm is released (see Alarm Settings: Air Accumulation
	Enable infusion set	True	False/True	Enable infusion set
	Bolus volume	10000	1000 - 999000 µl	Limit of the bolus volume being administered per bolus
	Name of infusion set	CODAN STANDARD	text	Name to be displayed on the pump
	Level setting for occlusion alarm	700	100 - 1000 mbar	Pressure level at which a downstream alarm is released

User Permissions	Setting	Default Value	Range/Unit	Description
Definition 1	Name	Administrator		The user name
	Pin code	1220	0 - 9999	Pin code of the user

Display	Setting	Default Value	Range/Unit	Description
General	Brightness	240	0 - 255 steps	Display backlight brightness
	Contrast	7	1 - 15 steps	Display contrast

Menu	Setting	Default Value	Range/Unit	Description
General	Alarm Presets	True	False/True	This menu shows the current alarm presets
	Battery Info	True	False/True	Access for user to check remaining battery capacity
	Bolus function	True	False/True	Access for user to bolus function
	Key Lock	False	False/True	Access for user to lock the keyboard by means of a pin
	Key lock pin code	0	0 - 9999	4 digit pin code
	Pressure Setting	True	False/True	Access for user to modify temporarily the occlusion level
	Automatic Purge	False	False/True	Access for user to purge IV tubing automatically
	Settings	True	False/True	Access for user to modify temporarily buzzer volume, standby alarm
	Fallback time from menu operation	60	5 - 60 sec	Time to fall back from menu to main screen
	Transport Mode False/True			Access for user to the transport mode
	Pressure unit settings	mbar	enum	mbar, mmhg, kpa, cmh20, psi, Pressure unit to be displayed
Info Menu	Accumulated Volume	False	False/True	Shows accumulated volume info menu
Special Functions	Barcode Mode	False	False/True	Shows Barcode Mode Menu
	Delayed Infusion	False	False/True	Shows Delay Infusion Menu

Start-up	Setting	Default Value	Range/Unit	Description
Splash Screen	Text Department		text	Department name to be displayed at the bottom of the splash screen

5.5.2 Nurse Call

The ARGUS 71x V can be adapted to the nurse call system. The connection can be found on the rear side of the device (see Section "Overview"). A connection plan of the RJ9 plug is shown in Figure 45.

During an alarm or pre-alarm the nurse call becomes activated (see in table below). After muting the alarm or pre-alarm the nurse call relay goes back to the normal contact.

The kind of the function can be configurated in 3 ways (see Section „5.5.1. Configuration Parameters"):

Signal form	Setting	Value
Single pulse alarm	Nurse Call Function Nurse Call Pause Width Nurse Call Pulse Width	True 3600 s Pulse duration
Pulse sequence alarm (with Reminder)	Nurse Call Function Nurse Call Pause Width Nurse Call Pulse Width	True Reminder time Pulse duration
Static alarm	Nurse Call Function Nurse Call Pause Width Nurse Call Pulse Width	True 0 s 3600 s
Nurse Call disabled	Nurse Call Function Nurse Call Pause Width Nurse Call Pulse Width	False Any Any

6.1 Exploded View ARGUS 71x V - complete

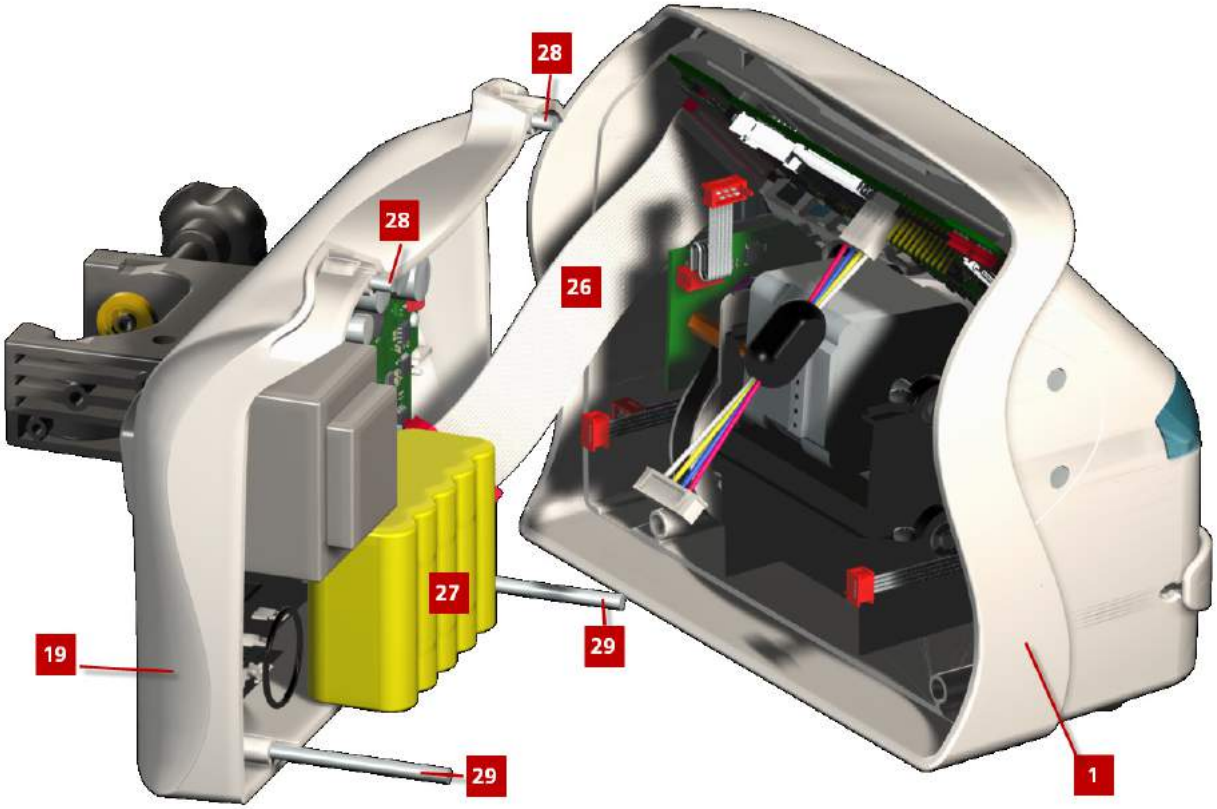


Figure 37: Exploded view ARGUS 71x V - complete

6.2 Exploded View ARGUS 71x V -Casing backside inside

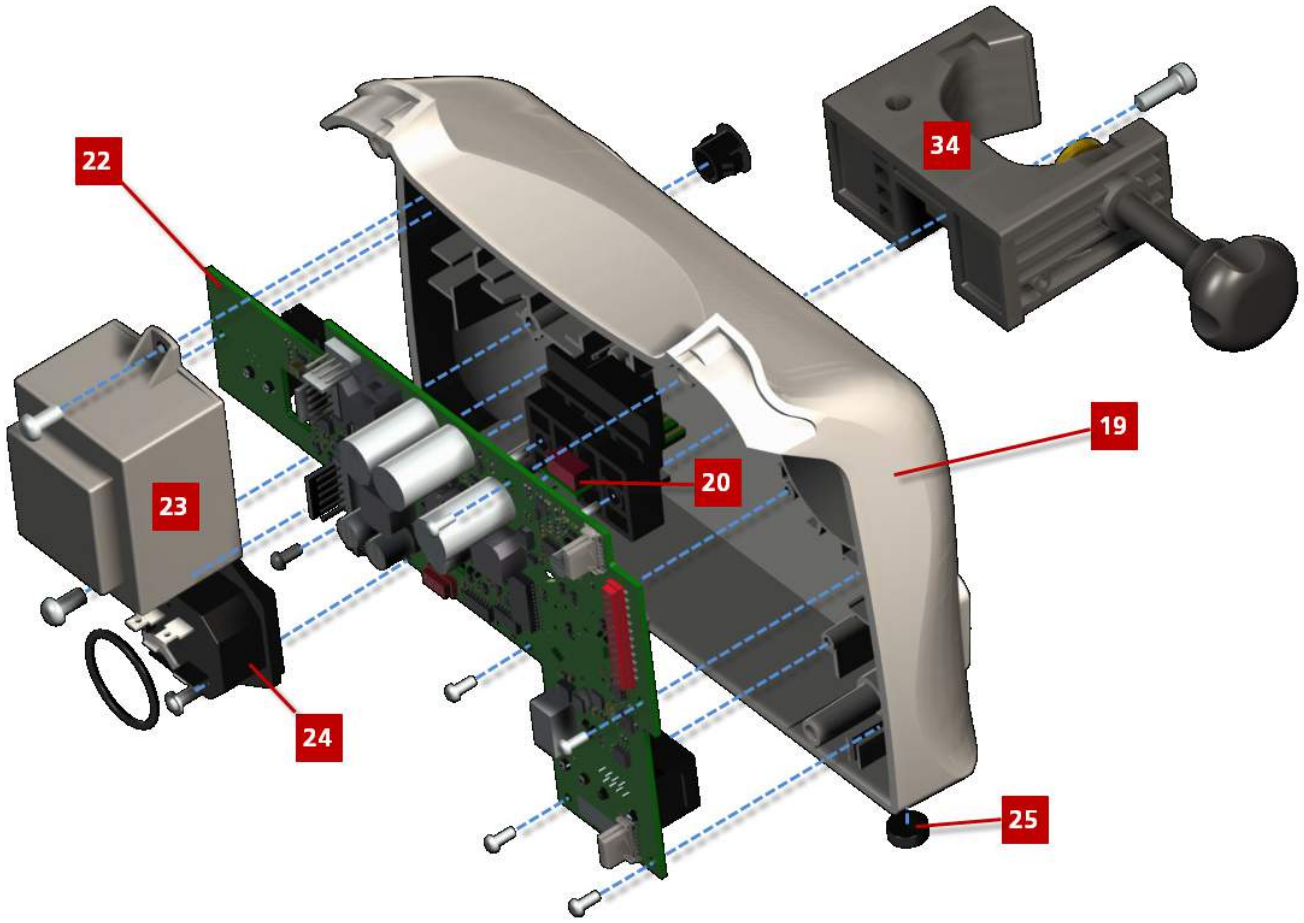


Figure 38: Exploded View ARGUS 71x V - Casing backside inside

6.3 Exploded View ARGUS 71x V - Casing backside outside

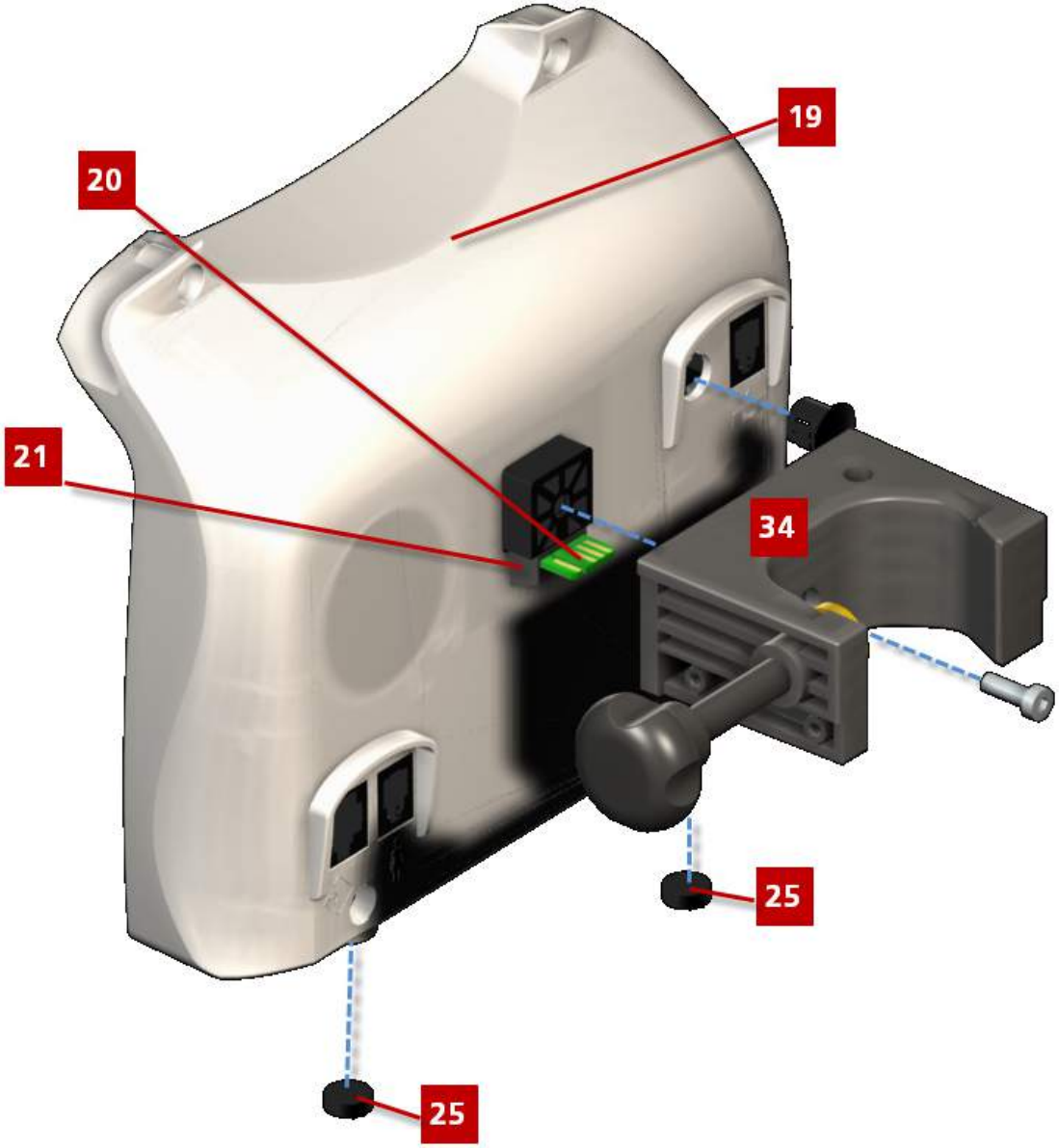


Figure 39: Exploded View ARGUS 71x V - Casing backside outside

6.4 Exploded View ARGUS 71x V - Casing front inside

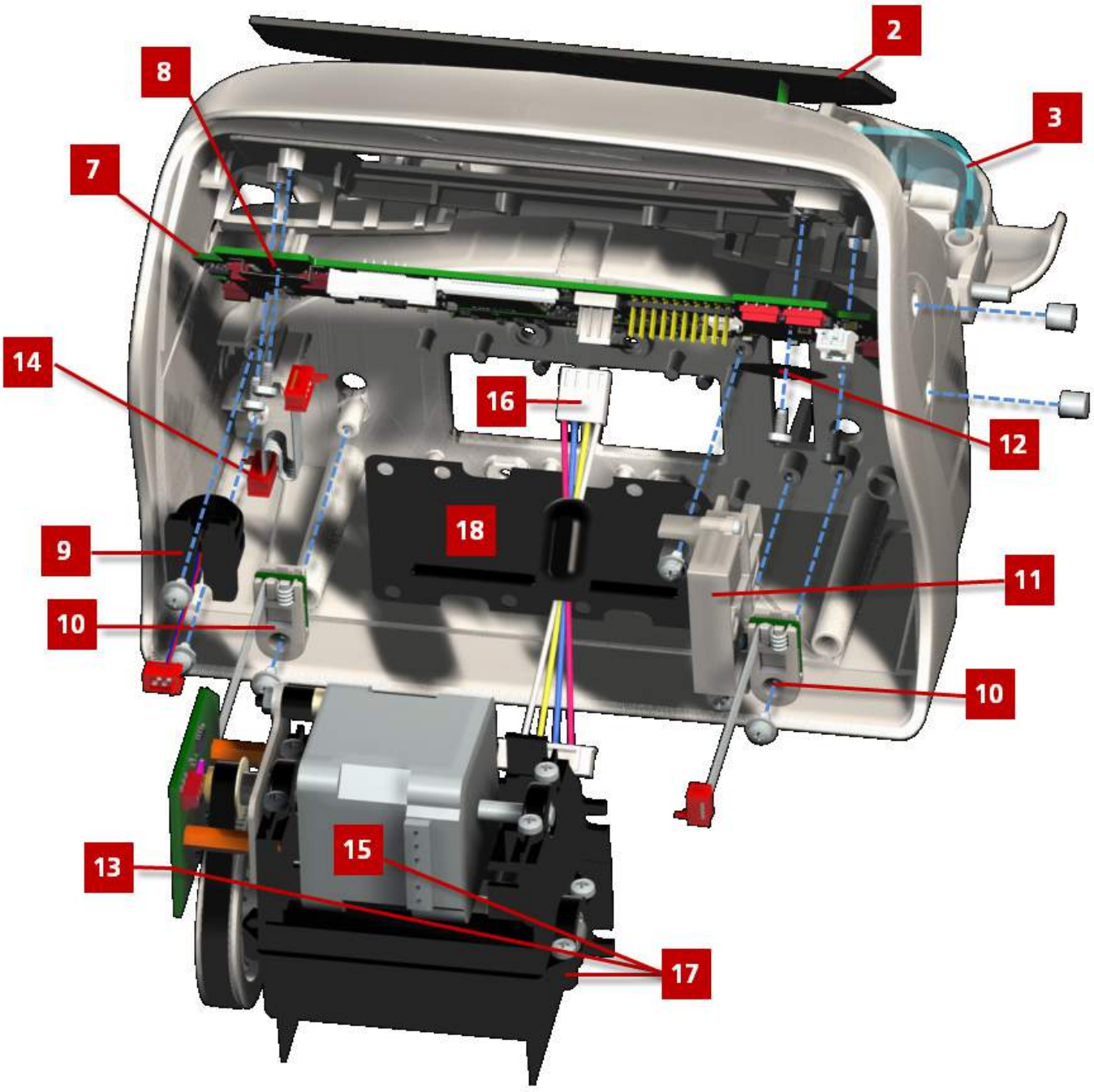


Figure 40: Exploded View ARGUS 71x V - Casing front inside

6.5 Exploded view of ARGUS 71x V - Casing front outside

Figure 41: Exploded View ARGUS 71x V - Casing front outside

6.6 Part Numbers and Descriptions

No.	Order No.	Spare Part
1	601281	Casing front complete ARGUS 717 V
1	601485	Casing front complete ARGUS 718 V
2	601279	Keypad (ARGUS 717 V)
2	601340	Keypad (ARGUS 718 V)
3	601238	Window global alarm left (upstream side)
4	601239	Window global alarm right (downstream side)
5	600960	Door (ARGUS 717 V)
5	601049	Door (ARGUS 718 V)
6	601231	Door handle (with dowel pin, securing screw)
7	601438	Main board with LCD (ARGUS 717 V)
7	601439	Main board with LCD (ARGUS 718 V)
8	600658	Lithium coin CR1632.IB 3V /125mAh (coin cell for mainboard)
9	600976	Air bubble detector
10	601188	Pressure sensor Z1.0
11	601057	Anti-free flow clamp (ARGUS 718 V)
11	600966	Stop flow clamp (ARGUS 717 V)
12	601491	Buzzer (>90dB RM15-D22,6mm)
13	601278	Sensor board
14	601343	Ribbon cable 6-pol (60mm ready-made)
15	600965	Stepper motor
16	600963	Stepper motor cable
17	601275	Pump unit (peristaltic block)
18	600604	Membrane for peristaltic NBR (000-70A-0099 (57618))
19	601389	Casing backside 115V (with transformer, mains receptacle and edge board)
19	601274	Casing backside 230V (with transformer, mains receptacle and edge board)
20	601282	Edge board
21	600478	Edge board protective insert against drops
22	601277	Power board
23	601103	Transformer 115 V (with cable, plug)
23	601062	Transformer 230 V (with cable, plug)
24	600486	Mains receptacle
25	600699	Non-slip rubber foot (ø10x3 black)
26	601342	Ribbon cable 24-pol (120 mm ready-made)
27	601074	Battery Ni-Mh / 12V / 1800 mAh (with temperature control)
28	601283	Socket head cap screw M4x12 (ZS-M4x12-IK-V-DIN 912)
29	601284	Socket head cap screw M4x70 (ZS-M4x70-IK-V-DIN 912)
30	600491	Edge board hood
31	600233	Socket head cap screw M5x20 (ZS-M5x20-IK-A2-DIN 7984)
32	601167	Screw cover
33	600484	Fuse T125mAL250V (230VAC mains power supply)
33	600485	Fuse T250mAL250V (115VAC mains power supply)
34	600978	Combination clamp

6.7 Technical Error List

Code Number	Probable defective hardware or firmware
8011 - 8014	1. MB
8015 - 8026	1. BP, 2. MB, 3. PB
8027 - 8038	1. MB
8039 - 8040	1. PB
8041 - 8046	1. MB
8047 - 8053	1. PB
8054 - 8073	1. MB
8074 - 8082	1. MB, 2. PB
8088 - 8090	1. MB
8094 - 8096	1. MB, 2. PB, 3. BIB
8105 - 8109	1. BP, 2. MB, 3. PB
8111	1. FW, 2. MB
8112 - 8114	1. H
8115	1. PB
8116 - 8117	1. MB
8119	1. MB
8122 - 8125	1. MB
8126, 8130	1. SM, 2. MB
8132 - 8134	1. MB
8135	1. MB, 2. PB
8137 - 8141	1. MB, 2. PB, 3. SB
8143 - 8144	1. MB, 2. PB, 3. SB
8174	1. KP
8177	1. MB
8182	1. UPS, 2. MB
8183	1. DPS, 2. MB
8184	1. ML
8186	1. MB
8199	1. BIB
8201 - 8204	1. BIB
8207	1. PB

Code Number	Probable defective hardware or firmware
8210 - 8213	1. MB
18001 - 18007	1. MB, 2. PB
18008	1. MB
18009 - 18011	1. MB, 2. PB
18012	1. PB
18019	1. ML
18020	1. UPS
18021	1. DPS
18031	1. PB
18034 - 18035	1. PB, 2. T
18036 - 18037	1. MB, 2. PB, 3. T
18038 - 18039	1. PB
18040 - 18043	1. MB
18044 - 18045	1. BP, 2. PB
18046 - 18047	1. PB
18048 - 18049	1. MB
18050	1. MV, 2. PB, 3. T
18051 - 18052	1. MB
18053 - 18055	1. BP, 2. PB
18056 - 18057	1. MB
18058 - 18059	1. MB
18060 - 18063	1. UPS, 2. MB
18064	1. IB
18065	1. MB
18066	1. MB
18067	1. PB
18068	1. SB
18069 - 18070	1. AT, 2. MB
18071 - 18072	1. AT, 2. BP
18074 - 18076	1. PB
all others	1. FW

Abbreviations:

AT ambient temperature
BIB bluetooth interface board
BP battery pack
DPS downstream pressure sensor
FW firmware
H description in the history file
IB interface board
KP keypad
MB main board
ML medication library
MV mains voltage
PB power board
SB sensor board
SM stepper motor
T transformer
UPS upstream pressure sensor

If the error is located in the firmware, check if new firmware is available. Some technical errors give a hint in the history which hardware component is defective. In the table above, the possible components are in the order of probability as error source. If the defective component can be found, first check the connections of the component. If the error occurs again, replace the components after order of the probability and check if the error occurs again. If no action has success, inform the CODAN ARGUS technical services.

6.8 Assembly Instructions

⚠ WARNING

- The ARGUS 71x V may only be used with original accessories and spare parts being approved by CODAN ARGUS AG.
- Repairs shall only be performed by authorized specialists who have been trained in maintenance and repair of the ARGUS 71x V infusion pumps.
- Disconnect the device from mains and remove all interface connections prior to repairs.
- The internal mains connectors below the transformer are not insulated.
- A complete recalibration is mandatory after:
  1. Calibration of a new set
  2. Replacement of a pressure sensor
  3. Replacement of the peristaltic block
  4. Replacement of the housing
  5. Replacement of the main board
  6. Replacement of battery pack
- Remove the battery connector (X15) prior to replacing any parts.
- Always completely re-assemble the ARGUS 71x V before attaching it to mains power again.

⚠ CAUTION

Ensure that proper ESD precautions are met before opening the device to avoid damaging any electronic components.

References to the exploded view drawings are in the following format: (#x).

6.8.1 Disassembling of the Housing

1. Remove the screw covers.
2. Remove the screws on the back side of the housing.
3. Separate the casing front side from the casing backside.
4. Unplug the ribbon cable 24-pol from main and power board

6.8.2 Assembling of the Housing

1. Merge the casing front (#1) with the casing backside (#19) together.
2. Plug in the ribbon cable 24-pol (#26) from main and power board
3. Fix the screws (2pcs #28 and 2pcs #29) in the casing backside and tighten them with a torque of 1.1 Nm.
4. Place the screw covers (4pcs #32).
5. A final recalibration of pressure and volume must be performed.

6.8.3 Replacement of Battery Pack

1. Perform steps in Section „6.8.1. Disassembling of the Housing“
2. Take the casing back side.
3. Unplug the battery pack.
4. Insert a new battery pack (#27).
5. Perform steps in Section „6.8.2. Assembling of the Housing“
6. Update the time on the device with CODAN *ARGUSservice* (Section „3.8.1. How to set Date and Time“).

Notice

- The battery pack of the ARGUS 71x V is equipped with a temperature and current sensors for an accelerated charging time with high current-flow. Therefore, only battery packs being provided by CODAN ARGUS AG shall be used.
- The charging time depends on the present intensity of use and the status of the pump (e.g. run or stop mode, high or low infusion rate, etc.).

6.8.4 Disassembling of the Main Board

1. Perform steps in Section „6.8.1. Disassembling of the Housing“
2. Take the casing front side.
3. Unplug all cables from pressure sensors, air detector, sensor board, power board, keypad and motor cable.
4. Remove all 4 screws on the main board.
5. Withdraw the main board.

6.8.5 Assembling of the Main Board

1. Insert the new main board (#7).
2. Fix the mainboard with 4 screws and tighten them with a torque of 0.5 Nm.
3. Plug in all connectors.
4. Perform steps in Section „6.8.2. Assembling of the Housing“

6.8.6 Replacement of the Coin Cell

Notice

Beware of the information written in Section „5.4. Coin Cell Battery“.

1. Perform steps in Section „6.8.4. Disassembling of the Main Board“
2. Remove the coin cell by lifting it with an insulated object. Be aware of the risk of local short circuits.
3. Any standard CR1632 coin cell can be used (#8).
4. Perform steps in Section „6.8.5. Assembling of the Main Board“
5. Turn the pump on (in regular user mode) in order to re-initialize the internal real time clock.
6. Switch the pump off again.
7. Use the CODAN *ARGUSservice* utility (Section „3.8.1. How to set Date and Time“) to set the clock.

6.8.7 Replacement of the Keypad

1. Perform steps in Section „6.8.4. Disassembling of the Main Board“
2. Push the window in the keypad from behind the front casing.
3. Clean the surface of the housing (e.g. isopropyl alcohol), where to keypad was located.
4. Remove the protective film of the new keypad (#2)
5. Insert the flex cable from the keypad through the provided opening and bring the keypad in the right position in the front casing.
6. Press the whole keypad surface on the front casing, so that the keypad is glued well.
7. Perform steps in Section „6.8.5. Assembling of the Main Board“

6.8.8 Replacement of Stop Flow Clamp ARGUS 717 V

1. Perform steps in Section „6.8.1. Disassembling of the Housing“
2. Take the casing front side.
3. Remove the 2 screws.
4. Remove the clamp.
5. Insert new clamp (#11).
6. Fix the clamp with the 2 screws and tighten them with a torque of 0.6 Nm
7. Perform steps in Section „6.8.2. Assembling of the Housing“.

6.8.9 Replacement of Anti-Free Flow Clamp ARGUS 718 V

1. Perform steps in Section „6.8.1. Disassembling of the Housing“
2. Take the casing front side.
3. Unplug the cable from the clamp.
4. Remove the 2 screws.
5. Remove the clamp.
6. Insert new clamp (#11).
7. Fix the clamp with the 2 screws and tighten them with a torque of 0.5 Nm
8. Plug in the cable from the clamp.
9. Perform steps in Section „6.8.2. Assembling of the Housing“.

6.8.10 Replacement of Pressure Sensor

1. Perform steps in Section „6.8.1. Disassembling of the Housing“.
2. Take the casing front side.
3. Unplug the cable from the downstream or/and the upstream Pressure Sensor.
4. Remove the screw of the selected Pressure Sensors.
5. Insert new Pressure Sensor (#10).
6. Fix the Pressure Sensor with the screw and tighten them with a torque of 0.3 Nm.
7. Perform steps in Section „6.8.2. Assembling of the Housing“.

6.8.11 Replacement of Air Detector

1. Perform steps in Section „6.8.1. Disassembling of the Housing“. Take the casing front side.
2. Unplug the cable from the Air Detector.
3. Remove the 2 screws and Air Detector.
4. Insert new Air Detector (#9).
5. Fix the Air Detector with the 2 screws and tighten them with a torque of 0.6 Nm.
6. Perform steps in Section „6.8.2. Assembling of the Housing“.

6.8.12 Replacement of Window Global Alarm

1. Perform steps in Section „6.8.1. Disassembling of the Housing“.
2. Take the casing front side.
3. Push with a thin pointed tool from behind into the holder hole of the Window Global Alarm.
4. Remove the Window Global Alarm.
5. Insert new Window Global Alarm (#3 and #4).
6. Perform steps in Section „6.8.2. Assembling of the Housing“.

6.8.13 Replacement of Interface Board Bluetooth

1. Perform steps in Section „6.8.1. Disassembling of the Housing“.
2. Take the casing back side.
3. Unplug the cable of the Interface Board from the Mainboard
4. Remove the Interface Board.
5. Insert new Interface Board (601551).
6. Plug in cable from the Interface Board.
7. Perform steps in Section „6.8.2. Assembling of the Housing“.

Notice

- it is only possible to use a Bluetooth Interface Board with Mainboard same or newer than index M in article number 601276.M (located on label, near plug for keypad).

6.8.14 Disassembling of Door

1. Open the door.
2. Gently press the hinge stopper backwards.
3. Pull the shaft towards the centre with help of needle nose pliers until the shaft is out of the holder.
4. Repeat step (2) and (3) for the other side of the door.
5. Remove the Door.

6.8.15 Assembling of Door

1. Insert Door (#5).
2. Push the two shafts with needle nose pliers into the holders.
3. Close the door.

6.8.16 Disassembling of Pump Unit

1. Perform steps in Section „6.8.1. Disassembling of the Housing“.
2. Perform steps in Section „6.8.14. Disassembling of Door“.
3. Unplug all cable from mainboard, sensor board and motor.
4. Remove the 4 screws on the front casing located above and below.
5. Be careful with the flat cable of the display when withdrawing the pump unit.

6.8.17 Assembling of Pump Unit

1. Insert a pump unit (#17) and ensure that the flat cable is not damaged.
2. Fix the pump unit with 4 screws and tighten them with a torque of 1.0 Nm.
3. Plug in the ribbon cable 6-pol (#14) from sensor board .and the stepper motor cable (#16) into mainboard.
4. Perform steps in Section „6.8.15. Assembling of Door“.
5. Perform steps in Section „6.8.2. Assembling of the Housing“.

6.8..18 Replacement of Peristaltic Membrane NBR

1. Perform steps in Section „6.8.16. Disassembling of Pump Unit“.
2. Change Membrane NBR (#18).
3. Perform steps in Section „6.8.17. Assembling of Pump Unit“.

6.8.19 Disassembling of Sensor Board
1. Perform steps in Section „6.8.16. Disassembling of Pump Unit".
2. Remove the 2 screws from the Sensor Board.
3. Separate the Sensor Board.

6.8.20 Assembling of Sensor Board
1. Insert new Sensor Board (#13).
2. Fix the 2 screws on sensor board and tighten them with a torque of 0.4 Nm.
3. Perform steps in Section „6.8.17. Assembling of Pump Unit".

6.8.21 Replacement of Stepper Motor
1. Perform steps in Section„6.8.19. Disassembling of Sensor Board".
2. Remove the screw nut, which stabilizes the step motor.
3. Remove the 2 spacer bolts on the motor metal plate.
4. Separate the motor metal plate.
5. Remove the 4 screws which fixes the axle on the pump unit.
6. Separate the Stepper Motor from pump unit.
7. Insert new Stepper Motor (#15).
8. Fix the 4 screws which fixes the axle on the pump unit and tighten them with a torque of 0.6 Nm.
9. Insert the motor metal plate.
10. Fix the 2 spacer bolts on the motor metal plate.
11. Fix the screw nut, which stabilizes the step motor.
12. Perform steps in Section „6.8.20. Assembling of Sensor Board".

6.8.22 Disassembling of Transformer and Mains Receptacle
1. Perform steps in Section „6.8.1. Disassembling of the Housing".
2. Take casing back side.
3. Plug out the transformer cable from the power board.
4. Remove both screws of the transformer.
5. Remove both screws of the mains receptacle.
6. Remove the transformer and mains receptacle.

6.8.23 Assembling of Transformer and Mains Receptacle
1. Insert the transformer (#23) and mains receptacle (#24).
2. Fix the transformer with two screws and tighten them with a torque of 1.0 Nm.
3. Fix the mains receptacle with two screws and tighten them with a torque of 0.5 Nm.
4. Plug in the transformer cable with Power Board.
5. Perform steps in Section „6.8.2. Assembling of the Housing".

6.8.24 Disassembling of Power Board
1. Perform steps in Section„6.8.22. Disassembling of Transformer and Mains Receptacle".
2. Separate all connectors of edge board, battery pack and main board.
3. Remove all 7 screws of the power board.
4. Withdraw the power board.

6.8.25 Assembling of Power Board
1. Insert a new power board (#22).
2. Fix the power board with 7 screws and tighten them with a torque of 0.6 Nm.
3. Plug in all connectors.
4. Perform steps in Section „6.8.23. Assembling of Transformer and Mains Receptacle".

6.8.26 Replacement of Edge Board
1. Perform steps in Section „6.8.1. Disassembling of the Housing".
2. Take casing back side.
3. Remove the screw witch fix the edge board with the clamp holder.
4. Unplug the edge board cable from the power board.
5. Remove the edge board.
6. Insert new edge board (20).
7. Fix the edge board with the screw on the clamp holder and tighten them with a torque of 0.5 Nm.
8. Perform steps in Section „6.8.2. Assembling of the Housing".

6.8.27 Replacement of Fuse
1. Use a screw driver to open the fuse holder of the mains receptacle.
2. Change the fuse (#33).
3. Close the fuse holder again.

6.8.28 Replacement of the Combination Clamp
1. Remove the M5x20 screw of the combination clamp.
2. Fix the new combination clamp (#34) with the M5x20 screw (#31) on the clamp holder and tighten them with a torque of 1.5 Nm.

6.8.29 Replacement of the Rubber Feet
1. Remove the rubber feet.
2. Clean surface (e.g. isopropyl alcohol).
3. Glue the new rubber feet (#25) on the bottom of casing.

Isolation of the Patient		
No.	**Values**	**Description**
1	2 MOPP	Transformer with isolation voltage of 4kV, medical approved, EN 61558-2-6
2	2 MOPP	No electrical connection to housing (see material datasheets)
3	2 MOPP	Air sensor is the most critical component to infusion set (conductive material on plates). infusion set wall thickness of 0.5mm (0.1mm => 1kV)
4	0 MOPP	Patients can be connected to conductive medication in infusion set

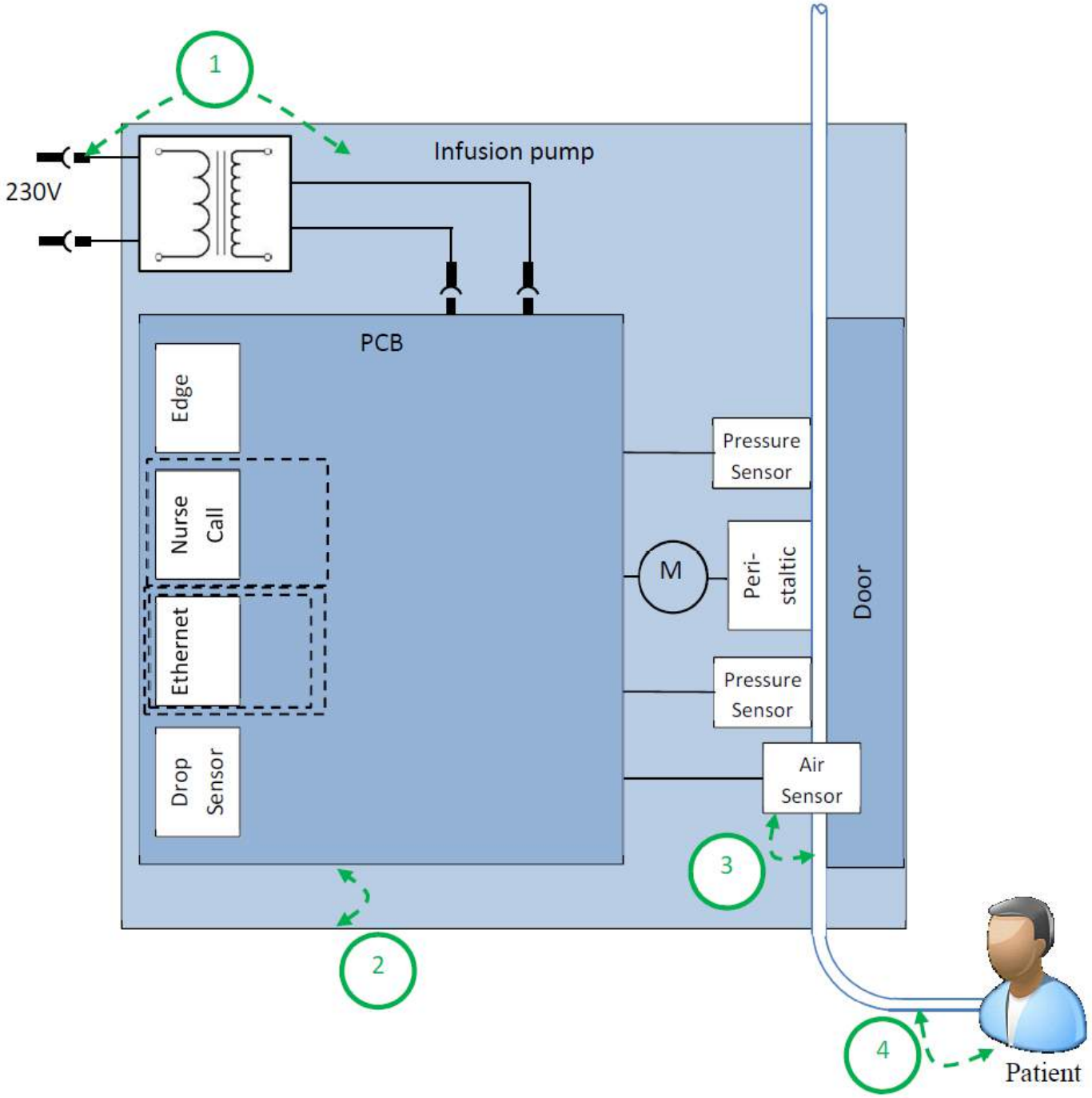


Figure 42: Isolation of the Patient

Isolation of the User		
No.	**Values**	**Description**
5	2 MOPP	Transformer with isolation voltage of 4kV, medical approved, EN 61558-2-6
6	2 MOPP	No electrical connection to housing (see material datasheets)
7	2 MOPP	Power cable standard isolation
8	1 MOPP	Isolation with relay (1.5kV)
9	2 MOPP	Double isolation (each 1.5kV)

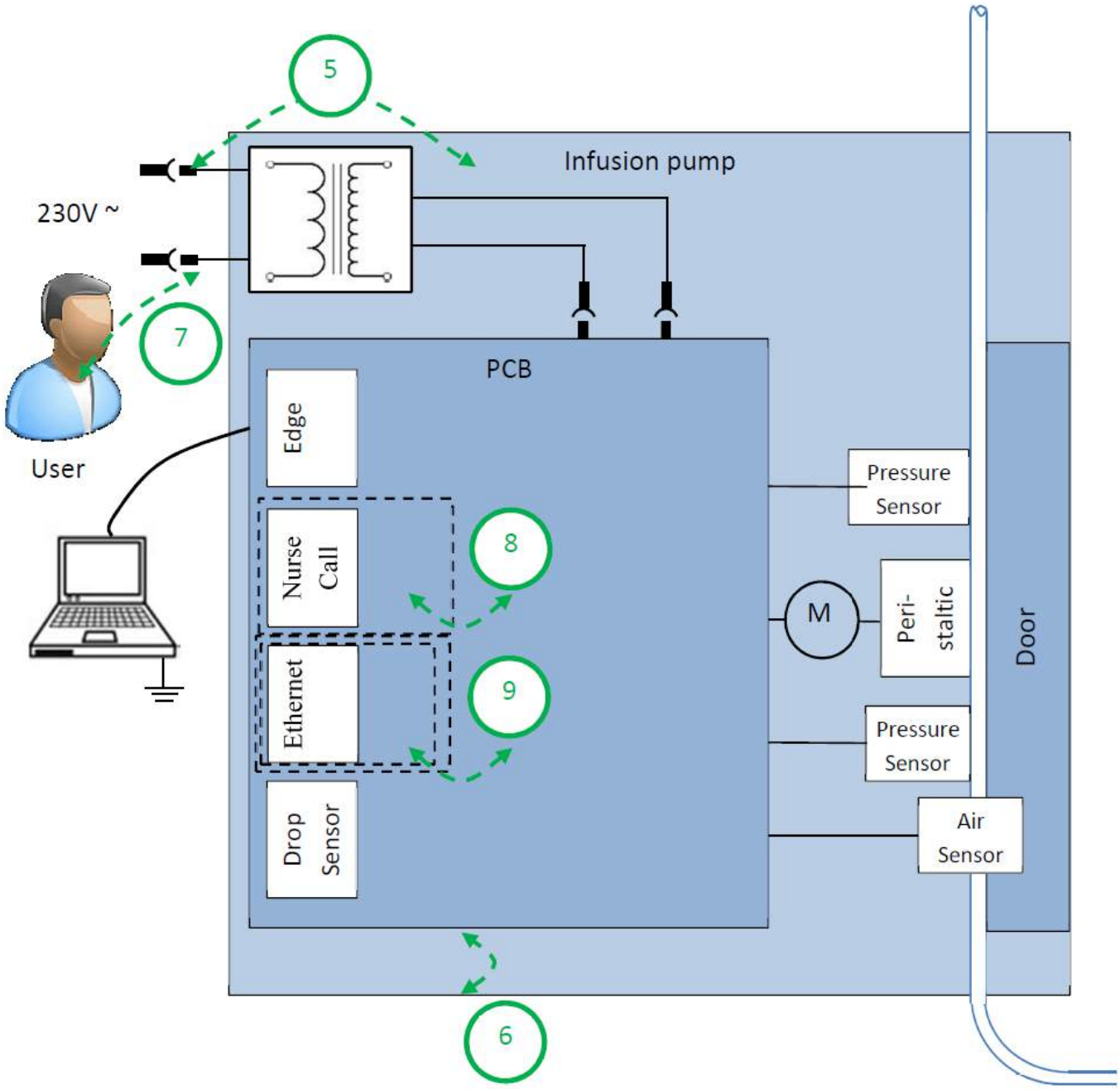


Figure 43: Isolation of the User

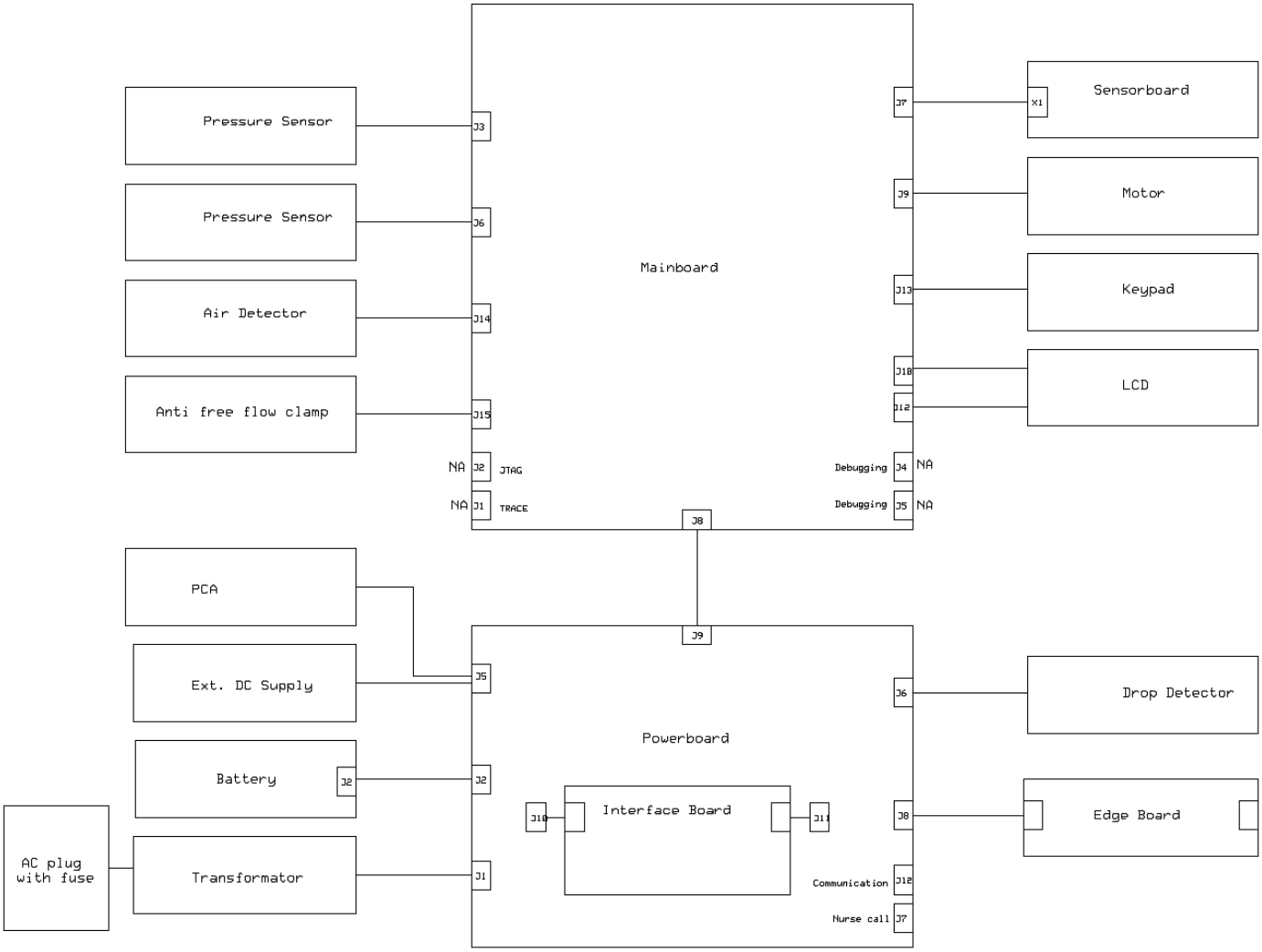


Figure 44: Wiring Diagram ARGUS 71x V

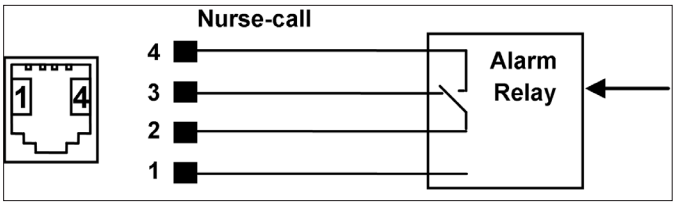


Figure 45: Connection Plan Nurse Call

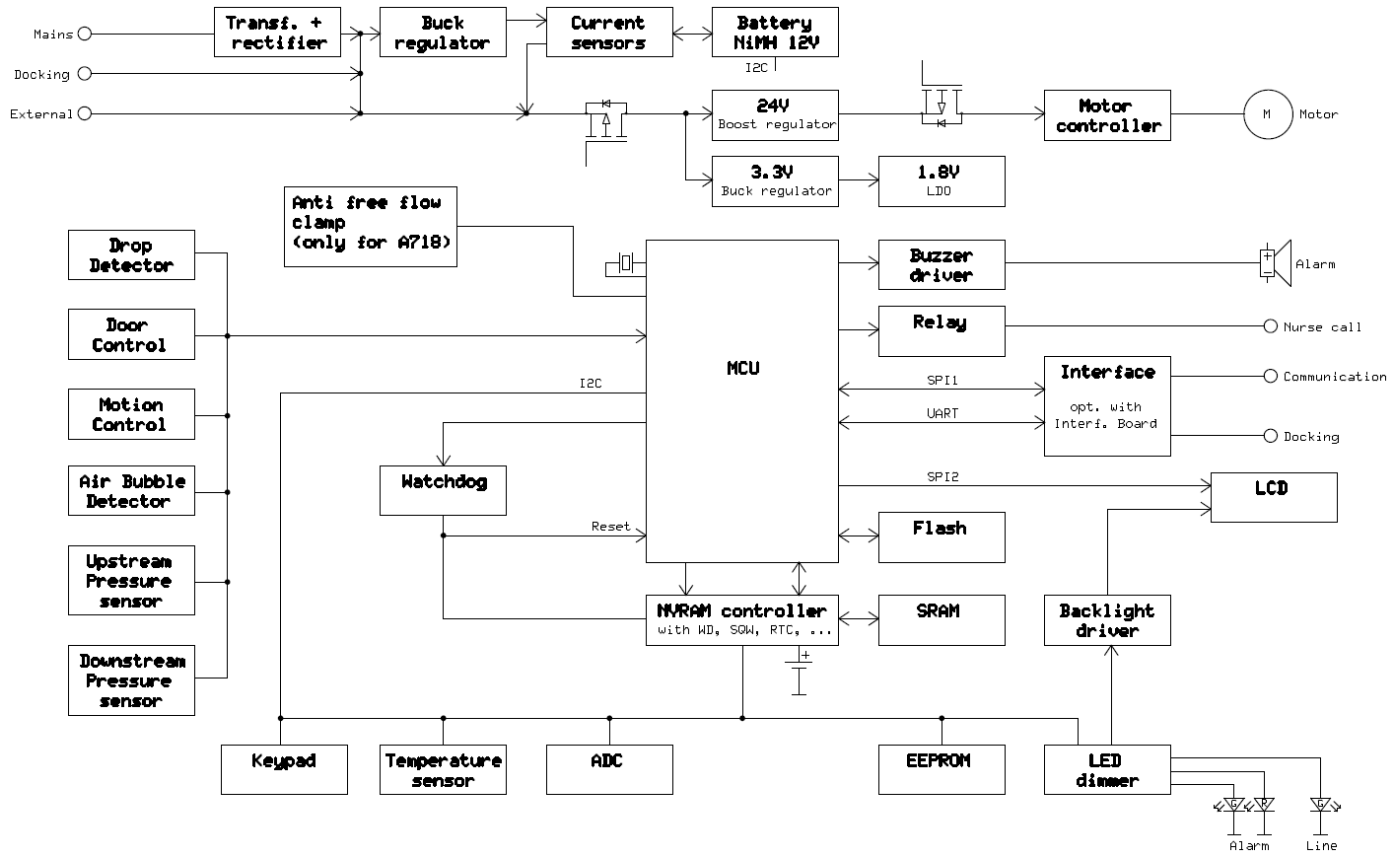
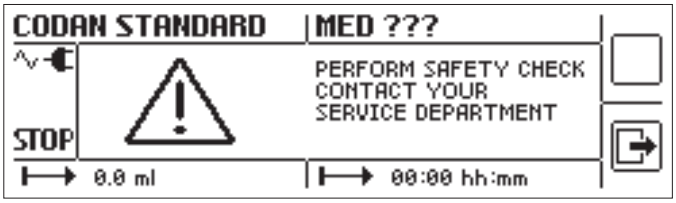


Figure 46: Block Diagram ARGUS 71x V

11.1 Reminder “Safety Check is Due”

When a safety standard check is due, a message appears after each startup procedure of the pump. Follow the steps in the SSC check list.



The reminder is triggered under the following conditions:

- Serial number of the device is missing
- Service interval (months or operating hours) has expired, if not configured to zero
- Time and date are not set
- Lithium coin cell battery has low voltage, replacement is necessary

Notice

The exact reason for the reminder “Safety Check is Due” may be found in the history. Look for Safety Standard Check (SSC) in the history.

11.2 Volume Control Measurement

Use the same volume calibration equipment as described in Section „5.2. Set Calibration“.

1. Switch the pump on. The pump must be in the regular infusion mode.
2. Prepare the balance for measurement and insert the infusion set in the pump.
3. Close the front door and open the roller clamp.
4. Verify that the inserted infusion set corresponds with the infusion set displayed in the pump screen.
5. Purge the extension line.
6. Set the balance to zero by pressing TARA.
7. Define a therapy with a rate of 250ml/h and a total volume of 30ml.
8. Start the infusion.
9. Wait until the END INFUSION alarm.
10. The resulting net weight shall read 30 g ±5% (corresponds to 28.5ml – 31.5ml).
11. If the weight is out of limit, the set calibration has to be repeated.

11.3 Pressure Control Measurement

Use the same pressure calibration equipment as described in Section „5.2. Set Calibration“.

1. Switch the pump on; the pump is in regular infusion mode.
2. Insert the infusion set and start the infusion at a rate of 200ml/h.
3. Close the 3-way stop cock on patient’s side to simulate an occlusion.
4. As soon as the manometer reaches 700 mbar, the pump must stop and release an occlusion alarm (tolerance is +/-150 mbar).
5. Make sure the upstream sensor is activated (see Section „5.1.1. Pump Settings“).
6. Pump Settings are configurable on the device.
7. Start an infusion without drop detector, at a rate of 200 ml/h and a VTBI of 10 ml.
8. Simulate an occlusion by closing the roller clamp on the side of the medication container.
9. The pump must stop after several seconds releasing an upstream occlusion alarm.

⚠WARNING

The pressure calibration procedure always includes all of the following steps and is complete when the control measurement was successful. The previous values remain stored in a premature termination of the calibration.

11.4 Functional Air Bubble Detection Test

Configuration Prerequisites:

Setting	Value
Infusion set/ General/Size of individual air bubble	250 µl
Infusion set/ General/Air accumulation volume	250 µl
Alarm/ Air Accumulation/Detection	True
Alarm/ Air Accumulation/Duration	32 min

1. Switch the pump in configuration mode and activate the upstream sensor in the pump settings.
2. Switch off and on again, so that the pump is in regular infusion mode.
3. Insert the infusion set in the pump.
4. Close the front door and open the roller clamp.
5. Verify that the inserted infusion set corresponds with the infusion set displayed in the pump screen.
6. Purge the extension line.
7. Start a therapy with a rate of 250ml/h and a total volume of 30ml.
8. Incline the drop chamber of the infusion set until the pump intakes air inside a segment of minimum 3,5 cm from the infusion line.
9. Change the rate to 1000ml/h.
10. Verify that after a few seconds the air alarm becomes displayed.
11. Open the door and move the infusion set until the air is outside of the pump.
12. Start the therapy again.
13. Verify that no alarm occurs.

11.5 Functional Drop Detection Test

1. Switch the pump on; the pump is in regular infusion mode with drop detector.
2. Insert the infusion set in the pump.
3. Close the front door and open the roller clamp.
4. Clamp the drop detector to the drop chamber (see section “4.3 Preparing the pump” in user manual ARGUS 71x V)
5. Purge the extension line.
6. Start a therapy with a rate of 250ml/h.
7. Verify that the drop light flashes green each time a drop falls.
8. Unclamp the drop detector from the drop chamber.
9. Verify that after a few seconds the drop occlusion alarm becomes displayed.

11.6 Battery Pack Test

The battery pack of the ARGUS 71x V is equipped with a temperature and current sensors for an accelerated charging time with high current-flow. Therefore, only battery packs being provided by CODAN ARGUS AG shall be used.
It is not permitted to reuse or to modify the built-in safety electronics. The charging time depends on the present intensity of use and the status of the pump (e.g. run or stop mode, high or low infusion rate, etc.). The replacement of a battery pack may only be performed by authorized specialist who were trained by CODAN ARGUS AG.

11.6.1 Check with CODAN *ARGUSservice* Utility

The following steps are to be carried out to check the battery pack with CODAN *ARGUSservice:*

1. Charge the battery until a capacity of 100% (see Section „3.6.4.6. Battery Information").
2. Discharge the full battery pack by running the pump at a rate of 25ml/h for at least 6 hours.
3. Disconnect the pump from the mains supply.
4. Wait until the battery alarm is released.
5. Open the history tool of the CODAN *ARGUSservice* utility (see Section „3.7. History Control").
6. Read out the last time stamps from the alarm event "Indication of alarm: (A12) END OF BATTERY CONNECT PUMP TO MAINS!" and notification event "Power source = Battery".
7. The elapsed time is the difference between this two time stamps.
8. If the battery pack does not reach the required capacity (see Item Battery operation in Section „14. Product Specifications"), the battery pack should be replaced (see Section „6.8.3. Replacement of Battery Pack").
9. Connect the pump to mains for 7 hours to charge the battery pack.

11.6.2 Check without CODAN *ARGUSservice* Utility

The following steps are to be carried out to check the battery pack without CODAN *ARGUSservice:*

1. Charge the battery until a capacity of 100% (see Battery Info menu).
2. Discharge the full battery pack by running the pump at a rate of 25ml/h for at least 6 hours.
3. Disconnect the pump from the mains supply and start a stopwatch.
4. Wait until the battery alarm is released and stop the stopwatch.
5. Read out the elapsed time.
6. If the battery pack does not reach the required capacity (see Item Battery operation in Section „14. Product Specifications"), the battery pack should be replaced (see Section „6.8.3. Replacement of Battery Pack").
7. Connect the pump to mains for 7 hours to charge the battery pack

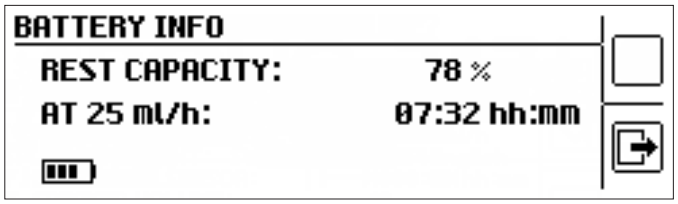


Figure 47: Battery Info Menu

11.7 Nurse Call Test

1. Switch the pump on; the pump is in regular infusion mode.
2. Insert the infusion set in the pump.
3. Close the front door and open the roller clamp.
4. Verify that the inserted infusion set corresponds with the infusion set displayed in the pump screen.
5. Purge the extension line.
6. Start a therapy with a rate of 250ml/h and a total volume of 30ml.
7. Open the door.
8. Verify that after the door open alarm occurs, the relay switches the contact on the RJ9 Plug. In this case the contact switches from Pin2/Pin3 to Pin2/Pin4 and back (Signal is depending of the configuration).

11. Safety Standard Check (SSC)

Device identification :			
ARGUS 717 V ☐	ARGUS 718 V ☐		
Serial-No.:		Hospital:	
Pump-No.:		Department:	
Used infusion set:		Customer:	
The SSC has to be performed at least every 24 months or after 10'000 hours of operation. The check has to be done in accordance to the user and service manuals.			

Test steps for ARGUS 717 V and ARGUS 718 V			
1	Visual check for damage, cleanness and completeness.	Housing, labels, accessories, connectors, power cable, etc.	
2	Switch pump on in configuration mode and note the SW-Rel. on the start-up screen and compare the right device type.	Firmware release:	
		Is the device type identical to the pump?	
3	Check if a firmware update is required.	Latest firmware is available on CODAN ARGUS AG website (www.codanargus.com)	
4	Perform display, keypad, LED and backlight tests (see Section „5.1.4. Keypad & Display Test").	Was all 3 tests successful?	
5	Switch pump off and start the pump in normal mode. Check of acoustic signal and indication of red status LED during start-up procedure.	Acoustic signal is audible?	
		The red status LED lights up?	
6	Connect/disconnect the pump to/from the mains.	The mains LED lights up only when connected to mains?	
7	Air bubble test (see Section „11.4. Functional Air Bubble Detection Test"):		
	Start therapy with a rate of 250.0 ml/h and a total of 30ml. Simulate air in the infusion line.	Air bubble alarm is displayed?	
	Confirm the alarm and remove the air in the infusion line. Start therapy again.	No more air bubble alarm occurs.	
8	Drop detector test (see Section „11.5. Functional Drop Detection Test"):		
	Start a therapy with a rate of 250ml/h. Remove drop detector from infusion set during therapy.	Drop occlusion alarm is displayed.	
9	Interfaces tests:		
	Check the external connector "Nurse Call" (see Section „11.7. Nurse Call Test").	Relay contact switches	
	Check the interface to docking station (connect pump to docking station).	The indicator for mains operation must light green The green status LED on the pump lights up.	
10	Pressure sensor tests (see Section „11.3. Pressure Control Measurement"):		
	Downstream sensor: Control measurement with pressure limit of 700mbar.	Measured pressure limit:	
	Upstream Sensor: Kink infusion set on bottle side.	An acoustic alarm will go off after a few seconds.	
11	Volume accuracy test (see Section „11.2. Volume Control Measurement"):		
	Start a therapy with KVO disabled, rate 250ml/h and total 30ml.	Measured volume:	
12	Battery pack test:		
	Charge battery of running pump for at least 9 hrs.	Mains power displayed	
	Battery Check at a rate of 35ml/h. Run the battery test until battery alarm goes off	Battery symbol is displayed during test	
13	Inspection certificate: Standard: IEC 62353	Visual check of mains connector measurements attached	

Additional test steps for ARGUS 717 V			
14	Test the function of the stop flow clamp	Proper function	
15	Recharge the battery after this test		

Additional test steps for ARGUS 718 V			
14	Test the function of the anti free flow clamp	Proper function	
15	Recharge the battery after this test		

The pump has passed the safety standard check and is safe for use.			
Date:	Name:	Signature:	

12. Repair Order Form

Purchase Order Proforma Invoice Number:	
Customer Name:	
Address:	
Contact Person:	
Tel. Number:	

Device Identification :											
ARGUS 717 V		ARGUS 707 V		ARGUS 600 S		ARGUS 404					
ARGUS 718 V		ARGUS 708 V		ARGUS 606 S		ARGUS 414					
ARGUS 300 P		ARGUS 500 P		ARGUS 600 P		ARGUS 60 P		ARGUS 100 P			
ARGUS 300 M		ARGUS 500 M		ARGUS 600 M		ARGUS 60 M		ARGUS 100 M			
Accessory:											
Serial-No.:						Production Code:					

Detailed failure or problem description:

Excepted work / repair to be done:		
Repair		Description:
Warranty repair		
Replacement		
Other		

Date:	Name:	Signature:

13.1 Important notes

Disconnect the pump from the mains before cleaning!

Remove all devices and connecting cables.

⚠CAUTION

- Avoid any liquid penetrating into the device or the device plug. If liquid is spilt over the device, the latter must be immediately disconnected from the mains plug or removed from the docking station. Then the pump must be dried immediately and thoroughly cleaned.
- Warnings relating to the liquids (medications) must be observed for cleaning.
- If there is any likelihood of liquid having penetrated inside the device, the device must be inspected by the Technical Service Department before continuing in use.

Notice

- The pump and the accessories must be kept clean and dry. In order to maintain the full functionality, regular cleaning within the product specifications is recommended (see Section „14. Product Specifications“).
- Do not use any abrasive cleaning agents.
- The pump is unsuitable for sterilization in autoclaves and must not be immersed in liquids.

13.2 Cleaning and disinfection

Clean the device only by wiping with a damp cloth. The use of lukewarm water is normally adequate. Care must be taken that the pump's connections are clean and dry so that no electrical damage occurs when connecting to a docking station or the mains.
For disinfection, only agents containing diluted alcohol (isopropyl) may be used. The in-house specialist department for hygiene can give information on suitable disinfectants.

13.3 Storage and transport

Devices may only be stored in clean conditions at a cool and dry place in accordance with Section „14. Product Specifications“

Notice

- The battery must be fully charged after 3 months at the latest so that full capacity is preserved. Otherwise batteries can over-discharge and leak, at worst.
- For transport, make sure that you choose appropriate packaging with sufficient protection against impact effects! We recommend using the original packaging.

Technical Data	Software 5.0X	Remarks
Performance Data		
Applications	intensive care, anesthesia, standard care, oncology, blood transfusion, parenteral nutrition, neonatal care	dose calculation, TIVA
Dosing units	g, mg, µg, ng, IU, mmol	per hour, minute, kilogram, day
Flow rate	0.1 – 1'200 ml/h	steps of 0.1 ml/h, modification without infusion interruption
Infusion volume	0.1 – 999.9 ml / 1'000 – 9'999 ml	steps of 0.1 ml / steps of 1.0 ml
Infusion time	1 min – 99 h 59 min	steps of 1 min
Programming	rate in ml/h, volume in ml, duration in h and min	
Automatic rate calculation	on the basis of volume and time	rate in ml/h, volume in ml, infusion duration in h and min
Bolus administration	manually or automatically	with / without dose limit, limits via ARGUS*medDB*
Bolus rate	0.1 – 1'200 ml/h	without infusion interruption
Bolus volume	0.1 – 999 ml	without infusion interruption
Purging of the infusion line	0.1 – 1'200 ml/h	
Accuracy	±5%, depending on the used, supported infusion set	under normal conditions according to IEC/EN 60601-2-24, technical deviation < ±1%
KVO (Keep Vein Open) rate	0.1 – 10.0 ml/h	depending on flow rate, deactivation possible
Standby mode	1 – 60 min	
History and Interface		
History and event log	up to 1'000 events	with time stamp
Nurse call	connection to the central system	24 V / 0.2 A, configurable pulse, potential-free
RS-232 interface		electrically isolated, connectable to PDMS (Patient Data Management System)
Operation		
Display type	monochrome LCD, 98.4 x 26.2 mm, 240 x 64 pixel	illuminated, adjustable brightness
Display contents	flow rate in units and ml/h, infused volume, target volume (VTBI), infusion time, remaining infusion time, battery capacity, pressure level, medication name and setup, bolus delivery and information menu etc.	
Menu overview	intuitive and configurable for specific applications	display text in national language, overview of infusion data
Menu configuration	by means of ARGUS*service* software / temporary settings by operator	client-specific configuration possible
Infusion lines	CODAN standard- and cyto-sets and other validated sets	tube materials: PVC, PVC-free, NoDEHP / display of the set name
	ARGUS 718 V: CODAN IVP© dedicated set	with anti-freeflow-clamp
Safety		
Pressure release	automatic pressure release after occlusion	
Air bubble detection	individual air bubbles	configurable from 50 – 1'000 µl
	accumulated air bubbles	configurable from 100 – 2'000 µl within 8 – 64 min
Drop detector	10 – 65 drops/ml	in transport mode alarm is less sensitive
Alarms, pre-alarms	visual and audible signals for rapid detection	with text explanation and symbols, large alarm window
Alarm types	occlusion (up- and downstream), air bubbles, no drops and too many drops, end of infusion, standby, low battery, end of battery, maintenance due etc.	
Key lock	activation / deactivation via numerical code	
Pressure limit for occlusion	100 – 1'000 mbar (also in mmHg, kPa, cmH2O, Psi)	10 configurable steps
DERS: Medication database (Dose Error Reduction System)	on request	on request
Power Supply		
Battery	1'800 mAh, NiMH	maintenance-free
Battery operation	6 hours at 25 ml/h	
Battery charging time	9 hours	in standby mode
Mains power supply	230 VAC ±10%, 50 – 60 Hz	option: 115 VAC ±10%, 50 – 60 Hz
Power consumption	12 VA maximum	
Product Specification		
Dimensions	190 x 160 x 130 mm (W x L x D)	without combination clamp
Housing	ASA high performance plastic	
Operating-/ medication temperature	5 – 40°C / 18 – 30°C	
Temperature for storage and transport	0 – 40°C	
Relative humidity	20 – 90% without condensation	
Weight with battery	2.0 kg	including battery and power supply unit
Maintenance	safety standard check (SSC): every 24 months	or after 10'000 operating hours
Compliance		
IP protection class	IP22	drop-protected in horizontal position up to ±15° inclination
Protection class	II	electric shock protection according to IEC 61140
Applied part type	CF	according to EN 60601-1
MDD classification	IIb	
Electrical safety	EN 60601-1, EN 60601-1-4, EN 60601-2-24	
Electromagnetic compatibility	EN 60601-1-2	
Certification CODAN ARGUS AG	ISO 13485, ISO 9001	
Device CE mark	CE 0123	according to directive 93/42/EEC
Accessories		
Docking stations	ARGUS docking stations in 3 sizes for different combinations	version M: monitoring (PDMS link) + power supply
		version P : only power supply
Attachment system	combination clamp	suitable for pole- and rail systems
Software	ARGUS*service*	program for simple maintenance and configuration

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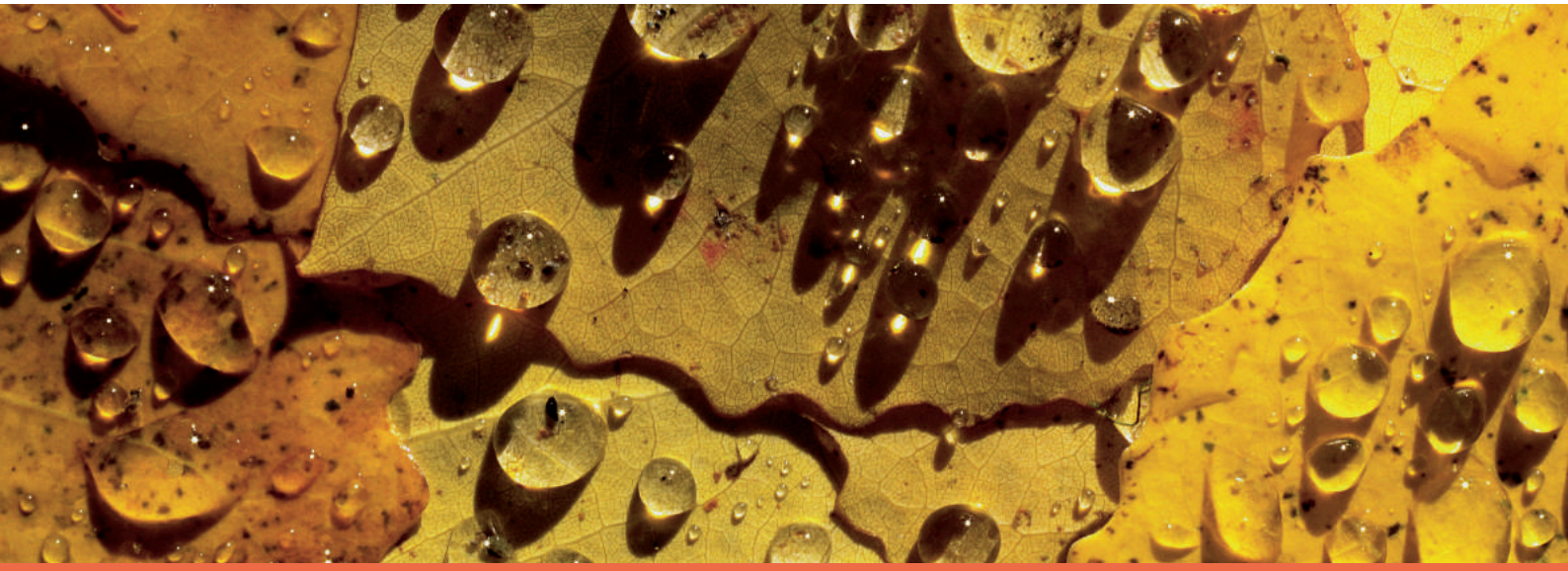

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