Leybold

TURBOVAC i(X)

TURBO.CONTROL i

Software Description

Operating Instructions 300702826_002_C0

Part No.
800100V0004

Contents

These Operating Instructions are a translation of the German original instructions 300702826_001_C0.

1 Description

The TURBO.CONTROL i serves to control and monitor a TURBOVAC i/iX turbomolecular pump.

Only one pump can be controlled and monitored.

The 24 VDC voltage supply can be provided by a plug power supply with round plug. The power supply unit is available as an accessory.

The TURBO.CONTROL i has two communication channels (RS 485 & USB) to the pump control and provides the possibility of attaching two measuring gauges. Connect a remote computer via the integrated Ethernet port to the web server of the TURBO.CONTROL i. Then use the installed internet browser to control and monitor the pump. The recorded data can be displayed and evaluated by means of the external Tool DataViewer.

The TURBO.CONTROL i contains a battery (button cell) for data buffering.

The TURBO.CONTROL i can be installed in a rack or be mounted in a table housing provided for it. The table housing is available as an accessory.

Further applicable Operating Instructions

Brief Instructions 300680364 for TURBO.CONTROL i	Information on hardware and connection of TURBO.CONTROL i (included with unit)
Operating Instructions 300450826 Serial Interfaces for TURBOVAC i/iX	Description of the interfaces RS 232, RS 485, Profibus and USB of the TURBOVAC i(X) including the parameter list of the TURBOVAC i(X) and the adjustment possibilities of the interface X1 and the 24-VDC accessory connections
Operating Instructions 300687441 TURBOVAC iX EtherCAT Interface	Description of the EtherCAT interface
Operating Instructions 300554863 for TURBOVAC i(X)	including allocation of the interfaces, LED displays at the pump

Functions of TURBO.CONTROL i

- Observe TURBOVAC i(X) during operation
- Pump start / stop / activate standby speed / error reset
- Show parameters on the main screen (nominal speed, current, bearing temperature, pressure values)
- Show warning and error memory with description
- Read and write parameters
- Set functions of the interface X1
- Set functions of the 24-VDC accessory connections X201, X202, X203
- Activate TURBOVAC i(X) depending on pressure
- Attach laptop and operate TURBOVAC i(X) via web server
- View logged data in real-time
- Read out logging memory and analyse with DataViewer PC tool
- Read out parameter set and error memory of the TURBOVAC i(X) with a PC

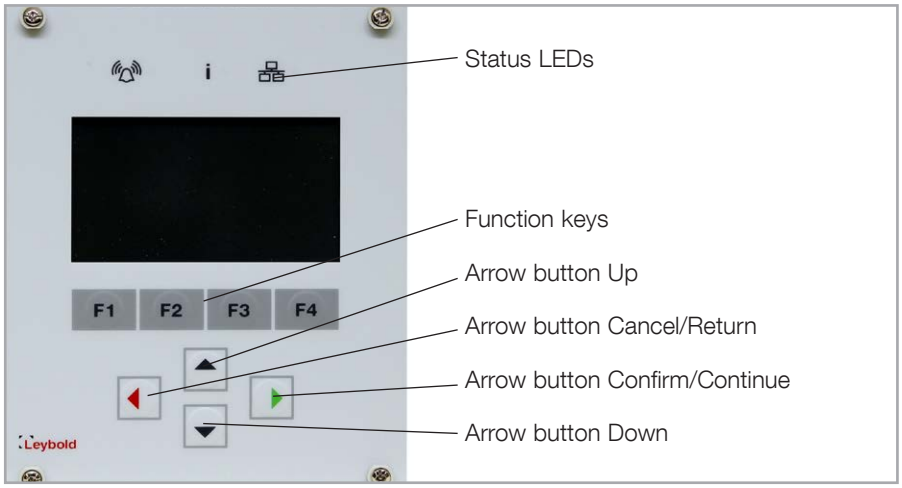


Fig. 1 Front side

2 Operation

2.1 Switching on

The display starts by applying the 24 VDC supply voltage. The communication between TURBO.CONTROL i and a turbo molecular pump can be established via RS485 or USB.

TURBO.CONTROL i automatically detects the pump and loads the appropriate setting. This process may take a few seconds.

Only one pump can be controlled and monitored.

2.2 Operation

- The meanings of the function keys F1 - F4 are shown in the lowest line of the display.
- A modified value or setting becomes active by confirming with green. If aborted with red, the old value remains valid.
- If the value is again saved by confirming, it remains after a power reset. **All the values** previously changed are saved by confirming the query.
- The saving procedure may take a few seconds. The pump must not be separated from the supply voltage during the saving procedure.

LED	Symbol	LED Status	Display	Meaning
Red		Off		No System Error
		Flashing		System Warning TURBO.CONTROL i runs up
		Steady		System Error
		Steady		Turbo Pump lost communication
Green		Off		Pump not turning / no start command active
		Flashing 50 ms on, 500 ms off		Start delay > 0 (P36)
		Flashing slowly 1/s		Running up
		Flashing fast 3/s		Running down
		Steady		Normal Operation
White		Steady		Ethernet Communication Active

Fig. 2 Monitoring of the operation conditions

Operation: Display

2.3 Operation via display

Control priority

When TURBO.CONTROL i is connected with a TURBOVAC i(X), the pump at first cannot be controlled.

To do so, press the function key F2 (REMOTE).

Now Start / Stop / Error Reset are possible

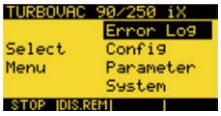
The pump can be started and stopped with F1.

With F2 the control priority is reset (DIS.REM). By resetting, an imminent start instruction is also reset.

Main screen

In the main screen you can switch from the values indicated in the list on the right to a large view (nominal speed, current, bearing temperature, pressure values - the pressure value of the TURBOVAC iX is at the end).

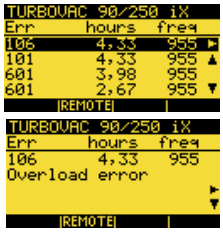
Menu



F3 opens 4 menus

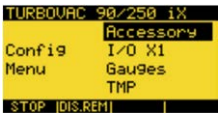
- Error memory
- Configuration (gauge heads, TMP, accessory connections). If no pump is attached, only a reduced selection is available.
- Parameters
- System

Error memory



The complete error memory of the pump is shown in the error memory. A selected error or a selected warning can be indicated in plain text.

Configuration



The 24-VDC connections (accessory), the interface X1 (I/O X1), the gauge heads (gauges) and the TURBOVAC i(X) (TMP) can be configured under "Configuration".

Fig. 3 shows an example of the configuration of the 24-VDC connection X201. For function codes and settings see the instructions for use 300450826 Serial Interfaces for TURBOVAC i/iX.

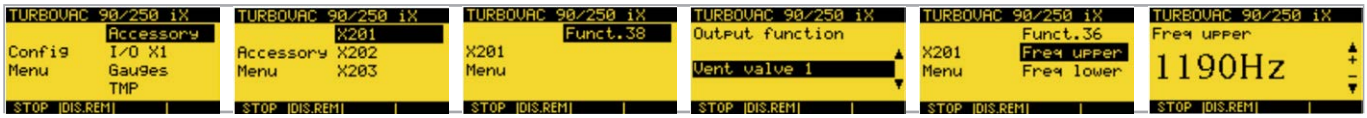


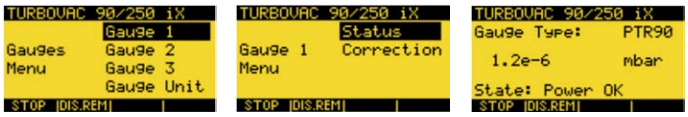
Fig. 3 Configuration of the 24 VDC connection X201

Gauges

In the gauge menu the connected gauge heads can be configured (change of unit torr, pascal, mbar, setting a gas correction factor and the gauge head parameters of the TURBOVAC iX).

The gauge heads are automatically recognized and allocated:

- Gauge head 1 = connection Gauge 1 at the TURBO.CONTROL i
- Gauge head 2 = connection Gauge 2 at the TURBO.CONTROL i
- Gauge head 3 = connection Gauge at the TURBOVAC iX



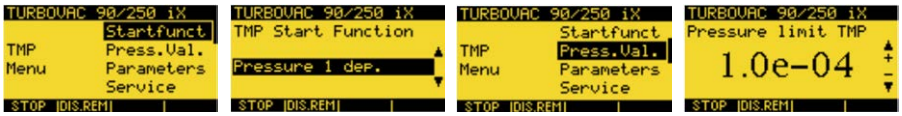
TMP

In the TMP menu the connected TURBOVAC i(X) can be configured.

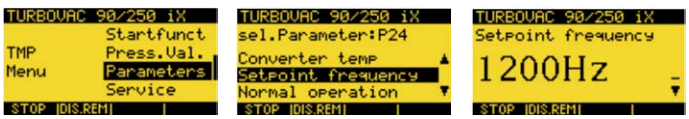
Start function:

- Start the TURBOVAC i(X) when start command active (default setting)
- Start of TURBOVAC i(X) depending on pressure. The turbo pump starts depending on pressure, if the value of the selected gauge head is undercut.
  - Pressure 1 = connection Gauge 1 at the TURBO.CONTROL i
  - Pressure 2 = connection Gauge 2 at the TURBO.CONTROL i
  - Pressure 3 = connection Gauge at the TURBOVAC iX

The value can be adapted under "Pressure Value".



Parameters: Activation of standby speed and reading/writing of selected parameters of the TURBOVAC i(X)



Service: Start of the bearing run-in function and status of the bearing run-in.

The bearing run-in is shown via a warning message on the TURBOVAC i(X) and the TURBO.CONTROL i.

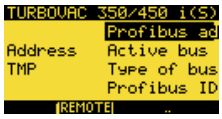
Operation: Display

Service: Resetting the parameters of the TURBOVAC i(X) to factory setting (resets all changed parameters of the pump).

The reset parameters become active only after a restart (power on/off) of the pump.

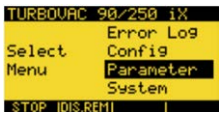
This will not reset the internal parameters of the TURBO.CONTROL i.

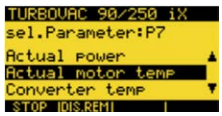
Address: Setting the RS 485 or Profibus address of the TURBOVAC i(X).



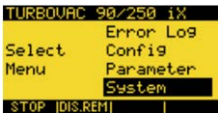
Parameters

Here parameters of the attached TURBOVAC i(X) and the internal parameters of the TURBO.CONTROL i can be read and written.





System



See Fig. 4.

Language: Switching between English/German

Control hierarchy: Control of TURBOVAC i(X) via display or web server.

If the control hierarchy is transferred to Ethernet Remote (web server), a start/stop of the pump via the display is no longer possible.

Brightness of the display

Timeout display: Display dims after the set time

Logging cycle: Sampling rate of internal data logging feature (see section "Storage Capacity")

Setting time and date

System information: Software version, serial number TURBOVAC i(X), etc.

Network settings: IP address and subnet mask

DHCP off – setting if you wish to set a static address

DHCP on – automatic address assignment via DHCP, e.g. a router, PC or company network

With DHCP off/on (2x F3) a new IP address with a connected network, PC or router is assigned.

Opening the web server via QR link

Resetting the parameters of the TURBOVAC i(X) and the TURBO.CONTROL i to factory setting. The TURBO.CONTROL i then restarts.

The reset parameters of the TURBOVAC i(X) become active only after a restart (power on/off) of the pump.

Reset of web server user name and password via F4.

Fig. 4 System settings

Operation: Webserver

2.4 Operation via web server

Connect a computer with the interface ETH of the TURBO.CONTROL i. Then access the IP address of the TURBO.CONTROL i using a browser (via display: Menu → System → Network Info).

The IP address must be co-ordinated with the attached PC.

This is done via a new assignment of the IP via DHCP (Press F3 key 2x in the menu "Network Info" → DHCP off→ on). This procedure causes TURBO.CONTROL i to connect to the PC.

The web server integrated in TURBO.CONTROL i can be opened with any browser. To do so, enter the IP address of TURBO.CONTROL i in the address field.

To operate the turbo pump via the web server, change the control hierarchy in the TURBO.CONTROL i to ETH Remote (under Menu → System → Control H).

Logging in

Username: user
Password: user

Then press LOGIN.

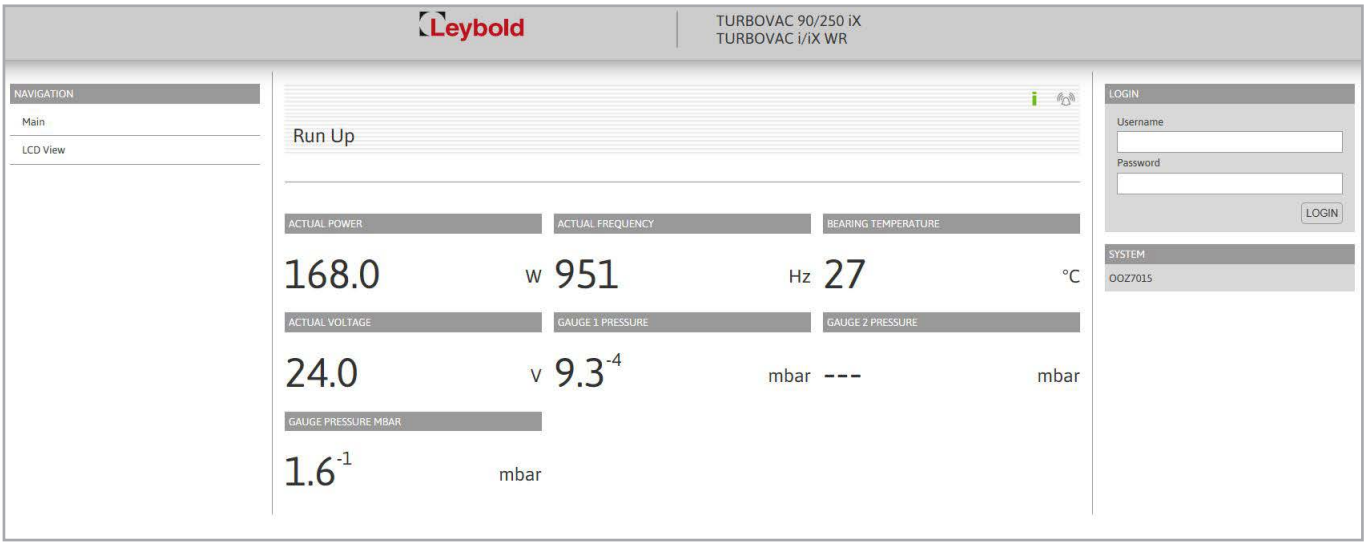


Fig. 5 Basic view before log-in. Data can only be read. Start/stop of the TURBOVAC i (X) is not possible.

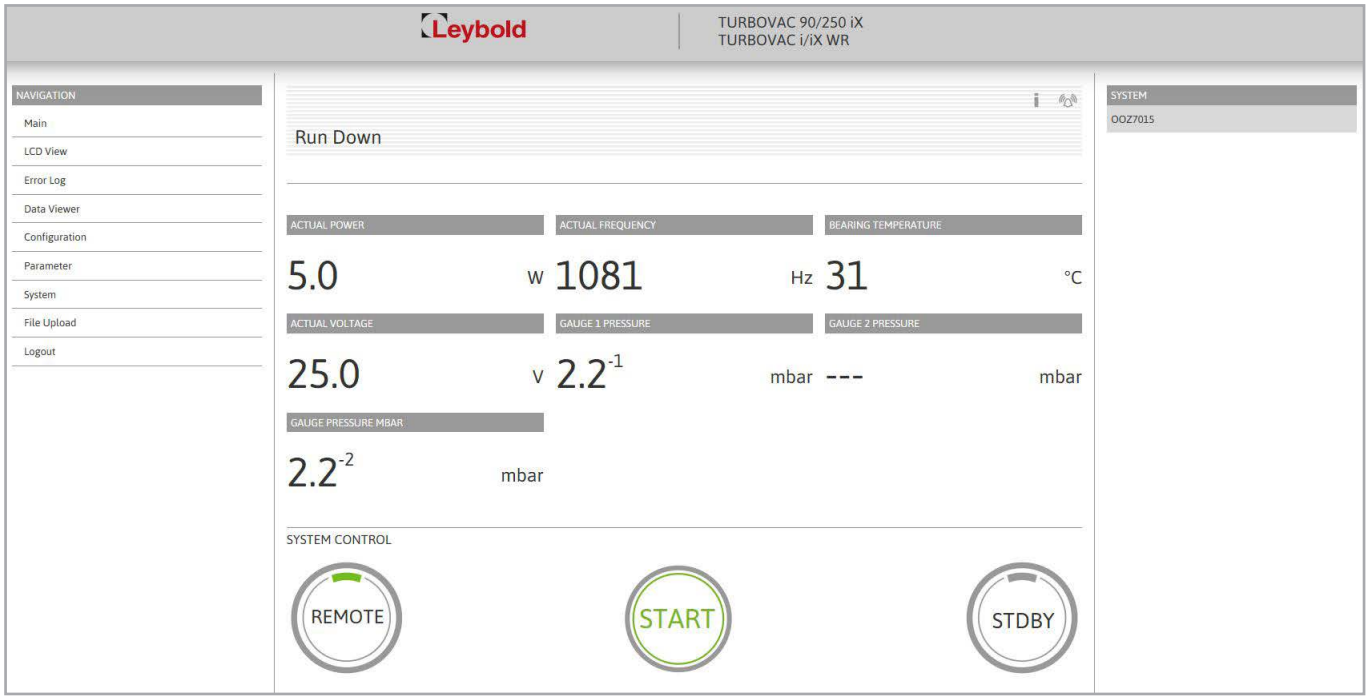


Fig. 6 Basic view after log-in

The top bar shows the state of the TURBOVAC i(X).

After activation by remote the functions start / stop / activate standby / error reset are available.

If the remote is reset, the start command is also reset.

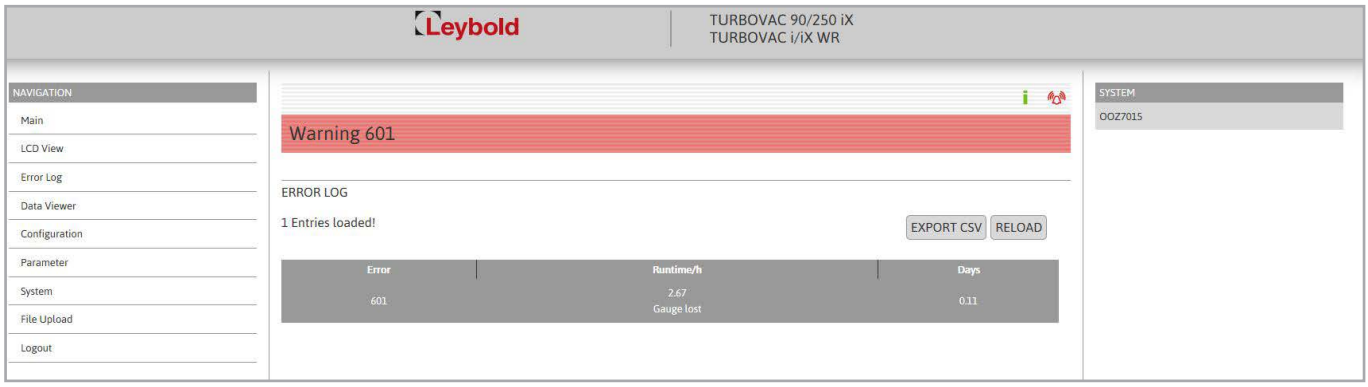


Fig. 7 Error memory

Error Memory

The error memory holds the errors of the turbo pump in chronological order. The operating time at the point of time the error has occurred is also indicated. By clicking on the corresponding line of the error, a detailed description will be displayed.

Operation: Webserver

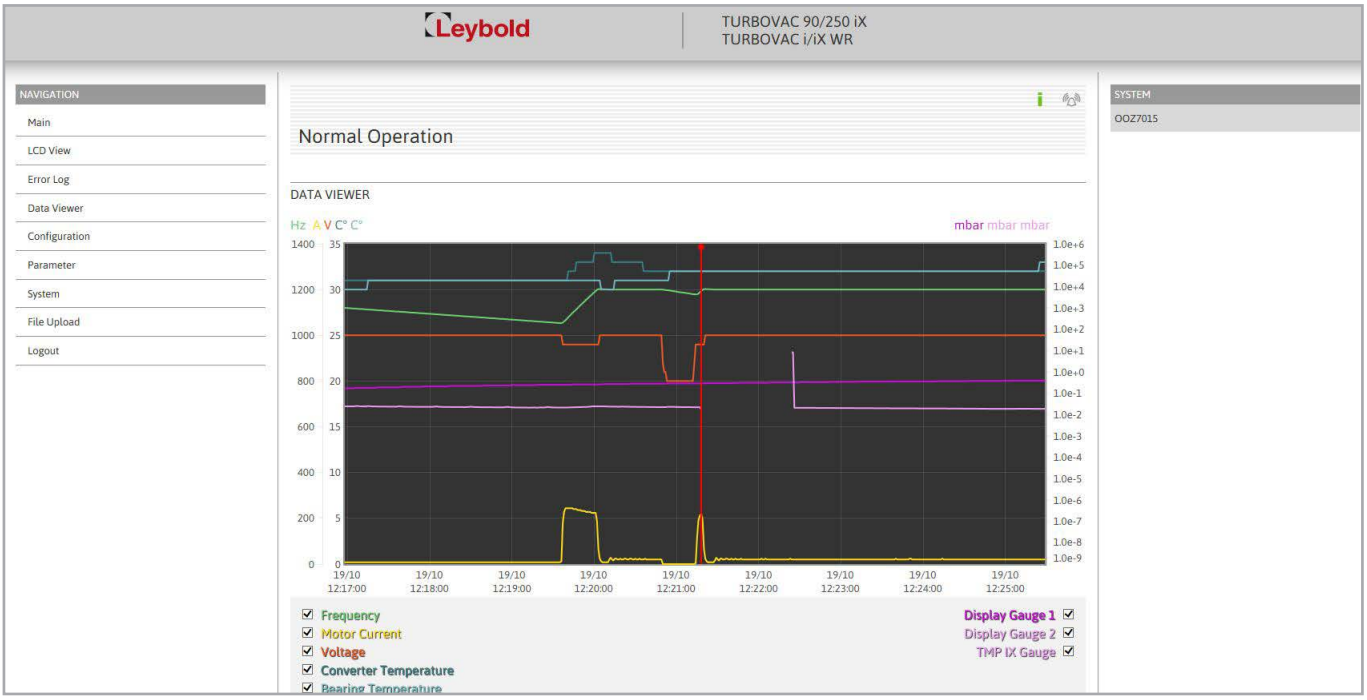


Fig. 8 Data Viewer

Data Viewer
Observing the logged data in real time.

To correctly display the trend of the data even after a longer downtime fully powered down it is necessary that the instrument has recorded 512 data records first. Depending on the setup LoggingCycle this can take more or less time.

Logging Cycle / Memory Capacity
For an estimate as to how long the device will be capable of recording data, refer to the following formula:

The log file has a size of 3264512 bytes → 3264512/32 = 102016 entries in the log file. → 102016 entries x 1 second (LoggingCycle) = 102016 seconds.

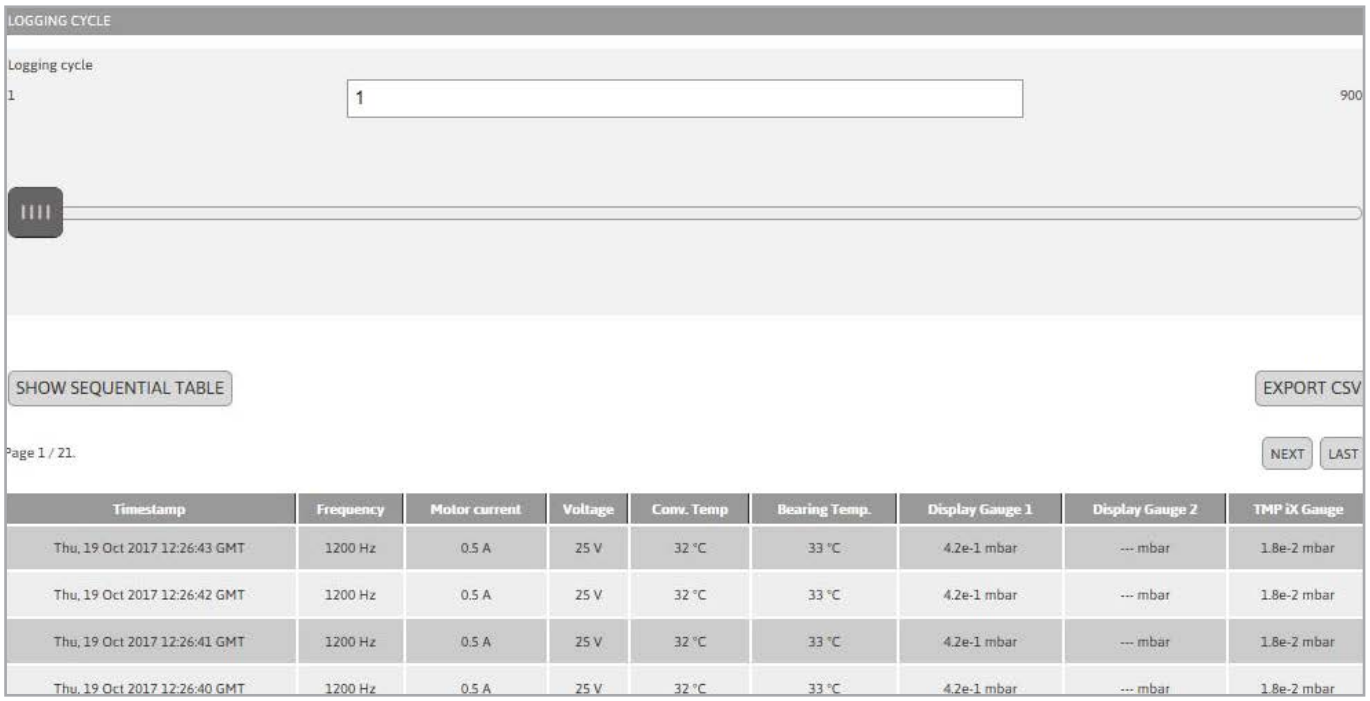
From this there results a recording duration of approximately 1700 minutes which is roughly equal to 28 hours.

The recording duration will vary depending on the selected LoggingCycle.

The measuring data can be selected via the respective checkmarks.

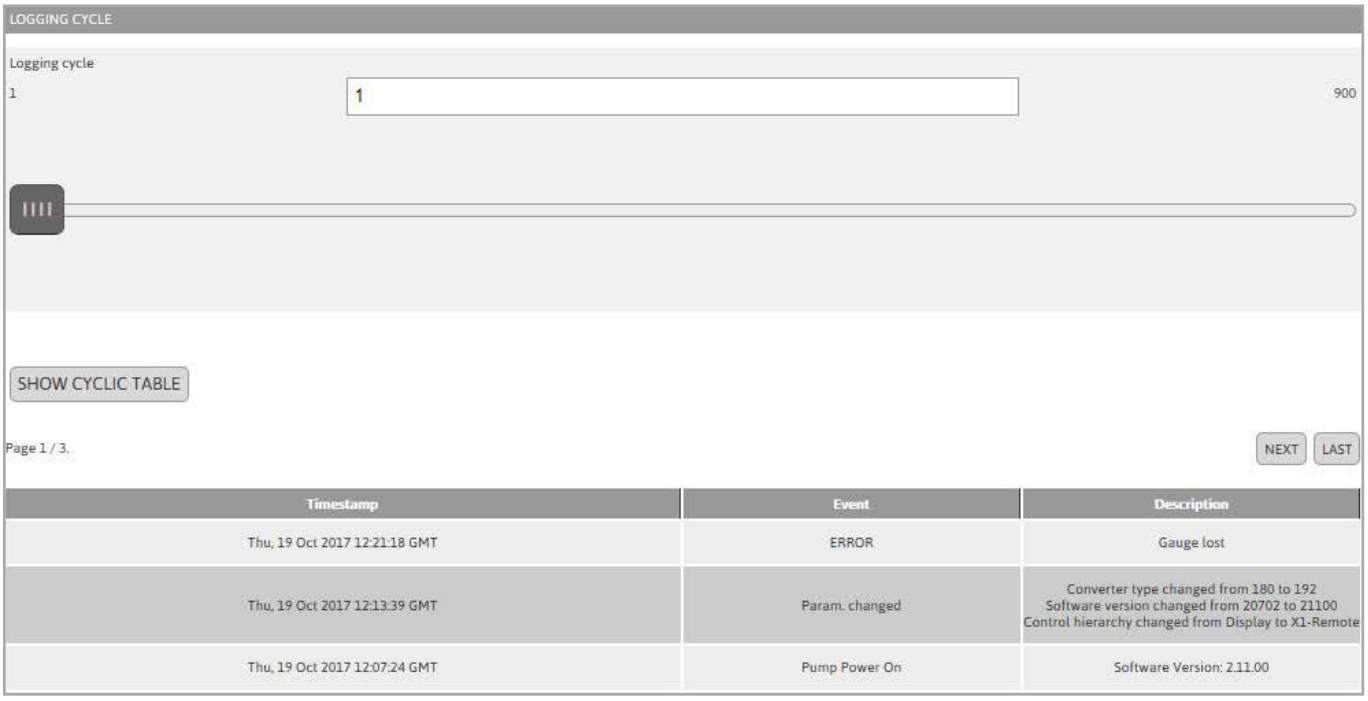
Display of cyclically logged data
The LoggingCycle can be varied. This determines at what intervals the data of each data point are recorded. The requested data are continuously updated in a table shown below the graph.

Switching to the sequentially logged data is possible. This is where actions are logged (e.g. change of a parameter, pump change, etc.)



Timestamp	Frequency	Motor current	Voltage	Conv. Temp	Bearing Temp.	Display Gauge 1	Display Gauge 2	TMP iX Gauge
Thu, 19 Oct 2017 12:26:43 GMT	1200 Hz	0.5 A	25 V	32 °C	33 °C	4.2e-1 mbar	--- mbar	1.8e-2 mbar
Thu, 19 Oct 2017 12:26:42 GMT	1200 Hz	0.5 A	25 V	32 °C	33 °C	4.2e-1 mbar	--- mbar	1.8e-2 mbar
Thu, 19 Oct 2017 12:26:41 GMT	1200 Hz	0.5 A	25 V	32 °C	33 °C	4.2e-1 mbar	--- mbar	1.8e-2 mbar
Thu, 19 Oct 2017 12:26:40 GMT	1200 Hz	0.5 A	25 V	32 °C	33 °C	4.2e-1 mbar	--- mbar	1.8e-2 mbar

Fig. 9 Data viewer: Display of cyclically logged data



Timestamp	Event	Description
Thu, 19 Oct 2017 12:21:18 GMT	ERROR	Gauge lost
Thu, 19 Oct 2017 12:13:39 GMT	Param. changed	Converter type changed from 180 to 192 Software version changed from 20702 to 21100 Control hierarchy changed from Display to X1-Remote
Thu, 19 Oct 2017 12:07:24 GMT	Pump Power On	Software Version: 2.11.00

Fig. 10 Data viewer: Display of sequentially logged data

Operation: Webserver

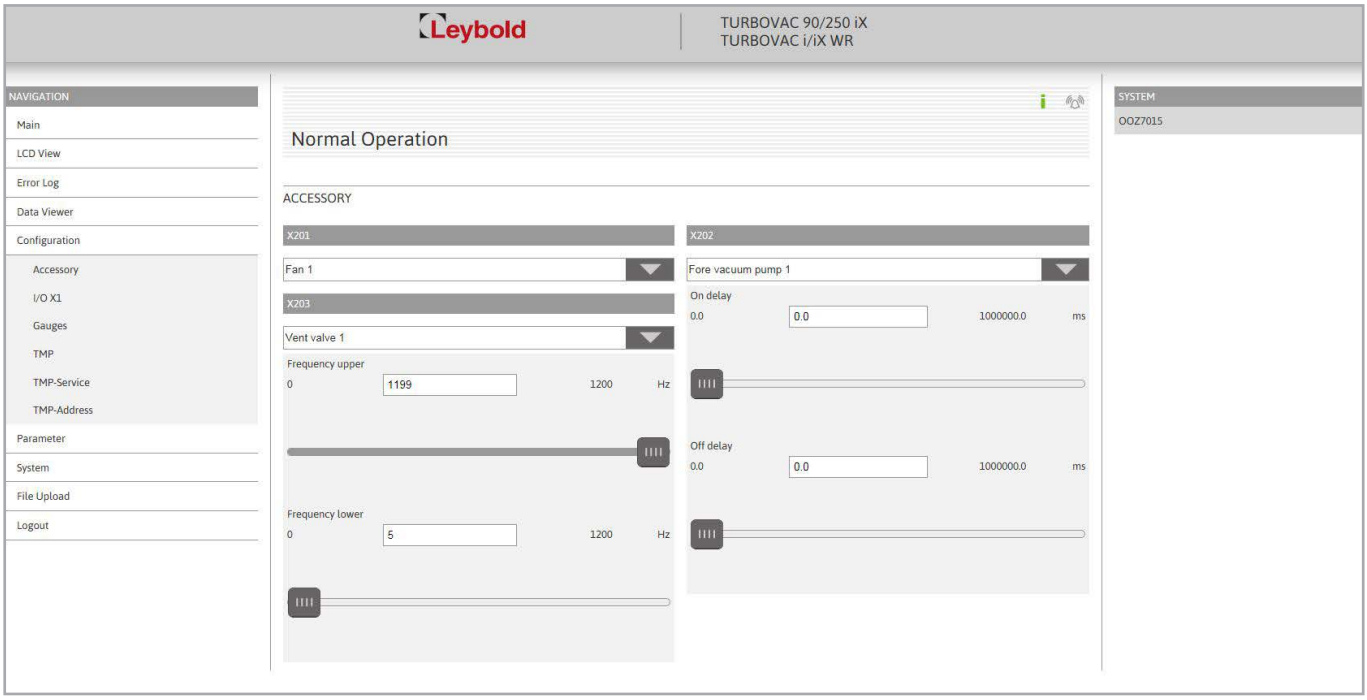


Fig. 11 Accessories configuration

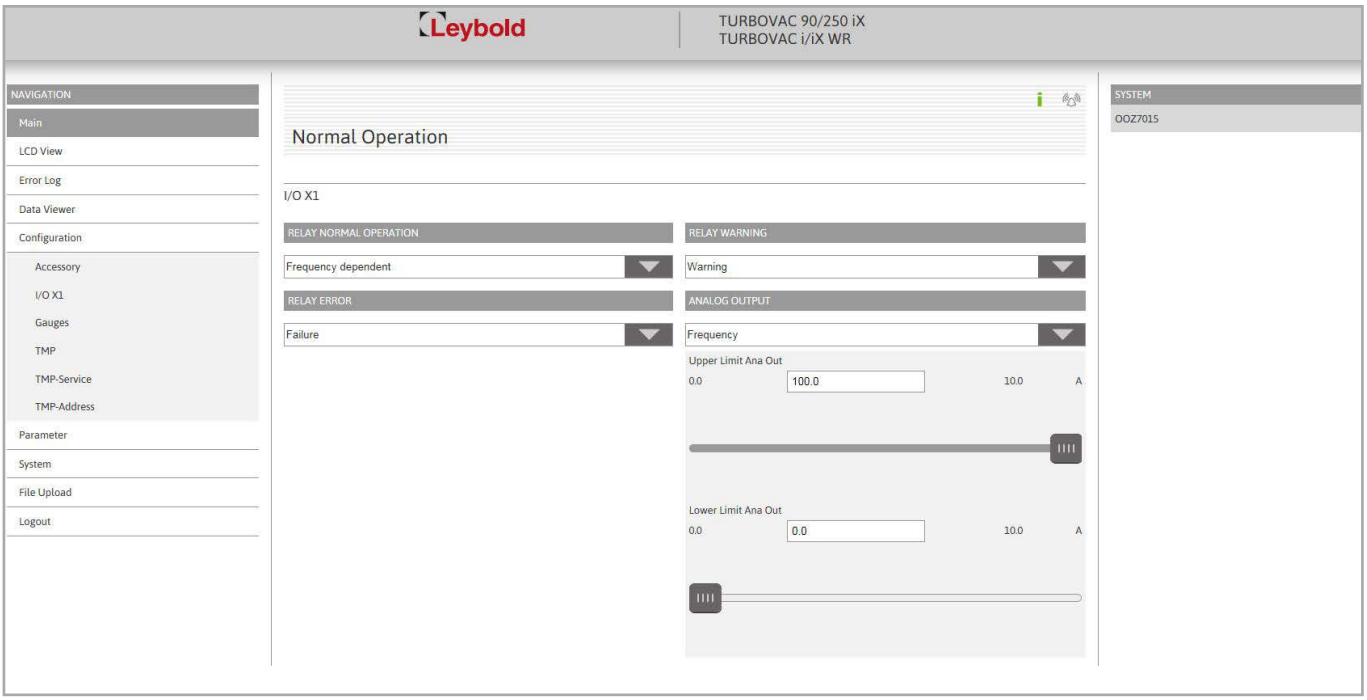


Fig. 12 Configuration: I/O X1

Configuration: Accessories & I/O X1
Configuration of 24-VDC connection and interface X1 of the TURBOVAC i(X).

For function codes and settings see the instructions for use 300450826 Serial Interfaces for TURBOVAC i/iX.

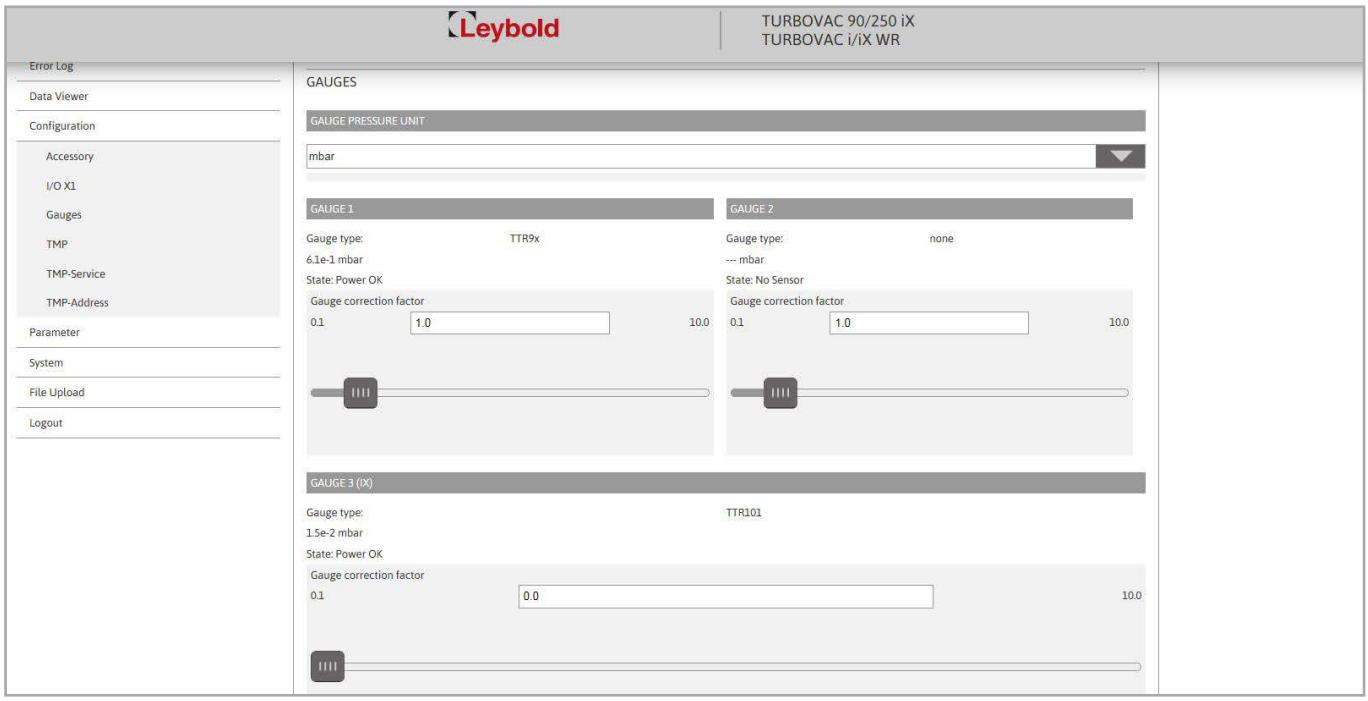


Fig. 13 Gauges configuration

Configuration: Gauge heads

Here the connected gauge heads can be configured (change of unit torr, pascal, mbar, setting a gas correction factor and the gauge head parameters of the TURBOVAC iX).

The gauge heads are automatically recognized and allocated:

- Gauge head 1 = connection Gauge 1 at the TURBO.CONTROL i
- Gauge head 2 = connection Gauge 2 at the TURBO.CONTROL i
- Gauge head 3 = connection Gauge at the TURBOVAC iX

Operation: Webserver

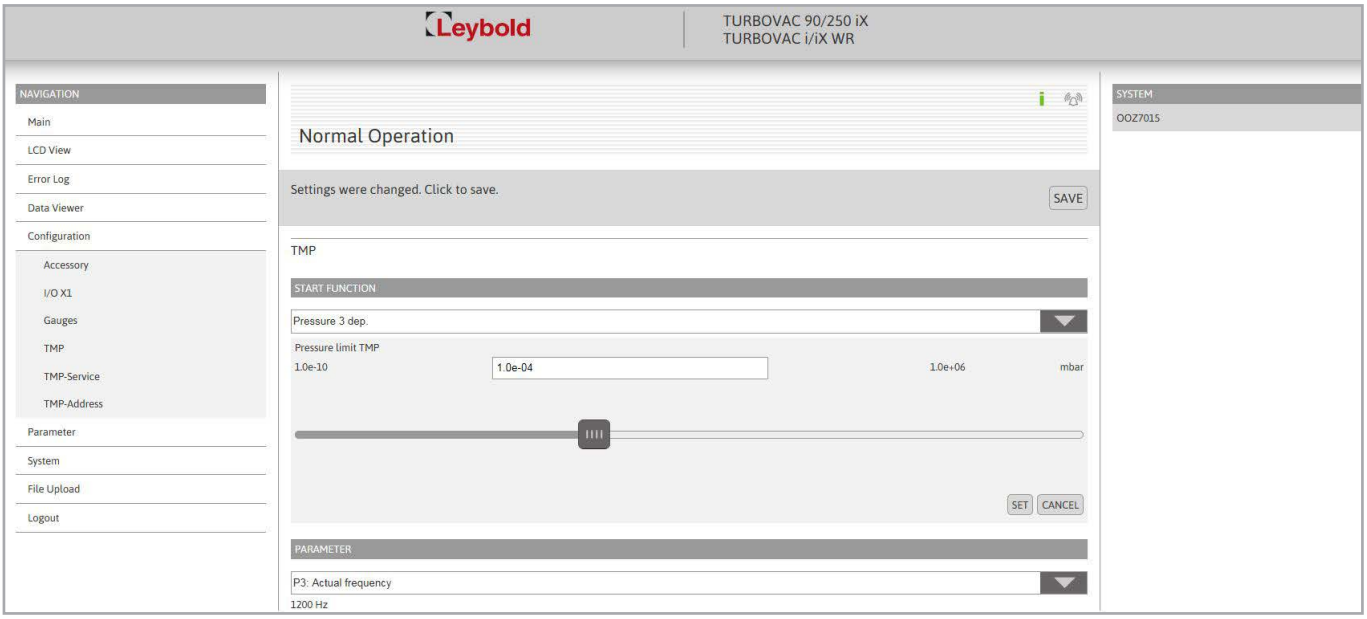


Fig. 14 TMP configuration

Configuration: TMP

Start function:

- Start of TURBOVAC i(X) when start command active (default setting)
- Start of TURBOVAC i(X) depending on pressure. The turbo pump starts depending on pressure, if the value of the selected gauge head is undercut.
  - Pressure 1 = connection Gauge 1 at the TURBO.CONTROL i
  - Pressure 2 = connection Gauge 2 at the TURBO.CONTROL i
  - Pressure 3 = connection Gauge at the TURBOVAC iX

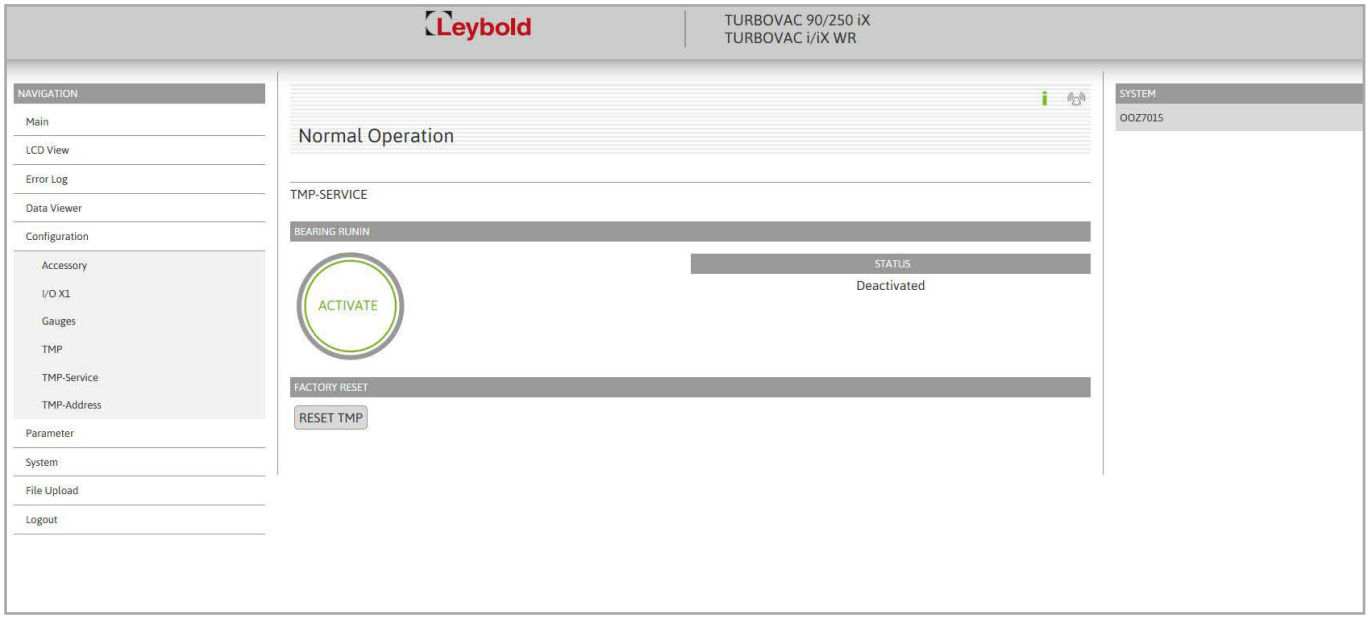


Fig. 15 Configuration: TMP Service

Configuration: TMP Service

Start of the bearing run-in function and status of the bearing run-in.

The bearing run-in is shown via a warning message on the TURBOVAC i(X) and the TURBO.CONTROL i.

Reset factory settings:

Resetting the parameters of the TURBOVAC i(X) to factory setting (resets all changed parameters of the pump).

The reset parameters become active only after a restart (power on/off) of the pump.

This will not reset the internal parameters of the TURBO.CONTROL i.

Operation: Webserver

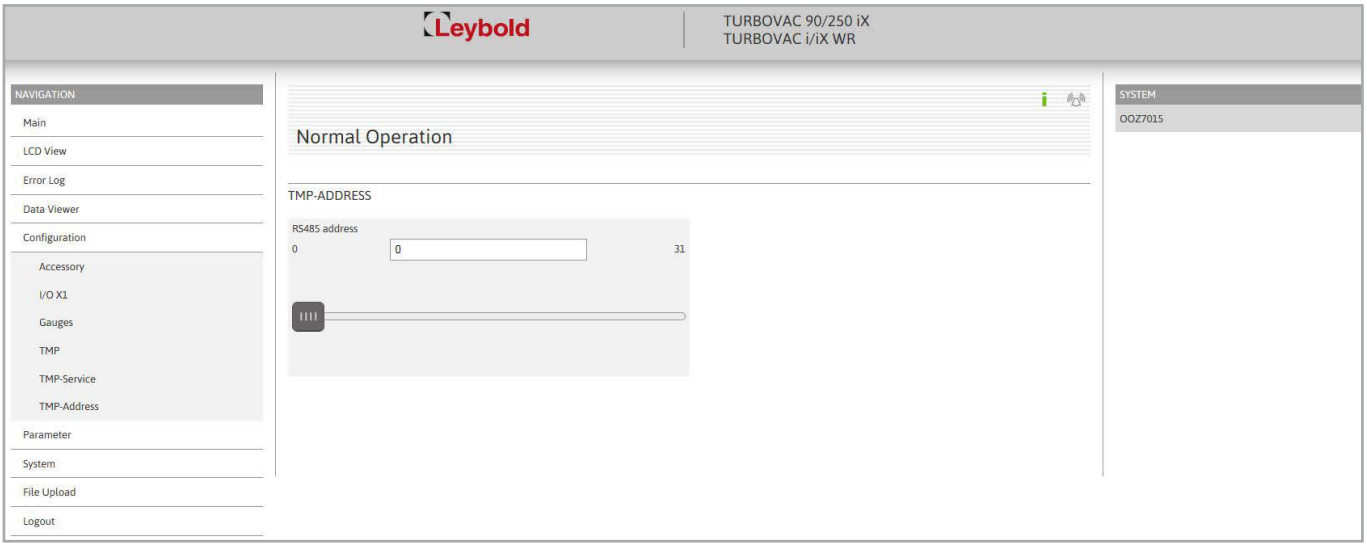


Fig. 16 Configuration: TMP address

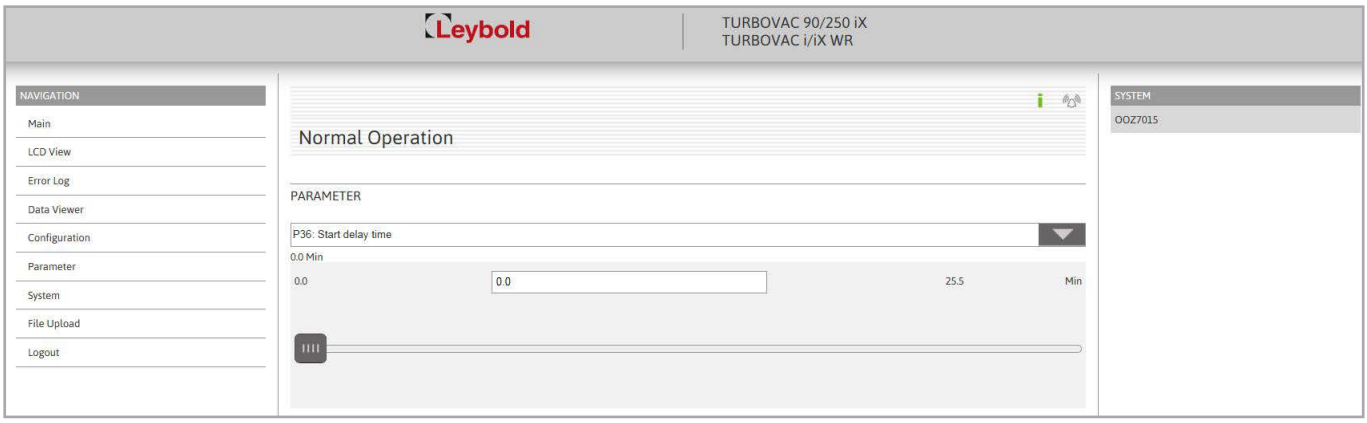


Fig. 17 Parameters

Configuration: TMP address
Setting the RS 485 or Profibus address of the TURBOVAC i(X). If the TURBOVAC i(X) has a Profibus module, this is automatically recognised and the respective parameters are provided.

Parameters
Display of all parameters of the TURBOVAC i(X). The respective parameters can be selected via a drop-down list. If you want to change a parameter, this is possible using the input field or through the slide.

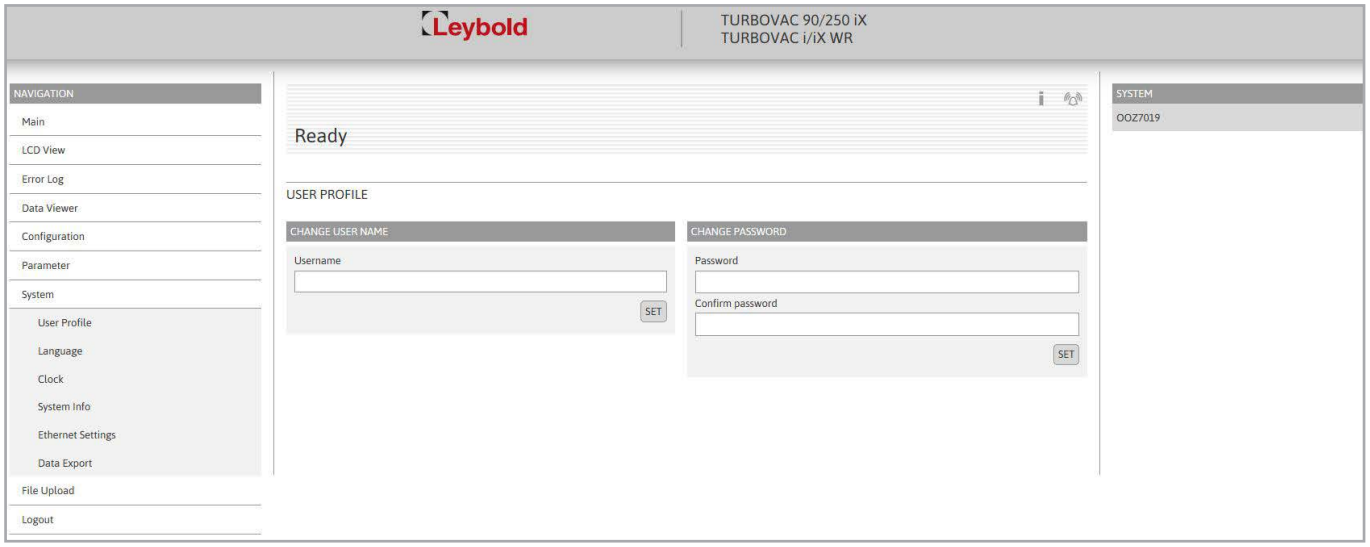


Fig. 18 System menu: user profile

System: User settings
Changing of user name and password

Default setting upon delivery:
User name: user
Password: user

System: Language
Change the language from German to English and vice versa.

System: Clock
Setting time and date. The UTC time is taken over via GET PC TIME.

Operation: Webserver

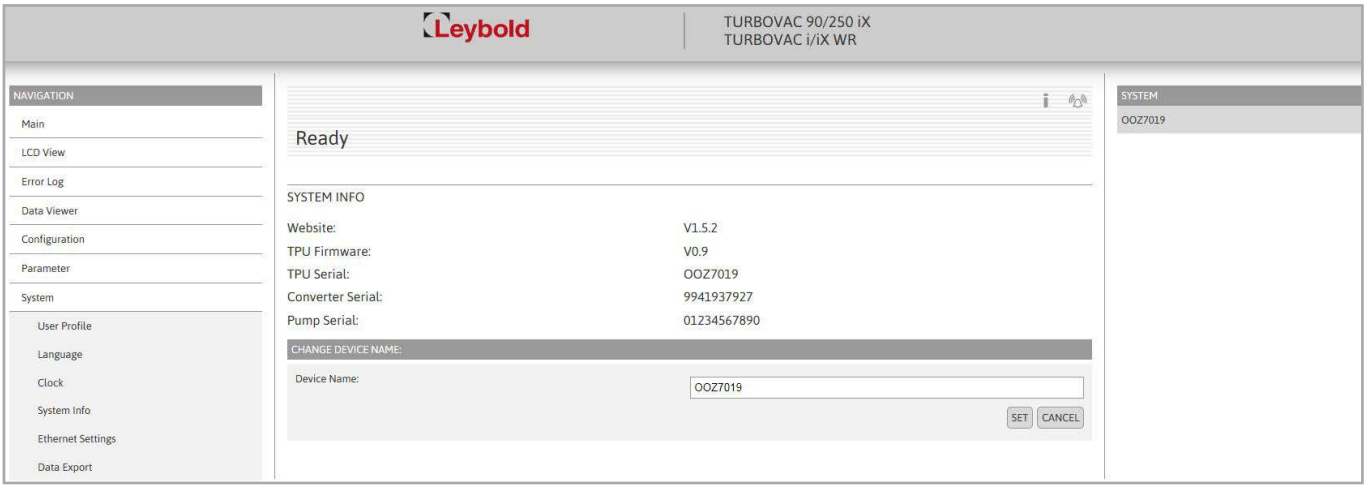


Fig. 19 System info

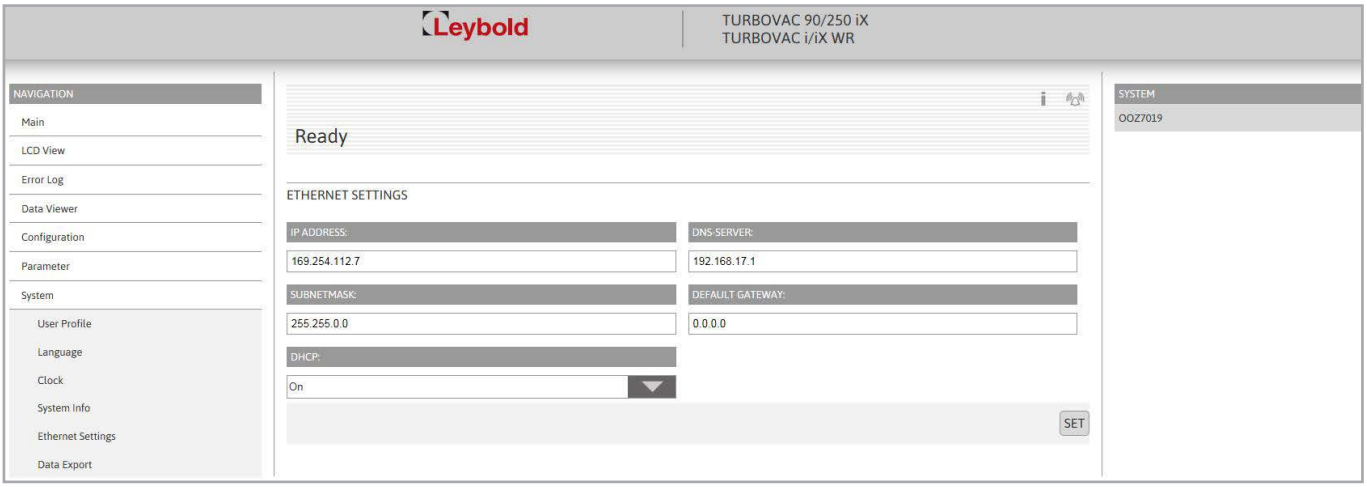


Fig. 20 System: Netzwerkeinstellungen

System: System info
Information about the connected TURBOVAC i(X) and the TURBO.CONTROL i.

System: Ethernet settings
Displays the current IP address of the device, the subnet mask, the DNS server, the gateway address as well as the DHCP status. All these data can be changed through the entry field and the drop-down list.

- DHCP on – automatic address assignment via DHCP, e.g. a router or company network
- DHCP off – setting when wishing to configure a static address.

System: Data Export
Export of the error memory and the parameter settings into one csv file.

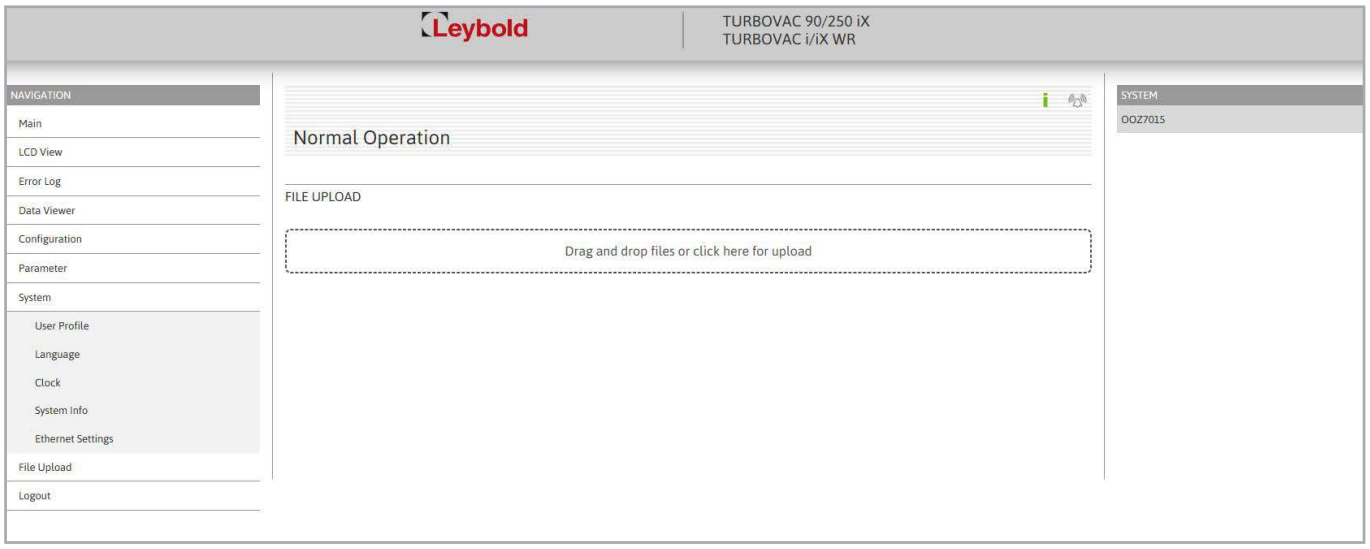


Fig. 21 File Upload

File upload
Software update of TURBO.CONTROL i

A new firmware can be put into the dotted field per drag & drop or selected by clicking on the field. The respective file can be uploaded to the unit via UPLOAD.

Logout of the web server
The control hierarchy is not automatically returned to the TURBO.CONTROL i.

The logout occurs automatically if the control hierarchy is set to Display on the TURBO.CONTROL i.

Saving changed values
Functions or parameters are selected via a drop-down list.

A value can be changed through a slide bar or by typing the value into the field.

The change of a value becomes active through SET. In the case of CANCEL the original value remains.

If the value is saved via SAVE (separate inquiry), it remains after a power reset.

Caution: All values changed up to then are saved when the SAVE button is clicked.

The saving of the pump parameters may take a few seconds. The pump must not be separated from the supply voltage during the saving procedure.

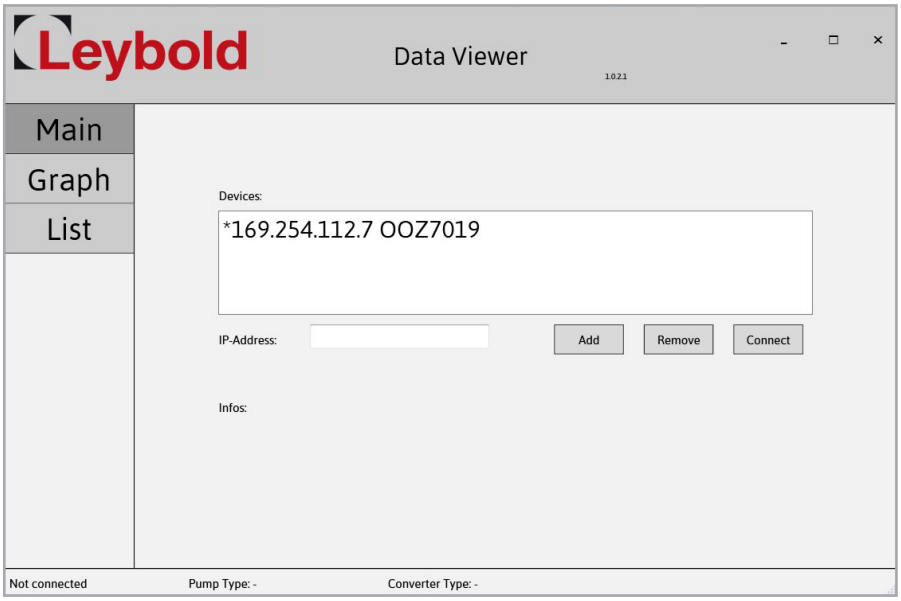


Fig. 22 Start screen of the DataViewer

2.5 Data viewer

The DataViewer can be downloaded on the Leybold homepage under Downloads → Download Software.

This tool serves the purpose of analysing and assessing the data recorded from the pump system. Here the process engineering measurement data is displayed by way of a graph as well as in a table.

Establishing the Link

The IP address of the connected TURBO.CONTROL i is automatically detected and displayed in the "Devices" window. In order to make a connection, click on the IP address and press "Connect".

An IP address can be entered in the input field "IP address". This then appears in the "Devices" window via "Add Device".

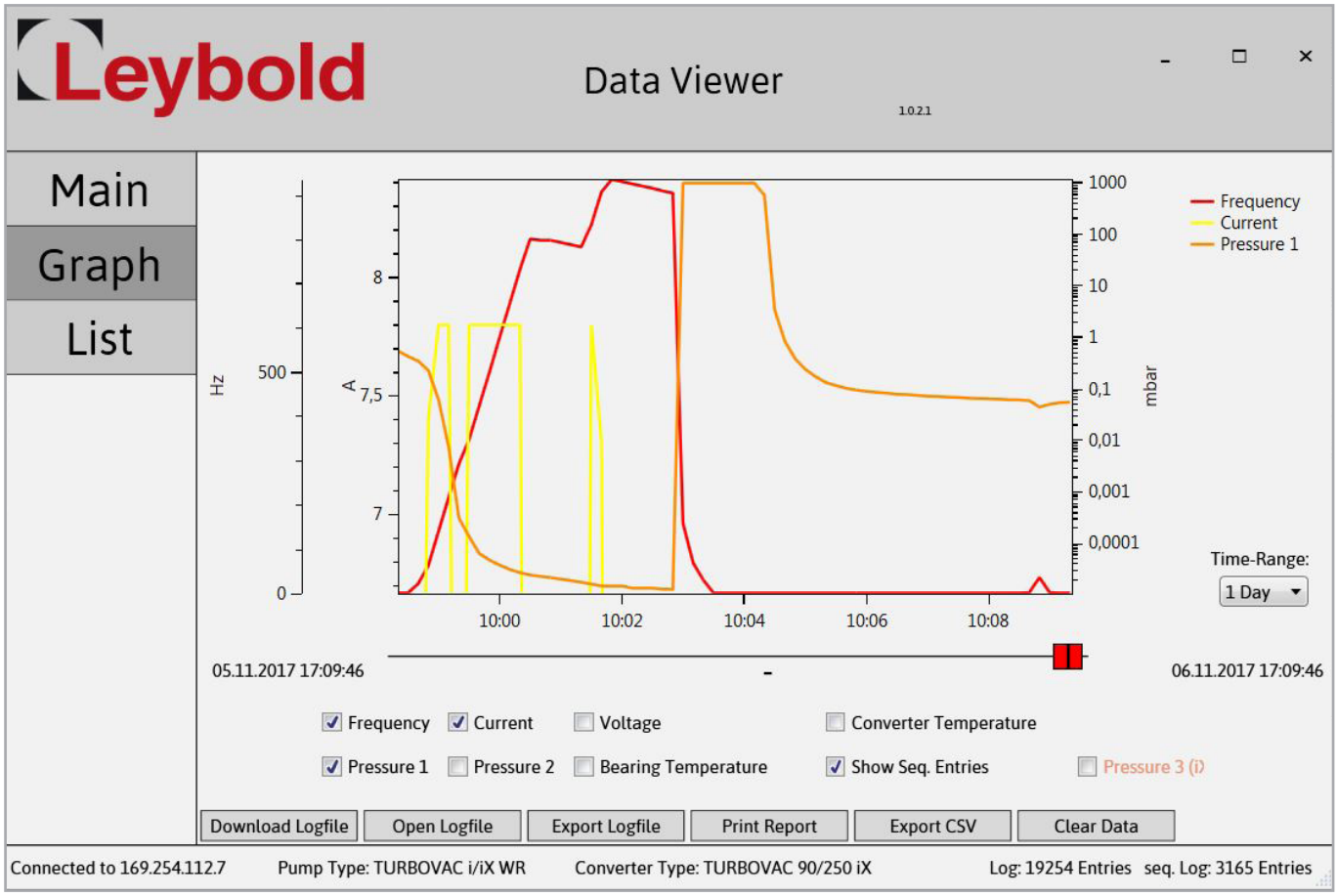


Fig. 23 Trend display

Download of data in the graph menu

The buttons in the lower section of the display allow the following:

- Loading data from the device. Downloading is indicated through the counter incrementing at the bottom right-hand corner.
- Opening a previously exported log file
- Exporting a downloaded log file into a .log file
- Exporting a downloaded log file to the Excel CSV file format

Under Graph the measured trend data is displayed in a graph. Through the red sliders, the selection window may be moved to a certain point of time and you may zoom into the data.

Zooming into the data is effected also through the third mouse key or the key combination ALT + left mouse button. To remove or show the data, switch the checkmark at the corresponding data off or on.

The scales can be shifted with the keyboard shortcut alt + left mouse click.

Operation: Data Viewer

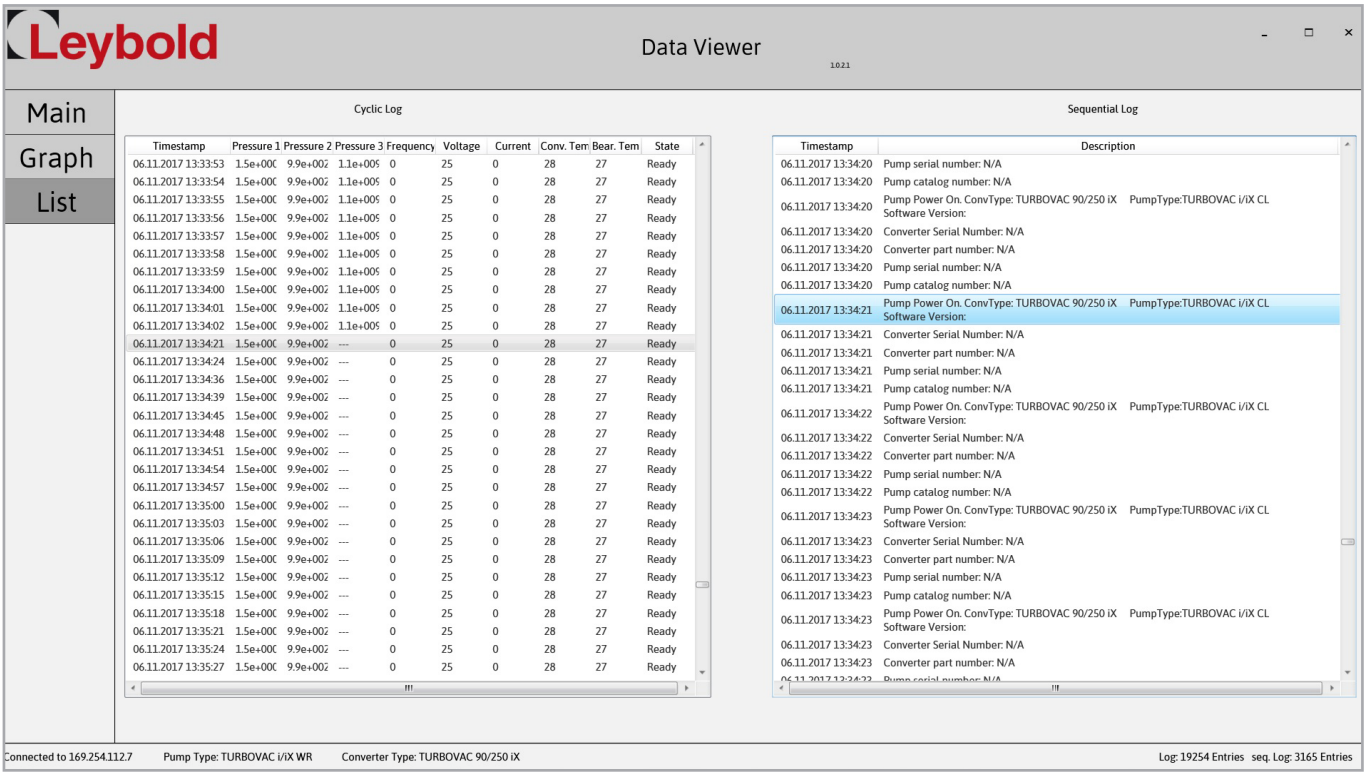


Fig. 24 Data list

Data List

Through the data list, all recorded data points can be viewed.

Furthermore, a list of all relevant occurrences is shown in the right window. You can access the corresponding row in the data points by double-clicking on a row of events.

You can access the corresponding point in the graph by double-clicking on a row of the data points.

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